# 2016 Annual Operations and Monitoring Report

## *Operable Units 1, 2, and 3*
## *Joslyn Manufacturing & Supply Co.*
## *Brooklyn Center, Minnesota*

Prepared for
Joslyn Manufacturing & Supply Co.

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# 1.0 Introduction

The Joslyn Manufacturing & Supply Co. (Joslyn) site is a former wood-treating facility located in Brooklyn Center, Minnesota. This report describes the implementation of the response action and monitoring plans for Operable Units 1, 2, and 3 during 2016. In addition, this report presents the data collected in 2016, describes the effectiveness of the response actions based on the 2016 data, and presents recommendations for 2017 for these three operable units, including a recommended 2017 water monitoring plan.

## 1.1 Background

Figure 1-1 shows the location of the Joslyn site. Figure 1-2 shows the onsite monitoring wells and pumpout wells. Figure 1-3 shows the offsite monitoring wells. Figure 1-4 shows the changes that have occurred to the onsite systems since remedial actions began in the late 1980s. Appendix A contains a summary of historical water level and water quality data. Appendix B contains a description of the site hydrogeologic setting and historical locations of monitoring points. Appendix C contains a summary of site redevelopment activities.

Response actions (RAs) at the site are being implemented in accordance with Task A of Part VIII of Exhibit B to the May 1985 Response Order by Consent between Joslyn and the Minnesota Pollution Control Agency (MPCA, 1985). The Record of Decision (ROD; MPCA, 1989) describes the remedies for the site that satisfy the "statutory preference for the remedy employing treatment that permanently and significantly reduces the toxicity, mobility and volume of the hazardous substances found at this Site." The response actions described in the ROD are directed at the following four Operable Units:

- **Operable Units 1 and 2 (OU1 and OU2)** are the shallow and middle sand units, respectively. A groundwater pumpout system is the response action selected in the ROD for both of these Operable Units. A system has been operational since February 1989.

- **Operable Unit 3 (OU3)** is the dense nonaqueous-phase liquid (DNAPL). A DNAPL recovery system is the response action selected in the ROD for OU3. The DNAPL recovery system began operation in December 1995.

- **Operable Unit 4 (OU4)** is the contaminated soil in the former operations area. Excavation and onsite biological treatment is the response action selected in the ROD for this Operable Unit. OU4 response action is complete. This report does not address OU4.

Remedial actions for a fifth Operable Unit are currently being evaluated:

- **Operable Unit 5 (OU5)** is the contaminated soil in the West Area and the Southern Lots. The West Area is the western portion of the site and consists mainly of wetland and floodplain areas adjacent to Middle Twin Lake. The Southern Lots are two adjacent undeveloped lots south of the West Area. Remedial options for OU5 are currently being evaluated. This report does not address OU5.

The RA objectives for OU1 through OU3 are described in Section 2 of this report.

## 1.2 2016 Updates

Remedial options for soil in the West Area of the site (OU5) are currently being evaluated. If the selected remedial option for OU5 requires modifications to wells, piping or any OU1, OU2 or OU3 operations, these will be coordinated with the OU5 remediation team and the MPCA. Additional information about OU5 can be found in the MPCA fact sheet, Joslyn Superfund Site West Area (OU5) Update (MPCA, 2010).

### 1.2.1 Site Redevelopment

Redevelopment at and near the Joslyn site began in 1999 and has included construction of three new buildings, regrading and landscaping, and road and highway construction. Details of the site redevelopment history and historical summaries of repairs and program modifications are included in Appendix C. All the parcels that make up the Joslyn Site, except for OU5, were purchased by AX RER, L.P. in 2012 and are currently being managed by CBRE, Inc. The property transaction did not alter any ownership or operational responsibilities with regard to the RAs for the site. Joslyn remains the owner of the pumpout system and its components, and the deed restrictions on the parcels are binding and remain in place. There were no redevelopment activities on the site in 2016.

### 1.2.2 2016 Maintenance and Repairs

The system generally operated as planned in 2016 with only temporary system-wide shut downs. The following repairs, changes and maintenance activities were performed on system components in 2016:

- Control panel repairs were completed on multiple occasions after weekly inspections indicated failing wire insulation and heated contact points.
- Oil/water vault ventilation fan ducting was repaired in April.
- Discharge pipeline cleaning was conducted on wells U2A, U11 and U12 as needed.
- Due to a slow discharge rate, the system discharge line from the oil/water separator vault to the city sanitary sewer was cleaned in May using a line jetting machine.
- Monthly treatments with chlorine granules to reduce iron bacteria buildup in the well screen and transfer line were applied to wells U2A, U11 and U12.
- Pumpout well flowmeters were cleaned and parts were replaced as needed.
- **Well U6N:**
    - A new pump end [16S07-8] was installed in April.
- **Well U11:**
    - A new pump end [25S07-5] and motor (Franklin Electric ¾ Horsepower (HP)) was installed in December.

- **Well U12:**
    - The pump end [40S50-15] was removed and replaced with an identical unit to allow continued well operation during pump repair and cleaning events.
    - A replacement pump end [60S50-9] was installed in November.
- **Well W255**
    - A new pump end [5E05-8] was installed in July.
- **DNAPL (Dense Non-Aqueous Liquid) Pumpout System:**
    - DNAPL vault water level was measured and recorded monthly to monitor changes due to water infiltration.
    - In November 2015, water was found in the interstitial space between the inner and secondary outer walls of the DNAPL tank, indicating a potential leak in the outer tank wall. The DNAPL pump was turned off and material in the DNAPL tank was removed and transported to Deer Park, Texas for disposal. All evidence indicates that the inner tank wall is stable and DNAPL has not leaked from the tank, but that the outer wall of the tank is compromised, and no longer provides secondary containment. The DNAPL recovery system remains off until a new tank is installed.

### 1.2.3 2016 Groundwater Monitoring Program Updates

No significant changes have been made to the groundwater monitoring program since 2007. Groundwater monitoring in 2016 was conducted as recommended in the 2015 Annual Operations and Monitoring Report (Barr, 2016a). The monitoring plan for 2016 was approved via email correspondence on September 20, 2016, with comments that were addressed by Barr on November 14, 2016 (Appendix E).

# 2.0 Response Action Objectives

This section describes the objectives for the remedial actions for Operable Units 1, 2, and 3 as set forth in the 1989 ROD and as modified by the subsequent Five-Year Reviews:

- *Five-Year Review and Superfund Preliminary Closeout Report* (1996 Five-Year Review; MPCA, 1996c).
- *1999 CERCLA Five-Year Review Report, Joslyn Manufacturing & Supply Co. Site, Brooklyn Center, Minnesota* (1999 Five-Year Review; MPCA, 1999).
- *2004 CERCLA Five-Year Review Report, Joslyn Manufacturing & Supply Co. Site, Brooklyn Center, Minnesota* (2004 Five-Year Review; MPCA, 2004a).
- *2009 CERCLA Five-Year Review Report, Joslyn Manufacturing & Supply Co. Site, Brooklyn Center, Minnesota* (2009 Five-Year Review; MPCA, 2009a).

While the Five-Year Reviews have modified the goals of the remedial actions, they have not resulted in changes to the operation of the response actions for Operable Units 1, 2, and 3.

## 2.1 Groundwater (Operable Units 1 and 2)

Groundwater at the site was impacted by the former wood-treating operations. A groundwater containment (pumpout) system was installed and has operated since February 1989. The 1989 ROD establishes the following goal of the system:

> "The goal of groundwater pump out is to reduce concentrations of PAHs and PCP to drinking water standards in the aquifer."

No public or private drinking water supplies are affected by the release of wood-treating chemicals from the site. However, progress toward site cleanup is evaluated against drinking water standards.

At the time the ROD was written, the Minnesota Department of Health (MDH) Recommended Allowable Limits (RALs) were used to evaluate attainment of the system's goal. However, the 1996, 1999, 2004, and 2009 Five-Year Reviews noted that new drinking water standards have been established by the MDH since 1989 and recommended using the new standards (Health Risk Limits—HRLs) rather than the RALs. The HRLs are To Be Considered (TBC; Table 2-1) for the site by the MPCA per their July 27, 2004 letter and the 2009 Five-Year review. In addition, the 1996, 1999, 2004, and 2009 Five-Year Reviews recommended using a Health Based Value (HBV) for benzo(a)pyrene and equivalency factors for other carcinogenic polycyclic aromatic hydrocarbons (cPAHs). The HBV is not promulgated but has been classified as a TBC by the MPCA. The equivalency factors, combined with the benzo(a)pyrene HBV, are used to calculate HBVs for the additional PAHs.

In 2007, the HRL for pentachlorophenol (PCP) was modified from 3.0 to 1.0 μg/L to keep it consistent with the federal Maximum Contaminant Limit. In 2013, a new HBV of 0.3 μg/L for PCP was issued by the MDH.

Because the HBV is not a promulgated value, the 2007 HRL was used for Joslyn through 2015. A new HRL of 0.3 µg/L for PCP was adopted as a rule in November 2015, after the 2015 Joslyn groundwater monitoring was completed. The 2015 HRL of 0.3 µg/L for PCP was used to evaluate Joslyn monitoring data in 2016. Similarly, some non-carcinogenic PAHs have both HRLs and HBVs, as shown in Table 2-1. The HRLs, which are values promulgated in Minnesota Rules, will continue to be used until they are revised.

The 1996 Five –Year Review (MPCA, 1996c) recommended that the EPA's "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Hydrocarbons" (USEPA, 1993) be used to provide benzo(a)pyrene equivalency factors for individual PAHs. Joslyn agreed and complied with this recommendation. The 2004 Five-Year Review included equivalency factors for an expanded list of PAHs. The referenced source for the factors is a 1992 report (OEHHA, 1992). Joslyn requested that the MPCA clarify the administrative record and specify that the 1993 USEPA provisional guidance continue to be used to evaluate PAHs at the site (Barr, 2009b). The MPCA concurred with Joslyn's request (MPCA, 2009b). The 2009 Five-Year Review specifies use of the 1993 USEPA provisional guidance, and Joslyn has continued to comply with this recommendation (MPCA, 2009a).

Joslyn calculates a "hazard index" for each groundwater sample. The hazard index is the sum of the ratios of the concentrations of each parameter divided by the risk-based criterion (MCL or HRL or HBV) for that parameter. Since it is based on TBC criteria, the hazard index itself is a TBC.

## 2.2 DNAPL (Operable Unit 3)

As stated in the Pumpout System Verification Plan (Barr, 1988b), the goal of the DNAPL recovery system is to:

> "Recover the dense non-aqueous phase liquid to reduce the potential source of PAH/heterocycles and pentachlorophenol to the groundwater."

This goal is addressed within the practical constraints of available technology and cost effectiveness. Unfortunately, in addition to this goal, the ROD confused the issue by including removal of groundwater as a part of the DNAPL remedial action selected alternative. Groundwater removal is specifically addressed by OU1 and OU2. The remedial action objective for OU3 was not altered by the 1996, 1999, 2004 or 2009 Five-Year Reviews.

## 2.3 Surface Water

The drain tile/storm sewer system under Highway 100, located east (downgradient) of the site, intercepts shallow groundwater (Figure 1-3). Surface water from the highway, the highway right-of-way, and the adjacent areas also flows into and through this storm sewer. The intercepted groundwater and the collected surface water flow through the storm sewer and eventually discharge into Shingle Creek. The 1989 ROD establishes surface water criteria for the quality of the water in the drain tile/storm sewer system. These criteria were later modified in the 1996 Five-Year Review (MPCA, 1996c), and again in the 2004 Five-Year Review (MPCA, 1999 and MPCA, 2004a). Table 2-2 summarizes the current surface water criteria that have been considered applicable to the flow in the drain tile/storm sewer system.

The ROD surface water criteria are based on the federal ambient water quality criteria (also called the aquatic life criteria or ALCs). The 1996, 1999, 2004 and 2009 Five-Year Reviews present Applicable or Relevant and Appropriate Requirements (ARARs) for the surface water. The 1996 Five-Year Review recommends using the Minnesota water quality criteria (also referred to as the aquatic life standards, or ALSs) based on the processes established in MN Rules Chapter 7050. These standards are to be applied to the receiving water, Shingle Creek, which has a water use classification of 2B, 3C, 4A, 4B, 5, and 6. The ALSs are the current surface water ARARs for the site, replacing the ALCs that were in the 1989 ROD. The MPCA has recommended using the chronic standards as the ARARs (or TBC, in the case of benzo(a)pyrene) for surface water discharges from the site, as measured in the drain tile. In the 1996 Five-Year Review, the MPCA also presented a site-specific surface water criterion (SSWC) for benzo(a)pyrene. Since this criterion has not been promulgated, it is a TBC for this site. The 2004 Five-Year Review updated the ALSs based on the most recently promulgated water quality criteria, which have not changed since that time.

There are numerous sources of contaminants tributary to the drain tile, storm sewer, and Shingle Creek that are unrelated to the Joslyn site. Historical monitoring shows these sources affect surface water quality in the drain tile, the storm sewer, and Shingle Creek. Therefore, groundwater is collected from wells near the drain tile to help estimate the impact of groundwater downgradient of the Joslyn site on surface water.

Joslyn responded to the MPCA's 1996 Five-Year Review in "Comments and Work Plan, Regarding Five-Year Review and CERCLA Preliminary Closeout Report" (Barr, 1996a). Some of the issues raised by Joslyn were as follows:

1. It is unclear which of the standards (Chronic Standard (CS), Maximum Standard (MS) or Final Acute Value (FAV)) should apply to the water monitored in the drain tile. The water being protected is Shingle Creek.
2. The appropriateness of the site-specific surface water chronic criterion for benzo(a)pyrene has not been properly documented. The criterion is based on a scenario of human exposure through fish consumption, and this is an unrealistic exposure pathway given the nature of Shingle Creek.
3. There is no clear evidence to show that PAHs detected in the water at the drain tile originate from the site.

The MPCA and Barr met on May 23, 1996 to discuss these issues. The MPCA responded to Joslyn's comments to the 1996 Five-Year Review and discussions at this meeting in a letter (MPCA, 1996b). The MPCA's staff clarified their position on these issues as follows:

- In response to #1 above, the MPCA stated that the chronic standard will be applied. This is also the position presented in the 1999 Five-Year Review.
- In response to #2, the MPCA agreed that the study used to develop the site-specific surface water chronic criterion for benzo(a)pyrene does not meet all of their criteria. However, the MPCA believes that this is the best study currently available. Therefore, the MPCA will apply a

benzo(a)pyrene site-specific surface water chronic criterion. The MPCA also noted that the chronic standard could be adjusted to 0.0008 µg/L; however, this is not significantly different from the 0.00051 µg/L listed in the 1996 Five-Year Review. The 1999, 2004, and 2009 Five-Year Reviews include the 0.00051 µg/L criterion.

- In response to #3, the MPCA recognizes that PAH sources, other than the site, influence the surface water quality at the monitoring station. Their recommendation was to add a time factor to the numerical standard—as long as there are no more than four consecutive detections of B(a)P at a well near the drain tile or a clear indication of B(a)P from the site migrating to the drain, no violation will be considered to have occurred (MPCA, 1996b). This modification is reflected in the 1999 Five-Year Review.

Several years of historical surface water monitoring results indicate that some PAHs have at times been present in the samples from the NE drain and Shingle Creek, but the groundwater monitoring and the lack of PCP suggests that the Joslyn site is not the source of these PAHs. As detailed above, the MPCA recognized this issue and recommended that the shallow well network be utilized to identify whether there is migration of PAHs from the site to the drain system (MPCA, 1996b, 1999). The MPCA also indicated in the 2009 Five-Year Review that changes to the surface water monitoring plan may be warranted with the following recommendation: “Continued groundwater and surface water monitoring with an annual review of the status and effectiveness, with recommendations for changes as warranted” (MPCA, 2009a). Therefore, surface water monitoring was recommended to be discontinued at the site in 2011. The MPCA approved the recommendation to discontinue surface water monitoring in an email to Barr on September 30, 2011 and subsequently documented the approval in the February 8, 2012 letter approving the annual monitoring report (MPCA, 2012a). The potential migration of PCP or PAHs from the Joslyn site will continue to be evaluated by monitoring downgradient wells S1A, S2, W132, and U1. Surface water monitoring will be resumed if potential offsite migration is observed based on monitoring results from the shallow downgradient well network.

# 3.0 Response Action Operation and Monitoring

The 1989 ROD describes the response actions for each Operable Unit. This section briefly describes the response actions implemented at the site for Operable Units 1, 2, and 3 and describes operation and maintenance actions conducted in 2016. All data collected in 2016 is presented in this section.

The sampling and analysis procedures for OU 1, 2 and 3 monitoring are described in the *Quality Assurance Project Plan* (QAPP), which was updated and approved by the MPCA in September 2016, (Barr, 2016b). Sampling and analyses performed prior to the 2016 QAPP approval were conducted under the previous QAPP (Barr, 2000a). Monitoring conducted after September 2016, including the major fall monitoring event in October, was conducted in accordance with the updated 2016 QAPP.

ALS Environmental (ALS, formerly Columbia Analytical Services) located in Kelso, Washington, completed most of the water quality analyses in 2016. Legend Technical Services, Inc. (Legend) in St. Paul, Minnesota was used for analysis of iron bacteria residue through September 2016, after which time this analysis was performed by ALS, in accordance with the 2016 QAPP. Appendix D contains a discussion of the QA/QC evaluation of the 2016 water quality data. Laboratory reports and field data are included in Appendix F.

## 3.1 OU1 and OU2 Groundwater Remediation

The primary goal for all site-related remedial actions is to protect public health and the environment. The ROD further clarified this by stating that the Joslyn remedial action must address (1) the migration of PAH compounds and pentachlorophenol (PCP) in the groundwater from the Joslyn site; (2) contamination of the lower aquifer; and (3) floating oil and sinking oil (see OU3). Therefore, the pumpout system is designed to:

- Create a groundwater capture zone in the upper aquifer within the site boundary and thereby control lateral migration.
- Reduce the potential for groundwater flux from the upper to the lower aquifer by reducing potentiometric levels in the middle sand portion of the upper aquifer.
- Control the migration of floating oil in the vicinity of the former wood-treating area on the site.

The shallow sand unit (OU1) and the middle sand unit (OU2) together comprise the upper aquifer at the site. The OU1 and OU2 groundwater pumpout systems began operation on February 1, 1989. Figure 1-4 shows the locations of existing and former pumpout wells that have been on site. The OU2 pumpout system has consisted of wells W253 and W255 since 1989. The OU1 pumpout system has been modified a number of times in response to site redevelopment and the shrinking of the plume. In January 2007, OU1 pumpout wells included U1A, U2A, U4N, U5, U6N, U7N, U11, and U12. Well U1A was shut off on May 11, 2007, as approved by the MPCA (MPCA, 2007), based on the success in reducing the plume size and groundwater modeling that indicated this change would not affect overall OU1 pumpout system performance. Well U1A was restarted in 2009 when well U2A was shut down in 2009 due to the foam “pig” getting stuck in the well U2A water line. The well U2A line was repaired and the pump was turned back on in November 2010. MPCA approved turning off well U1A again in 2012 after monitoring results indicated it was not needed to maintain capture of the OU1 plume (MPCA, 2012b). Well U1A therefore has been turned off since October 2012.

Table 3-1 summarizes the design-pumping rates for the OU1 and OU2 wells. Table 3-2 summarizes the 2016 performance of the OU1 and OU2 pumpout wells. Table 3-3 presents an updated list of the pump models and rated pumping rates in each well. Because the OU1 and OU2 pumpout water is treated via a POTW, the pumpout system is not operated at maximum capacity. Instead, the operation is balanced to maintain capture while minimizing discharge. The past decades of remedial pumping and monitoring have indicated that the design pumping rates are conservative. The overall OU1 system performance in 2016 averaged 91 percent of the 2016 overall design pumping rate.

Samples of the groundwater pumpout system effluent were collected quarterly in accordance with the Metropolitan Council Environmental Services (MCES) Special Discharge Permit for the site, which was renewed on October 9, 2015. These samples were analyzed for the constituents in Table 3-4. Organic compounds were analyzed by EPA Method 8270. In addition, oil and grease, chemical oxygen demand (COD), total suspended solids (TSS), and pH were analyzed by the methods listed in the QAPP (Barr, 2000a and Barr, 2016b). Analytical results are summarized in Table 3-5. The 2016 monitoring results show that the MCES discharge limits (less than 3 mg/L of any single toxic organic compound, less than 10 mg/L for all toxic organic compounds combined) were consistently met in 2016. Note that the MCES discharge permit requires analysis of 2,3,7,8-tetrachloro-dibenzo-p-dioxin once during the first quarter of the three year duration of the permit, so this analysis was performed in February 2016. Also note that a discharge limit for 2,3,7,8-tetrachloro-dibenzo-p-dioxin is no longer listed on the permit. Figure 3-1 shows the historical concentrations of PCP in the samples collected from the oil/water separator effluent (see also Table A-7 in Appendix A). During the first eight years of operation (1989-1996), the PCP concentration varied greatly, from 0 to over 4,000 µg/L, averaging greater than 1,000 µg/L. From 1997 through 2004, the PCP concentration was typically between 500 and 800 µg/L. Since 2004, the PCP concentration has been below 500 µg/L (following table).

| Year | Average PCP Concentration (µg/L) | Maximum PCP Concentration (µg/L) | MCES PCP Limit (µg/L) |
|---|---|---|---|
| 2003 | 600 | 790 | 3,000 |
| 2004 | 400 | 510 | 3,000 |
| 2005 | 300 | 340 | 3,000 |
| 2006 | 385 | 400 | 3,000 |
| 2007 | 413 | 530 | 3,000 |
| 2008 | 417 | 500 | 3,000 |
| 2009 | 370 | 430 | 3,000 |
| 2010 | 343 | 400 | 3,000 |
| 2011 | 280 | 300 | 3,000 |
| 2012 | 275 | 430 | 3,000 |
| 2013 | 285 | 320 | 3,000 |
| 2014 | 278 | 290 | 3,000 |
| 2015 | 240 | 330 | 3,000 |
| 2016 | 288 | 330 | 3,000 |

Iron bacteria maintenance (pigging) was conducted on the discharge lines as needed for wells U2A, U11 and U12 in 2016. Samples of the iron bacteria residue from the maintenance were collected and analyzed by Legend for pH, TSS, and COD per MCES permitting requirements. The results are shown in Table 3-6.

An ongoing issue for pumping performance is maintenance work performed by the City of Brooklyn Center to their lift station that services the discharge from the pumpout system. The City’s maintenance work requires that the pumpout system be periodically shut down for short periods. Coordinated effort by both the City and Barr minimizes the effect these maintenance activities have on the overall performance of the system.

The OU2 pumpout system generally operated as planned throughout 2016. The system operates continuously, but the pumps are cycled so that one pump operates in recovery mode while the other pump is in observation mode. Prior to 2007, the cycling alternated monthly between wells W253 and W255. The cycling operation was adjusted in 2007 to cycle on for two months at well W255, then on for one month at well W253. The increase in pumping at well W255 will increase the duration in which an upward gradient is maintained in the vicinity of well W255, where higher concentrations have been observed, while also increasing mass removal by OU2. The 2007 cycling pattern was generally continued throughout 2014, except during periods when maintenance or repairs were required on one of the wells.

The 2013 annual report recommended further modifying the pumping cycle to incrementally increase the pumping duration at W255 a month at a time up to five months, alternating with one month of operation at W253. This modified pump cycling schedule was approved by the MPCA in September 2014 (MPCA, 2014), and was implemented beginning in 2015. The pumping schedule for W255 began to ramp up the pumping duration in 2015, and is now fully implemented with W255 operating for five month periods and W253 operating during March and September.

Floating non-aqueous phase liquid (NAPL) was identified in the area between U4, U5 and U6 during various phases of investigation, and much was removed as part of the OU4 response action work. Early in its operating life, the OU1 pumpout system captured some light NAPL product. The OU1 system includes an oil-water separator to capture floating NAPL, which is regularly inspected and cleaned as necessary. Little or no floating NAPL has accumulated in the oil-water separator for many years and none accumulated in 2016.

## 3.2 OU3 DNAPL Remediation

During early investigative work at the site, a viscous liquid composed primarily of creosote was found pooled in a subsurface stratigraphic depression on the surface of the sandy clay that underlies the upper aquifer. The liquid, which has a density slightly greater than water, is referred to as dense nonaqueous-phase liquid (DNAPL). This subsurface DNAPL pool is Operable Unit 3.

The DNAPL recovery system consists of DNAPL recovery well W251, DNAPL recovery enhancement well U8 (now offline and determined to be insignificant to operational performance), and a 2,000-gallon, double-walled storage tank in a concrete vault. The DNAPL recovery system began operating at full scale in 1997. Its operation has been interrupted for periods of time due to site redevelopment. Long-cycle intervals are now necessary to avoid pumping water due to the low DNAPL level in the recovery well that has resulted from the DNAPL system’s successful operation.

As discussed in Section 1.2.2, the DNAPL system was shut off in late 2015 when the outer wall of the tank was observed to no longer provide secondary containment. The system remained off in 2016 as options for replacing the tank were evaluated. Plans to replace the DNAPL tank and modify the subsurface concrete vault that houses the tank to reduce water infiltration were submitted to the MPCA and approved in September 2016 (Barr, 2016c and MCPA, 2016a). The work is anticipated to be completed in early summer 2017. Measurements of the fluid surface and oil/water interface in the DNAPL storage tank are used to monitor system performance and to plan for DNAPL shipments. The tank was almost completely empty in 2016, as shown by the measurements in Table 3-7 and on Figure 3-2. Water elevations, DNAPL/water interface elevations, and bottom/sediment elevations were measured in the DNAPL recovery well W251 throughout 2016 (Table 3-8 and Figure 3-3).

In order to minimize the intrusion of water into the DNAPL pool and maximize the total DNAPL volume recovered, the recovery system is programmed with a longer time period between pump cycles to allow the DNAPL pool level to recover. This is consistent with the DNAPL operation plan, which was included in the 2004 Annual Operations and Monitoring Report (Barr, 2005a) and was approved by the MPCA (MPCA, 2005).

Over the years, Barr has replaced the DNAPL pump controllers with systems that allow for longer cycling and more precise timing adjustments in order to maintain water-free DNAPL recovery. Barr replaced the DNAPL pump controller in 2007 with one that allows for cycling once over several days, rather than hours. In early 2012, DNAPL recovery was noted to be slowing. Work on the DNAPL system in 2012 included replacing a leaking air supply regulator and filter assembly, installing a new more precise and versatile on/off cycle timer to allow for more exact pump timing cycles, and replacing a sticking air supply valve with piping. Throughout 2015, DNAPL pump output testing was conducted on a regular basis and adjustments were made to the pump on/off cycle to maximize product recovery with minimal water intake. Currently the DNAPL recovery pump is activated for approximately 4 minutes every 51 hours, when turned on.

Water is found in the DNAPL vault at times. The most likely source is either water from the automatic lawn-sprinkling system, precipitation, or a combination of both, leaking in through joints in the top of the vault. The DNAPL system was pressure-tested on September 5, 2002. Both the inner tank and the tank annulus were found to be fully sound. Subsequently, regular maintenance includes caulking the vault's joints periodically, along with more frequent vault inspections. The vault and tank are regularly inspected to determine if there is any evidence that tank integrity has been compromised. On November 9, 2015, the routine inspection identified water between the inner and outer DNAPL tank walls. Further evaluation indicated the outer wall of the tank was compromised, no longer providing secondary containment of DNAPL if the inner wall should leak. The DNAPL tank was emptied on December 7, 2015 and the material was transported to the Clean Harbors Deer Park, Texas facility for disposal. The DNAPL system remains off and options for replacing the DNAPL containment system are currently being evaluated.

Well U8 was installed with a dual purpose. With respect to OU1, it provided withdrawal of groundwater in the shallow aquifer. With respect to OU3, it had the potential to aid in DNAPL removal. Based on tests completed when it was installed, well U8 appeared to be capable of producing 16 gpm. In actual operation, well U8 had the following discharge history:

- From 1989 through 1993, well U8 was pumped sporadically as a supplement to the OU1 system while the OU3 system was being constructed.
- From 1993 through 1997, well U8 was pumped continuously as a supplement to the OU1 system but near the end of 1994, production from well U8 began to decline due to fouling of the pump by DNAPL product and residuals.
- The OU3 system began full operation in 1997. Well U8 continued to be problematic and was taken offline in 1998-1999 due to fouling by DNAPL.
- Operation of well U8 was attempted again in 2000-2001. However, despite rigorous maintenance, 2.5 gpm was the highest possible discharge rate of that could be sustained from well U8.

Throughout the years of sporadic production from well U8, effective OU1 remediation had to be maintained. Therefore, the OU1 pumpout system was configured to operate successfully without well U8. The second purpose for well U8 was for groundwater removal that may assist in OU3 DNAPL recovery via the Ghyben-Herzberg theory (Freeze and Cherry, 1979). No physical effect such as predicted by the theory has ever been observed at the site using well U8. Therefore, there is no longer any practical purpose for pumping well U8, and it was not operated in 2015.

It is possible that DNAPL is continuing to accumulate in the subsurface pool at a rate slower than the recovery pumping rate. A publication by the British Environment Agency (Kueper, et al., 2003) notes that downward migration of DNAPL can proceed for many decades. Joslyn's approach to OU3 has been to maximize the total volume recovery of free-flowing DNAPL via well W251. A low pumping rate over a long period of time leads to maximum recovery. The recommended course of action at this point is to continue to adjust the recovery rate as necessary to maintain a recoverable pool level (nominal minimum of 6 to 12 inches above the sandy clay unit). Due to adjustments in the pumping rates and frequency in recent years, the recoverable pool level has been maintained at a consistently higher level. When DNAPL recovery resumes, the DNAPL pumping system will continue to be monitored and adjusted to maximize DNAPL recovery while minimizing the intrusion of water.

## 3.3 Regional Groundwater Monitoring

Groundwater monitoring in areas beyond the capture zone is used to assess the effectiveness of the groundwater pumpout system at containing wood treatment chemicals. Onsite and historical data are used to measure system effectiveness against the remedial action objectives. In 2016, groundwater samples were collected and water levels were measured in accordance with the 2016 groundwater monitoring plan. Table 3-10 summarizes monitoring well construction information. Figure 1-2 shows the onsite monitoring well locations and offsite monitoring locations are shown on Figure 1-3. Figure 1-4 shows locations of all existing and former onsite monitoring wells.

Table 3-11 lists the groundwater elevations measured in upper aquifer wells and Table 3-12 lists the groundwater elevations measured in the middle sand and lower aquifer wells in 2016. Historical water elevations are in Appendix A.

The major annual sampling event was conducted in October 2016.

Table 3-13 lists the analytical parameters for groundwater samples. PAHs and PCP were analyzed using EPA Method SW846-8270 SIM (see next section). The 2016 analytical laboratory data for samples collected from the monitoring and groundwater pumpout system wells are summarized in Tables 3-14, 3-15, and 3-16 (upper aquifer, middle sand, and lower aquifer wells, respectively). Table 3-17 summarizes the field data collected during 2016.

## 3.4 Water Monitoring Reporting Limit Review

The issue of using reporting limits appropriate to the media and chemicals of concern was reviewed for the site at the request from the MPCA (MPCA, 2003). The issue was discussed in a March 5, 2003 Barr

Engineering response letter to the MPCA (Barr, 2003), and is further evaluated here for the current year's data.

The commercially available method for analysis of semi-volatile organic compounds (SVOCs) with the lowest method reporting limits is U.S. EPA Method 8270 SIM. This method applies mass spectrometry (MS) with selected ion monitoring (SIM) to increase the analytical sensitivity of standard EPA Method 8270. Given these methods, the lowest reporting limit for SVOCs in water samples potentially achievable by ALS (the project analytical laboratory) using EPA Method 8270 SIM is 0.0033 µg/L, for most target compounds.

Although the trace level reporting limit of 0.0033 µg/L can be achieved for most target compounds using current technology, there are factors that can raise the reporting limit of the analysis, such as the presence of non-target compounds that interfere with the analysis, sample volume, and relatively high concentrations of some target compounds. Following acceptable laboratory procedure, ALS dilutes some samples to reduce the effect of background interferences and/or to bring levels of high concentrations of target compounds within the established calibration curve used for the analysis. As required by the analytical method, samples have elevated reporting limits in proportion to their dilution and/or sample volume received.

In 2016, samples from all offsite groundwater monitoring wells in the monitoring program were analyzed for SVOCs at the trace level. As in past years, reporting limits for most onsite monitoring wells and pumpout wells were greater than the trace level. The primary reason for these higher reporting limits is the SVOC concentrations typically present require sample dilution to prevent damage to analytical instrumentation and to fall within the calibration range of the analytical method.

In 2016, reporting limits associated with non-detect results were all below groundwater ARARs and TBCs for the site with the exception of one benzo(a)pyrene reporting limit (at W7) that was 10% higher than the HRL of 0.06 µg/L (see Tables 3-14 and 3-15). The trace level reporting limit for PAHs (0.0033 µg/L) is higher than the surface water quality criterion for benzo(a)pyrene (0.00051 µg/L). However, historical monitoring has shown that the typical background/upstream benzo(a)pyrene concentration in the Shingle Creek receiving water is significantly higher than the surface water quality criterion and the available reporting limit so surface water monitoring has been discontinued at the site.

## 3.5 Highway 100/Soo Line Underpass Drain Tile

Highway 100 is protected in times of high rainfall and high groundwater levels by a system of catch basins and drain tile. The drain tile system intercepts groundwater during times of high groundwater levels thereby protecting the road's subgrade. The drain tile system is downgradient of the site, so it could potentially capture site chemicals not captured by the site pumpout system. For this reason, the drain tile and two other locations connected to the drainage system were historically part of the monitoring program.

Several years of historical surface water monitoring results indicate that some PAHs have at times been present in the samples from the NE drain and Shingle Creek, but the groundwater monitoring results and the lack of PCP suggests that the Joslyn site is not the source of these PAHs. Therefore, the MPCA approved of discontinuing surface water quality monitoring at the site (MPCA, 2012b). Details regarding the historical surface water monitoring locations are presented in Appendix B.

# 4.0 2016 Response Action Effectiveness

Even though the aquifer underlying the Joslyn site has a relatively high transmissivity, the groundwater still takes considerable time to flow from one end of the site to the other. Monitoring results in any given year reflect the effectiveness of operations in that year, and in previous years.

The Joslyn remediation systems have been historically effective (Figure 4-1), and have significantly reduced the size of the plume and kept the plume within the site boundary for many years. The Joslyn system was designed to control the plume based on typical groundwater flow conditions.

## 4.1 Operable Unit 1 (Shallow Aquifer) Pumpout System

The effectiveness of the OU1 groundwater pumpout system is evaluated according to the following methods from the *Pumpout System Verification Plan* (Barr, 1988b):

1. Evaluating the water quality monitoring data.
2. Contouring the measured water table elevations.
3. Reviewing the site groundwater gradient.
4. Computer modeling of groundwater flow.

The results of these evaluations are discussed in the following sections. In general, each of these methods indicates that the shallow aquifer pumpout system remains effective. Some of these evaluation methods are useful in verifying that site conditions are stable over the long term (water table maps, groundwater gradients and, to some extent, water quality). For 2016, these evaluations indicate that the shallow aquifer pumpout system was effective.

### 4.1.1 Water Quality as an Indicator of Effectiveness

Water quality monitoring performed to evaluate the effectiveness of the OU1 pumpout system includes sampling and analysis of groundwater, surface water and pumpout system effluent.

#### 4.1.1.1 Groundwater Quality

The groundwater monitoring data provides clear evidence that the wood-treating chemicals are being contained. PCP and PAH compound concentrations in samples from the offsite monitoring wells have decreased significantly during operation of the pumpout system (Figure 4-1). PCP has not been detected in an offsite well sample for many years, except for a 2005 sample collected from well W129, which was likely the result of dewatering activities during the Twin Lakes Avenue reconstruction. PAH concentrations in offsite well samples have similarly been at background concentrations for many years. Even some onsite wells produce samples with PAHs at background concentrations. Chemicals from the source areas on the site are being contained by the OU1 pumpout system. The cleanup of soils above the water table as part of Operable Unit 4 response actions that were completed several years ago also is helping to reduce chemical concentrations in groundwater.

A “hazard index” is calculated for each groundwater sample at the site. The hazard index is the sum of the ratios of the concentrations of each parameter divided by the risk-based criterion for that parameter. The goal is a hazard index below 1. In accordance with the 2009 5-year review, Joslyn uses the U.S. EPA (1993) Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, EPA/600/R-93/089 as the basis for the relative potency factors (MPCA, 2009a and 2009b).

The hazard indices were less than 1.0 for all samples from the offsite wells and lower aquifer wells in 2016. Tables 4-1, 4-2, and 4-3 compare the water quality data and hazard indices to the criterion for groundwater samples collected in 2016 from the onsite upper sand, middle sand, and lower sand aquifers, respectively. The calculations of the hazard indices are shown in Table 4-4. The hazard index for samples from lower aquifer well W300SPN was slightly above 1.0 in recent years, but 2014, 2015 and 2016 sample results from this well were non-detect. Concentrations in downgradient and offsite lower aquifer wells continue to be non-detect for PCP and carcinogenic PAHs and well below criteria for non-carcinogenic PAHs. Therefore, the lower aquifer wells will continue to be monitored to evaluate the pumpout system effectiveness but no further action is recommended at this time. Overall, the 2016 data demonstrate continued onsite containment.

Figure 4-1 presents the change in the extent of the PCP plume since 1988. Figure 4-2 presents the 2016 PCP concentration contours for OU1. Appendix A contains the historical water quality data for 1988 through 2016. Historical water quality trends illustrated on Figure 4-1 indicate that the extent of the plume has diminished significantly since the start-up of the system.

The wells that monitor the edge of the plume most closely are well U1 and well U1A on the downgradient east side, well W7, well W6N and well W132 on the south side, and well W10 on the north side. Well W7 had not been sampled since 1988, but was added back into the monitoring program in 2012 at the request of the MPCA to verify the extent of the groundwater plume (MPCA, 2012b). All these wells are located within the Joslyn site.

Analytical results from well U1A in 2011 indicated that the extent of the PCP plume extended close to the eastern site boundary at that time. Operation of well U1A had been deemed necessary when well U2A was temporarily shut off in 2010. Well U1A continued to operate through October 2012. No PCP or cPAHs were detected at wells U1A and U1 in 2016, indicating the extent of the PCP plume no longer extends to the eastern boundary, and that operation of well U1A remains unnecessary to maintain plume capture in this area. This is some of the clearest evidence of the OU1 remediation system’s effectiveness, especially given that well U1 was a remediation pumpout well at one time.

At the southern site boundary, samples from well W132 have had concentrations similar to background and below the hazard index since its installation. Well W6N is a relatively new well. Samples from W6N contained 62-120 µg/L PCP from 1999 through 2002. PCP increased to 1800 µg/L in 2003 likely due to the Highway 100 construction dewatering, but dropped to levels ranging from 3.6 to 120 µg/L from 2004 through 2008, likely due to the mitigation measures taken in 2003 and 2004. The PCP concentration in well W6N has since fluctuated between 45 and 830 µg/L, with reported values of 200 µg/L in the spring and 49 µg/L in the fall of 2016.

Well W7 samples exhibited the highest PCP concentration at the site in 2016. The PCP concentration in this well was 840 µg/L in the spring and 1,200 µg/L in the fall, higher than concentrations observed in pumpout wells near the center of the site. These PCP concentrations are within the range of historical concentrations at this well and remain lower than the historically maximum measured concentration of over 7,000 µg/L in 1987. PAHs were generally not detected or were at concentrations well below criteria in samples from well W7. PCP has not been detected at offsite well W127N, southeast of well W7 since it was installed in 2003. The absence of detectable PCP at wells W127N and W128, located offsite to the south, indicates that the PCP plume near W7 is limited in extent. It is recommended that well W7 continue to be monitored semiannually to obtain additional data to verify the stability and extent of the PCP plume in this area. Semiannual sampling at well W6N and annual monitoring at well 127N also provide continued monitoring of the PCP plume extent to the south.

On the north side of the site, samples from well W10 contained PCP concentrations up to 11,000 µg/L in the early years of site remediation. Through most of the 1990s, PCP was not detected in samples from well W10. After 2000, samples from W10 contained PCP at concentrations near 100 µg/L; far below concentrations identified at the start of remediation. This may be in response to the reconfigured pumpout well system that has resulted from the site redevelopment, or the end of the operation of the land treatment unit, or some other cause. In 2016, the PCP concentration in the sample from well W10 was 200 µg/L, within the range of concentrations observed in recent years, and two orders of magnitude below the highest historical concentrations.

In general the onsite water quality data show that the OU1 remediation system is effective.

Offsite PCP and PAH concentrations have repeatedly been below levels of concern in recent years as indicated by the results from wells W124, W125N, W126, W127N, W128 and W129. Water quality monitoring was discontinued at these wells in accordance with the approved monitoring plans (MPCA 2005 and 2007). The following lists the current monitoring status of these wells and others in the network:

- Well 125N is downgradient of the site, and may be used in the future for monitoring if pumpout system operations change, or for monitoring natural attenuation.
- Water level information from well W126 is needed for computing site gradients and from well W129 for groundwater contouring.
- Well W127N is currently being sampled annually to monitor concentrations south of the site. This well was added back to the monitoring program temporarily in 2012 during dewatering activities to the south (Barr, 2013), and is currently sampled annually to monitor potential changes in the southern PCP plume boundary.
- Wells W124 and W128 were no longer needed for evaluations of water quality or water levels, and did not have an anticipated future use. These wells were sealed on October 25, 2012, as approved by the MPCA (MPCA, 2012b).
- Results from well U1 have also historically been below levels of concern, but monitoring at this well will be continued to evaluate the effects of operating or shutting off well U1A.

#### 4.1.1.2 Surface Water Quality

Surface water has historically been monitored at three locations: (1) at the underdrain system beneath Highway 100 (referred to as the NE Drain); (2) at the outlet of the storm sewer into the Shingle Creek watershed; and (3) at Shingle Creek upstream of the outlet. The Highway 100 underdrain periodically captures shallow groundwater downgradient of the site. Monitoring of the NE Drain location was last conducted in March 2007, and has subsequently been discontinued in accordance with the approved 2007 monitoring plan (MPCA, 2007). Some historical surface water quality information and site figures are provided in Appendix B. Beginning in 2011 surface water monitoring was also discontinued at the storm sewer outlet and upstream of the outlet at Shingle Creek. The MPCA approved the proposal to cease surface water sampling in an email to Barr on September 30, 2011. MPCA approval of the 2011 monitoring plan was also documented in their letter approving the 2010 annual report (MPCA, 2012a).

The potential for the site to impact surface water quality through groundwater entering the Highway 100 underdrain system is better monitored by the shallow well network at the site. Wells S-1A and S-2 are located immediately downgradient of the site, between the site and the Highway 100 underdrain system. PCP and benzo(a)pyrene were not detected in samples from either of these wells in 2016, indicating that it is unlikely that contaminants from the site are reaching the Highway 100 storm drain system.

#### 4.1.1.3 PCP and cPAHs Removed by OU1 and OU2 Response Action

Table 4-5 presents calculations of the quantities of cPAHs, total monitored PAHs, and PCP removed from the site via the groundwater pumpout system, as requested by the MPCA (MPCA, 1995). As is typical for these systems, the removal rates have declined since start-up in 1989. Most of the recovered mass comes from the OU1 system.

In 2016, approximately 160 pounds of PCP were removed with the groundwater. An estimated 10,700 pounds of PCP have been removed since start-up of the pumpout system in 1989.

In 2016, approximately 44 pounds of total detectable monitored PAHs were removed with the groundwater, similar to recent years. In 2016, as well as in recent years, no measurable cPAHs were detected in the groundwater effluent. An estimated 3,500 pounds of detectable PAHs and 33 pounds of cPAHs have been removed since the start-up of the pumpout system.

The mass of PCP and PAHs removed annually has been declining overall since the start-up of the pumpout system, but has remained relatively constant since 2005. The overall pumping rate of the OU1 and OU2 systems was slightly lower in 2016 than during 2003 through 2005, but similar to the average pumping rate in earlier years. It is unlikely that a slight reduction in pumping has had a significant effect on the total mass removal of PCP or PAHs. Instead, the reduction in mass removed reflects a typical trend for these systems.

### 4.1.2 Water Table Contouring

As discussed in the pumpout system verification plan, the water table at the site is generally flat, which presents difficulties when trying to verify the capture zone with water table contouring. Due to the highly transmissive nature of the shallow aquifer, the drawdown from the pumping becomes difficult to measure even a short distance from the well. Calculations of drawdown since the start-up of the system are not useful because of the degree and frequency of regional changes in groundwater levels and the high transmissivity of the aquifer. Some of the construction dewatering conducted for the Highway 100 project in 2003 caused significant, measurable drawdowns in shallow groundwater at the site.

Figures 4-3 through 4-6 show the water table contours based on the 2016 water level measurements. In general, these show that groundwater flow directions and gradients were similar throughout 2016 and are consistent with historically measured conditions. Water level measurements generally indicate no changes to the overall groundwater flow direction in the shallow aquifer.

### 4.1.3 Lateral Groundwater Gradient

The lateral groundwater gradient is a measure of the slope of the water table, which is an indicator of flow rate for a given formation. If the lateral gradient increases, the pumpout system may not be able to achieve capture due to greater rates of groundwater flow across the site, even if flow directions have not changed. If the lateral gradient decreases, the pumpout system may be extracting more groundwater than is necessary to maintain capture.

Historically, lateral gradients were evaluated based on the water levels measured at two sets of wells on the upgradient and downgradient sides of the site: W101 to W122, and W104 to W112. Redevelopment has led to the abandonment of wells W112 and W122. Redevelopment has also led to the loss of most of the shallow monitoring wells on the downgradient side of the site. Gradient calculations using wells W126, S-1A and W104 are now being used to provide an assessment of the gradient across a greater distance. Well W126 has a long historical record, and the W104/W126 gradient generally coincides with the gradients historically measured at the site. Figure 4-7 compares W104/S1, S-1A and W104/W126 gradients to historically measured gradients calculated using W104/W112 and W101/W122.

As is the case with other site wells, the W104/W126 gradient data from the late 1980s reflects the extreme conditions of drought that occurred in that period. Also consistent with other observed site gradients, the W104/W126 gradient is typically steeper over the winter months. During these months, the water table generally drops, but the lake provides a constant source of recharge on the upgradient side of the site. The average W104/W126 gradient for the period 1991-2002 is 0.0013 ft/ft. This is the same as the average gradients for the formerly used well pairs W101/W122 and W104/W112.

In comparison, the groundwater flow model for normal conditions computes a gradient of approximately 0.0014 ft/ft between wells W104 and W112 (Figure 4-7). The design pumping rates are therefore based on maintaining capture in a modeled system with slightly higher flow than is typical for the real-world conditions at the site.

Gradients calculated for 2016 were 0.0010 for the W104/W126 well pair and ranged from about 0.0012 to 0.0015 ft/ft for the W104/S1A well pair, in the range of typical historical values. It appears that site conditions are returning to the typical condition that was used as the basis for setting up the groundwater flow model, after dewatering effects have gone away.

### 4.1.4 Modeling of Design Pumpout System Pumping Rates

In 1996, as a part of the analysis of and recommendation for a modified pumpout system, a SLAEM model was developed for the site (Barr, 1996c). The SLAEM model was adequate for evaluating steady-state conditions on site, but could not model the transient offsite conditions that were anticipated during the Highway 100 reconstruction project beginning in 2003. Therefore, a MODFLOW model was created for the site. The MODFLOW model began with the same site characteristics used in the SLAEM model, and then was modified and calibrated using historical and current site data, including data collected in 2002 during the reconstruction of the railroad bridge east of the site. Minor changes were made to the model throughout the 2003 and 2004 dewatering activities as additional data became available.

In 2015, a study was performed to re-evaluate the model's prediction of pumpout system capture across the site, and especially in OU5 (West Area). Values of hydraulic conductivity used in both the SLAEM and MODFLOW models increase from west to east across the site, which is consistent with the results of site investigations in the 1980s. In the 2003 version of the model, the West Area is represented by discontinuous hydraulic conductivity zones, with a zone of relatively high conductivity in the center, which was incorporated in 2003 to improve agreement between modeled and observed Highway 100 dewatering efforts. The study performed in 2015 evaluated whether the varying hydraulic conductivity values across the West Area used in the model are warranted. Field measurements using in-situ hydrogeologic profiling and slug testing methods were used to collect additional data to evaluate and refine the model. The results of the 2015 hydraulic conductivity study and model refinement were included in the 2014 annual report (Barr, 2015). The MPCA approved the groundwater model data collection work plan via email on May 14, 2015, and concurred with the model refinement approach during a phone call on September 24, 2015. The refined model was used to evaluate the capture zone in 2016.

The design pumping scheme for the Joslyn OU1 and OU2 systems was generally met throughout 2016 (Table 3-1). The actual pumping rates were very close to the design pumping rates in 2016, for most wells, except for U12 and U5. The pump in well U12 was underperforming and the motor and pump end were replaced in January 2017. Well U5 pumping rates are further discussed below. Average rates shown on Table 3-1 include periods when the system was shut off for maintenance, and pumping rates when the system was turned on were slightly higher than the average calculated rate for 2016. Routine discharge line cleaning and well treatment to reduce iron bacteria buildup were performed on several wells in 2016 to maintain design flow rates. Continued routine cleaning and treatment is planned for wells U2A, U4N, U11 and U12 in 2017. High pressure flushing and redevelopment of wells U2A, U4N and U11 conducted in 2013 and again in June of 2015 at wells U6N and U11 has greatly improved flow from those wells. These methods will be considered in 2017 as needed if adequate flow rates cannot be achieved with routine maintenance and cleaning.

Capture of the groundwater plume was maintained in 2016. The 2016 refined steady-state groundwater flow model was used to delineate the average capture zone for the pumpout wells in 2016. Figure 4-8 illustrates modeled site capture during 2016 based on reported pumping rates for the Joslyn pumpout system wells (rates and volumes are in Tables 3-1 and 3-2). The site capture zone shown on Figure 4-8 was delineated using backward particle tracking from particles started around each of the pumpout wells.

This indicates the capture zone in 2016 was as designed. The capture zone encompasses the whole site, except for a small area on the east side of the site. Results of groundwater quality sampling at U1 and downgradient at S-1A and S-2 indicate that groundwater in this area has no detectable site chemicals (or that the concentrations are at background levels).

Capture is maintained on the southern edge of the site, where higher PCP concentrations have been observed in recent years. Analytical results from groundwater samples collected at well W6N in recent years indicated higher PCP concentrations than during the period from 2003 through 2008, but still far below historical concentrations identified in this area. The PCP concentrations detected at well W7 since 2012 are similar to historical concentrations; this well had not been sampled since 1988. Concentrations at W6N and W7 will continue to be evaluated as part of the monitoring program. Based on concentrations at well W132, downgradient of well W6N, and historical concentrations at offsite wells south of the site such as W127N, it is concluded that adequate plume capture is being maintained on the south side of the site.

The groundwater model was also used to help evaluate future design pumping rates for the pumpout system. The long-term design rates are based on future long-term control of the plume. The following goals were used to establish the new long-term design pumping rates: (1) maintain capture of the contaminated portion of the site, (2) maintain "clean" conditions in the eastern portion of the site, (3) maximize mass removal, and (4) minimize the overall pumping rate to meet the first three goals. The long-term design pumpout system rates and the resulting modeled capture zone are shown on Figure 4-9 (see also Table 3-1).

Table 3-1 presents the recommended 2016 design rates, which are the same as the long-term design rates recommended since the 2004 annual report, with the exception that the design pumping rate at well U5 has been reduced to 4 gpm and reduced to zero at well U1A.

The following conclusions for 2016 and recommendations for 2017 are made based on the modeling and past findings from the site:

- U1 – Remain off. Continue to use for monitoring.
- U1A – Remain off.
- U2A – Continue pumping at the recommended long-term design rate. Continue to conduct pigging on a quarterly basis to help achieve the design rate. Conduct maintenance or pump replacement as necessary if the design rate is not achievable. Redevelop the well with high pressure jetting/flushing if needed. Implement regular treatments of chlorine tablets/granules to reduce iron bacteria buildup.
- U4N – Pump at the recommended long-term design rate. Redevelop the well with high pressure jetting/flushing if needed. Implement regular treatments of chlorine tablets/granules to reduce iron bacteria buildup.
- U5 – Continue pumping just below the design pumping rate of 4 gpm, as recommended in 2007. The previous design pumping rate of 6 gpm has not been maintained during recent years due to

a reduction in the water level in this well, resulting in the pump taking in air if pumped at higher rates. Because this well is considerably impacted with product below the water table and occasional LNAPL, maintenance within the well has been avoided as long as it has provided a reasonable discharge. The discharge in 2016 averaged about 1 gpm. Model results show that reducing the pumping rate at this well does not reduce the capture zone, and that capture south of the site is maintained beyond the site boundary. At this time, monitoring results at wells W6N and W7 near the southern site boundary are stable and results at W127N do not indicate that the plume has migrated south. The future operation of U5 will be evaluated annually based on monitoring results.

- U6N – Pump at the recommended long-term design rate. Redevelop the well with high pressure jetting/flushing if needed.
- U7N – Pump at the recommended long-term design rate.
- U11 – Pump at the recommended long-term design rate. Continue to conduct pigging on a quarterly basis to help achieve the design rate. Redevelop the well with high pressure jetting/flushing if needed. Implement regular treatments of chlorine tablets/granules to reduce iron bacteria buildup.
- U12 – Pump at the recommended long-term design rate. Continue to conduct pigging on a quarterly basis to help achieve the design rate. Redevelop the well in with high pressure jetting/flushing if needed. Implement regular treatments of chlorine tablets/granules to reduce iron bacteria buildup.

The recommended design rates should be appropriate for several years into the future. As shown on Figure 4-9, the recommended long term design rates maintain capture across most of the site, except east of well U2A, which is acceptable because groundwater quality monitoring in recent years indicates this area meets remediation goals. Capture of the plume is being maintained.

## 4.2 Operable Unit 2 Middle Sand Pumpout System

The primary goal of the OU2 system is to reduce the risk of contaminated groundwater migrating from the upper aquifer into the lower aquifer. Monitoring results suggest the lower aquifer has not been impacted by Joslyn activities, although recent results from lower aquifer well W300SPN were slightly above the hazard index of 1.0 on two occasions due to PAH concentrations. The 2016 analytical results are consistent with historical monitoring results, as shown in Tables 4-3 and A-6. The OU2 remediation system consists of pumpout wells W253 and W255. When either well is pumping, an upward gradient is induced near the pumping well. In recent years, OU2 wells have pumped in an alternating pattern for two months at W255 and then for one month at W253 such that one well is always in operation, and a longer duration of upward gradients and greater chemical mass removal is achieved at the more impacted well, W255. Recommendations for 2014 included incrementally increasing the pumping duration at W255 to five months to further increase chemical mass removal. This new pumping cycle was approved by the MPCA in September 2014 (MCPA, 2014), and was fully implemented in 2015.

The secondary goal of the OU2 system is to remove chemical mass from the middle sand unit. Chemical mass removal for both the OU1 and OU2 systems was evaluated in Section 4.1.1.3. Figures 4-10 and 4-11 show select PAH concentrations over time in samples from wells W253 and W255, respectively. The PAHs have declined one to three orders of magnitude at well W253, but have remained generally constant at well W255. Therefore, ongoing remediation at OU2 is appropriate.

The Pumpout System Verification Plan (Barr, 1988b) set a goal of 2 feet of drawdown in well W253 when well W255 is pumping with the assumption that well W255 would pump continuously. Since the preparation of that Plan, the OU2 system operation has been modified as approved by the MPCA, first with wells W253 and W255 alternating between pumping and monitoring/observation. The effect of the staggered pumping is that the water level in the middle sand does not stabilize, making determination of drawdown difficult. Based on numerous observations, the middle sand does not have good lateral connectivity. While wells W253 and W255 have been concluded to be in a connected zone, the other middle sand wells do not appear to be part of that zone.

As described, the protection of the lower aquifer that is provided by pumping from the middle sand must be balanced against the potential for middle sand pumping to draw chemical mass into the middle sand. In addition, there are physical constraints such as excessive drawdowns that prevent pumping the existing wells at significantly higher rates. Therefore, an alternative goal to the original goal for the OU2 system has been developed in recent years.

The primary intent of the middle sand pumpout system is to reduce the potential for downward migration of site chemicals into the lower aquifer (a secondary goal is to remove chemical mass from the middle sand). Therefore, the optimum drawdown in the middle sand is one that places the middle sand potentiometric level equal to that of the lower aquifer, so there is a zero gradient between the two units. It is prohibitively difficult to construct a system that completely eliminates the downward gradient—this would require a great number of pumping wells, each pumping a small amount in order to balance the heads of the middle sand and the lower aquifer. The current system is a compromise, whereby Joslyn alternately pumps one of two wells. Each well, when pumped, creates an area of large upward vertical gradients. Each area of upward vertical gradient is temporary, existing only for the period that the well is pumped.

The goal of the monitoring program is to demonstrate that the area of upward gradient exists. An upward gradient is present in the vicinity of each middle sand well while the well is pumping. The area of upward gradient induced by each middle sand pumping well is assessed with the existing monitoring system by measuring whether a zero or upward gradient is present from the lower aquifer to the non-pumping middle sand well (the observation well).

The first step in computing the gradient from the lower aquifer to the middle sand observation well is to determine the potentiometric levels in the two aquifers. The middle sand potentiometric level is based on direct measurement in the middle sand observation well. The lower aquifer potentiometric level below the middle sand observation well is calculated based on the measured water levels in lower aquifer wells

W300SPN and W328. Figure 4-12 illustrates the lower aquifer potentiometric surface. Table 4-6 summarizes the 2016 results from the middle sand pumping performance evaluation.

The gradients observed in 2016 at the middle sand wells were similar to recent years. When well W255 is pumping, there is an upward gradient at well W255 (due to pumping) and a downward gradient at well W253. When well W253 is pumping, there is an upward gradient at both wells W253 (due to pumping) and W255. The downward differences in potentiometric levels observed at well W253 were typically less than one foot. The downward gradient observed at well W253 during pumping of well W255 does not pose a significant risk for contaminant migration to the lower aquifer because PAH concentrations in that area are relatively low. In addition, pumping at well W255 induces an upward gradient and increases chemical mass removal near well W255, where PAH concentrations are higher.

In summary, the 2016 gradients were consistent with gradients measured in previous years and indicate that the OU2 system is operating as intended and preventing lower aquifer contamination while also removing contaminant mass from the middle sands. The goals of OU2 are optimized by pumping well W255 for longer durations than well W253. The absence of PCP in the lower aquifer is additional evidence of the effectiveness of OU2. However, PAH concentrations that have been detected in the lower aquifer in recent years indicate that operation of the OU2 system should continue.

## 4.3 Operable Unit 3 – DNAPL

As described previously, the DNAPL recovery system remained off during 2016 as options and plans for replacing the DNAPL tank were developed, so no liquid was removed from the DNAPL pool in 2016. Table 4-7 shows the historical removal of PCP and PAHs by the DNAPL recovery system. DNAPL recovery rates have declined overall since earlier years of operation when recovery was on the order of 1,000 to 2,000 gallons per year.

Approximately 152,000 pounds of DNAPL (16,700 gallons) have been removed from the ground since OU3 remediation system start-up in 1996 (Table 4-7). In 1990, it was estimated that approximately 9,500 gallons of DNAPL were present in the subsurface clay-lined "pool" (based upon saturated sediments to Elevation 787.5 feet MSL, a flat DNAPL surface, and an estimated porosity of 0.3). It now appears that the 1990 estimate was low, or that additional DNAPL has migrated to the pool in the intervening time. The 1990 DNAPL pool volume estimate was recalculated, in response to MPCA comments on the 2015 annual report (MPCA, 2016; Appendix E). The initial 1990 estimate was based on a lower starting pool elevation than was measured in 1997, when the DNAPL system began operation. The recalculation confirmed the 1990 estimate of the DNAPL pool volume and estimated the volume in 1997, when the system began operation, to be about 11,500 gallons. The change in elevation of the DNAPL pool between 1990 and 1997 suggests that additional DNAPL continued to migrate down into the pool from the 60-feet (or so) of unconsolidated saturated upper aquifer that overlays the DNAPL pool, where wood treating fluids were observed in non-continuous segments of the soil column. Monitoring of the DNAPL level in well W251 since the DNAPL system was shut off in 2015 shows periods of increases in the static DNAPL level (Table 3-8 and Figure 3-3), but a statistically significant or steady increase has not been observed.. The difference in the estimated DNAPL pool volume in 1997 (11,500 gallons) and the recovered DNAPL volume (16,700 gallons) is attributed to uncertainty in the DNAPL pool volume estimate. Several factors and assumptions used in the volume calculation contribute to the uncertainty, including the horizontal extent of the pool, the exact shape of the depression in the top of the clay layer containing the pool, the porosity of the soil, and/or the DNAPL elevation measurements. For example, increasing the horizontal extent of the DNAPL pool by less than 5 feet in all directions accounts for the under-estimated volume of DNAPL. Even with a potentially larger DNAPL pool volume, the DNAPL extent remains limited to a small area of the site as delineated by borings used in the initial 1990 DNAPL pool evaluation. Further delineation of the DNAPL extent is not necessary or recommended.

Care has been taken to minimize the introduction of groundwater into the lowest portion of the DNAPL pool because this could reduce the effectiveness of the DNAPL removal system. This is managed by DNAPL level monitoring and adjusting the DNAPL pumping rate. From 1990 through the end of 2000, the level of the top of the DNAPL pool appeared to be similar to the original elevation of 787.5 feet MSL. Through 2001 and into 2002, a noticeable decline in the DNAPL surface elevation was apparent (Figure 3-3). The decline continued into 2003 with a low surface elevation of about 783.3 feet MSL measured in November which is less than 1 foot above the clay layer (Table 3-8). The pump was shut off in order to prevent introducing water into the DNAPL recovery system. The DNAPL surface rose by over 2 feet in the next month, and pumping was resumed. The DNAPL pool surface was below 786 feet MSL throughout 2007. In 2007 Joslyn installed a new timer that allowed the pump to cycle on a much longer period. This reduced the pumping rate while the system is on, but it stabilized the DNAPL pool at a level well above the pump intake. DNAPL level monitoring and pumping rate adjustments should be continued. The 2007 timer was replaced in early 2012 with a more precise and adjustable timer to help optimize DNAPL recovery at well 251. Additional routine monitoring and measuring of the DNAPL product recovery and timer adjustments will continue once the system is turned on in 2017 to further optimize recovery.

As discussed in Section 1.2.2, the DNAPL recovery pump was shut off in November 2015 in response to an observed leak in the outer secondary containment wall of the DNAPL tank, noted when water was observed to have entered the space between the inner and outer walls from the outside of the tank. No DNAPL was observed to have leaked into the interstitial space or into the underground concrete vault that houses the DNAPL tank. The DNAPL tank was emptied and the DNAPL recovery system will remain off until a replacement for the tank is selected and installed, which is anticipated to be implemented in the spring of 2017. Historically, DNAPL recovery has ceased on occasion, and horizontal and vertical capture of the groundwater plume has been maintained, so the temporary shutdown of the DNAPL pumping is not expected to impact the overall effectiveness of response actions at the site.

As noted elsewhere in this report, pumping of well U8 has been discontinued. Because of the DNAPL in the aquifer near well U8, the pump required significant maintenance to operate. Even with regular, intensive maintenance, recent pumping of well U8 yielded only about 2.5 gpm. As described, Well U8 originally had a dual purpose—to aid in the overall OU1 remediation pumping and to enhance DNAPL recovery. It is apparent, based on the site monitoring data since well U8 was shut off, that well U8 is not necessary to aid OU1 and is not needed to continue DNAPL recovery in the foreseeable future. However, the need to operate well U8 will be re-evaluated if the need arises to modify the pumpout system.

# 5.0 Conclusions and Recommendations

## 5.1 Conclusions from 2016

- Evaluations of the OU1 shallow aquifer pumpout system show that the system performed as intended in 2016. The system operated at about 91 percent of its design capacity overall. This was obtained primarily by minimizing downtime for any of the major volume producing wells at the site. The OU1 system was effective at containing site chemicals, as indicated by stable downgradient concentrations in the shallow groundwater in 2016. Evaluation and refinement of the groundwater model was performed in 2016 to improve the model's accuracy at predicting the zone of capture by the pumpout system. The refined model was used to evaluate the effectiveness of the OU1 system in 2016.

- Middle sand remediation wells W253 and W255 (OU2) were effective at achieving remediation goals in 2016. The overall goal of the system is to prevent migration of chemicals to the lower aquifer by reducing the downward vertical gradient to near zero. This goal was generally achieved throughout the year with upward gradients observed, except at well W253 when well W255 is pumping. PAH concentrations remain low at well W253, but are higher at well W255. Therefore, pumping well W255 for longer durations provides the benefit of increasing chemical mass recovery while maintaining an upward gradient at well W255, in the area where the contaminant concentrations are higher. The 2016 water quality results from samples from the lower aquifer are similar to historical results, indicating that OU2 is effective.

- The DNAPL recovery system (OU3) was turned off in late 2015 because the containment tank needs to be replaced. It is anticipated that recovery will resume in mid-2017. The temporary shutdown did not impact the overall effectiveness of response actions at the site. To date, the DNAPL recovery system has removed more than 16,700 gallons (about 152,000 pounds) of DNAPL, consisting primarily of creosote.

- The Joslyn site has no adverse effect on the quality of the water collected by the underdrain beneath Highway 100, as shown by monitoring results from downgradient shallow wells at the site.

- Groundwater quality data from onsite and offsite shallow monitoring wells (OU1) indicates that the PCP and PAH concentrations, as well as the limits of the plume, have significantly decreased since the start-up of the pumpout system. The overall plume reduction has been aided by the source removal actions in OU3 and OU4. Samples from all offsite wells and a number of onsite wells on the downgradient side of the site had hazard indices below 1 in 2016. Samples from well W7 on the southern site boundary continue to show PCP concentrations of a similar order of magnitude as those in the center of the site. Continued monitoring of this well is recommended to assess the stability of the PCP concentrations. PCP concentrations remain nondetect offsite to the south and downgradient to the east. Downgradient and overall shallow groundwater concentrations have remained stable or are generally decreasing, indicating that the OU1 system continues to maintain capture of the plume.

- An estimated 166,000 pounds (83 tons) of wood-treating chemicals have been removed in the operation of OU1, OU2, and OU3, with the majority of the mass (152,000 pounds) removed from OU3 as creosote/DNAPL and the remainder (14,000 pounds) consisting of dissolved phase PAHs and PCP from OU1 and OU2. An estimated 25,400 pounds of PAHs have been removed, the majority in the DNAPL via OU3. An estimated 10,700 pounds of PCP have been removed, most of it via OU1 as dissolved phase in water due to PCP's higher water solubility compared to the PAHs. In comparison, the operation of the land treatment unit (OU4, reported separately) led to the destruction of about 100,000 pounds (50 tons) of wood-treating chemicals. Offsite disposal of soil in 1988 facilitated the removal of about 20,000 to 30,000 pounds of wood-treating chemicals.

## 5.2 Recommendations for 2017

It is recommended the program for 2017 be similar to the 2016 program with actions taken to improve system performance, conduct repairs and modifications to the monitoring system as described below.

### 5.2.1 2017 Water Monitoring Plan

- Conduct the 2017 monitoring in accordance with the updated 2016 QAPP (Barr, 2016b).
- The 2017 monitoring program will be the same as in 2016. The recommended 2017 monitoring program is described in Table 5-1.
- Use the 2004-2016 analytical parameter list in 2017, as shown in Table 3-13.

### 5.2.2 Groundwater Operable Unit 1 (Upper Sand)

- Operate the groundwater pumpout wells according to target pumping rates shown in Table 3-1. The recommended 2017 design pumping rates are unchanged from 2016.
- Pumping at well U1A will resume if water quality monitoring analytical results at well U1 or downgradient wells exceed the response action objectives shown in Table 4-1.
- Conduct pigging of the discharge lines from wells U2A, U11 and U12 (and at U1A when operating) on a quarterly basis, or as needed with the goal of maintaining design pumping rates at these wells. Monitor flow rates at other pumpout wells and pig discharge lines as needed.
- Implement regular treatments using chlorine tablets/granules on wells U2A, U4N, U11 and U12 with the goal of reducing iron bacteria buildup.
- Perform high pressure jetting and well redevelopment at wells U2A, U4N, U6N, U11 and U12, if routine maintenance listed above does not achieve design pumping rates.
- Continue to evaluate the performance of well U5. Achievable pumping rates at well U5 have been decreasing in recent years due to low recharge in this well despite maintenance efforts to remove buildup on the pump. Modeling results show that operation of U5 at lower rates does not reduce the capture zone, so it is recommended to continue operating this well at achievable rates.

- Conduct repairs and maintenance as needed to efficiently operate the pumpout system. Evaluate the condition of the flow meters and replace as needed. The recommended routine maintenance schedule for 2017 is shown in Table 5-2.

### 5.2.3 Operable Unit 2 (Middle Sand)

- To maintain higher mass removal from well W255, continue to implement the MPCA-approved modified pumping cycle for the OU2 wells, which involves a pumping duration at W255 of five months, alternating with one month of operation at W253.

- Continue to evaluate the water level data and water quality data as described in Section 4.2 of this report to track the effectiveness of the OU2 pumpout system.

### 5.2.4 Operable Unit 3 (DNAPL)

- Replace the DNAPL tank and complete the improvements to the DNAPL vault as recommended in the plans to the MPCA (Barr, 2016c).

- Resume operation of the OU3 DNAPL recovery system, once the containment equipment is replaced. Continue to adjust the timing cycle of the DNAPL pump to minimize water intake and maximize DNAPL removal.

- Continue DNAPL system data collection as described in the Operation Plan (Appendix E of the 2004 Annual Report).

- Continue to re-evaluate the need for well U8.

### 5.2.5 Modifications Resulting From OU5 Remediation

The selected remedy for the West Area soils (OU5) may require modifications to the existing OU1, OU2 or/and OU3 groundwater pumpout wells, monitoring wells, or underground utilities. If modifications are required, they will be coordinated with the OU5 remediation team and the MPCA. Changes to the system will be documented in subsequent annual operations and monitoring reports.

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# Tables

# Table 2-1

## Summary of Current Groundwater ARARs and TBCs
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, Minnesota

| Chemical | CAS No. | HRL[1] Value (µg/L) | HBV[2] Value (µg/L) | USEPA B(a)P Equiv. Factor[3] |
|---|---|---|---|---|
| Pentachlorophenol[4] | 87-86-5 | 0.3 | None | NA |
| Carcinogenic PAHs | NA | None | 0.06 | None |
| Benz(a)anthracene | 56-55-3 | None | None | 0.1 |
| Benzo(b)fluoranthene | 208-99-2 | None | None | 0.1 |
| Benzo(k)fluoranthene | 207-08-9 | None | None | 0.01 |
| Benzo(a)pyrene | 50-32-8 | None | 0.06 | 1 |
| Chrysene | 218-01-9 | None | None | 0.01 |
| Dibenzo(a,h)anthracene | 53-70-3 | None | None | 1 |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | None | None | 0.1 |
| Noncarcinogenic PAHs | | | | |
| Acenaphthene[5] | 83-32-9 | 400 | 100 | None |
| Acenaphthylene | 208-96-8 | None | None | None |
| Anthracene | 120-12-7 | 2,000 | None | None |
| Fluoranthene[5] | 206-44-0 | 300 | 70 | None |
| Fluorene | 86-73-7 | 300 | None | None |
| Naphthalene | 91-20-3 | 70 | None | None |
| Pyrene[5] | 129-00-0 | 200 | 50 | None |
| Benzo(ghi)perylene | 191-24-2 | None | None | None |
| Phenanthrene | 85-02-8 | None | None | None |

1 HRLs – Health Risk Limits (TBCs).

2 HBV – Health Based Values (TBCs) The HBV developed by the Minnesota Department of Health for benzo(a)pyrene is used to evaluate the risk for all carcinogenic PAHs based on their relative toxicity to benzo(a)pyrene. HBVs do not exist for individual carcinogenic PAHs.

3 Benzo(a)pyrene Equivalency Factor. This is the toxicity of specific carcinogenic PAH compounds relative to the toxicity of benzo(a)pyrene. As proposed by Joslyn (Barr, 2009b) and accepted by MPCA (MPCA, 2009b), this value is used to evaluate PAH risk using relative potency factors from EPA's "Provisional guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons" (EPA/600/R-93/089-July 1993).

4 The HRL for PCP was changed in 2007 from 3.0 to 1.0 µg/L and again in 2015 from 1.0 to 0.3 µg/L.

5 HBVs were adopted for these PAHs in 2015. The HRLs, which are values promulgated in Minnesota Rules, will continue to be used until they are revised.

# Table 2-2

## Summary of Surface Water ARARs and TBCs
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, Minnesota

### 1989 Record of Decision

| Parameter | Criteria | Concentration Limit |
|---|---|---|
| Pentachlorophenol | SSWC | 5/7.8 µg/L [1] |
| cPAHs | SSWC | 0.07 µg/L |
| nPAHs | SSWC | 17 µg/L [2] |

| | |
|---|---|
| SSWC | Site-Specific Surface Water Criterion – human health-based aquatic life criteria to protect humans from potential adverse effects of eating fish |
| cPAHs | Carcinogenic PAH compounds as defined by MDH |
| nPAHs | Noncarcinogenic PAH compounds as defined by MDH |
| 1 | Interpreted as 5.7 µg/L at pH of 7 |
| 2 | MPCA internal memorandum corrected value to 17 µg/L from 0.17 µg/L (MPCA, 1993) |

### Five-Year Reviews

| Chemical | Criteria | Concentration Limit 1996 and 1999 | Concentration Limit 2004 and 2009 |
|---|---|---|---|
| Pentachlorophenol | ALS | 5.5 µg/L [1] | 5.5 µg/L [1] |
| Acenaphthene | ALS | 12.0 µg/L | 20.0 µg/L |
| Anthracene | ALS | 0.029 µg/L | 0.035 µg/L |
| Fluoranthene | ALS | 20.0 µg/L | 1.9 µg/L |
| Phenanthrene | ALS | 2.1 µg/L | 3.6 µg/L |
| Naphthalene | ALS | 81.0 µg/L | 81 µg/L |
| Benzo(a)pyrene | SSWC | 0.00051 µg/L [2] | 0.00051 µg/L [2] |

ALS Aquatic Life Standard – Chronic standard for Class 2B waters from MN Rules Chapter 7050. The chronic standard is defined as the highest water concentration of a toxicant to which organisms can be exposed without causing chronic toxicity.

1. pH dependent standard; value listed for pH 7.0
2. SSWC Site-specific surface water criterion. MPCA recalculated this to be 0.0008 µg/L and then referred to 0.00051 µg/L in the 1999 Review, which was cited in the 2004 & 2009 Review.

# Table 3-1

## Groundwater Pumpout System Design Flow Rates
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| | Pumping Rate (GPM) | | |
|---|---|---|---|
| | Average 2016 Rate[1] | Recommended 2017 Design Rate | Recommended Long-Term Design Rate[3,4] |
| **Shallow Sand Unit Wells** | | | |
| U1 | 0 | 0 | 0 |
| U1A | 0 | 0 | 0 |
| U2A | 21 | 22 | 22 |
| U4N | 17 | 16 | 16 |
| U5 | 1 | 4 | 4 |
| U6N | 14 | 15 | 15 |
| U7N | 19 | 18 | 18 |
| U11 | 22 | 22 | 22 |
| U12 | 33 | 42 | 42 |
| Shallow Sand Total[1] | 127 | 139 | 139 |
| **Middle Sand Unit Wells** | | | |
| W253 | 1 | 0-+5 | 0-+5 |
| W255 | 4 | 0-+5 | 0-+5 |
| Middle Sand Total | 3[2] | 5[2] | 5[2] |

1. Average 2016 rate includes periods when the system or individual wells were shut down.
2. W253 and W255 are operated alternately, so the design rate for the middle sands wells is based on pumping one well at a time.
3. Recommended long term design rates are the same as the recommended 2017 design rates.
4. The following goals were used in setting the recommended long term pumping rates: (1) maintain capture; (2) maximize mass removal; (3) optimize capture at well U2A and west-ward, thereby continuing the cleanup of the east portion of the site near well U1A.

### Table 3-2
## 2016 Groundwater Pumpout System Discharge Volumes and Discharge Rates
### Joslyn Manufacturing & Supply Co.
### Brooklyn Center, MN

Meter Readings in Gallons

| Well | U1 | U1A | U2A | U4N | U5 | U6N | U7N | U8 | U11 | U12 | W253 | W255 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06-Jan-16 | None | 6,753,190 | 7,716,280 | 274,010 | 3,369,590 | 5,315,170 | 7,734,710 | None | 9,733,360 | 50,889,900 | 3,440,970 | 1,482,380 |
| 01-Feb-16 | None | 6,753,190 | 8,517,730 | 922,720 | 3,408,760 | 5,876,640 | 8,402,980 | None | 629,810 | 52,299,300 | 3,440,970 | 1,570,760 |
| 29-Feb-16 | None | 6,753,190 | 9,314,550 | 1,616,090 | 3,450,270 | 6,618,250 | 9,127,550 | None | 1,544,630 | 53,691,900 | 3,441,030 | 1,670,430 |
| 01-Apr-16 | None | 6,753,190 | 199,950 | 2,322,560 | 3,495,260 | 6,618,740 | 9,961,090 | None | 2,418,710 | 55,290,600 | 3,701,450 | 1,670,450 |
| 02-May-16 | None | 6,753,190 | 1,229,000 | 3,062,230 | 3,539,670 | 7,188,880 | 890,490 | None | 3,410,130 | 56,898,800 | 3,701,450 | 1,775,170 |
| 01-Jun-16 | None | 6,753,190 | 2,200,810 | 3,789,630 | 3,580,960 | 7,904,720 | 1,785,660 | None | 4,373,650 | 58,370,700 | 3,701,450 | 1,854,490 |
| 01-Jul-16 | None | 6,753,190 | 3,182,440 | 4,516,030 | 3,621,210 | 8,574,130 | 2,608,390 | None | 5,287,140 | 59,887,600 | 3,701,450 | 2,081,900 |
| 05-Aug-16 | None | 6,753,190 | 4,255,250 | 5,364,900 | 3,667,760 | 9,349,980 | 3,559,190 | None | 6,344,260 | 61,395,000 | 3,834,740 | 2,260,530 |
| 08-Sep-16 | None | 6,753,190 | 5,173,310 | 6,206,750 | 3,714,740 | 102,610 | 4,475,200 | None | 7,380,370 | 62,837,600 | 3,834,770 | 2,571,710 |
| 30-Sep-16 | None | 6,753,190 | 5,871,250 | 6,756,400 | 3,745,920 | 584,790 | 5,060,440 | None | 8,090,300 | 64,074,200 | 4,010,070 | 2,571,750 |
| 08-Nov-16 | None | 6,753,190 | 7,088,200 | 7,763,530 | 3,802,130 | 1,455,080 | 6,124,140 | None | 9,288,780 | 66,057,300 | 4,010,130 | 2,873,850 |
| 01-Dec-16 | None | 6,753,190 | 7,785,820 | 8,331,900 | 3,834,730 | 1,981,550 | 6,747,490 | None | 9,917,770 | 67,099,100 | 4,010,130 | 3,092,050 |
| 27-Dec-16 | None | 6,753,190 | 8,521,930 | 8,949,520 | 3,871,140 | 2,565,870 | 7,453,790 | None | 772,880 | 67,985,100 | 4,010,130 | 3,339,290 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Initial | None | 6,753,190 | 7,716,280 | 274,010 | 3,369,590 | 5,315,170 | 7,734,710 | None | 9,733,360 | 50,889,900 | 3,440,970 | 1,482,380 |
| Final | None | 6,753,190 | 8,521,930 | 8,949,520 | 3,871,140 | 2,565,870 | 7,453,790 | None | 772,880 | 67,985,100 | 4,010,130 | 3,339,290 |
| Meter Adjustments | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Meter | No | No | No | No | No | No | No | No | No | No | No | No |
| Rollover | 0 | 0 | 10,000,000 | 0 | 0 | 10,000,000 | 10,000,000 | 0 | 20,000,000 | 0 | 0 | 0 |
| Period Volume, gallons | None | 0 | 10,805,650 | 8,675,510 | 501,550 | 7,250,700 | 9,719,080 | None | 11,039,520 | 17,095,200 | 569,160 | 1,856,910 |
| Days of Operation | NA | 0 | 356 | 356 | 356 | 356 | 356 | NA | 356 | 356 | 356 | 356 |
| Calc. Avg. Flow, gpm | None | 0.0 | 21.1 | 16.9 | 1.0 | 14.1 | 19.0 | None | 21.5 | 33.3 | 1.1 | 3.6 |
| Design Pumping Rate | NA | 0 | 22 | 16 | 4 | 15 | 18 | NA | 22 | 42 | 0±5 | 0±5 |
| Performance | NA | NA | 96% | 106% | 24% | 94% | 105% | NA | 98% | 79% | -- | -- |

| | | |
|---|---|---|
| Pigging | 4,344 | gal |
| Pumping | 67,513,280 | gal |
| Total | 67,517,624 | gal |
| Total 2016 Design Rate | 144.0 | gpm |
| Total Calc. 2016 Rate | 131.7 | gpm |
| Design Performance | 91% | |

# Table 3-2 Continued
# 2016 Groundwater Pumpout System Discharge Volumes and Discharge Rates
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

Gallons Per Month

| Well | U1 | U1A | U2A | U4N | U5 | U6N | U7N | U8 | U11 | U12 | W253 | W255 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0 | 0 | 801,450 | 648,710 | 39,170 | 561,470 | 668,270 | 0 | 896,450 | 1,409,400 | 0 | 88,380 |
| February | 0 | 0 | 796,820 | 693,370 | 41,510 | 741,610 | 724,570 | 0 | 914,820 | 1,392,600 | 60 | 99,670 |
| March | 0 | 0 | 885,400 | 706,470 | 44,990 | 490 | 833,540 | 0 | 874,080 | 1,598,700 | 260,420 | 20 |
| April | 0 | 0 | 1,029,050 | 739,670 | 44,410 | 570,140 | 929,400 | 0 | 991,420 | 1,608,200 | 0 | 104,720 |
| May | 0 | 0 | 971,810 | 727,400 | 41,290 | 715,840 | 895,170 | 0 | 963,520 | 1,471,900 | 0 | 79,320 |
| June | 0 | 0 | 981,630 | 726,400 | 40,250 | 669,410 | 822,730 | 0 | 913,490 | 1,516,900 | 0 | 227,410 |
| July | 0 | 0 | 1,072,810 | 848,870 | 46,550 | 775,850 | 950,800 | 0 | 1,057,120 | 1,507,400 | 133,290 | 178,630 |
| August | 0 | 0 | 918,060 | 841,850 | 46,980 | 752,630 | 916,010 | 0 | 1,036,110 | 1,442,600 | 30 | 311,180 |
| September | 0 | 0 | 697,940 | 549,650 | 31,180 | 482,180 | 585,240 | 0 | 709,930 | 1,236,600 | 175,300 | 40 |
| October | 0 | 0 | 1,216,950 | 1,007,130 | 56,210 | 870,290 | 1,063,700 | 0 | 1,198,480 | 1,983,100 | 60 | 302,100 |
| November | 0 | 0 | 697,620 | 568,370 | 32,600 | 526,470 | 623,350 | 0 | 628,990 | 1,041,800 | 0 | 218,200 |
| December | 0 | 0 | 736,110 | 617,620 | 36,410 | 584,320 | 706,300 | 0 | 855,110 | 886,000 | 0 | 247,240 |

Average Flow Rate by Month in Gallons per Minute

| Well | U1 | U1A | U2A | U4N | U5 | U6N | U7N | U8 | U11 | U12 | W253 | W255 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0 | 0 | 21 | 17 | 1 | 15 | 18 | 0 | 24 | 38 | 0 | 2 |
| February | 0 | 0 | 20 | 17 | 1 | 18 | 18 | 0 | 23 | 35 | 0 | 2 |
| March | 0 | 0 | 19 | 15 | 1 | 0 | 18 | 0 | 19 | 35 | 6 | 0 |
| April | 0 | 0 | 23 | 17 | 1 | 13 | 21 | 0 | 22 | 36 | 0 | 2 |
| May | 0 | 0 | 22 | 17 | 1 | 17 | 21 | 0 | 22 | 34 | 0 | 2 |
| June | 0 | 0 | 23 | 17 | 1 | 15 | 19 | 0 | 21 | 35 | 0 | 5 |
| July | 0 | 0 | 21 | 17 | 1 | 15 | 19 | 0 | 21 | 30 | 3 | 4 |
| August | 0 | 0 | 19 | 17 | 1 | 15 | 19 | 0 | 21 | 29 | 0 | 6 |
| September | 0 | 0 | 22 | 17 | 1 | 15 | 18 | 0 | 22 | 39 | 6 | 0 |
| October | 0 | 0 | 22 | 18 | 1 | 15 | 19 | 0 | 21 | 35 | 0 | 5 |
| November | 0 | 0 | 21 | 17 | 1 | 16 | 19 | 0 | 19 | 31 | 0 | 7 |
| December | 0 | 0 | 20 | 16 | 1 | 16 | 19 | 0 | 23 | 24 | 0 | 7 |

## Table 3-3

## List of Pump Models in Pumping Wells
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| Well No. | 2016 Design Pumping Rate (gpm) | Rated Pump Flow Rate (gpm) | Pump Model | Notes |
|---|---|---|---|---|
| U1 | 0 | None | None | Well used only as needed |
| U1A | 0 | 15-30 | 25S10-07 (1 HP) | Installed in 2005<br>New pump end - 2012 |
| U2A | 22 | 18-32 | 25S10-07 ( 2 HP) | New pump end - 2013 |
| U4N | 16 | 5-14 | 16S07-8 (3/4 HP) | New pump end - 2009 |
| U5 | 4 | 3-10 | 10S05-9 (½ HP) | New in 2009 |
| U6N | 15 | 18-32 | 16S07-8 (¾ HP) | New motor - 2015<br>New pump end - 2016 |
| U7N | 18 | 18-32 | 25S07-5 (¾ HP) | New in 1999 |
| U8 | NA | NA | NONE | No longer needed |
| U11 | 22 | 15-30 | 25S07-5 (¾ HP) | New motor in 2016<br>New pump end in 2016 |
| U12 | 42 | 60 | 60S50-9 (5 HP) | New motor - 2015<br>New pump end - 2016 |
| W253 | 0-5 | 3-10 | 10S05-9 (1/3 HP) | New in 1996 |
| W255 | 0-5 | 3-10 | 5E05-8 (3/4 HP) | New motor - 2014<br>New pump end - 2016 |
| **Total** | **144** | | | |

NA – Information Not Applicable

## Table 3-4

## MCES Effluent Monitoring Parameters
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

### Semivolatile Organic Compounds – EPA 8270

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Pentachlorophenol
Phenanthrene
Pyrene

### General Chemistry

Chemical Oxygen Demand – SM 5220 C
Oil and Grease – EPA 1664
Total suspended Solids – SM 2540 D
pH (field parameter)

Note:

Analysis of 2,3,7,8-tetrachlorodibenzo-p-dioxin is required only once, between January and March 2016, for the MCES Industrial Discharge Permit (Special Discharges) Number 2013, effective November 1, 2015, through October 31, 2018.

# Table 3-5
# 2016 Water Quality Data
# Pumpout System Effluent
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | Location | EFF | EFF | EFF | EFF |
|---|---|---|---|---|---|
| | Date | **2/04/2016** | **6/30/2016** | **9/12/2016** | **10/11/2016** |
| Parameter | Units | | | | |
| General Parameters | | | | | |
| Chemical Oxygen Demand | mg/l | **10.5** | **14.6** | **12.4** | **17.5** |
| Oil and Grease | mg/l | < 5.3 | < 5.2 | < 5.3 | < 5.0 |
| pH | pH units | **7.58** | **7.53** | **7.43** | **7.27** |
| Solids, total suspended | mg/l | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| SVOCs | | | | | |
| 2-Methylnaphthalene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Acenaphthene | ug/l | **42** | **49** | **37** | **49** |
| Acenaphthylene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Anthracene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Benz(a)anthracene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Benzo(a)pyrene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Benzo(b)fluoranthene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Benzo(g,h,i)perylene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Benzo(k)fluoranthene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Chrysene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Dibenz(a,h)anthracene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Fluoranthene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Fluorene | ug/l | **18** | **21** | **12** | **18** |
| Indeno(1,2,3-cd)pyrene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Naphthalene | ug/l | < 10 | **45** | < 10 | < 10 |
| Pentachlorophenol | ug/l | **250** | **310** | **260** | **330** |
| Phenanthrene | ug/l | < 10 | **15** | < 10 | < 10 |
| Pyrene | ug/l | < 10 | < 9.9 | < 10 | < 10 |
| Chlorinated Dioxins / Furans | | | | | |
| 2,3,7,8-Dioxin, tetra | pg/l | < 0.693 | -- | -- | -- |

See Table 3-18 for data qualifiers and footnotes.

# Table 3-6
# 2016 Water Quality Data
# Iron Bacteria Residue Discharge to Sanitary Sewer
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | Location | U2A | U2A | U2A | U2A | U11 | U11 | U11 | U11 | U12 | U12 | U12 | U12 | U12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | 3/08/2016 | 5/17/2016 | 9/02/2016 | 11/02/2016 | 3/08/2016 | 5/17/2016 | 9/02/2016 | 11/02/2016 | 3/08/2016 | 5/17/2016 | 9/02/2016 | 9/14/2016 | 11/02/2016 |
| Parameter | Units | | | | | | | | | | | | | |
| General Parameters | | | | | | | | | | | | | | |
| Chemical Oxygen Demand | mg/l | **5400** | **150** | **6000 h** | **546** | **13000** | **480** | **12000 h** | **1170** | **7300** | **400** | **4700 h** | < 100 | **184** |
| pH | pH units | **7.1** | **7.1** | **7.57** | **7.45** | **7.1** | **7.1** | **7.63** | **7.50** | **6.9** | **7.0** | **7.53** | **7.64** | **7.41** |
| Solids, total suspended | mg/l | **77000** | **93000 BQV** | **100000** | **169000** | **21000** | **23000 *** | **85000** | **95900** | **180000** | **51000 BQV** | **92000 *** | **2400** | **26500** |

See Table 3-18 for data qualifiers and footnotes.

# Table 3-7
# 2016 DNAPL Recovery Data
# DNAPL Storage Tank
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, Minnesota

| Date | DNAPL/Water Measured Feet | DNAPL in Tank Gallons | Water in Tank Gallons | Water + DNAPL Gallons | Tank Capacity Remaining Gallons |
|---|---|---|---|---|---|
| 06-Jan-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 01-Feb-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 29-Feb-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 01-Apr-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 02-May-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 01-Jun-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 01-Jul-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 05-Aug-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 08-Sep-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 30-Sep-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 08-Nov-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 01-Dec-16 | 6.50 | 3 | 11 | 14 | 1,990 |
| 27-Dec-16 | 6.50 | 3 | 11 | 14 | 1,990 |

The DNAPL system was off in 2016 while plans were being made to repair and modify the DNAPL containment system.

# Table 3-8
## 2016 DNAPL Recovery System Data
## DNAPL Recovery Well 251
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, Minnesota

| Date | Water Table Elevation Feet MSL | DNAPL Thickness in Well Feet | DNAPL Thickness in Formation Feet (a) | DNAPL Static Feet MSL |
|---|---|---|---|---|
| 06-Jan-16 | 850.09 | 4.24 | 2.74 | 785.34 |
| 01-Feb-16 | 849.79 | 4.32 | 2.82 | 785.42 |
| 29-Feb-16 | 849.83 | 4.03 | 2.53 | 785.13 |
| 01-Apr-16 | 850.14 | 4.14 | 2.64 | 785.24 |
| 02-May-16 | 850.44 | 4.19 | 2.69 | 785.29 |
| 01-Jun-16 | 850.18 | 4.21 | 2.71 | 785.31 |
| 01-Jul-16 | 849.93 | 4.23 | 2.73 | 785.33 |
| 05-Aug-16 | 850.72 | 4.25 | 2.75 | 785.35 |
| 08-Sep-16 | 851.24 | 4.27 | 2.77 | 785.37 |
| 30-Sep-16 | 851.49 | 4.24 | 2.74 | 785.34 |
| 08-Nov-16 | 850.79 | 4.22 | 2.72 | 785.32 |
| 01-Dec-16 | 851.07 | 4.21 | 2.71 | 785.31 |
| 27-Dec-16 | 850.98 | 4.22 | 2.72 | 785.32 |

| | |
|---|---|
| Riser Elevation ft, MSL | 865.04 |
| Well Diameter, inches | 8.0 |
| Total Well Depth, ft, from original TOR | 83.9 |
| Elevation, Well Bottom, ft MSL | 781.1 |
| Pump Intake Elevation, ft MSL | 782.50 |
| Elevation, Top of Sandy Clay Formation, ft MSL | 782.6 |

(a) DNAPL Thickness in Formation = DNAPL Static (MSL) - Top of Sandy Clay Formation (MSL)

Note: the DNAPL recovery well 251 was not operated in 2016 while plans were being made to repair and modify the DNAPL containment system.

# Table 3-9

## 2016 Monitoring Program Summary
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| Monitoring Station Identification | Type | Response Action Monitoring Schedule | | |
|---|---|---|---|---|
| | | Water Level | Water Quality | Flow Rate |
| **Shallow Upper Aquifer Wells** | | | | |
| S1A | Monitoring Well | Quarterly | Fall | NA |
| W2N | Monitoring Well | Annually | None | NA |
| W6N | Monitoring Well | Quarterly | Spring, Fall | NA |
| W7 | Monitoring Well | Quarterly | Spring, Fall | NA |
| W10 | Monitoring Well | Annually | Fall | NA |
| W101 | Monitoring Well | Quarterly | None | NA |
| W104 | Monitoring Well | Quarterly | Fall | NA |
| W125N | Monitoring Well | Annually | None | NA |
| W126 | Monitoring Well | Annually | None | NA |
| W127N | Monitoring Well | Annually | Fall | NA |
| W129 | Monitoring Well | Quarterly | None | NA |
| W130 | Monitoring Well | Quarterly | Fall | NA |
| W132 | Monitoring Well | Quarterly | Fall | NA |
| U1 | Monitoring Well/Pumpout Well - Off | Quarterly | Quarterly | Monthly if on |
| U1A | Monitoring Well/Pumpout Well - Off | Annually | Fall | Monthly if on |
| U2A | Pumpout Well | Annually | Fall (g,o) | Monthly |
| U4N | Pumpout Well | Annually | Fall (o) | Monthly |
| U5 | Pumpout Well | Quarterly | Fall (o) | Monthly |
| U6N | Pumpout Well | Annually | Fall (o) | Monthly |
| U7N | Pumpout Well | Annually | Fall (o) | Monthly |
| U8 | Monitoring Well/Pumpout Well-Off | Annually | None | Monthly if on |
| U11 | Pumpout Well | Annually | Fall (g,o) | Monthly |
| U12 | Pumpout Well | Annually | Fall (g,o) | Monthly |
| **Mid-Depth Upper Aquifer Wells** | | | | |
| W201 | Monitoring Well | Annually | None | NA |
| S2 | Monitoring Well | Annually | Fall | NA |
| **Middle Sand Wells** | | | | |
| W252N | Monitoring Well | Annually | Fall | NA |
| W253 | Pumpout Well | Monthly | Fall (o) | Monthly |
| W254 | Monitoring Well | Annually | Fall | NA |
| W255 | Pumpout Well | Monthly | Fall (o) | Monthly |
| **Lower Aquifer Wells** | | | | |
| W300 SPN | Monitoring Well | Monthly | Fall | NA |
| W301 | Monitoring Well | Annually | Fall | NA |
| W328 | Monitoring Well | Monthly | Fall | NA |
| S3 | Monitoring Well | Annually | Fall | NA |

# Table 3-9 (continued)

## 2016 Monitoring Program Summary
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| Monitoring Station Identification | Type | Response Action Monitoring Schedule | | |
|---|---|---|---|---|
| | | Water Level | Water Quality | Flow Rate |
| **Surface Water Monitoring Locations** | | | | |
| Twin Lake | Surface Water | Quarterly | None | NA |
| NE Drain | Surface Water | NA | None | None |
| Storm Sewer Outlet | Surface Water | NA | None | None |
| Upstream Shingle Creek | Surface Water | NA | None | None |
| **Pumpout System** | | | | |
| Oil/Water Separator | Effluent | None | Quarterly (d) | Monthly (calc.) |
| Tank Fluid Surface | Oil Depth | Estimate | NA | NA |
| **DNAPL Recovery System** | | | | |
| W251 | DNAPL Recovery Well<br>• Air/water interface<br>• Oil/water interface<br>• Bottom of well/sediment | <br>Monthly<br>Monthly<br>Monthly | None | Annual calculation |
| DNAPL Tank | Storage Tank<br>• Air/water interface<br>• Oil/water interface | <br>Monthly<br>Monthly | None | <br>Monthly (calc.)<br>Monthly (calc.) |

Notes:

Sampling was conducted according to the recommended 2016 monitoring plan.

Sample analyzed by enhanced GC/MS unless otherwise noted.

(d) Sample analyzed using standard level 8270
(f) Samples collected when flowing.
(g) Additional samples collected quarterly when discharge lines are cleaned (TSS, COD and pH).
(o) Collected from operating well.

# Table 3-10

## Monitoring Station Data
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| Well No. | Riser Elev. (ft. MSL) | Well Depth (ft.) | Well Diameter (in.) | Screened Interval (ft MSL) | Comments |
|---|---|---|---|---|---|
| W2N | 862.19 | 12 | 2 | 849.8-846.8 | (1,a) |
| W6N | 866.70 | 25 | 2 | 853.7-848.7 | (1,a) |
| W7 | 864.23 | 25 | 2 | 848.8-838.8 | (1,a) |
| W10 | 876.62 | 23.5 | 4 | 857.2-847.2 | (1,a) |
| W101 | 856.22 | 13 | 2 | 851.8-841.6 | (1,a) |
| W104 | 861.13 | 12.5 | 2 | 851.6-841.4 | (1,a) |
| W112 | 867.80 | 26 | 2 | 851.6-841.4 | (1,a) |
| W124 | 867.84 | 29 | 2 | 848.5-838.5 | (1,8,a) |
| W125N | 866.18 | 25 | 2 | 850.3-840.3 | (1,a) |
| W126 | 859.21 | 20.5 | 2 | 848.9-838.7 | (1,a) |
| W127N | 866.27 | 22.7 | 2 | 853.6-843.6 | (1,a) |
| W128 | 863.03 | 20.5 | 2 | 852.3-842.1 | (1,8,a) |
| W129 | 856.36 | 15.5 | 2 | 851.4-841.2 | (1,a) |
| W130 | 868.41 | 25.5 | 2 | 853.3-842.3 | (1,a) |
| W132 | 867.52 | 27.2 | 2 | 850.3-840.3 | (1,a) |
| W201 | 856.41 | 67.5 | 4 | 797.0-787.0 | (1,a) |
| W209 | 867.23 | 60 | 2 | 811.3-806.1 | (2,a) |
| W252N | 865.47 | 82 | 4 | 793.5-783.5 | (2,a) |
| W254 | 869.67 | 81 | 4 | 787.5-777.5 | (2,a) |
| W300SPN | 867.31 | 133.1 | 2 | 739.5-734.5 | (2,a) |
| W301 | 856.33 | 139 | 4 | 736.8-716.8 | (2,a) |
| W328 | 862.85 | 125 | 4 | 745.3-735.3 | (2,a) |
| S1A | 870.33 | 30 | 2 | 852.9-837.9 | (1,a,7) |
| S2 | 869.92 | 35 | 2 | 842.2-832.2 | (1,a) |
| S3 | 870.43 | 149 | 2 | 726.0-721.0 | (a) |
| U1 | 864.89 | 36 | 8 | 852.8-832.8 | (1,7,a) |
| U1A | 869.43 | 35 | 8 | 852.7-832.7 | (1,7,b) |
| U2A | 867.87 | 40.5 | 8 | 845.0-825.0 | (1,b) |
| U4N | 868.35 | 32.4 | 8 | 854.2-836.2 | (1,b) |
| U5 | 866.51 | 36 | 8 | 840.5-830.5 | (1,b) |
| U6N | 865.57 | 42 | 8 | 838.6-825.6 | (1,b) |
| U7N | 860.07 | 39.5 | 8 | 835.6-820.6 | (1,b) |
| W255 | 865.49 | 81 | 4 | 806.6-786.6 | (2,b) |
| W253 | 865.18 | 82 | 4 | 793.9-783.0 | (2,b) |
| U8 | 865.25 | 69 | 4 | 811.5-796.5 | (1,3,4,c) |
| W251 | 865.04 | 83 | 8 | 788.1-783.1 | (3,b) DNAPL Recovery Well, Not operated in 2016 |
| U11 | 869.42 | 31 | 8 | 850.4-838.4 | (1,b) |
| U12 | 868.62 | 40 | 8 | 846.6-828.6 | (1,b) |
| Twin Lake | NA | NA | NA | NA | 5 |
| NE Drain | NA | NA | NA | NA | 6 |

(a) Monitoring Well (b) Pumpout Well (c) Pump currently off
(1) Operable Unit 1 Well
(2) Operable Unit 2 Well
(3) Operable Unit 3 Well
(4) Well currently not operating due to high maintenance requirements and lack of need.
(5) Lake elevation measured from foot-bridge on east side of Highway 100, across Twin Lake. Reference Elevation 870.13 ft MSL.
(6) Sampled at manhole east side of Highway 100 and north of CP Railroad bridge.
(7) Well elevation resurveyed on May 14, 2010, following installation of well S1A.
(8) Wells W124 and W128 were sealed in October 2012.

# Table 3-11
# 2016 Water Elevations
# Upper Aquifer Wells & Twin Lake
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN
# (elevations in ft, MSL)

| Location | 2/5/2016 | 6/30/2016 | 9/12/2016 | 10/10/2016 |
|---|---|---|---|---|
| U1 | 848.39 | 847.99 | 849.39 | 849.49 |
| U1A | -- | -- | -- | 849.43 |
| U2A | -- | -- | -- | 835.27 |
| U4N | -- | -- | -- | 844.74 |
| U5 | -- | -- | -- | 843.07 |
| U6N | -- | -- | -- | 841.32 |
| U7N | -- | -- | -- | 848.02 |
| U8 | -- | -- | -- | 850.80 |
| U11 | -- | -- | -- | 846.42 |
| U12 | -- | -- | -- | 842.32 |
| W2N | -- | -- | -- | 851.19 |
| W6N | 849.05 | 849.33 | 850.53 | 850.59 |
| W7 | 849.71 | 849.83 | 850.93 | 851.02 |
| W10 | -- | -- | -- | 848.35 |
| W101 | 851.62 | 850.97 | 851.59 | 851.65 |
| W104 | 851.82 | 851.40 | 852.14 | 852.23 |
| W125N | -- | -- | -- | 848.93 |
| W126 | -- | -- | -- | 849.64 |
| W127N | -- | -- | -- | 850.77 |
| W129 | 850.83 | 849.91 | 852.04 | 852.16 |
| W130 | 849.19 | 849.41 | 850.61 | 850.69 |
| W132 | 848.82 | 849.11 | 850.20 | 850.31 |
| W201 | -- | -- | -- | 851.84 |
| S-1A | 848.38 | 848.50 | 849.13 | 849.22 |
| S-2 | -- | -- | -- | 849.14 |
| TWINLK | 851.63 | 851.51 | 851.93 | 851.98 |

-- Not measured
See Table 3-18 for data qualifiers and footnotes.

# Table 3-12
# 2016 Water Elevations
# Lower Aquifer and Middle Sand Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN
# (elevations in ft, MSL)

| Location | 1/6/2016 | 2/1/2016 | 2/29/2016 | 4/1/2016 | 5/2/2016 | 6/1/2016 | 7/1/2016 | 8/5/2016 | 9/8/2016 | 9/30/2016 | 10/10/2016 | 11/8/2016 | 12/1/2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W251 | 850.09 | 849.79 | 849.83 | 850.14 | 850.44 | 850.18 | 849.93 | 850.72 | 851.24 | 851.49 | 851.54 | 850.79 | 851.07 |
| W252N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.37 | -- | -- |
| W253 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.28 | -- | -- |
| W253 OFF | 849.08 | 848.78 | 848.71 | 848.86 | 849.28 | 849.03 | 848.18 | 849.18 | 849.68 | 851.14 | -- | 849.48 | 849.73 |
| W253 ON | -- | -- | 806.18 | 805.18 | -- | -- | -- | -- | 805.18 | 805.18 | -- | -- | -- |
| W254 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.63 | -- | -- |
| W255 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 806.49 | -- | -- |
| W255 OFF | -- | -- | 844.84 | 848.19 | 806.49 | -- | -- | -- | 849.89 | 849.71 | -- | -- | -- |
| W255 ON | 806.49 | 806.49 | 807.14 | 806.49 | -- | 806.49 | 806.49 | 806.49 | 806.49 | 806.49 | -- | 806.49 | 806.49 |
| W300SPN | 848.01 | 847.66 | 847.59 | 847.81 | 848.06 | 847.79 | 847.16 | 848.24 | 848.9 | 849.18 | 848.96 | 848.61 | 848.91 |
| W301 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 829.73 | -- | -- |
| W328 | 849.15 | 848.8 | 848.7 | 848.93 | 849.22 | 848.9 | 848.35 | 849.4 | 850.03 | 850.35 | 850.05 | 849.74 | 850.04 |
| S-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 843.83 | -- | -- |

-- Not measured

See Table 3-18 for data qualifiers and footnotes.

# Table 3-13

## Groundwater Monitoring Parameters
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

### PAH Compounds – EPA 8270 SIM

#### Carcinogenic PAHs

Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3,cd)pyrene
Benzo(k)fluoranthene
Dibenzo(ah)anthracene
Benzo(j)fluoranthene*

#### Noncarcinogenic PAHs

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)perylene
Fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

### Phenolic Compounds – EPA 8270 SIM

Pentachlorophenol

---

*Co-elutes with benz(b)fluoranthene

Target reporting limits: PAHs = 0.0033 µg/L, PCP = 0.3 µg/L

# Table 3-14
# 2016 Water Quality Data
# Organic Compounds
# Upper Aquifer Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| **Location** | | **U1** | **U1** | **U1** | **U1** | **U11** | | **U12** | **U1A** | **U2A** | **U4N** | **U5** | **U6N** | **U7N** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Date** | | **2/04/2016** | **6/30/2016** | **9/12/2016** | **10/18/2016** | **10/11/2016** | | **10/11/2016** | **10/18/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** |
| **Sample Type** | | **N** | **N** | **N** | **N** | **N** | **FD** | **N** | **N** | **N** | **N** | **N** | **N** | **N** |
| Parameter | Units | | | | | | | | | | | | | |
| Carcinogenic PAHs | | | | | | | | | | | | | | |
| Benz(a)anthracene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | **0.036** | < 0.033 | **0.14** | **0.47** | **0.075** |
| Benzo(b)fluoranthene | ug/l | < 0.0033 c | < 0.0034 ch | < 0.0033 c | < 0.0035 c | < 0.033 c | < 0.033 c | < 0.033 c | < 0.0033 c | **0.035 c** | < 0.033 c | < 0.033 c | **0.25 c** | < 0.033 c |
| Benzo(k)fluoranthene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | **0.034** | < 0.033 | < 0.033 | **0.083** | < 0.033 |
| Benzo(a)pyrene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | **0.035** | < 0.033 | < 0.033 | **0.13** | < 0.033 |
| Chrysene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | **0.042** | < 0.033 | **0.052** | **0.14** | < 0.033 |
| Dibenz(a,h)anthracene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | **0.036** | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Indeno(1,2,3-cd)pyrene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | **0.035** | < 0.033 | < 0.033 | **0.055** | < 0.033 |
| Non-Carginogenic PAHs | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | **0.0038** | **5.6** | **4.7** | < 0.033 | **0.0044** | < 0.034 | **2.2** | **0.32** | **8.2** | **1.9** |
| Acenaphthene | ug/l | **0.0047** | < 0.0034 h | **0.0040** | **0.0096** | **79** | **76** | **56** | **0.35** | **0.76** | **33** | **120** | **28** | **69** |
| Acenaphthylene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | **0.0049** | **1.6** | **1.5** | **0.86** | **0.012** | **0.063** | **0.35** | **1.3** | **0.44** | **0.60** |
| Anthracene | ug/l | **0.011** | **0.020 h** | **0.011** | **0.030** | **1.4** | **1.2** | **0.67** | **0.062** | **0.11** | **0.63** | **2.2** | **1.4** | **1.0** |
| Benzo(g,h,i)perylene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | **0.041** | < 0.033 | < 0.033 | **0.057** | < 0.033 |
| Fluoranthene | ug/l | **0.0040** | **0.0051 h** | **0.0053** | **0.0067** | **3.5** | **3.4** | **4.5** | < 0.012 | **0.084** | **0.81** | **18** | **10** | **9.6** |
| Fluorene | ug/l | **0.0061** | **0.0075 h*** | **0.0067** | **0.015 *** | **38** | **37** | **23** | **0.0087** | **0.050** | **9.1** | **57** | **16** | **20** |
| Naphthalene | ug/l | **0.0082** | **0.0077 bh** | **0.0050** | **0.0097** | **60 *** | **43 *** | **2.9** | **0.013** | **0.066** | **47** | **2.1** | **25** | **32** |
| Phenanthrene | ug/l | < 0.0033 | < 0.0034 h | < 0.0033 | **0.0045** | **23** | **20** | **0.65** | **0.0071** | **0.046** | **4.4** | **2.8** | **13** | **13** |
| Pyrene | ug/l | **0.0078** | **0.0085 h** | **0.0085** | **0.013** | **1.2** | **1.2** | **1.9** | **0.021** | **0.10** | **0.29** | **8.1** | **5.2** | **4.2** |
| | | | | | | | | | | | | | | |
| Pentachlorophenol | ug/l | < 0.29 | < 0.20 h | < 0.29 | < 0.31 | **480** | **570** | **12** | < 0.29 | **46** | **110** | **16** | **650** | **53** |

See Table 3-18 for data qualifiers and footnotes.

# Table 3-14
# 2016 Water Quality Data
# Organic Compounds
# Upper Aquifer Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| Location | | **W6N** | **W6N** | **W7** | **W7** | **W10** | **W104** | **W127N** | **W130** | **W132** | | **S-1A** | **S-2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Date** | | **6/30/2016** | **10/14/2016** | **6/30/2016** | **10/19/2016** | **10/19/2016** | **10/20/2016** | **10/18/2016** | **10/14/2016** | **10/14/2016** | | **10/13/2016** | **10/13/2016** |
| **Sample Type** | | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **FD** | **N** | **N** |
| Parameter | Units | | | | | | | | | | | | |
| Carcinogenic PAHs | | | | | | | | | | | | | |
| Benz(a)anthracene | ug/l | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Benzo(b)fluoranthene | ug/l | < 0.017 ch | < 0.0033 c | < 0.017 ch | < 0.067 c | < 0.034 c | < 0.0037 c | < 0.0033 c | < 0.0034 c | < 0.0034 c | < 0.0033 c | < 0.0033 c | < 0.0033 c |
| Benzo(k)fluoranthene | ug/l | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Benzo(a)pyrene | ug/l | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Chrysene | ug/l | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | **0.018** | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Dibenz(a,h)anthracene | ug/l | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Indeno(1,2,3-cd)pyrene | ug/l | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Non-Carginogenic PAHs | | | | | | | | | | | | | |
| 2-Methylnaphthalene | ug/l | < 0.017 h | < 0.0033 | **0.019 h** | < 0.067 | **0.13** | **0.0054** | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Acenaphthene | ug/l | < 0.017 h | < 0.0033 | **0.062 h** | **0.13 *** | **35** | < 0.0037 | **0.0053** | < 0.0034 | < 0.0034 | < 0.0033 | **0.0066** | **0.0038** |
| Acenaphthylene | ug/l | < 0.017 h | **0.0065** | **0.025 h** | < 0.067 | **0.73** | **0.013** | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | **0.0049** | **0.0036** |
| Anthracene | ug/l | **0.16 h** | **0.14** | **0.55 h** | **0.48** | **0.93** | **1.9** | **0.0047** | **0.013** | **0.055** | **0.054** | **0.024** | **0.020** |
| Benzo(g,h,i)perylene | ug/l | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Fluoranthene | ug/l | < 0.017 h | < 0.0033 | **0.034 h** | < 0.067 | **0.30** | **0.0081** | < 0.0033 | **0.0038** | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Fluorene | ug/l | **0.12 h** | **0.064** | **1.5 h** | **1.6** | **14** | **0.015** | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | **0.012** |
| Naphthalene | ug/l | **0.020 bh** | **0.020** | **0.44 h** | **0.58** | **12** | **0.011** | **0.0034** | **0.0047** | < 0.0034 | < 0.0033 | **0.0091** | **0.0067** |
| Phenanthrene | ug/l | < 0.017 h | < 0.0033 | **0.95 h** | **0.91** | **3.4** | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | **0.0040** |
| Pyrene | ug/l | < 0.017 h | < 0.0033 | **0.029 h** | < 0.067 | **0.12** | < 0.0037 | < 0.0033 | **0.0038** | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| | | | | | | | | | | | | | |
| Pentachlorophenol | ug/l | **200** | **49** | **840** | **1200** | **200** | **0.37** | < 0.29 | < 0.30 | **0.33** | < 0.29 | < 0.29 | < 0.29 |

See Table 3-18 for data qualifiers and footnotes.

# Table 3-15
# 2016 Water Quality Data
# Organic Compounds
# Middle Sand Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | **Location** | **W252N** | **W253** | **W254** | **W255** |
|---|---|---|---|---|---|
| | **Date** | **10/19/2016** | **10/11/2016** | **10/18/2016** | **10/11/2016** |
| Parameter | Units | | | | |
| Carcinogenic PAHs | | | | | |
| Benz(a)anthracene | ug/l | < 0.0033 | < 0.0065 | < 0.0033 | **17** |
| Benzo(b)fluoranthene | ug/l | < 0.0033 c | < 0.0065 c | < 0.0033 c | **14 c** |
| Benzo(k)fluoranthene | ug/l | < 0.0033 | < 0.0065 | < 0.0033 | **4.7** |
| Benzo(a)pyrene | ug/l | < 0.0033 | < 0.0065 | < 0.0033 | **9.2** |
| Chrysene | ug/l | < 0.0033 | < 0.0065 | < 0.0033 | **9.6** |
| Dibenz(a,h)anthracene | ug/l | < 0.0033 | < 0.0065 | < 0.0033 | **1.2** |
| Indeno(1,2,3-cd)pyrene | ug/l | < 0.0033 | < 0.0065 | < 0.0033 | **4.1** |
| Non-Carginogenic PAHs | | | | | |
| 2-Methylnaphthalene | ug/l | **0.0054** | **0.013** | < 0.0033 | **110** |
| Acenaphthene | ug/l | < 0.0033 | **10** | < 0.0033 | **210** |
| Acenaphthylene | ug/l | < 0.0033 | **0.12** | < 0.0033 | **5.0** |
| Anthracene | ug/l | **0.010** | **0.049** | **0.0097** | **10** |
| Benzo(g,h,i)perylene | ug/l | < 0.0033 | < 0.0065 | < 0.0033 | **3.3** |
| Fluoranthene | ug/l | **0.0074** | **0.023** | < 0.0033 | **85** |
| Fluorene | ug/l | **0.0066** | **1.4** | < 0.0033 | **110** |
| Naphthalene | ug/l | **0.058** | **0.028** | **0.0046** | **2800** |
| Phenanthrene | ug/l | **0.012** | **0.14** | < 0.0033 | **170** |
| Pyrene | ug/l | **0.0083** | **0.012** | < 0.0033 | **48** |
| | | | | | |
| Pentachlorophenol | ug/l | < 0.29 | < 0.57 | < 0.29 | **14** |

See Table 3-18 for data qualifiers and footnotes.

# Table 3-16
# 2016 Water Quality Data
# Organic Compounds
# Lower Aquifer Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | Location | **W300SPN** | **W301** | **W328** | **S-3** |
|---|---|---|---|---|---|
| | Date | **10/18/2016** | **10/20/2016** | **10/20/2016** | **10/13/2016** |
| Parameter | Units | | | | |
| Carcinogenic PAHs | | | | | |
| Benz(a)anthracene | ug/l | < 0.0034 | **0.0065** | < 0.0033 | < 0.0033 |
| Benzo(b)fluoranthene | ug/l | < 0.0034 c | **0.0057 c** | < 0.0033 c | < 0.0033 c |
| Benzo(k)fluoranthene | ug/l | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Benzo(a)pyrene | ug/l | < 0.0034 | **0.0084** | < 0.0033 | < 0.0033 |
| Chrysene | ug/l | < 0.0034 | **0.025** | < 0.0033 | < 0.0033 |
| Dibenz(a,h)anthracene | ug/l | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Indeno(1,2,3-cd)pyrene | ug/l | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Non-Carginogenic PAHs | | | | | |
| 2-Methylnaphthalene | ug/l | < 0.0034 | **0.0083** | **0.0061** | < 0.0033 |
| Acenaphthene | ug/l | < 0.0034 | **0.0075** | < 0.0033 | < 0.0033 |
| Acenaphthylene | ug/l | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Anthracene | ug/l | **0.0049** | **0.018** | **0.013** | **0.016** |
| Benzo(g,h,i)perylene | ug/l | < 0.0034 | **0.0034** | < 0.0033 | < 0.0033 |
| Fluoranthene | ug/l | **0.0036** | **0.012** | **0.0050** | < 0.0033 |
| Fluorene | ug/l | < 0.0034 | **0.0073** | **0.0037** | < 0.0033 |
| Naphthalene | ug/l | **0.011** | **0.018** | **0.013** | **0.0044** |
| Phenanthrene | ug/l | **0.0035** | **0.041** | **0.0083** | < 0.0033 |
| Pyrene | ug/l | < 0.0034 | **0.017** | **0.0041** | < 0.0033 |
| | | | | | |
| Pentachlorophenol | ug/l | < 0.30 | < 0.29 | < 0.29 | < 0.29 |

See Table 3-18 for data qualifiers and footnotes.

# Table 3-17
# 2016 Water Quality Data
# Field Data - All Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | Parameter | Temperature | Specific Conductance @ 25 ºC | pH | Redox (oxidation potential) | Dissolved oxygen | Turbidity |
|---|---|---|---|---|---|---|---|
| | Units | deg C | umhos/cm | pH units | mV | mg/l | NTU |
| Location | Date | | | | | | |
| U1 | 2/04/2016 | 11.57 | 1047 | 6.97 | 134.9 | 0.60 | 4.15 |
| U1 | 6/30/2016 | 12.67 | 1127 | 7.53 | -101.2 | 0.59 | 4.00 |
| U1 | 9/12/2016 | 13.36 | 1295 | 7.40 | -133.4 | 1.07 | 6.39 |
| U1 | 10/18/2016 | 13.33 | 1137 | 7.31 | -124.0 | 0.52 | 8.00 |
| U11 | 10/11/2016 | 9.03 | 900 | 6.47 | -47.1 | 1.42 | 2.17 |
| U12 | 10/11/2016 | 9.17 | 837 | 7.11 | -49.7 | 2.15 | 0.90 |
| U1A | 10/18/2016 | 13.01 | 1174 | 7.20 | -125.9 | 0.40 | 5.11 |
| U2A | 10/11/2016 | 9.20 | 900 | 6.87 | -51.7 | 1.11 | 2.00 |
| U4N | 10/11/2016 | 8.91 | 890 | 6.39 | -31.7 | 1.29 | 2.51 |
| U5 | 10/11/2016 | 9.12 | 751 | 6.95 | -29.4 | 1.39 | 1.00 |
| U6N | 10/11/2016 | 9.21 | 741 | 6.89 | -39.4 | 1.37 | 0.99 |
| U7N | 10/11/2016 | 9.14 | 645 | 6.97 | -51.4 | 1.39 | 0.76 |
| S-1A | 10/13/2016 | 12.95 | 1153 | 7.39 | -149.2 | 2.25 | 25.5 |
| S-2 | 10/13/2016 | 12.78 | 1093 | 7.19 | -137.0 | 1.75 | 5.05 |
| S-3 | 10/13/2016 | 11.33 | 450 | 8.19 | -125.6 | 1.37 | 39.7 |
| W10 | 10/19/2016 | 10.37 | 1112 | 6.79 | -101.2 | 1.47 | 47.9 |
| W104 | 10/20/2016 | 12.00 | 1837 | 7.11 | -121.4 | 0.97 | 57.1 |
| W127N | 10/18/2016 | 14.93 | 841 | 7.23 | 31.4 | 4.04 | 1.47 |
| W130 | 10/14/2016 | 13.87 | 1167 | 6.90 | -84.7 | 1.67 | 8.72 |
| W132 | 10/14/2016 | 15.60 | 1493 | 6.92 | 146.2 | 3.41 | 1.22 |
| W252N | 10/19/2016 | 13.66 | 611 | 7.83 | -162.3 | 0.74 | 39.7 |
| W253 | 10/11/2016 | 9.00 | 617 | 7.01 | -34.3 | 1.27 | 5.44 |
| W254 | 10/18/2016 | 11.56 | 671 | 7.91 | -248.1 | 0.36 | 3.97 |
| W255 | 10/11/2016 | 9.03 | 683 | 7.07 | -60.1 | 1.00 | 0.87 |
| W300SPN | 10/18/2016 | 10.80 | 737 | 7.69 | -147.9 | 0.55 | 0.93 |
| W301 | 10/20/2016 | 10.57 | 937 | 8.11 | 67.4 | 3.11 | 36.8 |
| W328 | 10/20/2016 | 11.43 | 813 | 7.85 | 167.2 | 2.60 | 34.4 |
| W6N | 6/30/2016 | 10.29 | 971 | 7.51 | -74.1 | 2.01 | 1.71 |
| W6N | 10/14/2016 | 12.69 | 1020 | 6.84 | 73.7 | 1.97 | 1.21 |
| W7 | 6/30/2016 | 10.00 | 1047 | 7.08 | -93.7 | 0.53 | 3.71 |
| W7 | 10/19/2016 | 12.52 | 809 | 7.03 | 90.4 | 1.67 | 8.88 |

See Table 3-18 for data qualifiers and footnotes.

# Table 3-18
# Data Footnotes and Qualifiers

## Barr Standard Footnotes and Qualifiers

| | |
|---|---|
| -- | Not analyzed/Not available. |
| N | Sample Type: Normal |
| FD | Sample Type: Field Duplicate |
| ND | Not detected. |
| * | Estimated value, QA/QC criteria not met. |
| b | Potential false positive value based on blank data validation procedures. |
| BQA | Barr-applied project specific qualifier: extraction and/or analyses conducted using an alternative method and/or procedure. |
| BQE | Barr-applied project specific qualifier: equipment adjustment. |
| BQV | Barr-applied project specific qualifier: estimated value. |
| c | Coeluting compound. |
| h | EPA recommended sample preservation, extraction or analysis holding time was exceeded. |

# Table 4-1
# 2016 Water Quality Data
# Comparison to ARARs and TBCs
# Upper Aquifer Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | | **Location** | **U1** | **U1** | **U1** | **U1** | **U11** | | **U12** | **U1A** | **U2A** | **U4N** | **U5** | **U6N** | **U7N** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Date** | **2/04/2016** | **6/30/2016** | **9/12/2016** | **10/18/2016** | **10/11/2016** | | **10/11/2016** | **10/18/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** |
| | | **Sample Type** | **N** | **N** | **N** | **N** | **N** | **FD** | **N** | **N** | **N** | **N** | **N** | **N** | **N** |
| Parameter | Units | Response Action Objective | | | | | | | | | | | | | |
| **Exceedance Key** | | **Bold** | | | | | | | | | | | | | |
| Carcinogenic PAHs | | | | | | | | | | | | | | | |
| Benz(a)anthracene | ug/l | NA | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | 0.036 | < 0.033 | 0.14 | 0.47 | 0.075 |
| Benzo(b)fluoranthene | ug/l | NA | < 0.0033 c | < 0.0034 ch | < 0.0033 c | < 0.0035 c | < 0.033 c | < 0.033 c | < 0.033 c | < 0.0033 c | 0.035 c | < 0.033 c | < 0.033 c | 0.25 c | < 0.033 c |
| Benzo(k)fluoranthene | ug/l | NA | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | 0.034 | < 0.033 | < 0.033 | 0.083 | < 0.033 |
| Benzo(a)pyrene | ug/l | **0.06**[2] | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | 0.035 | < 0.033 | < 0.033 | **0.13** | < 0.033 |
| Chrysene | ug/l | NA | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | 0.042 | < 0.033 | 0.052 | 0.14 | < 0.033 |
| Dibenz(a,h)anthracene | ug/l | NA | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | 0.036 | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| Indeno(1,2,3-cd)pyrene | ug/l | NA | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | 0.035 | < 0.033 | < 0.033 | 0.055 | < 0.033 |
| | | | | | | | | | | | | | | | |
| Pentachlorophenol | ug/l | **0.3**[1] | < 0.29 | < 0.20 h | < 0.29 | < 0.31 | **480** | **570** | **12** | < 0.29 | **46** | **110** | **16** | **650** | **53** |
| | | | | | | | | | | | | | | | |
| BaP Equivalent[3] | ug/l | **0.06**[2] | ND a | ND a | ND a | ND a | ND a | ND a | ND a | ND a | **0.082 a** | ND a | 0.015 a | **0.21 a** | 0.0075 a |
| Hazard Index[4] | | **1** | ND a | ND a | ND a | ND a | **16000 a** | **19000 a** | **400 a** | ND a | **1500 a** | **3700 a** | **530 a** | **22000 a** | **1800 a** |
| | | | | | | | | | | | | | | | |
| Non-Carginogenic PAHs | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | ug/l | | < 0.0033 | < 0.0034 h | < 0.0033 | 0.0038 | 5.6 | 4.7 | < 0.033 | 0.0044 | < 0.034 | 2.2 | 0.32 | 8.2 | 1.9 |
| Acenaphthene | ug/l | 400[1] | 0.0047 | < 0.0034 h | 0.0040 | 0.0096 | 79 | 76 | 56 | 0.35 | 0.76 | 33 | 120 | 28 | 69 |
| Acenaphthylene | ug/l | | < 0.0033 | < 0.0034 h | < 0.0033 | 0.0049 | 1.6 | 1.5 | 0.86 | 0.012 | 0.063 | 0.35 | 1.3 | 0.44 | 0.60 |
| Anthracene | ug/l | 2000[1] | 0.011 | 0.020 h | 0.011 | 0.030 | 1.4 | 1.2 | 0.67 | 0.062 | 0.11 | 0.63 | 2.2 | 1.4 | 1.0 |
| Benzo(g,h,i)perylene | ug/l | | < 0.0033 | < 0.0034 h | < 0.0033 | < 0.0035 | < 0.033 | < 0.033 | < 0.033 | < 0.0033 | 0.041 | < 0.033 | < 0.033 | 0.057 | < 0.033 |
| Fluoranthene | ug/l | 300[1] | 0.0040 | 0.0051 h | 0.0053 | 0.0067 | 3.5 | 3.4 | 4.5 | < 0.012 | 0.084 | 0.81 | 18 | 10 | 9.6 |
| Fluorene | ug/l | 300[1] | 0.0061 | 0.0075 h* | 0.0067 | 0.015 * | 38 | 37 | 23 | 0.0087 | 0.050 | 9.1 | 57 | 16 | 20 |
| Naphthalene | ug/l | 70[1] | 0.0082 | 0.0077 bh | 0.0050 | 0.0097 | 60 * | 43 * | 2.9 | 0.013 | 0.066 | 47 | 2.1 | 25 | 32 |
| Phenanthrene | ug/l | | < 0.0033 | < 0.0034 h | < 0.0033 | 0.0045 | 23 | 20 | 0.65 | 0.0071 | 0.046 | 4.4 | 2.8 | 13 | 13 |
| Pyrene | ug/l | 200[1] | 0.0078 | 0.0085 h | 0.0085 | 0.013 | 1.2 | 1.2 | 1.9 | 0.021 | 0.10 | 0.29 | 8.1 | 5.2 | 4.2 |

See Table 3-18 for data qualifiers and footnotes.

# Table 4-1
# 2016 Water Quality Data
# Comparison to ARARs and TBCs
# Upper Aquifer Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | | **Location** | **W6N** | **W6N** | **W7** | **W7** | **W10** | **W104** | **W127N** | **W130** | **W132** | | **S-1A** | **S-2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Date** | **6/30/2016** | **10/14/2016** | **6/30/2016** | **10/19/2016** | **10/19/2016** | **10/20/2016** | **10/18/2016** | **10/14/2016** | **10/14/2016** | | **10/13/2016** | **10/13/2016** |
| | | **Sample Type** | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **FD** | **N** | **N** |
| Parameter | Units | Response Action Objective | | | | | | | | | | | | |
| **Exceedance Key** | | **Bold** | | | | | | | | | | | | |
| Carcinogenic PAHs | | | | | | | | | | | | | | |
| Benz(a)anthracene | ug/l | NA | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Benzo(b)fluoranthene | ug/l | NA | < 0.017 ch | < 0.0033 c | < 0.017 ch | < 0.067 c | < 0.034 c | < 0.0037 c | < 0.0033 c | < 0.0034 c | < 0.0034 c | < 0.0033 c | < 0.0033 c | < 0.0033 c |
| Benzo(k)fluoranthene | ug/l | NA | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Benzo(a)pyrene | ug/l | **0.06**[2] | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Chrysene | ug/l | NA | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | 0.018 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Dibenz(a,h)anthracene | ug/l | NA | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Indeno(1,2,3-cd)pyrene | ug/l | NA | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| | | | | | | | | | | | | | | |
| Pentachlorophenol | ug/l | **0.3**[1] | **200** | **49** | **840** | **1200** | **200** | **0.37** | < 0.29 | < 0.30 | **0.33** | < 0.29 | < 0.29 | < 0.29 |
| | | | | | | | | | | | | | | |
| BaP Equivalent[3] | ug/l | **0.06**[2] | ND a | ND a | ND a | ND a | ND a | 0.00018 a | ND a | ND a | ND a | ND a | ND a | ND a |
| Hazard Index[4] | | **1** | **6700 a** | **1600 a** | **28000 a** | **40000 a** | **6700 a** | **12 a** | ND a | ND a | **11 a** | ND a | ND a | ND a |
| | | | | | | | | | | | | | | |
| Non-Carginogenic PAHs | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | ug/l | | < 0.017 h | < 0.0033 | 0.019 h | < 0.067 | 0.13 | 0.0054 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Acenaphthene | ug/l | 400[1] | < 0.017 h | < 0.0033 | 0.062 h | 0.13 * | 35 | < 0.0037 | 0.0053 | < 0.0034 | < 0.0034 | < 0.0033 | 0.0066 | 0.0038 |
| Acenaphthylene | ug/l | | < 0.017 h | 0.0065 | 0.025 h | < 0.067 | 0.73 | 0.013 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | 0.0049 | 0.0036 |
| Anthracene | ug/l | 2000[1] | 0.16 h | 0.14 | 0.55 h | 0.48 | 0.93 | 1.9 | 0.0047 | 0.013 | 0.055 | 0.054 | 0.024 | 0.020 |
| Benzo(g,h,i)perylene | ug/l | | < 0.017 h | < 0.0033 | < 0.017 h | < 0.067 | < 0.034 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Fluoranthene | ug/l | 300[1] | < 0.017 h | < 0.0033 | 0.034 h | < 0.067 | 0.30 | 0.0081 | < 0.0033 | 0.0038 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Fluorene | ug/l | 300[1] | 0.12 h | 0.064 | 1.5 h | 1.6 | 14 | 0.015 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | 0.012 |
| Naphthalene | ug/l | 70[1] | 0.020 bh | 0.020 | 0.44 h | 0.58 | 12 | 0.011 | 0.0034 | 0.0047 | < 0.0034 | < 0.0033 | 0.0091 | 0.0067 |
| Phenanthrene | ug/l | | < 0.017 h | < 0.0033 | 0.95 h | 0.91 | 3.4 | < 0.0037 | < 0.0033 | < 0.0034 | < 0.0034 | < 0.0033 | < 0.0033 | 0.0040 |
| Pyrene | ug/l | 200[1] | < 0.017 h | < 0.0033 | 0.029 h | < 0.067 | 0.12 | < 0.0037 | < 0.0033 | 0.0038 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |

See Table 3-18 for data qualifiers and footnotes.

# Table 4-2
# 2016 Water Quality Data
# Comparison to ARARs and TBCs
# Middle Sand Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | | **Location** | **W252N** | **W253** | **W254** | **W255** |
|---|---|---|---|---|---|---|
| | | **Date** | **10/19/2016** | **10/11/2016** | **10/18/2016** | **10/11/2016** |
| Parameter | Units | Response Action Objective | | | | |
| **Exceedance Key** | | **Bold** | | | | |
| Carcinogenic PAHs | | | | | | |
| Benz(a)anthracene | ug/l | NA | < 0.0033 | < 0.0065 | < 0.0033 | 17 |
| Benzo(b)fluoranthene | ug/l | NA | < 0.0033 c | < 0.0065 c | < 0.0033 c | 14 c |
| Benzo(k)fluoranthene | ug/l | NA | < 0.0033 | < 0.0065 | < 0.0033 | 4.7 |
| Benzo(a)pyrene | ug/l | **0.06**[2] | < 0.0033 | < 0.0065 | < 0.0033 | **9.2** |
| Chrysene | ug/l | NA | < 0.0033 | < 0.0065 | < 0.0033 | 9.6 |
| Dibenz(a,h)anthracene | ug/l | NA | < 0.0033 | < 0.0065 | < 0.0033 | 1.2 |
| Indeno(1,2,3-cd)pyrene | ug/l | NA | < 0.0033 | < 0.0065 | < 0.0033 | 4.1 |
| | | | | | | |
| Pentachlorophenol | ug/l | **0.3**[1] | < 0.29 | < 0.57 | < 0.29 | **14** |
| | | | | | | |
| BaP Equivalent[3] | ug/l | **0.06**[2] | ND a | ND a | ND a | **14 a** |
| Hazard Index[4] | | **1** | ND a | ND a | ND a | **701 a** |
| | | | | | | |
| Non-Carginogenic PAHs | | | | | | |
| 2-Methylnaphthalene | ug/l | | 0.0054 | 0.013 | < 0.0033 | 110 |
| Acenaphthene | ug/l | 400[1] | < 0.0033 | 10 | < 0.0033 | 210 |
| Acenaphthylene | ug/l | | < 0.0033 | 0.12 | < 0.0033 | 5.0 |
| Anthracene | ug/l | 2000[1] | 0.010 | 0.049 | 0.0097 | 10 |
| Benzo(g,h,i)perylene | ug/l | | < 0.0033 | < 0.0065 | < 0.0033 | 3.3 |
| Fluoranthene | ug/l | 300[1] | 0.0074 | 0.023 | < 0.0033 | 85 |
| Fluorene | ug/l | 300[1] | 0.0066 | 1.4 | < 0.0033 | 110 |
| Naphthalene | ug/l | **70**[1] | 0.058 | 0.028 | 0.0046 | **2800** |
| Phenanthrene | ug/l | | 0.012 | 0.14 | < 0.0033 | 170 |
| Pyrene | ug/l | 200[1] | 0.0083 | 0.012 | < 0.0033 | 48 |

See Table 3-18 for data qualifiers and footnotes.

# Table 4-3
# 2016 Water Quality Data
# Comparison to ARARs and TBCs
# Lower Aquifer Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| | | **Location** | **W300SPN** | **W301** | **W328** | **S-3** |
|---|---|---|---|---|---|---|
| | | **Date** | **10/18/2016** | **10/20/2016** | **10/20/2016** | **10/13/2016** |
| Parameter | Units | Response Action Objective | | | | |
| **Exceedance Key** | | **Bold** | | | | |
| Carcinogenic PAHs | | | | | | |
| Benz(a)anthracene | ug/l | NA | < 0.0034 | 0.0065 | < 0.0033 | < 0.0033 |
| Benzo(b)fluoranthene | ug/l | NA | < 0.0034 c | 0.0057 c | < 0.0033 c | < 0.0033 c |
| Benzo(k)fluoranthene | ug/l | NA | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Benzo(a)pyrene | ug/l | **0.06[2]** | < 0.0034 | 0.0084 | < 0.0033 | < 0.0033 |
| Chrysene | ug/l | NA | < 0.0034 | 0.025 | < 0.0033 | < 0.0033 |
| Dibenz(a,h)anthracene | ug/l | NA | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Indeno(1,2,3-cd)pyrene | ug/l | NA | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| | | | | | | |
| Pentachlorophenol | ug/l | **0.3[1]** | < 0.30 | < 0.29 | < 0.29 | < 0.29 |
| | | | | | | |
| BaP Equivalent[3] | ug/l | 0.06[2] | ND a | 0.0099 a | ND a | ND a |
| Hazard Index[4] | | 1 | ND a | 0.16 a | ND a | ND a |
| | | | | | | |
| Non-Carginogenic PAHs | | | | | | |
| 2-Methylnaphthalene | ug/l | | < 0.0034 | 0.0083 | 0.0061 | < 0.0033 |
| Acenaphthene | ug/l | 400[1] | < 0.0034 | 0.0075 | < 0.0033 | < 0.0033 |
| Acenaphthylene | ug/l | | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 |
| Anthracene | ug/l | 2000[1] | 0.0049 | 0.018 | 0.013 | 0.016 |
| Benzo(g,h,i)perylene | ug/l | | < 0.0034 | 0.0034 | < 0.0033 | < 0.0033 |
| Fluoranthene | ug/l | 300[1] | 0.0036 | 0.012 | 0.0050 | < 0.0033 |
| Fluorene | ug/l | 300[1] | < 0.0034 | 0.0073 | 0.0037 | < 0.0033 |
| Naphthalene | ug/l | 70[1] | 0.011 | 0.018 | 0.013 | 0.0044 |
| Phenanthrene | ug/l | | 0.0035 | 0.041 | 0.0083 | < 0.0033 |
| Pyrene | ug/l | 200[1] | < 0.0034 | 0.017 | 0.0041 | < 0.0033 |

See Table 3-18 for data qualifiers and footnotes.

# Table 4-4
# 2016 Hazard Index Summary
# All Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| Location | | U1 | U1 | U1 | U1 | U11 | | U12 | U1A | U2A | U4N | U5 | U6N | U7N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Date** | | **2/04/2016** | **6/30/2016** | **9/12/2016** | **10/18/2016** | **10/11/2016** | | **10/11/2016** | **10/18/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** | **10/11/2016** |
| **Sample Type** | | **N** | **N** | **N** | **N** | **N** | **FD** | **N** | **N** | **N** | **N** | **N** | **N** | **N** |
| Parameter | Units | | | | | | | | | | | | | |
| Sample PAH Concentrations | | | | | | | | | | | | | | |
| Benz(a)anthracene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0.036** | 0 | **0.14** | **0.47** | **0.075** |
| Benzo(b)fluoranthene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0.035** | 0 | 0 | **0.25** | 0 |
| Benzo(k)fluoranthene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0.034** | 0 | 0 | **0.083** | 0 |
| Benzo(a)pyrene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0.035** | 0 | 0 | **0.13** | 0 |
| Chrysene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0.042** | 0 | **0.052** | **0.14** | 0 |
| Dibenz(a,h)anthracene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0.036** | 0 | 0 | 0 | 0 |
| Indeno(1,2,3-cd)pyrene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0.035** | 0 | 0 | **0.055** | 0 |
| Calculated BaP Equivalents | | | | | | | | | | | | | | |
| Benz(a)anthracene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0036 | 0 | 0.014 | 0.047 | 0.0075 |
| Benzo(b)fluoranthene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0035 | 0 | 0 | 0.025 | 0 |
| Benzo(k)fluoranthene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00034 | 0 | 0 | 0.00083 | 0 |
| Benzo(a)pyrene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.035 | 0 | 0 | 0.13 | 0 |
| Chrysene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00042 | 0 | 0.00052 | 0.0014 | 0 |
| Dibenz(a,h)anthracene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.036 | 0 | 0 | 0 | 0 |
| Indeno(1,2,3-cd)pyrene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0035 | 0 | 0 | 0.0055 | 0 |
| | | | | | | | | | | | | | | |
| BaP Equivalent[3] | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.08236 | 0 | 0.01452 | 0.20973 | 0.0075 |
| | | | | | | | | | | | | | | |
| Pentachlorophenol | ug/l | 0 | 0 | 0 | 0 | **480** | **570** | **12** | 0 | **46** | **110** | **16** | **650** | **53** |
| | | | | | | | | | | | | | | |
| Hazard Index[4] | | 0 | 0 | 0 | 0 | 16000 | 19000 | 400 | 0 | 1535 | 3667 | 534 | 21670 | 1767 |

See Table 3-18 for data qualifiers and footnotes.

# Table 4-4
# 2016 Hazard Index Summary
## All Wells
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| | **Location** | **W6N** | **W6N** | **W7** | **W7** | **W10** | **W104** | **W127N** | **W130** | **W132** | | **W252N** | **W253** | **W254** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Date** | **6/30/2016** | **10/14/2016** | **6/30/2016** | **10/19/2016** | **10/19/2016** | **10/20/2016** | **10/18/2016** | **10/14/2016** | **10/14/2016** | | **10/19/2016** | **10/11/2016** | **10/18/2016** |
| | **Sample Type** | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **N** | **FD** | **N** | **N** | **N** |
| Parameter | Units | | | | | | | | | | | | | |
| Sample PAH Concentrations | | | | | | | | | | | | | | |
| Benz(a)anthracene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(b)fluoranthene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(k)fluoranthene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(a)pyrene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chrysene | ug/l | 0 | 0 | 0 | 0 | 0 | **0.018** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dibenz(a,h)anthracene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indeno(1,2,3-cd)pyrene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Calculated BaP Equivalents | | | | | | | | | | | | | | |
| Benz(a)anthracene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(b)fluoranthene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(k)fluoranthene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(a)pyrene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chrysene | ug/l | 0 | 0 | 0 | 0 | 0 | 0.00018 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dibenz(a,h)anthracene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indeno(1,2,3-cd)pyrene | ug/l | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | |
| BaP Equivalent[3] | ug/l | 0 | 0 | 0 | 0 | 0 | 0.00018 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | |
| Pentachlorophenol | ug/l | **200** | **49** | **840** | **1200** | **200** | **0.37** | 0 | 0 | **0.33** | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | |
| Hazard Index[4] | | 6667 | 1633 | 28000 | 40000 | 6667 | 12 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |

See Table 3-18 for data qualifiers and footnotes.

# Table 4-4
# 2016 Hazard Index Summary
# All Wells
# Joslyn Manufacturing & Supply Co.
# Brooklyn Center, MN

| Location | | W255 | W300SPN | W301 | W328 | S-1A | S-2 | S-3 |
|---|---|---|---|---|---|---|---|---|
| Date | | 10/11/2016 | 10/18/2016 | 10/20/2016 | 10/20/2016 | 10/13/2016 | 10/13/2016 | 10/13/2016 |
| Sample Type | | N | N | N | N | N | N | N |
| Parameter | Units | | | | | | | |
| Sample PAH Concentrations | | | | | | | | |
| Benz(a)anthracene | ug/l | **17** | 0 | **0.0065** | 0 | 0 | 0 | 0 |
| Benzo(b)fluoranthene | ug/l | **14** | 0 | **0.0057** | 0 | 0 | 0 | 0 |
| Benzo(k)fluoranthene | ug/l | **4.7** | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(a)pyrene | ug/l | **9.2** | 0 | **0.0084** | 0 | 0 | 0 | 0 |
| Chrysene | ug/l | **9.6** | 0 | **0.025** | 0 | 0 | 0 | 0 |
| Dibenz(a,h)anthracene | ug/l | **1.2** | 0 | 0 | 0 | 0 | 0 | 0 |
| Indeno(1,2,3-cd)pyrene | ug/l | **4.1** | 0 | 0 | 0 | 0 | 0 | 0 |
| Calculated BaP Equivalents | | | | | | | | |
| Benz(a)anthracene | ug/l | 1.7 | 0 | 0.00065 | 0 | 0 | 0 | 0 |
| Benzo(b)fluoranthene | ug/l | 1.4 | 0 | 0.00057 | 0 | 0 | 0 | 0 |
| Benzo(k)fluoranthene | ug/l | 0.047 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(a)pyrene | ug/l | 9.2 | 0 | 0.0084 | 0 | 0 | 0 | 0 |
| Chrysene | ug/l | 0.096 | 0 | 0.00025 | 0 | 0 | 0 | 0 |
| Dibenz(a,h)anthracene | ug/l | 1.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indeno(1,2,3-cd)pyrene | ug/l | 0.41 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| BaP Equivalent[3] | ug/l | 14.053 | 0 | 0.00987 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| Pentachlorophenol | ug/l | **14** | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| Hazard Index[4] | | 701 | 0 | 0.16 | 0 | 0 | 0 | 0 |

See Table 3-18 for data qualifiers and footnotes.

1 (HRL) Health Risk Limit. Minnesota Rules 4717.7100 to 4717.7800.

2 (HBV) Health Based Value. Minnesota Department of Health (MDH) developed Health Based Value (HBV) for Benzo(a)pyrene of 0.06 ug/L.

3 Total BaP equivalence calculated using zero for the detection limit on the non detected compounds.

**Benzo(a) Pyrene (BaP) Equivalence - Relative Potency Factors from USEPA, 1993, EPA/600/R-93/089**

| | CAS No. | Site Conc. (mg/kg) dry weight | Relative Potency Factor | BaP Equivalent (mg/kg) |
|---|---|---|---|---|
| Benzo(a)anthracene | 56553 | 0.000 | 0.1 | 0.000 |
| Benzo(b)fluoranthene | 205992 | 0.000 | 0.1 | 0.000 |
| Benzo(k)Fluoranthene | 207089 | 0.000 | 0.01 | 0.000 |
| Benzo(a)pyrene | 50328 | 0.000 | 1 | 0.000 |
| Chrysene | 218019 | 0.000 | 0.01 | 0.000 |
| Dibenz(a,h)anthracene | 53703 | 0.000 | 1 | 0.000 |
| Indeno(1,2,3-cd)pyrene | 193395 | 0.000 | 0.1 | 0.000 |
| | | Total BaP equivalence =<br>compare this value<br>to the BaP criteria | | 0.000 |

4 Hazard Index Calculation =

$$\frac{\text{B(a)P Equivalent}}{0.06} + \frac{\text{Pentachlorophenol}}{0.3}$$

See Table 3-18 for additional data qualifiers and footnotes.

## Table 4-5
## 2016 and Historical Summary of PCP and PAH Removal by OU1 & OU2 Wells
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| Date | Volume Removed by Pumpout System (gallons) | Total cPAH Concentration (ug/L) | Mass of cPAHs* Removed (lbs) | Total PAH Concentration** (ug/L) | Mass of PAHs Removed (lbs) | PCP Concentration (ug/L) | Mass of PCP Removed (lbs) |
|---|---|---|---|---|---|---|---|
| 1st Quarter 2016 | 15,722,440 | ND | 0.00 | 60 | 7.9 | 250 | 33 |
| 2nd Quarter 2016 | 17,781,480 | ND | 0.00 | 130 | 19.3 | 310 | 46 |
| 3rd Quarter 2016 | 17,304,830 | ND | 0.00 | 49 | 7.1 | 260 | 38 |
| 4th Quarter 2016 | 16,704,530 | ND | 0.00 | 67 | 9.3 | 330 | 46 |
| | | | | | | | |
| Total 2016 | 67,513,280 | | 0.00 | | 44 | | 162 |
| Total 2015 | 73,464,380 | | 0.00 | | 29 | | 147 |
| Total 2014 | 66,520,220 | | 0.00 | | 28 | | 136 |
| Total 2013 | 70,269,730 | | 0.00 | | 49 | | 168 |
| Total 2012 | 71,278,450 | | 0.00 | | 38 | | 166 |
| Total 2011 | 75,591,335 | | 0.00 | | 41 | | 177 |
| Total 2010 | 66,756,630 | | 0.00 | | 68 | | 190 |
| Total 2009 | 71,591,110 | | 0.00 | | 64 | | 220 |
| Total 2008 | 67,016,341 | | 0.00 | | 58 | | 235 |
| Total 2007 | 72,387,704 | | 0.00 | | 69 | | 244 |
| Total 2006 | 69,871,530 | | 0.00 | | 62 | | 178 |
| Total 2005 | 84,200,690 | | 0.00 | | 54 | | 214 |
| Total 2004 | 81,794,430 | | 0.00 | | 111 | | 267 |
| Total 2003 | 86,174,040 | | 0.00 | | 126 | | 429 |
| Total 2002 | 77,231,770 | | 0.00 | | 107 | | 444 |
| Total 2001 | 63,925,430 | | 0.97 | | 78 | | 320 |
| Total 2000 | 66,833,790 | | 8.36 | | 193 | | 341 |
| Total 1999 | 54,022,380 | | 0.00 | | 62 | | 331 |
| Total 1998 | 65,465,040 | | 0.00 | | 72 | | 337 |
| Total 1997 | 61,962,020 | | 9.72 | | 700 | | 507 |
| Total 1996 | 67,609,091 | | 2.13 | | 115 | | 761 |
| Total 1995 | 71,469,880 | | 0.30 | | 156 | | 495 |
| Total 1994 | 60,076,669 | | 2.04 | | 162 | | 725 |
| Total 1993 | 79,877,815 | | 2.41 | | 230 | | 764 |
| Total 1992 | 86,723,040 | | 0.00 | | 157 | | 833 |
| Total 1991 | 88,091,420 | | 2.64 | | 275 | | 782 |
| Total 1990 | 85,174,190 | | 0.77 | | 153 | | 586 |
| Total 1989 | 62,787,740 | | 4.17 | | 230 | | 564 |
| Total Cumulative | 2,015,680,145 | | 33 | | 3,528 | | 10,723 |

ND Not detected.

* cPAHs are as follows: benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, indeno(123cd)pyrene, and dibenzo(ah)anthracene

** Using EPA Method 8270-L

Notes: PAH, cPAH, and pentachlorophenol concentrations are from pumpout system effluent sampling results (Table 3-5).
Volume removed by pumpout system obtained from Table 3-2.

## Table 4-6
## Evaluation of Middle Sand Pumping Performance
## Joslyn Manufacturing & Supply Company
## Brooklyn Center, MN

### Step 1: Calculate Lower Aquifer Head beneath wells 253 and 255 (ft, MSL)

| | Actual | Projected Lower Aquifer Potentiometric level below | | Actual |
|---|---|---|---|---|
| | Well 300 SPN | Well 253 | Well 255 | Well 328 |
| 1/6/2016 | 848.01 | 848.41 | 848.58 | 849.15 |
| 2/1/2016 | 847.66 | 848.06 | 848.23 | 848.80 |
| 2/29/2016 | 847.59 | 847.98 | 848.15 | 848.70 |
| 4/1/2016 | 847.81 | 848.20 | 848.37 | 848.93 |
| 5/2/2016 | 848.06 | 848.47 | 848.64 | 849.22 |
| 6/1/2016 | 847.79 | 848.18 | 848.35 | 848.90 |
| 7/1/2016 | 847.16 | 847.58 | 847.76 | 848.35 |
| 8/5/2016 | 848.24 | 848.65 | 848.82 | 849.40 |
| 9/8/2016 | 848.90 | 848.95 | 848.97 | 849.03 |
| 9/30/2016 | 849.18 | 849.59 | 849.77 | 850.35 |
| 10/10/2016 | 848.96 | 849.34 | 849.51 | 850.05 |
| 11/8/2016 | 848.61 | 849.01 | 849.18 | 849.74 |
| 12/1/2016 | 848.91 | 849.31 | 849.48 | 850.04 |

Notes

Actual values are from field measurements of water levels in ft, MSL.

Projected levels are calculated as:

Projected levels below Well 253 = (well 328 level - well 300SPN level)*0.35 + well 300SPN level - ft, MSL

Projected levels below Well 255 = (well 328 level - well 300SPN level)*0.50 + well 300SPN level - ft, MSL

The formulas were derived from the September 29, 2009 potentiometric surface map.

### Step 2: Compare "Projected Lower Aquifer Head (Target)" Calculated Above to "Actual Measured Head in Middle Sand Observation Well"

| | Actual 253 | Target 253 | Target 255 | Actual 255 | Delta | Evaluation |
|---|---|---|---|---|---|---|
| 1/6/2016 | 849.08 | 848.41 | -- | -- | -0.67 | |
| 2/1/2016 | 848.78 | 848.06 | -- | -- | -0.72 | |
| 2/29/2016 | 848.71 | 847.98 | -- | -- | -0.73 | |
| 4/1/2016 | -- | -- | 848.37 | 848.19 | 0.18 | Upward Gradient |
| 5/2/2016 | 849.28 | 848.47 | -- | -- | -0.81 | |
| 6/1/2016 | 849.03 | 848.18 | -- | -- | -0.85 | |
| 7/1/2016 | 848.18 | 847.58 | -- | -- | -0.60 | |
| 8/5/2016 | 849.18 | 848.65 | -- | -- | -0.53 | |
| 9/8/2016 | 849.68 | 848.95 | -- | -- | -0.73 | |
| 9/30/2016 | -- | -- | 849.77 | 849.71 | 0.05 | Upward Gradient |
| 10/10/2016 | 851.28 | 849.34 | -- | -- | -1.94 | |
| 11/8/2016 | 849.48 | 849.01 | -- | -- | -0.47 | |
| 12/1/2016 | 849.73 | 849.31 | -- | -- | -0.42 | |

Notes "Delta" is the head difference between the middle sand and the lower aquifer beneath the observation well. A negative value indicates downward flow at the oservation well. The goal is maintain a near zero head between the middle sand and the lower aquifer.

## Table 4-7
## 2016 and Historical Summary PCP and PAH Removal by DNAPL Recovery System (OU-3)
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| Year | Volume DNAPL Removed (gallons) | Weight DNAPL Removed (pounds) | Total cPAH Concentration (mg/L) | Weight of cPAHs Removed (lbs.) | Total PAH Concentration (mg/L) | Weight of PAHs Removed (lbs.) | PCP Concentration (mg/L) | Weight of PCP Removed (lbs.) |
|---|---|---|---|---|---|---|---|---|
| 2016 | 0 | 0 | 20,600 | 0 | 171,300 | 0 | 170 | 0.00 |
| 2015 | 558 | 5,079 | 20,600 | 88 | 171,300 | 731 | 170 | 0.73 |
| 2014 | 421 | 3,832 | 20,600 | 66 | 171,300 | 552 | 170 | 0.55 |
| 2013 | 660 | 6,007 | 20,600 | 104 | 171,300 | 865 | 170 | 0.86 |
| 2012* | *569* | 5,179 | 20,600 | 90 | 171,300 | 746 | 170 | 0.74 |
| 2011 | 188 | 1,711 | 20,600 | 30 | 171,300 | 246 | 170 | 0.24 |
| 2010 | 336 | 3,058 | 20,600 | 53 | 171,300 | 440 | 170 | 0.44 |
| 2009 | 326 | 2,967 | 20,600 | 51 | 171,300 | 427 | 170 | 0.42 |
| 2008 | 327 | 2,976 | 20,600 | 52 | 171,300 | 429 | 170 | 0.43 |
| 2007 | 105 | 956 | 20,600 | 17 | 171,300 | 138 | 170 | 0.14 |
| 2006 | 707 | 6,435 | 20,600 | 111 | 171,300 | 927 | 170 | 0.92 |
| 2005 | 876 | 7,973 | 20,600 | 138 | 171,300 | 1,148 | 170 | 1.14 |
| 2004 | 870 | 7,918 | 20,600 | 137 | 171,300 | 1,140 | 170 | 1.13 |
| 2003 | 1,515 | 13,789 | 20,600 | 239 | 171,300 | 1,986 | 170 | 1.97 |
| 2002 | 1,928 | 17,548 | 20,600 | 304 | 171,300 | 2,527 | 170 | 2.51 |
| 2001 | 2,026 | 18,440 | 20,600 | 319 | 171,300 | 2,655 | 170 | 2.64 |
| 2000 | 1,045 | 9,511 | 20,600 | 165 | 171,300 | 1,370 | 170 | 1.36 |
| 1999 | 1,258 | 11,450 | 20,600 | 198 | 171,300 | 1,649 | 170 | 1.64 |
| 1998 | 1,712 | 15,582 | 20,600 | 270 | 171,300 | 2,244 | 170 | 2.23 |
| 1997 | 1,205 | 10,967 | 20,600 | 190 | 171,300 | 1,579 | 170 | 1.57 |
| 1996 | 78 | 710 | 20,600 | 12 | 171,300 | 102 | 170 | 0.10 |
| Cumulative Amount Removed | 16,710 | 152,086 |  | 2,634 |  | 21,901 |  | 22 |

Note: 1) Concentrations are taken from 1987 and 1989 DNAPL analyses.
2) DNAPL Specific Gravity = 1.09
3) Weight of PAHs based on EPA method 8270 analysis. Remaining mass of DNAPL made up of other organic compounds.
4) cPAHs are as follows: benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(k)fluoranthene, indeno(123cd)pyrene, and dibenzo(ah)anthracene
5) Volume DNAPL removed was calculated based on volume of DNAPL in tank on December 1, 2015 and December 27, 2016 (Table 3-7).
6) *Volume DNAPL removed in 2012 was corrected in the 2016 report from 780 to 569.

# Table 5-1

## Recommended 2017 Monitoring Program
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| Monitoring Station Identification | Type | Response Action Monitoring Schedule | | |
|---|---|---|---|---|
| | | Water Level | Water Quality | Flow Rate |
| **Shallow Upper Aquifer Wells** | | | | |
| S1A | Monitoring Well | Quarterly | Fall | NA |
| W2N | Monitoring Well | Annually | None | NA |
| W6N | Monitoring Well | Quarterly | Spring, Fall | NA |
| W7 | Monitoring Well | Quarterly | Spring, Fall | NA |
| W10 | Monitoring Well | Annually | Fall | NA |
| W101 | Monitoring Well | Quarterly | None | NA |
| W104 | Monitoring Well | Quarterly | Fall | NA |
| W125N | Monitoring Well | Annually | None | NA |
| W126 | Monitoring Well | Annually | None | NA |
| W127N | Monitoring Well | Annually | Fall | NA |
| W129 | Monitoring Well | Quarterly | None | NA |
| W130 | Monitoring Well | Quarterly | Fall | NA |
| W132 | Monitoring Well | Quarterly | Fall | NA |
| U1 | Monitoring Well/Pumpout Well-Off | Quarterly | Quarterly | Monthly if on |
| U1A | Monitoring Well/Pumpout Well-Off | Annually | Fall | Monthly if on |
| U2A | Pumpout Well | Annually | Fall (g.o) | Monthly |
| U4N | Pumpout Well | Annually | Fall (o) | Monthly |
| U5 | Pumpout Well | Annually* | Fall (o) | Monthly |
| U6N | Pumpout Well | Annually | Fall (o) | Monthly |
| U7N | Pumpout Well | Annually | Fall (o) | Monthly |
| U8 | Monitoring Well/Pumpout Well-Off | Annually | None | Monthly if on |
| U11 | Pumpout Well | Annually | Fall (g,o) | Monthly |
| U12 | Pumpout Well | Annually | Fall (g,o) | Monthly |
| **Mid-Depth Upper Aquifer Wells** | | | | |
| W201 | Monitoring Well | Annually | None | NA |
| S2 | Monitoring Well | Annually | Fall | NA |
| **Middle Sand Wells** | | | | |
| W252N | Monitoring Well | Annually | Fall | NA |
| W253 | Pumpout Well | Monthly | Fall (o) | Monthly |
| W254 | Monitoring Well | Annually | Fall | NA |
| W255 | Pumpout Well | Monthly | Fall (o) | Monthly |
| **Lower Aquifer Wells** | | | | |
| W300 SPN | Monitoring Well | Monthly | Fall | NA |
| W301 | Monitoring Well | Annually | Fall | NA |
| W328 | Monitoring Well | Monthly | Fall | NA |
| S3 | Monitoring Well | Annually | Fall | NA |

## Table 5-1 (continued)

## Recommended 2017 Monitoring Program
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| Monitoring Station Identification | Type | Response Action Monitoring Schedule | | |
|---|---|---|---|---|
| | | Water Level | Water Quality | Flow Rate |
| **Surface Water Monitoring Locations** | | | | |
| Twin Lake | Surface Water | Quarterly | None | NA |
| NE Drain | Surface Water | NA | None | None |
| Storm Sewer Outlet | Surface Water | NA | None | None |
| Upstream Shingle Creek | Surface Water | NA | None | None |
| **Pumpout System** | | | | |
| Oil/Water Separator | Effluent | None | Quarterly (c) | Monthly (calc.) |
| Tank Fluid Surface | Oil Depth | Quarterly | NA | NA |
| **DNAPL Recovery System** | | | | |
| W251 | DNAPL Recovery Well<br>• Air/water interface<br>• Oil/water interface<br>• Bottom of well/sediment | Monthly<br>Monthly<br>Monthly | None | Annual calculation |
| DNAPL Tank | Storage Tank<br>• Air/water interface<br>• Oil/water interface | Monthly<br>Monthly | None | Monthly (calc.)<br>Monthly (calc.) |

Notes:

The Recommended 2017 Monitoring Program is the same as the 2016 Monitoring Program.

Sample analyzed by enhanced GC/MS unless otherwise noted.
(c) Sample analyzed using standard level 8270
(f) Samples collected when flowing.
(g) Additional samples collected quarterly when discharge lines are cleaned (TSS, COD and pH).
(o) Collected from operating well.

# Table 5-2

## 2017 Maintenance Schedule
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, Minnesota

Weekly and Ongoing Maintenance:

- Complete one site visit/inspection per week.
- Perform flow reading and basic system checks.
- Respond to system-faxed alarm reports and troubleshoot as needed.
- Pick up trash or debris around control building.
- Inspect control building area for damage or vandalism.
- Inspect U1A area fence for damage or vandalism.
- Inspect building interior and control panel for problems.
- Remove snow from control building parking area and sidewalk as needed.
- Fill out a system log sheet including safety log and deliver to office for filing.
- Inspect fenced West Area for signs of trespassing or storm damage.

Routine Quarterly Maintenance:

- Monitor air quality in water treatment vault using a four gas air monitoring instrument.
- Inspect copper transfer lines inside the water treatment vault for leakage.
- Inspect DNAPL tank vault for water infiltration. Remove water as needed. Replace caulking and seals as necessary.
- Test DNAPL storage tank high level shutdown float and Oil/water treatment tank high level shutdown float for proper operation.
- Assess well flows and schedule quarterly line pigging and pump maintenance as needed with T.L. Stevens.
- Implement regular treatments of chlorine tablets or granules on wells U2A, U4N, U11 and U12 to reduce iron bacteria buildup.

Semiannual Maintenance:

- Change air compressor oil and filter (1st and 3rd quarters, or as needed)

Annual Maintenance:

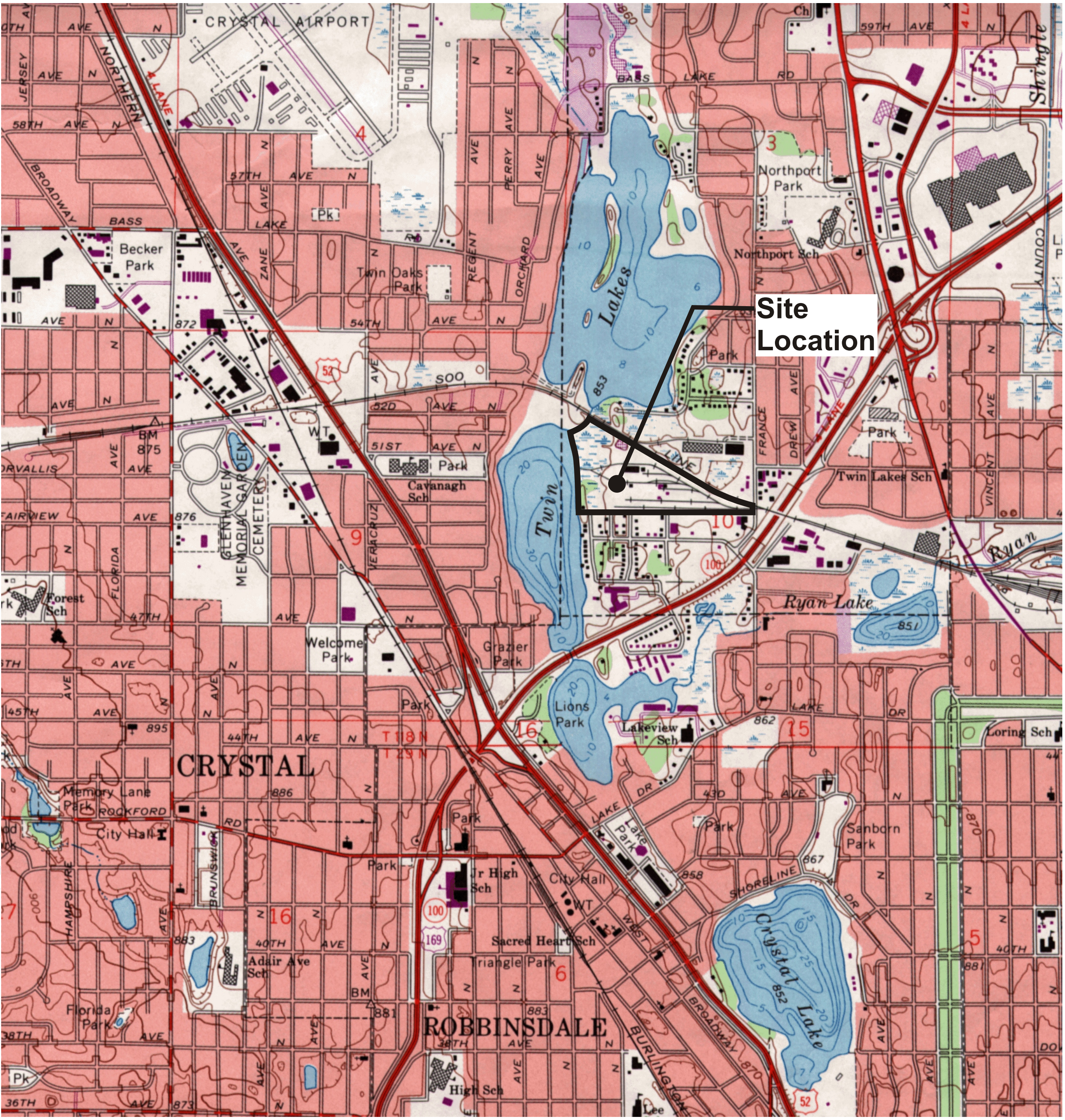
- Meet with City and test high water alarms in sanitary sewer manhole on Azelia Avenue and sanitary sewer lift station south of Building 3 (Spring).
- Redevelop wells U2A, U4N, U6N, U11 and U12 (and other wells where needed) with high pressure jetting and surging, as needed to improve flow rates.

Notes:

Site visit frequency may be decreased with consistent problem free operation.

DNAPL tank and vault will not require maintenance when the system is shut off. The DNAPL system inspection and maintenance requirements may change when containment equipment is replaced.

# Figures



Source: USGS 7.5' Quadrangle, Minneapolis North, MN 1967 Photorevised 1993

0 2000
Scale in Feet

Figure 1-1

SITE LOCATION
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

P:\Mpls\23 MN\23\2327110\MovedFromMpls_p\Graphics\Site Location.CDR RLG 03-10-11

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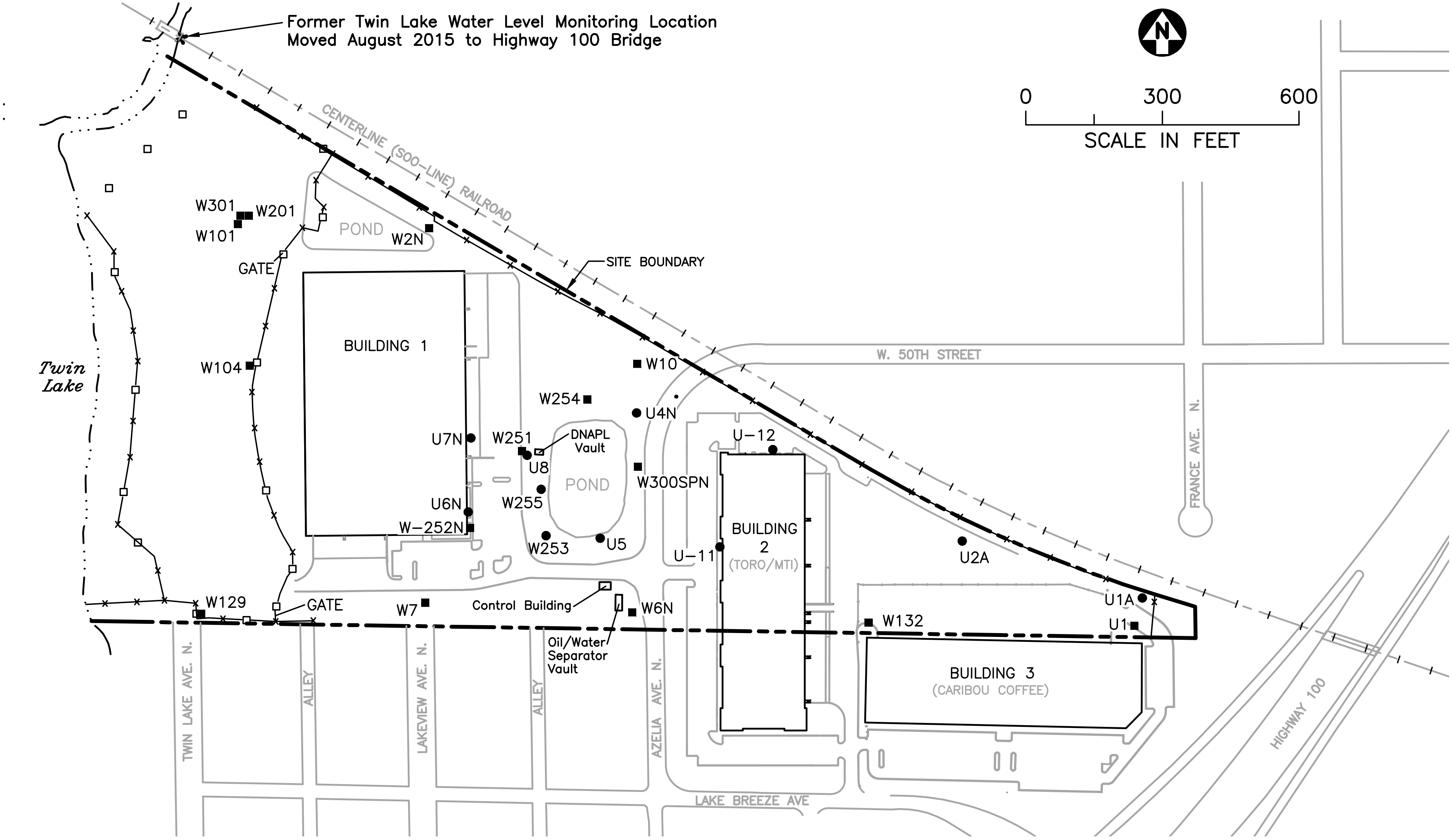

Figure 1-2

2016
ON-SITE MONITORING NETWORK
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

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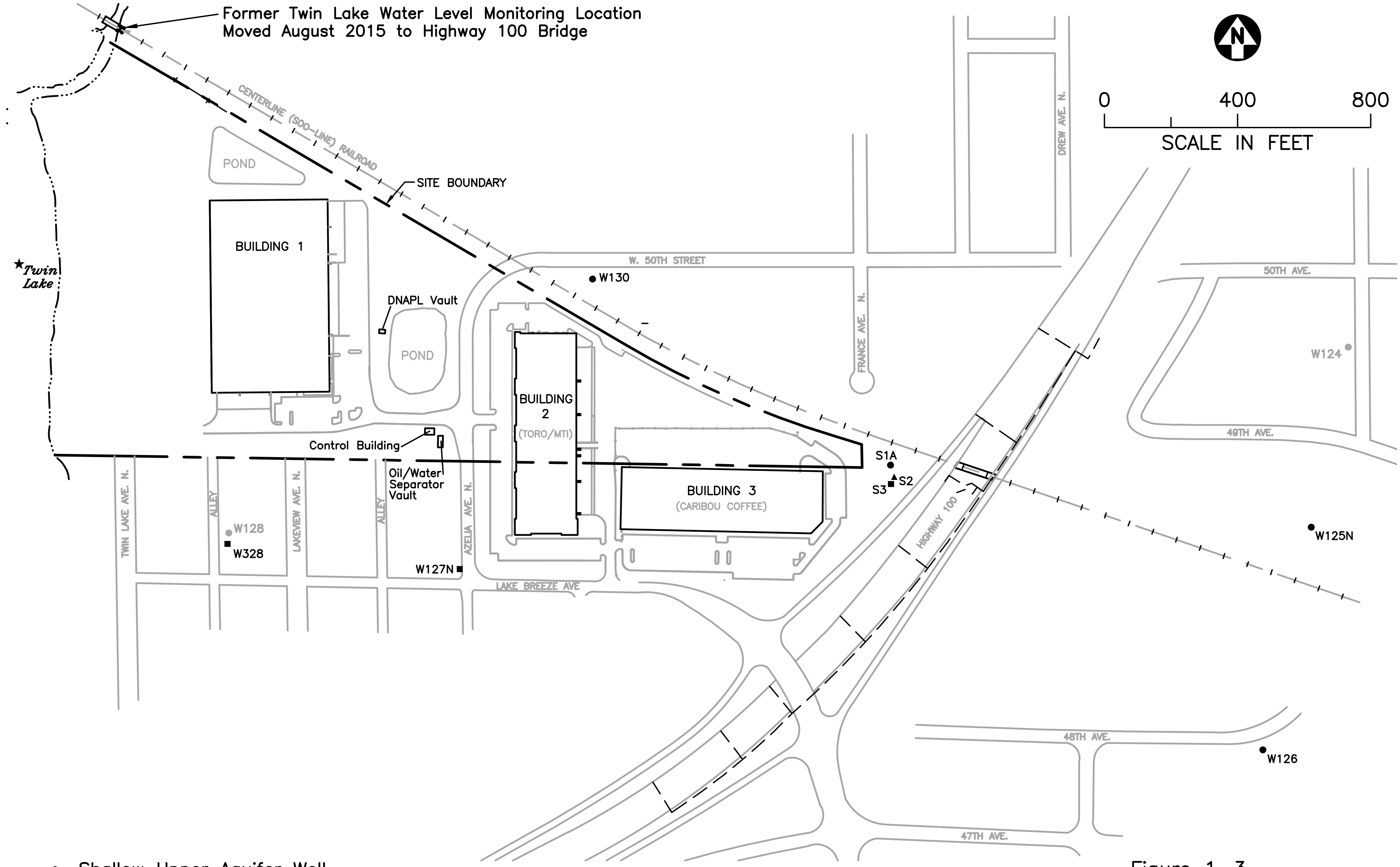
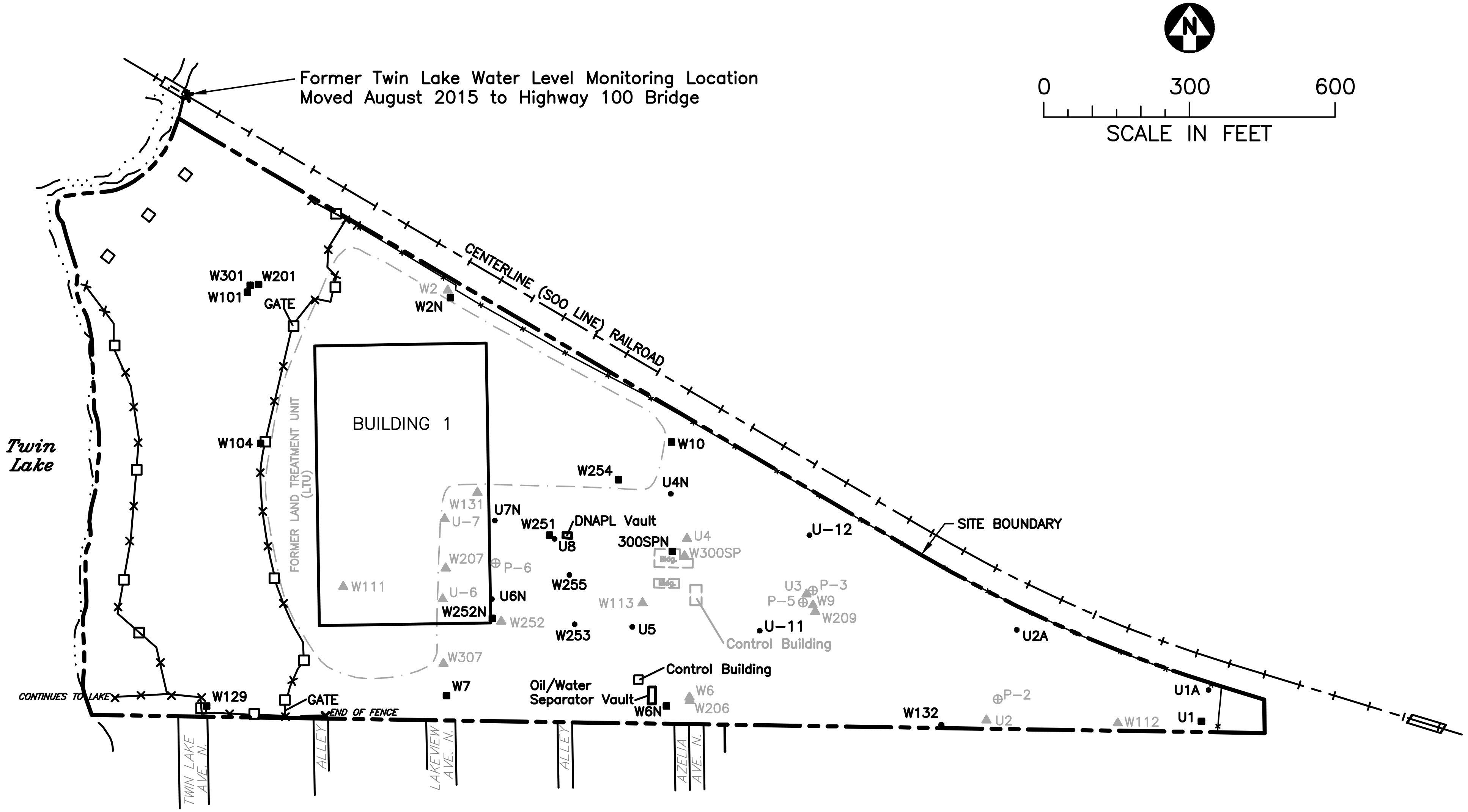


Figure 1–3

2016
OFF–SITE MONITORING NETWORK
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

rlg M:\AdeptWork\RLG\2327011000_AR Figure 1-4.dwg Plot at 200 02/27/2017 12:15:34



Former Site Features

Site Boundary

Posted Signs/Security Fence

● Pump–Out Well

■ Monitoring Well

▲ Sealed Wells

⊕ Sealed Piezometers

Figure 1–4

2016
HISTORICAL ON–SITE MONITORING NETWORK
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

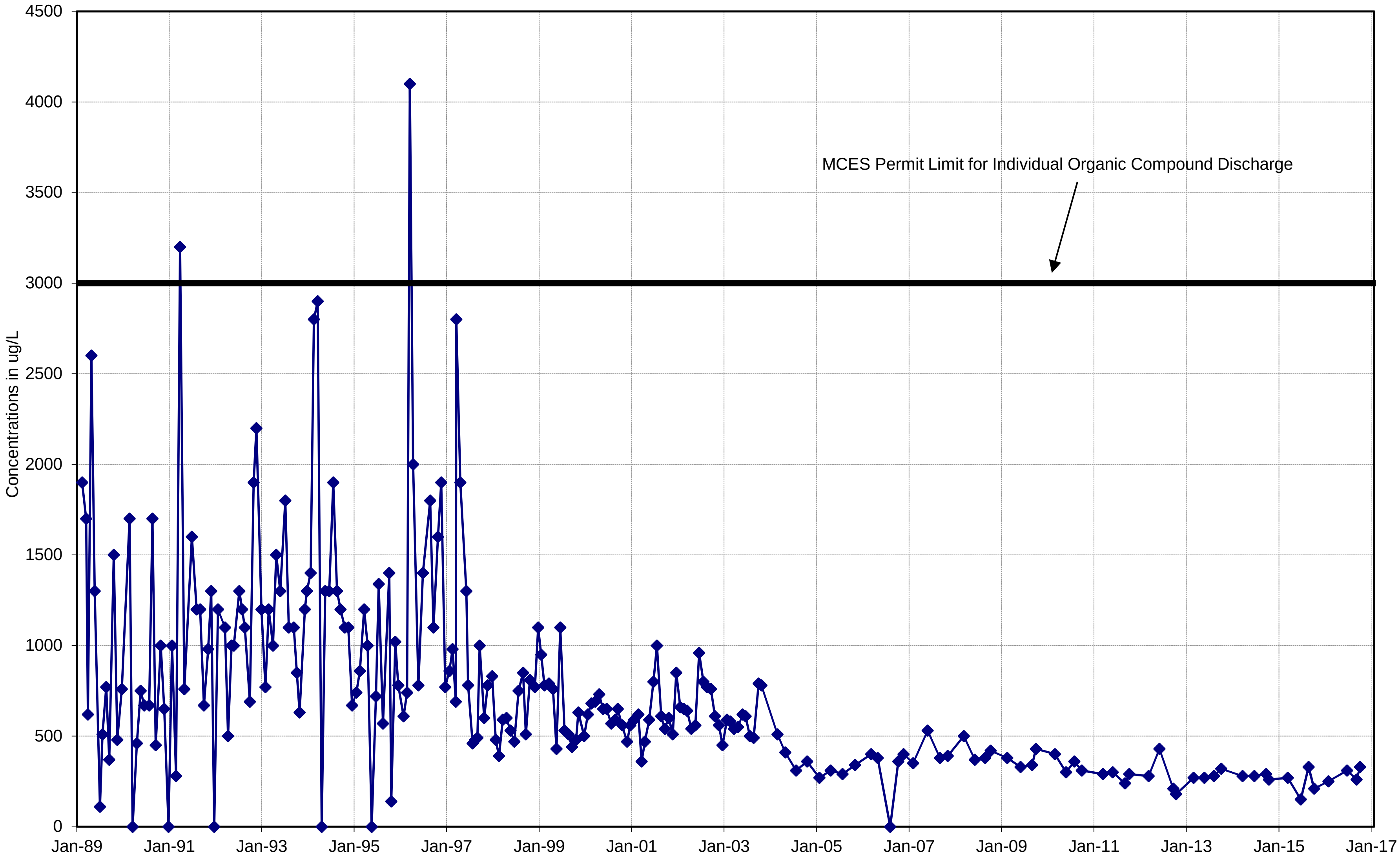


Figure 3-1
PCP in Tank Effluent

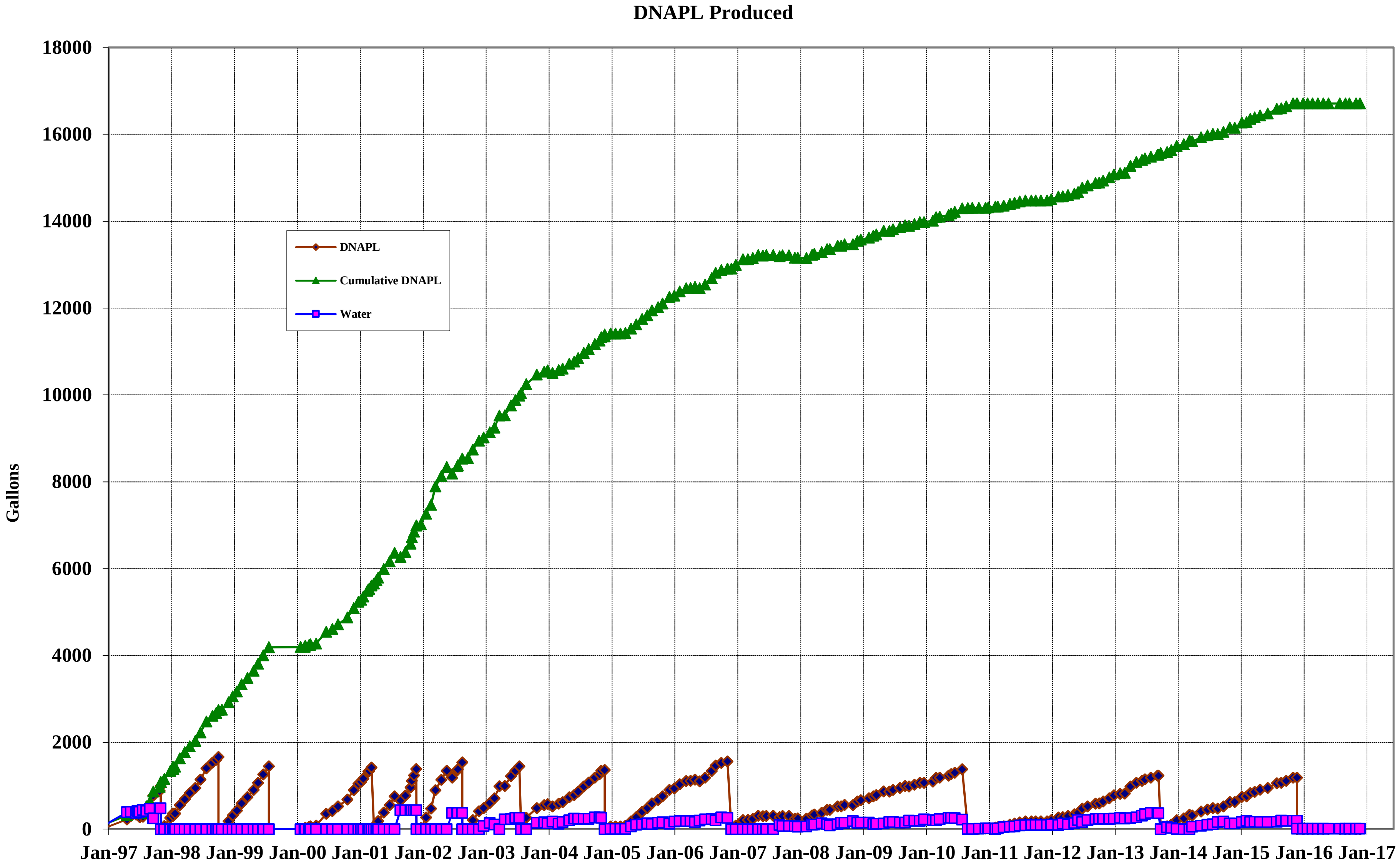


**Figure 3-2**
**Historical DNAPL Storage Tank Volumes**

P:\Mpls\23 MN\27\2327110\WorkFiles\Flow Data\DNAPL\dnapl2016.xls

## DNAPL Oil/Water vs. Pump Intake Elevation

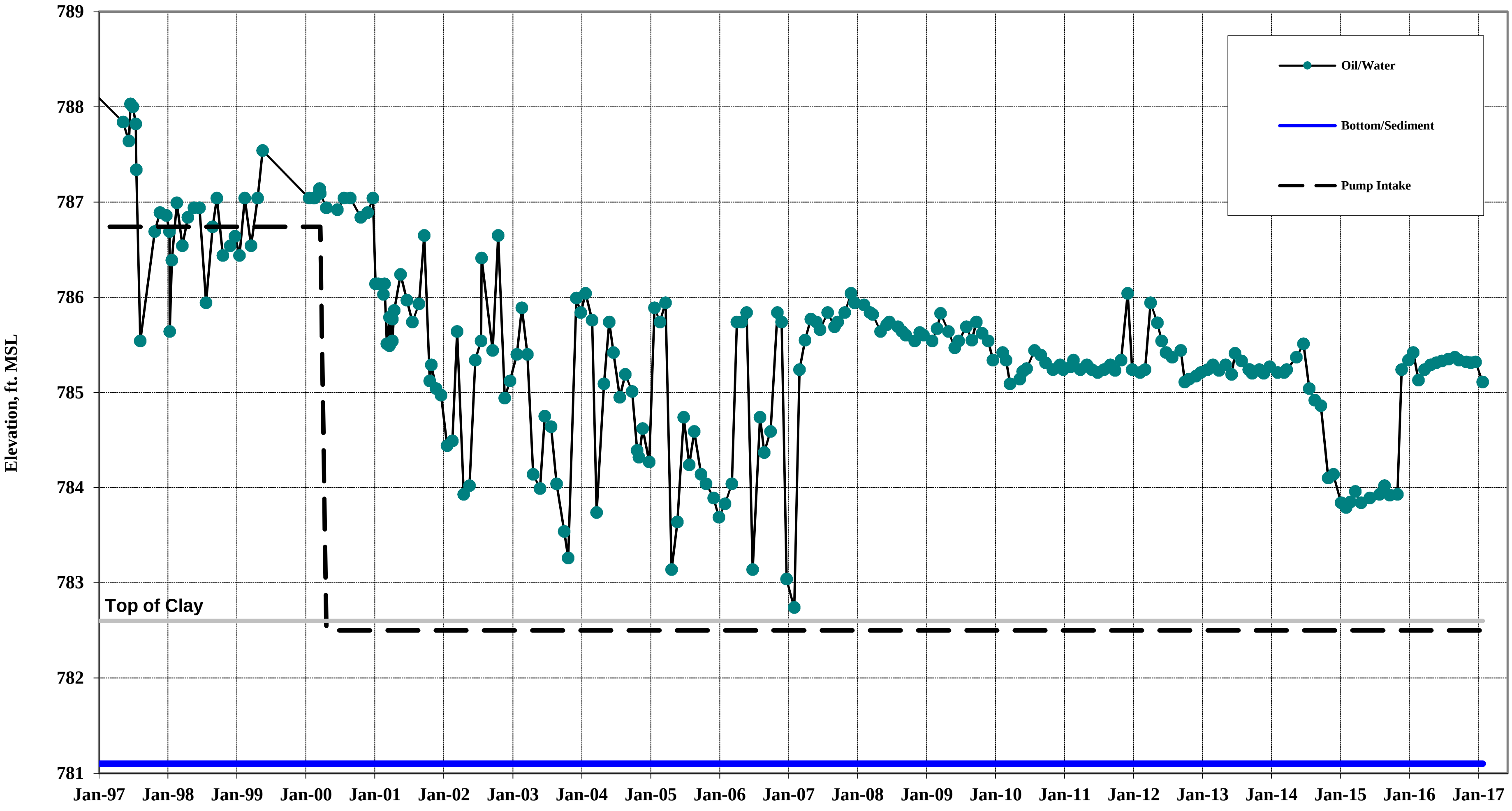


**Figure 3-3**
**Historical DNAPL Thickness**
**W251 Recovery Well**

P:\Mpls\23 MN\27\2327110\WorkFiles\Flow Data\DNAPL\dnapl2016.xls

rlg M:\AdeptWork\RLG\2327011000_AR Figure 4-1.dwg Plot at 0 02/27/2017 12:22:24

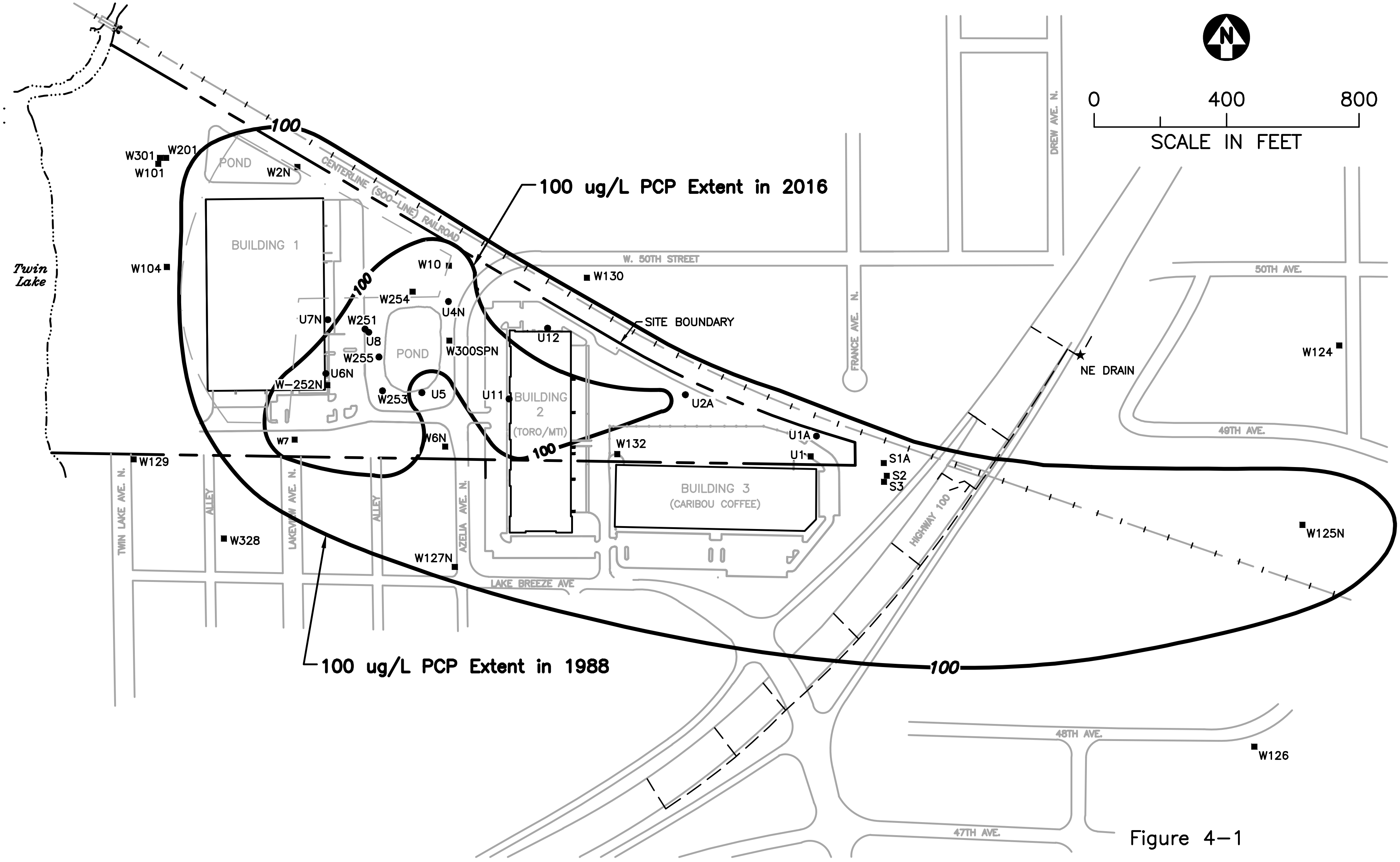
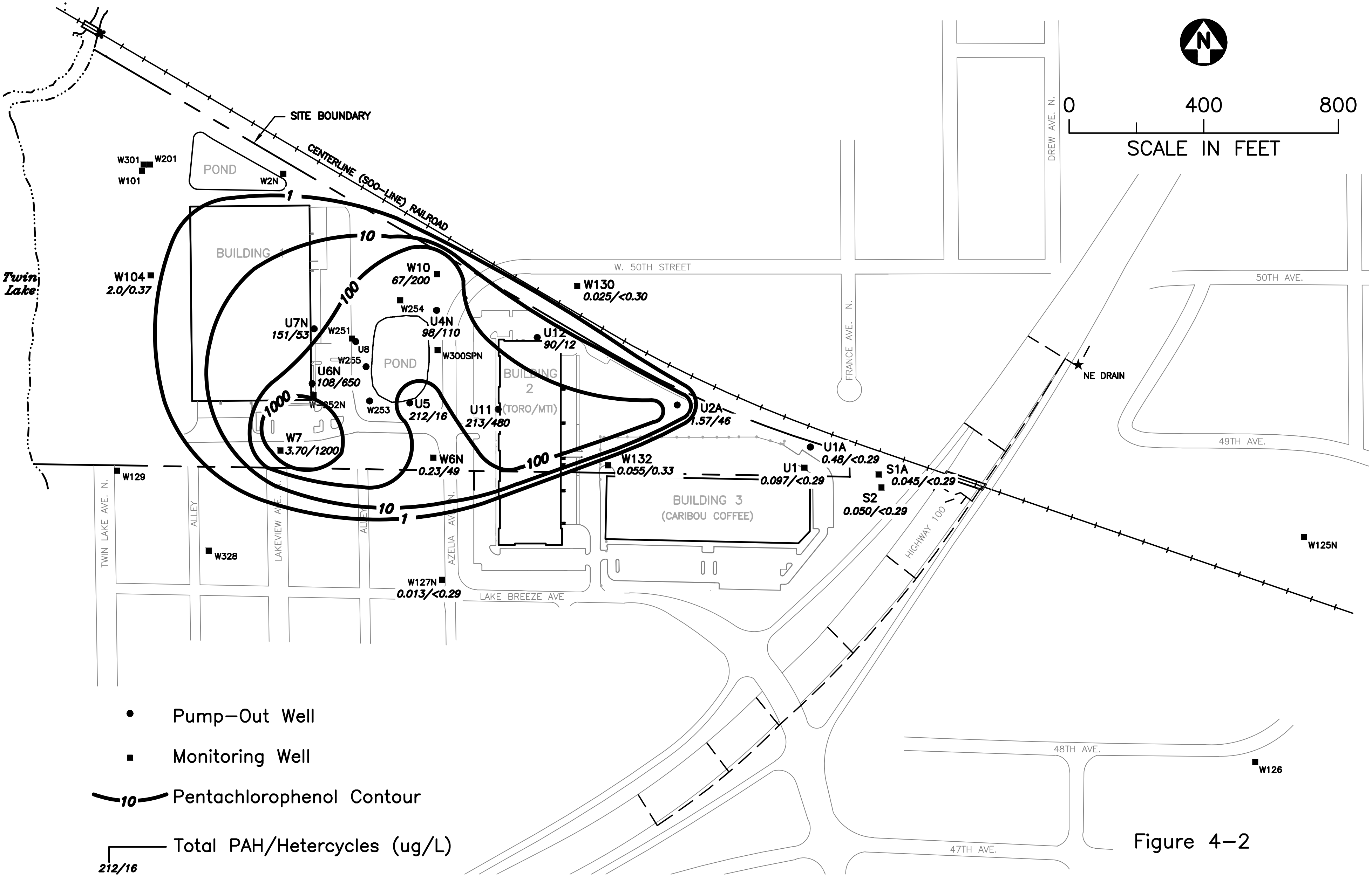


Figure 4-1

DECREASE IN EXTENT OF PCP PLUME
1988 TO 2016
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

- ● Pump-Out Well
- ▪ Monitoring Well

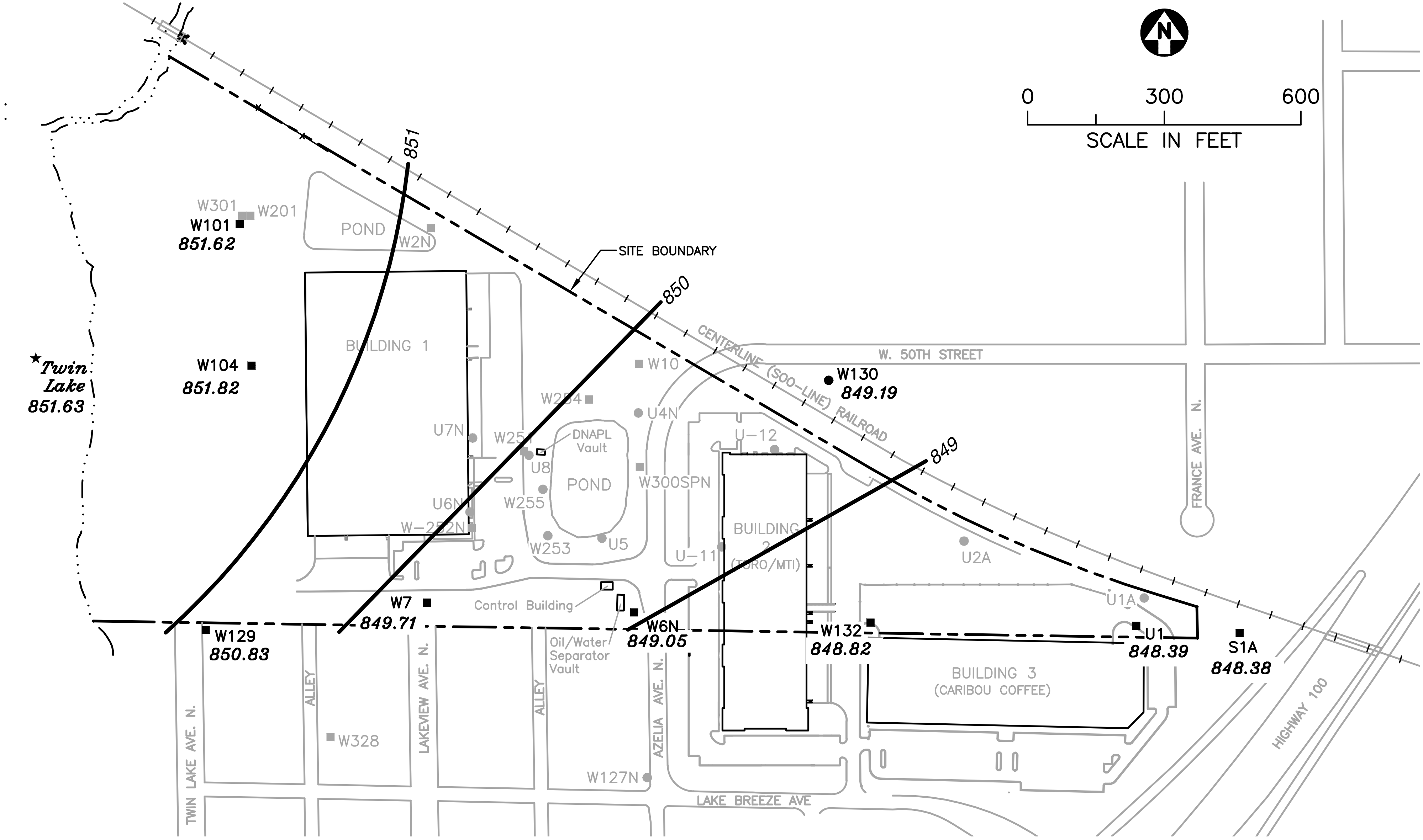
rlg M:\AdeptWork\RLG\2327011000_AR Figure 4-2.dwg Plot at 0 02/27/2017 12:56:56



NOTE: Results from October 2016

Figure 4-2

2016
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co
Brooklyn Center, MN



● Pump–Out Well

■ Monitoring Well

849 Groundwater Contour (Feet, MSL)

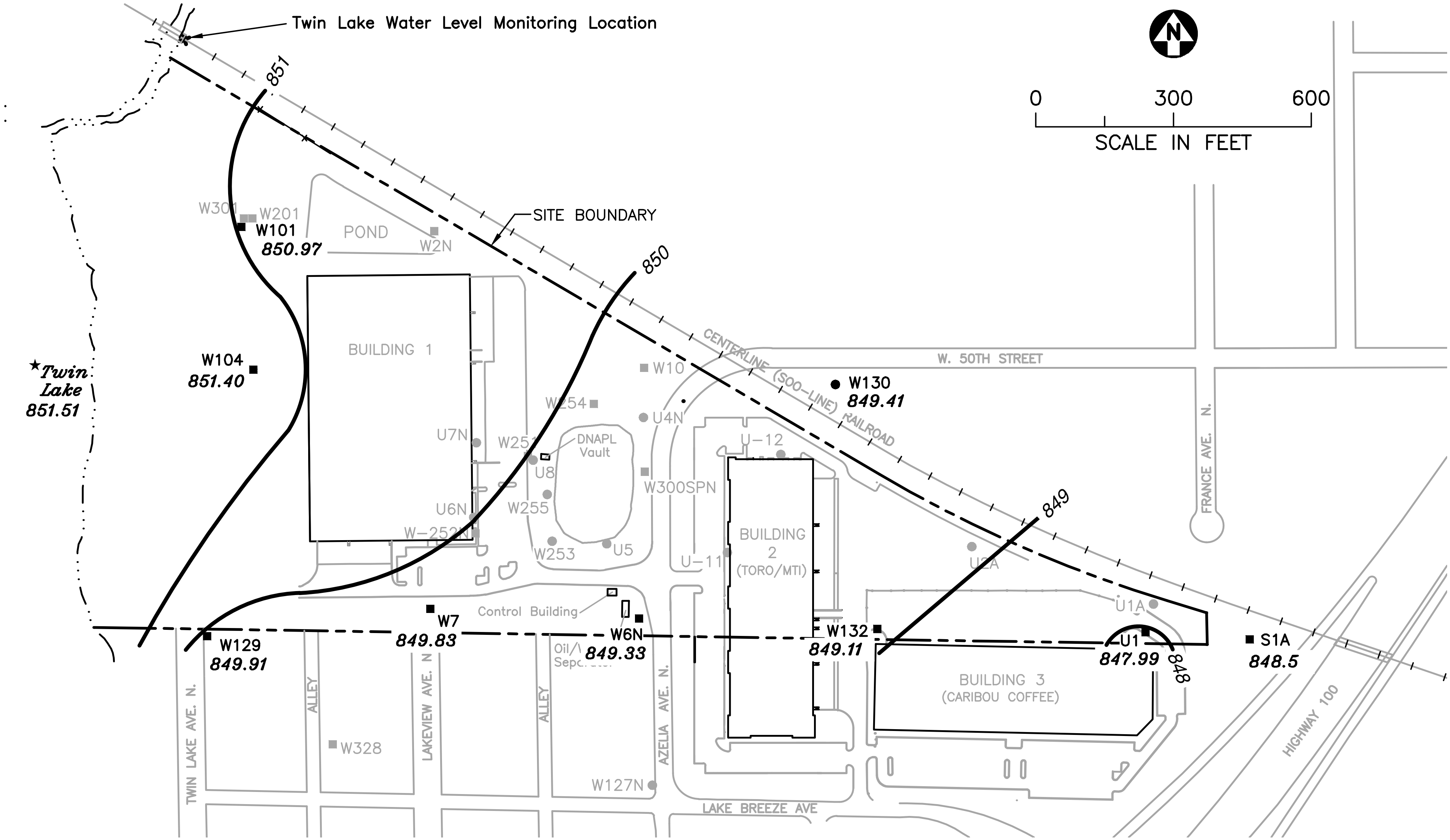
850.81 Water Elevation (Feet, MSL)

★ Twin Lake Water Level taken from Hwy 100 Bridge

Figure 4–3

WATER TABLE MAP
February 5, 2016
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

rlg M:\AdeptWork\RLG\2327011000_AR Figure 4-4.dwg Plot at 0 03/03/2017 10:06:38



● Pump–Out Well

■ Monitoring Well

*849* Groundwater Contour (Feet, MSL)

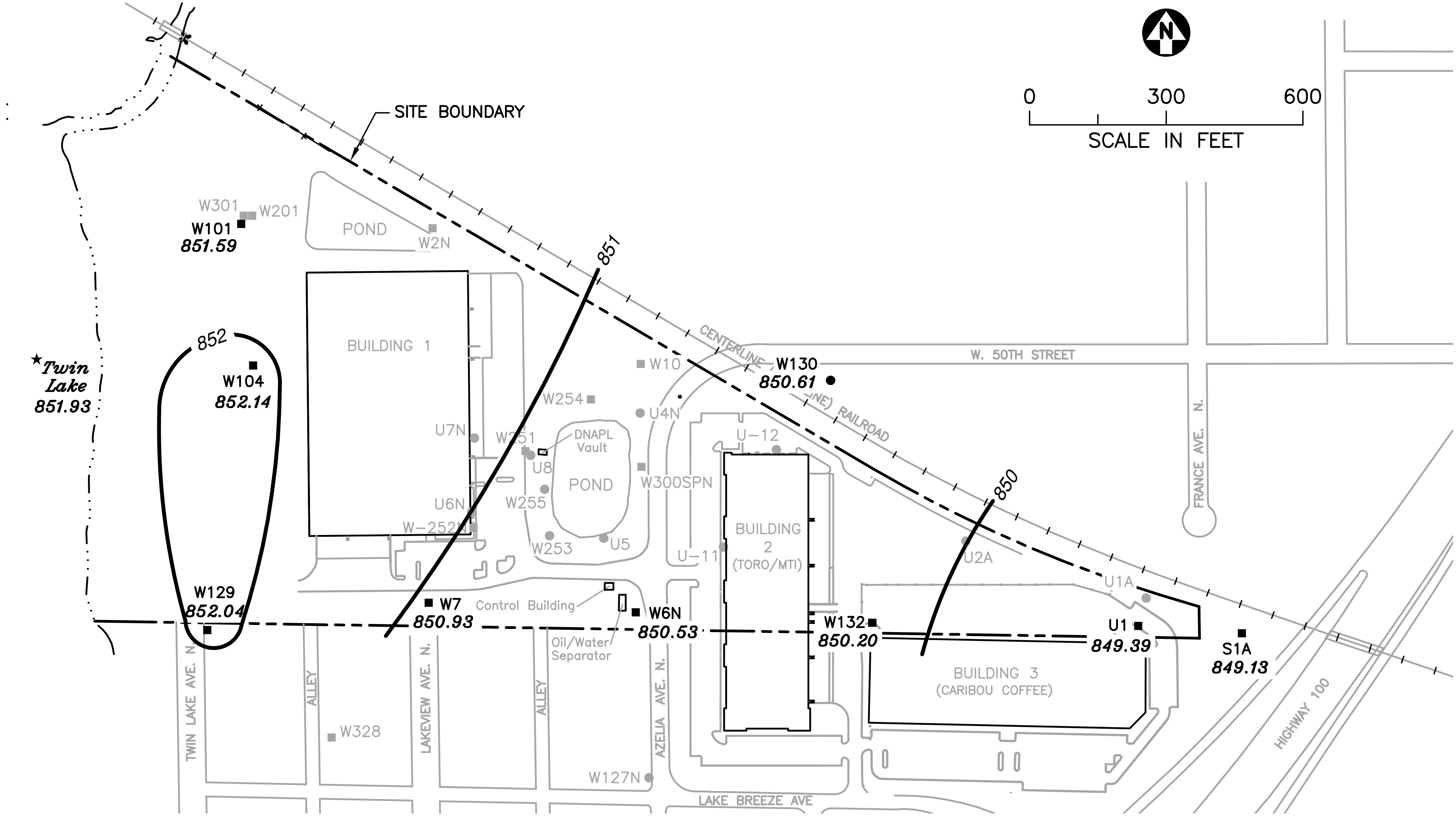
***850.41*** Water Elevation (Feet, MSL)

★ Twin Lake Water Level taken from Hwy 100 Bridge

Figure 4–4

WATER TABLE MAP
June 30, 2016
Joslyn Manufacturing &
Supply Co.
Brooklyn Center, MN

rlg M:\AdeptWork\RLG\2327011000_AR Figure 4-5.dwg Plot at 0 03/03/2017 10:07:52



● Pump—Out Well

■ Monitoring Well

849 Groundwater Contour (Feet, MSL)

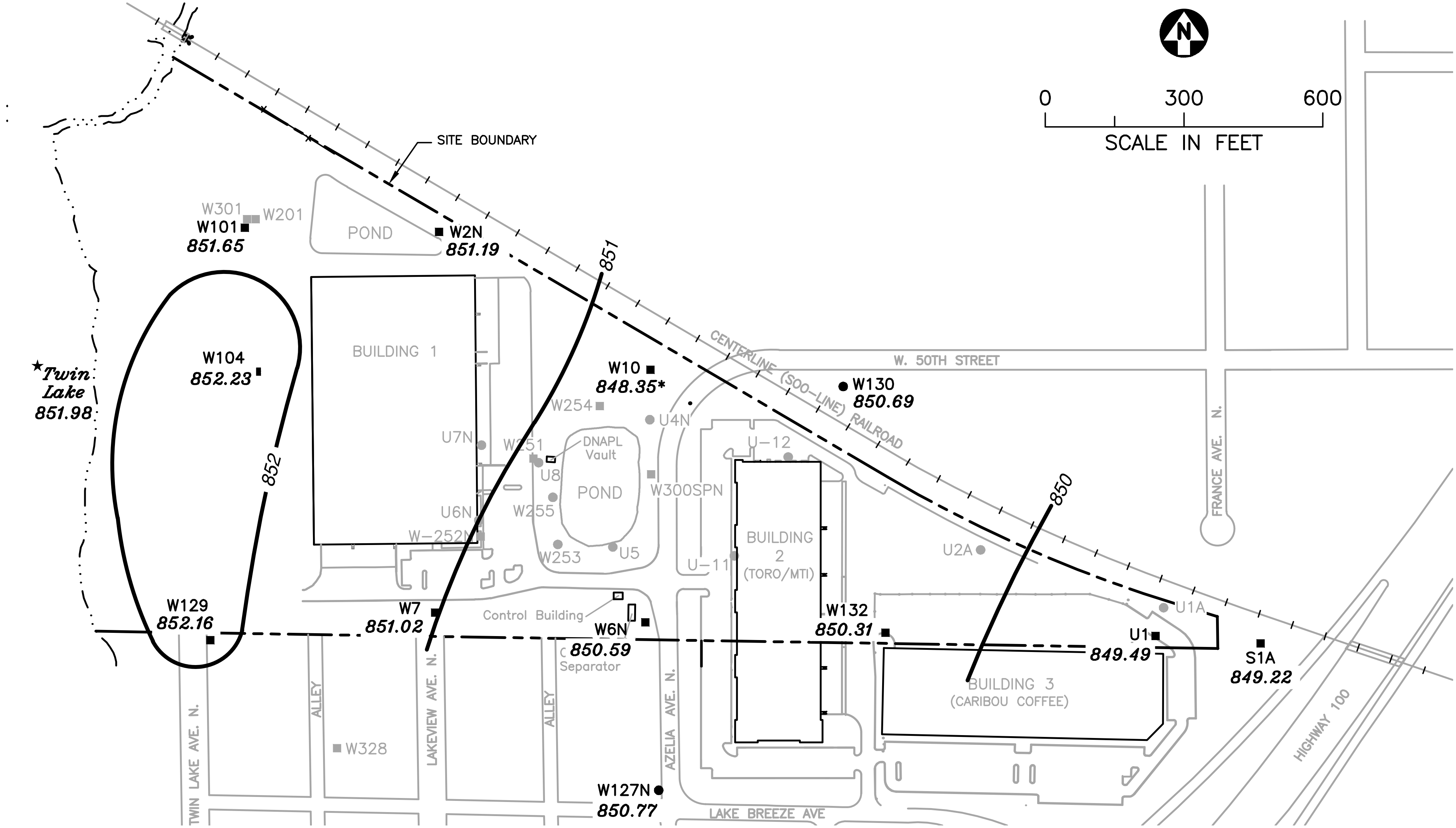
*852.04* Water Elevation (Feet, MSL)

★ Twin Lake Water Level taken from Hwy 100 Bridge

Figure 4—5

WATER TABLE MAP
September 12, 2016
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

rlg M:\AdeptWork\RLG\2327011000_AR Figure 4-6.dwg Plot at 0 03/03/2017 10:08:40



● Pump-Out Well

■ Monitoring Well

849 Groundwater Contour (Feet, MSL)

*852.23* Water Elevation (Feet, MSL)

★ Twin Lake Water Level taken from Hwy 100 Bridge

NOTE: * Data not used during contouring

Figure 4-6

WATER TABLE MAP
October 10, 2016
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

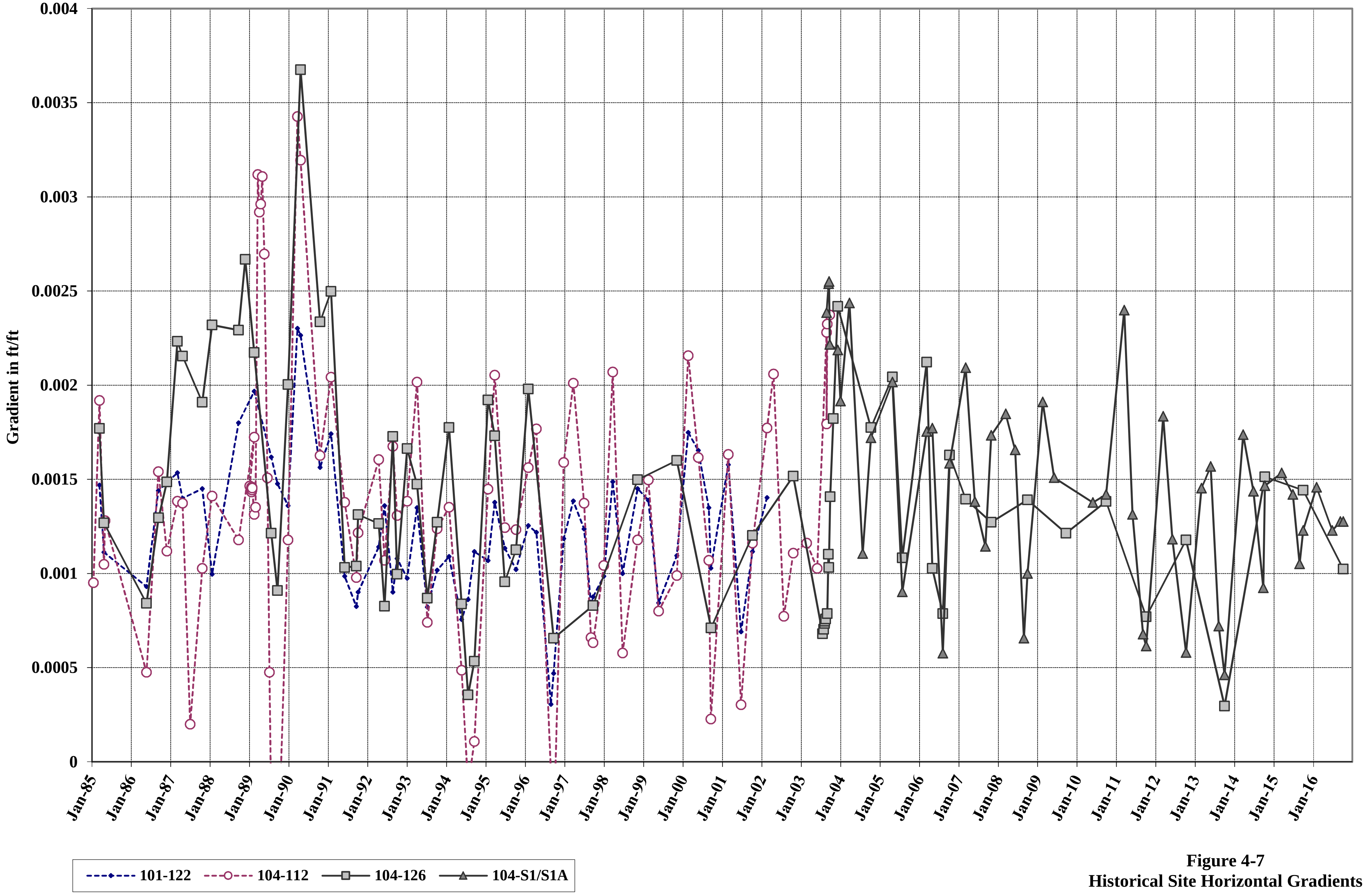
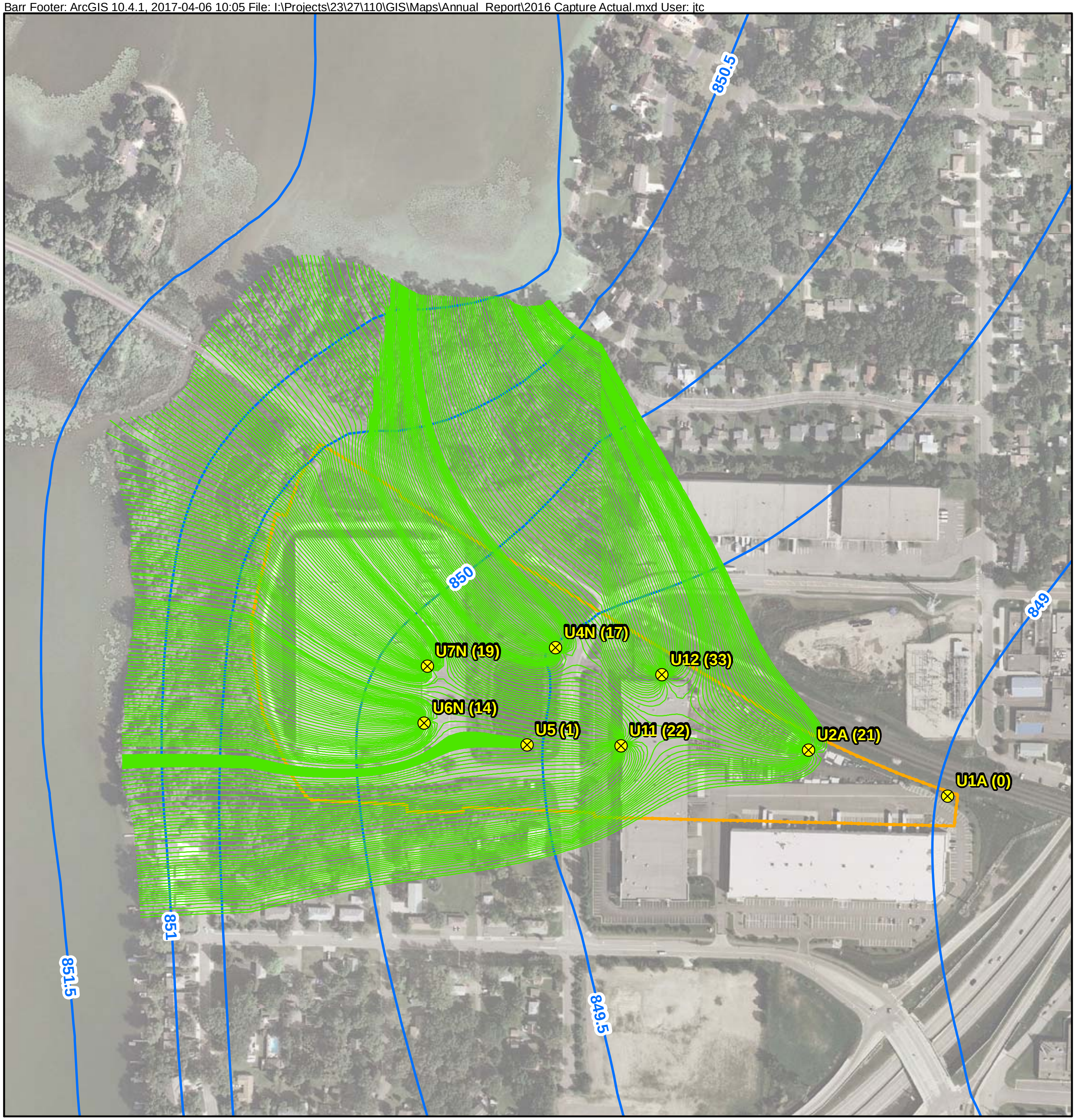


**Figure 4-7**
**Historical Site Horizontal Gradients**



Imagery: Aerials Express, 2009

Figure 4-8

SIMULATED PIEZOMETRIC SURFACE
AND CAPTURE ZONE FOR 2016
AVERAGE REPORTED PUMPING RATES
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

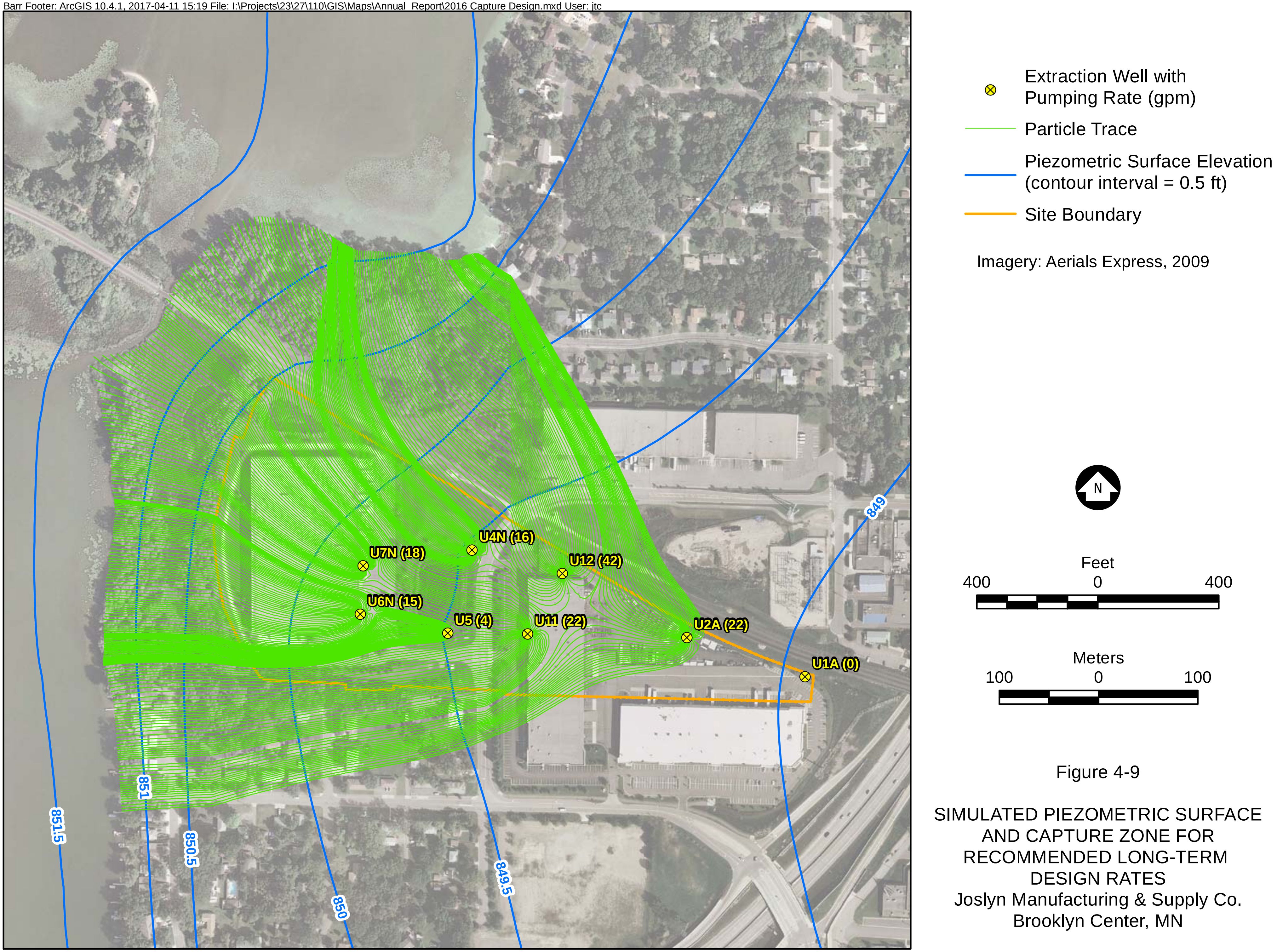
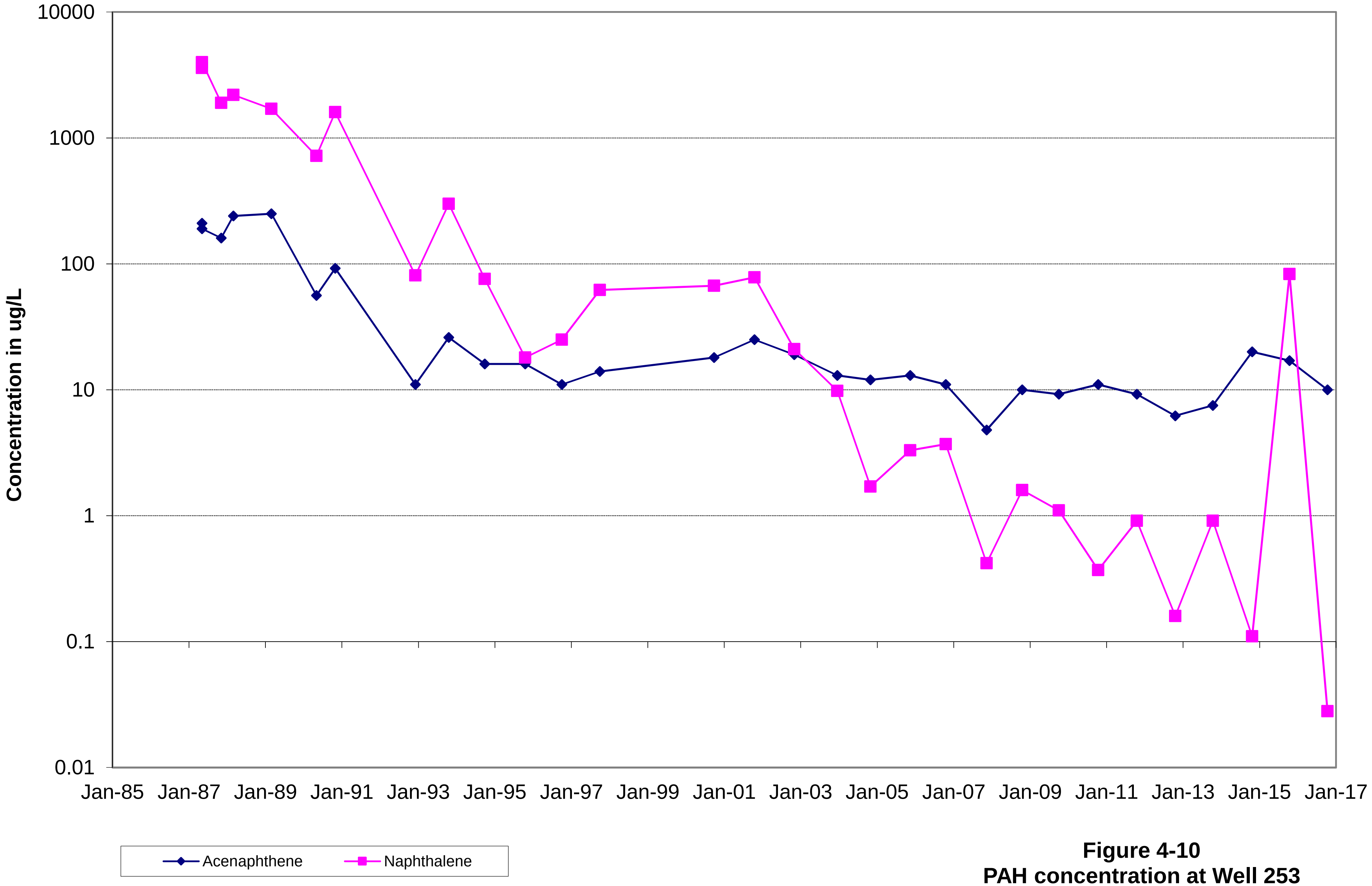


Figure 4-9

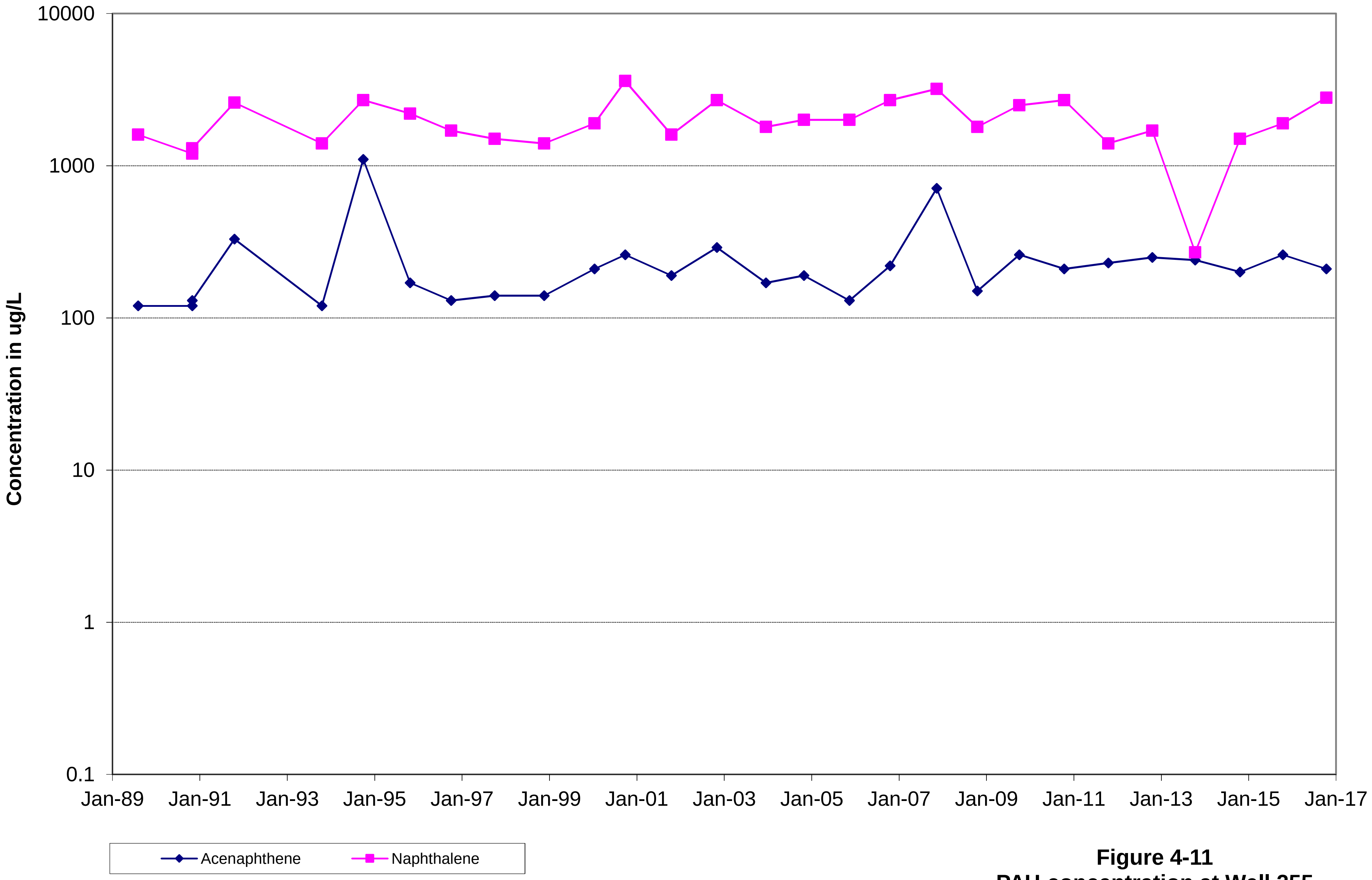
SIMULATED PIEZOMETRIC SURFACE
AND CAPTURE ZONE FOR
RECOMMENDED LONG-TERM
DESIGN RATES
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN



Note: Non-detects = 1x their value.

**Figure 4-10**
**PAH concentration at Well 253**

P:\Mpls\23 MN\27\2327110\WorkFiles\DATA MGMT\2016 Annual Report Tables and Figures\Joslyn_2016 ann rpt_Fig 4-10-11_PAHs in middle sand pumping wells.xlsx

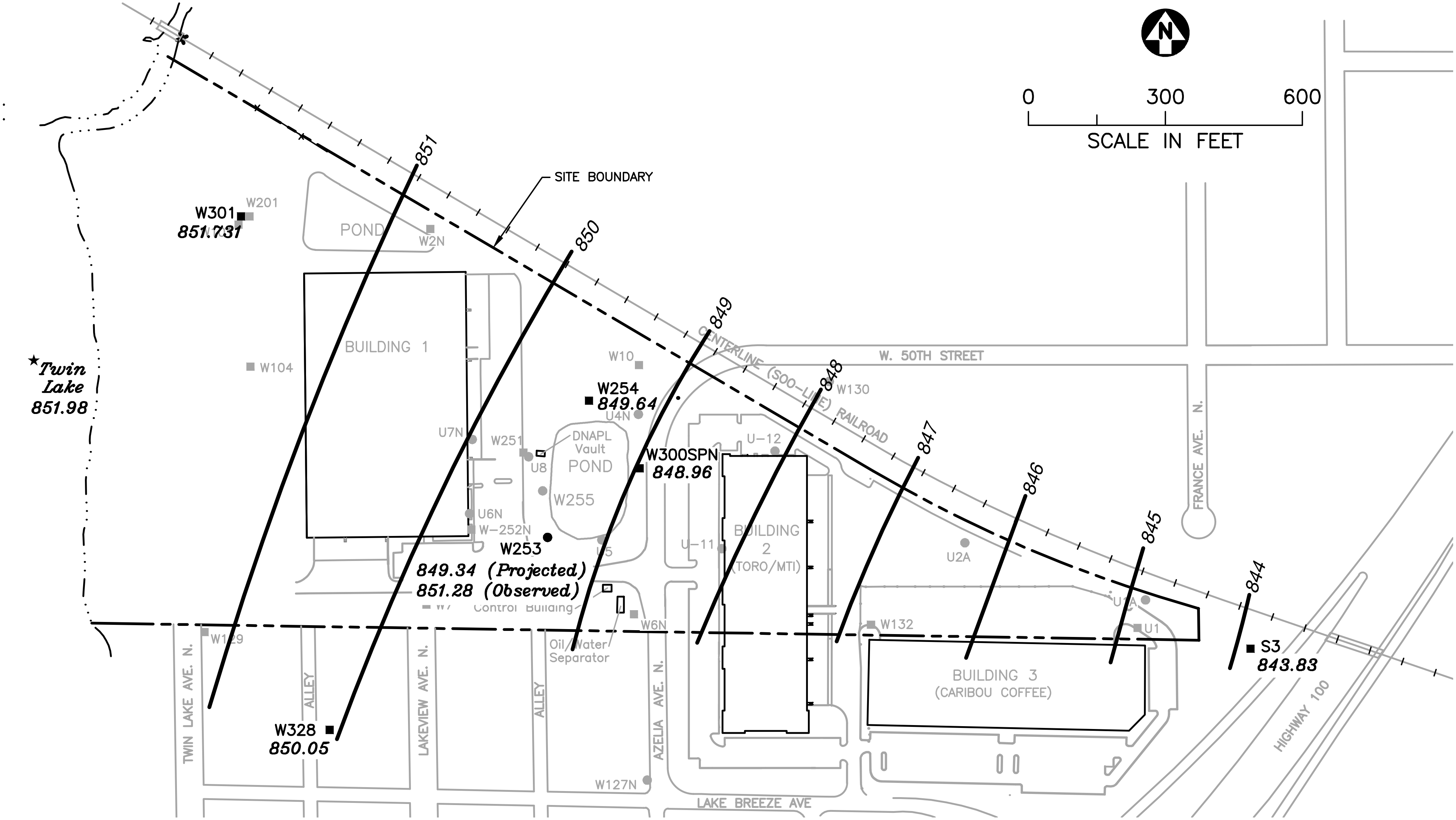


Non-detects = 1x their value.

**Figure 4-11**
**PAH concentration at Well 255**

P:\Mpls\23 MN\27\2327110\WorkFiles\DATA MGMT\2016 Annual Report Tables and Figures\Joslyn_2016 ann rpt_Fig 4-10-11_PAHs in middle sand pumping wells.xlsx

rlg M:\AdeptWork\RLG\2327011000_AR Figure 4-12.dwg Plot at 0 03/15/2017 09:35:20



● Pump-Out Well

■ Monitoring Well

*849* Potentiometric Surface Contour (Feet, MSL)

*848.60* Potentiometric Level (Feet, MSL)

★ Twin Lake Water Level taken from Hwy 100 Bridge

*849.34 Projected – Potentiometric Level in Lower Aquifer*
*Value used for Contouring*
*851.28 Observed – Potentiometric Level in Upper Aquifer*

Figure 4–12

LOWER AQUIFER
POTENTIOMETRIC SURFACE
October, 2016
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

# Appendices

# Appendix A

## Historical Groundwater Levels and Water Quality Data

# Appendix A

## Tables

# Table A-1
## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | P1 | P12 | P13 | P15 | P2 | P23 | P3 | P4 | P5 | P6 | S-1 | S-1A | S-2 | TWINLK | U1 | U1A | U2 | U2A | U3 | U4 | U4N | U5 | U6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/11/1984 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/28/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/29/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/25/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/26/1985 | -- | 845.40 | 845.70 | -- | -- | 846.04 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/27/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/28/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/12/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/6/1985 | -- | 844.67 | 844.27 | 847.10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/16/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/22/1985 | -- | -- | -- | -- | -- | 846.10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/26/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/4/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.79 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/18/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/20/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/2/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/3/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/4/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/23/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/24/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/25/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/26/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/9/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/10/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/11/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/17/1987 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.13 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/4/1987 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.50 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/13/1987 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.34 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 11/3/1987 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 840.96 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/1/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.92 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/22/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/23/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/25/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/29/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/3/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/5/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 845.32 | -- | 845.82 | -- | 846.20 | 846.56 | -- | 846.66 | 847.10 |
| 1/16/1989 | -- | -- | -- | -- | 845.44 | -- | 845.71 | -- | 845.86 | 846.65 | -- | -- | -- | -- | 845.02 | -- | 845.46 | -- | 845.86 | 846.18 | -- | 846.20 | 853.34 |
| 2/1/1989 | -- | -- | -- | -- | 845.09 | -- | 845.49 | -- | 845.49 | 846.30 | -- | -- | -- | -- | 844.70 | -- | 845.17 | -- | 845.52 | 845.89 | -- | 845.84 | 846.31 |
| 2/2/1989 | -- | -- | -- | -- | 845.07 | -- | 845.25 | -- | 845.25 | 846.14 | -- | -- | -- | -- | 843.92 | -- | 844.96 | -- | 844.95 | 840.55 | -- | 828.62 | 845.59 |
| 2/3/1989 | -- | -- | -- | -- | 844.98 | -- | -- | -- | 845.16 | 846.11 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/4/1989 | -- | -- | -- | -- | 844.97 | -- | -- | -- | 845.16 | 846.13 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/5/1989 | -- | -- | -- | -- | 844.97 | -- | 845.07 | -- | 845.09 | 846.03 | -- | -- | -- | -- | 843.83 | -- | 844.83 | -- | 844.76 | 840.52 | -- | -- | 845.46 |
| 2/6/1989 | -- | -- | -- | -- | 844.97 | -- | 845.08 | -- | 845.10 | 846.03 | -- | -- | -- | -- | 843.79 | -- | 844.87 | -- | 844.76 | 840.56 | -- | -- | 845.46 |

# Table A-1
## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | P1 | P12 | P13 | P15 | P2 | P23 | P3 | P4 | P5 | P6 | S-1 | S-1A | S-2 | TWINLK | U1 | U1A | U2 | U2A | U3 | U4 | U4N | U5 | U6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/7/1989 | -- | -- | -- | -- | 844.97 | -- | 845.08 | -- | 845.09 | 846.13 | -- | -- | -- | -- | 843.79 | -- | 844.89 | -- | 844.76 | 840.54 | -- | -- | 845.45 |
| 2/27/1989 | -- | -- | -- | -- | 844.67 | -- | 844.76 | -- | 844.79 | 845.70 | -- | -- | -- | 849.88 | 843.89 | -- | 844.54 | -- | 844.67 | 840.48 | -- | -- | 844.28 |
| 3/9/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/10/1989 | -- | -- | -- | -- | 844.57 | -- | 844.68 | -- | 844.68 | 845.69 | -- | -- | -- | -- | 843.81 | -- | 844.51 | -- | 844.40 | 845.17 | -- | -- | 842.62 |
| 3/31/1989 | -- | -- | -- | -- | 845.02 | -- | 845.13 | -- | 845.21 | -- | -- | -- | -- | 851.20 | 844.22 | -- | 845.00 | -- | 844.87 | 845.69 | -- | -- | 835.22 |
| 4/14/1989 | -- | -- | -- | -- | 845.73 | -- | 845.90 | -- | 845.97 | 847.19 | -- | -- | -- | 851.00 | 845.04 | -- | 845.73 | -- | 845.63 | 846.43 | -- | -- | -- |
| 4/28/1989 | -- | -- | -- | -- | 846.08 | -- | 846.25 | -- | 846.28 | 847.59 | -- | -- | -- | 850.98 | 845.27 | -- | 845.99 | -- | 845.93 | -- | -- | -- | -- |
| 5/12/1989 | -- | -- | -- | -- | 846.68 | -- | 846.64 | -- | 846.68 | 847.99 | -- | -- | -- | 851.18 | 845.65 | -- | 846.38 | -- | 846.32 | -- | -- | -- | -- |
| 5/31/1989 | -- | -- | -- | -- | 846.84 | -- | 847.01 | -- | 847.00 | 848.30 | -- | -- | -- | 851.29 | 846.02 | -- | 846.80 | -- | 846.88 | -- | -- | -- | -- |
| 6/6/1989 | -- | -- | -- | -- | 847.27 | -- | 847.46 | -- | 847.47 | 848.56 | -- | -- | -- | 851.45 | 846.18 | -- | 846.88 | -- | 847.11 | 846.56 | -- | -- | 847.82 |
| 6/29/1989 | -- | -- | -- | -- | 846.95 | -- | 847.12 | -- | 847.13 | 848.13 | -- | -- | -- | 850.64 | 846.25 | -- | 846.87 | -- | 846.80 | 844.20 | -- | 840.83 | 847.23 |
| 7/18/1989 | -- | -- | -- | -- | 846.61 | -- | 846.75 | -- | 846.76 | 847.85 | -- | -- | -- | 850.52 | 845.47 | -- | 846.51 | -- | 846.41 | 843.51 | -- | 840.87 | 846.68 |
| 8/2/1989 | -- | -- | -- | -- | 846.45 | -- | 846.65 | -- | 846.65 | 847.60 | -- | -- | -- | 850.28 | 845.02 | -- | 846.36 | -- | 846.34 | 844.25 | -- | 839.87 | 846.67 |
| 9/5/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/29/1989 | -- | -- | -- | -- | 846.12 | -- | 846.33 | -- | 846.39 | 847.42 | -- | -- | -- | 849.88 | 845.16 | -- | 846.04 | -- | 846.02 | 844.05 | -- | 840.91 | 849.58 |
| 11/3/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/1/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/5/1990 | -- | -- | -- | -- | 844.59 | -- | 844.75 | -- | 844.81 | 845.73 | -- | -- | -- | 849.24 | 843.59 | -- | 844.23 | -- | 844.41 | 841.01 | -- | -- | 848.57 |
| 2/2/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/9/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/2/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/1/1990 | -- | -- | -- | -- | 846.00 | -- | 846.27 | -- | 846.28 | 847.71 | -- | -- | -- | 850.84 | 844.22 | -- | 845.92 | -- | 845.96 | 844.51 | -- | 847.53 | 850.77 |
| 6/4/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/22/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/27/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.97 | -- | -- | -- | -- | -- | -- |
| 9/7/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/29/1990 | -- | -- | -- | -- | 847.03 | -- | 847.10 | -- | 847.14 | -- | -- | -- | -- | 850.88 | 846.16 | -- | 846.78 | -- | 846.55 | 845.09 | -- | 834.01 | 850.09 |
| 12/6/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/10/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/7/1991 | -- | -- | -- | -- | 845.45 | -- | 845.47 | -- | 845.55 | -- | -- | -- | -- | 850.60 | 844.18 | -- | 845.20 | -- | 844.90 | 842.30 | -- | 838.04 | 849.61 |
| 3/11/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/14/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/14/1991 | -- | -- | -- | -- | 848.62 | -- | 850.32 | -- | 850.33 | -- | -- | -- | -- | -- | 845.28 | -- | 849.53 | -- | 847.88 | 849.24 | -- | 839.08 | 852.82 |
| 7/12/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
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| 9/30/1991 | -- | -- | -- | -- | 850.19 | -- | 850.14 | -- | 850.17 | -- | -- | -- | -- | 851.64 | 848.62 | -- | 849.89 | -- | 849.58 | 849.63 | -- | -- | 851.86 |
| 10/16/1991 | -- | -- | -- | -- | 849.76 | -- | 849.71 | -- | 849.74 | -- | -- | -- | -- | 851.50 | 848.53 | -- | 849.51 | -- | 849.16 | 849.29 | -- | -- | 852.00 |
| 11/19/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/12/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
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| 2/4/1992 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
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# Table A-1
## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | P1 | P12 | P13 | P15 | P2 | P23 | P3 | P4 | P5 | P6 | S-1 | S-1A | S-2 | TWINLK | U1 | U1A | U2 | U2A | U3 | U4 | U4N | U5 | U6 |
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| 4/24/1992 | -- | -- | -- | -- | 849.69 | -- | 849.66 | -- | 849.69 | -- | -- | -- | -- | 851.74 | 846.51 | -- | 849.54 | -- | 849.18 | 845.89 | -- | -- | 851.31 |
| 6/17/1992 | -- | -- | -- | -- | 849.43 | -- | 849.36 | -- | 849.38 | -- | -- | -- | -- | 852.01 | 849.27 | -- | 849.31 | -- | 848.85 | 846.60 | -- | 850.09 | 850.97 |
| 9/3/1992 | -- | -- | -- | -- | 849.46 | -- | 849.38 | -- | 849.40 | -- | -- | -- | -- | 851.65 | 846.72 | -- | 849.36 | -- | 848.88 | 848.87 | -- | 849.94 | 855.80 |
| 10/12/1992 | -- | -- | -- | -- | 849.74 | -- | 849.71 | -- | 838.72 | -- | -- | -- | -- | 851.89 | 849.96 | -- | 849.63 | -- | 849.17 | 844.98 | -- | 850.28 | 851.47 |
| 1/13/1993 | -- | -- | -- | -- | 848.83 | -- | 848.83 | -- | 848.84 | -- | -- | -- | -- | 851.81 | 846.28 | -- | 848.64 | -- | 848.28 | 845.49 | -- | 855.86 | 851.32 |
| 4/13/1993 | -- | -- | -- | -- | 849.01 | -- | 849.01 | -- | 849.05 | -- | -- | -- | -- | 851.87 | 847.05 | -- | 848.78 | -- | 848.46 | 846.47 | -- | 843.45 | 850.10 |
| 7/19/1993 | -- | -- | -- | -- | 850.65 | -- | 850.67 | -- | 850.68 | -- | -- | -- | -- | 852.01 | 848.75 | -- | 850.46 | -- | 850.04 | 848.37 | -- | 847.19 | 853.80 |
| 10/18/1993 | -- | -- | -- | -- | 849.79 | -- | 849.74 | -- | 849.75 | -- | -- | -- | -- | 851.73 | 849.73 | -- | 849.69 | -- | 849.11 | 846.75 | -- | 848.76 | 852.65 |
| 2/5/1994 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.99 | 846.76 | -- | 848.89 | -- | 849.46 | 846.25 | -- | 849.78 | 852.31 * |
| 5/31/1994 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.79 | 849.02 | -- | 850.59 | -- | 851.06 | 846.98 | -- | 851.01 | 853.62 * |
| 8/1/1994 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.55 | 848.25 | -- | 849.24 | -- | 848.81 | 845.89 | -- | 855.99 * | 849.49 |
| 9/28/1994 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.67 | 842.35 | -- | 849.12 | -- | 849.43 | 845.75 | -- | 845.90 | 849.65 |
| 2/1/1995 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.61 | 847.96 | -- | 848.27 | -- | 847.68 | 844.38 | -- | 847.35 | 849.33 |
| 4/3/1995 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.78 | 849.01 | -- | 849.14 | -- | 848.17 | 845.41 | -- | 847.69 | 849.71 |
| 7/6/1995 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 852.34 | 849.96 | -- | 850.19 | -- | 849.47 | 850.77 | -- | 850.87 | 854.30 |
| 10/18/1995 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.79 | 849.26 | -- | 849.52 | -- | 848.75 | 847.96 | -- | 835.41 * | 851.99 |
| 2/8/1996 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.69 | 847.97 | -- | -- | -- | 847.97 | 846.50 | -- | 841.86 | 850.58 |
| 4/24/1996 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.75 | 848.63 | -- | 849.13 | -- | -- | -- | -- | -- | -- |
| 5/14/1996 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/6/1996 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.04 | 848.32 | -- | 848.60 | -- | -- | -- | -- | -- | -- |
| 10/1/1996 | 843.07 | -- | -- | -- | 848.09 | -- | 848.14 | 848.15 | 848.14 | -- | -- | -- | -- | 851.49 | 846.14 | -- | 848.13 | -- | 847.99 | 845.22 | -- | 848.97 | 846.28 |
| 1/2/1997 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.79 | -- | 847.66 | -- | 848.76 | -- | -- | -- | -- | -- |
| 3/31/1997 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.97 | 847.33 | -- | 849.78 | -- | -- | 847.20 | -- | 842.61 | 851.33 |
| 7/9/1997 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 852.18 | 849.79 | 841.92 | 850.15 | 849.08 | -- | -- | -- | -- | -- |
| 9/12/1997 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.81 | 850.22 | 848.46 | 850.55 | 848.57 | -- | -- | -- | -- | -- |
| 10/1/1997 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.71 | 850.09 | 848.33 | 850.39 | 848.26 | 849.29 | 847.30 | -- | 844.54 | 851.72 |
| 1/7/1998 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.57 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
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| 11/18/1998 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.76 | 848.65 | 848.50 | 848.96 | 848.21 | 847.67 | 846.75 | -- | 843.66 | 847.32 |
| 2/25/1999 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.57 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/31/1999 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.82 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 11/15/1999 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.84 | 848.39 | 848.41 | 851.63 | 847.73 | 847.33 | 849.20 | -- | 840.85 | -- |
| 3/1/2000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.34 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/2/2000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.59 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
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| 9/26/2000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.22 | -- | 849.45 | -- | 849.86 | -- | 836.48 | -- |
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| 10/16/2001 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.60 | -- | 847.77 | -- | 848.28 | -- | 846.58 | -- | 836.85 | -- |
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## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | P1 | P12 | P13 | P15 | P2 | P23 | P3 | P4 | P5 | P6 | S-1 | S-1A | S-2 | TWINLK | U1 | U1A | U2 | U2A | U3 | U4 | U4N | U5 | U6 |
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| 12/15/2001 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.65 | 850.00 | 850.66 | -- | -- | -- | 844.64 | -- | 837.50 | -- |
| 1/31/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 835.49 | -- |
| 2/28/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.39 | -- | -- | -- | -- | -- | -- | -- | 834.04 | -- |
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| 4/8/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
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| 10/28/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.71 | 849.95 | 848.30 | -- | 852.12 | -- | -- | 849.81 | 832.71 | -- |
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| 2/4/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.92 | 831.18 | -- |
| 3/3/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.77 | -- | -- | -- | -- | -- | -- | 848.71 | 831.12 | -- |
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| 1/9/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.52 | -- | -- | -- | -- | -- | -- | 845.95 | -- | -- |
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# 1984 - 2016 Upper Aquifer Water Levels
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| 11/7/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.47 | -- | -- | -- | 852.15 | 839.42 | -- | 845.46 | -- | -- | 848.35 | -- | -- |
| 12/12/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 835.08 | -- |
| 1/9/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 832.43 | -- |
| 2/10/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 832.93 | -- |
| 3/1/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.52 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/19/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.81 | -- | -- | 851.72 | -- | -- | -- | -- | -- | -- | -- | 832.91 | -- |
| 4/14/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 844.86 | -- |
| 5/9/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.92 | -- | -- | 853.02 | -- | -- | -- | -- | -- | -- | -- | 845.56 | -- |
| 6/5/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 834.21 | -- |
| 7/7/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 832.98 | -- |
| 8/15/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.47 | -- | -- | 851.62 | -- | -- | -- | -- | -- | -- | -- | 834.51 | -- |
| 9/6/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 834.42 | -- |
| 10/9/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 833.35 | -- |
| 10/16/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.42 | -- | 847.92 | 851.47 | 851.65 | 839.47 | -- | 843.97 | -- | -- | 847.70 | 833.35 | -- |
| 11/14/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 833.44 | -- |
| 12/7/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 830.99 | -- |
| 1/2/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 833.66 | -- |
| 2/12/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 834.48 | -- |
| 3/12/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 833.66 | -- |
| 3/15/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.92 | -- | -- | 852.42 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/10/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 834.10 | -- |
| 5/11/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 833.94 | -- |
| 6/8/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.87 | -- | -- | 851.72 | -- | -- | -- | -- | -- | -- | -- | 833.71 | -- |
| 6/28/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 833.14 | -- |
| 8/7/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 832.89 | -- |

# Table A-1

# 1984 - 2016 Upper Aquifer Water Levels

# Joslyn Manufacturing and Supply Company

# Brooklyn Center, MN

# (elevations in ft./MSL)

| Location | P1 | P12 | P13 | P15 | P2 | P23 | P3 | P4 | P5 | P6 | S-1 | S-1A | S-2 | TWINLK | U1 | U1A | U2 | U2A | U3 | U4 | U4N | U5 | U6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/12/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.92 | -- | -- | 851.47 | -- | -- | -- | -- | -- | -- | -- | 833.11 | -- |
| 11/6/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.02 | -- | 848.62 | 851.97 | 852.45 | 849.60 | -- | 845.16 | -- | -- | 848.53 | 832.97 | -- |
| 3/19/2008 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.97 | -- | -- | 851.57 | 851.20 | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/14/2008 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.32 | -- | -- | 852.47 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/4/2008 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.25 | -- | -- | 851.27 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/6/2008 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.02 | -- | 847.57 | 851.57 | 851.65 | 848.52 | -- | 842.97 | -- | -- | 847.55 | 833.01 | -- |
| 2/25/2009 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.12 | -- | -- | 851.62 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/11/2009 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.32 | -- | -- | 850.47 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/29/2009 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.37 | 850.56 | 850.15 | 844.67 | -- | 849.04 | -- | -- | 844.75 | 840.22 | -- |
| 3/9/2010 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.97 | 849.80 | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/4/2010 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.03 | -- | 850.72 | 847.14 | -- | -- | -- | -- | -- | -- | 837.51 | -- |
| 8/9/2010 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.96 | 847.74 | -- | -- | -- | -- | -- | -- | 834.14 | -- |
| 10/5/2010 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.21 | 848.22 | 851.65 | 848.49 | 848.13 | -- | 850.87 | -- | -- | 846.17 | 838.50 | -- |
| 3/22/2011 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.78 | -- | 851.92 | 847.99 | -- | -- | -- | -- | -- | -- | 834.61 | -- |
| 6/6/2011 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.03 | -- | 852.27 | 849.44 | -- | -- | -- | -- | -- | -- | 833.06 | -- |
| 9/11/2011 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.88 | -- | 851.85 | 849.19 | -- | -- | -- | -- | -- | -- | 833.06 | -- |
| 10/11/2011 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.38 | 848.82 | 851.69 | 848.49 | 845.67 | -- | 843.62 | -- | -- | 845.80 | 832.91 | -- |
| 3/16/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.43 | -- | 851.42 | 847.59 | -- | -- | -- | -- | -- | -- | 833.21 | -- |
| 6/9/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.83 | -- | 851.98 | 849.14 | -- | -- | -- | -- | -- | -- | 832.99 | -- |
| 8/7/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/13/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/14/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/15/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/17/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/20/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/21/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/22/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/23/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/24/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/27/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.75 | -- | 850.66 | 847.84 | -- | -- | -- | -- | -- | -- | 833.41 | -- |
| 10/15/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.51 | 847.52 | 850.64 | 847.67 | 845.53 | -- | 841.92 | -- | -- | 842.65 | 837.00 | -- |
| 1/3/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/8/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/7/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.48 | -- | 851.55 | 846.69 | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/9/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/13/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/30/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.38 | -- | 851.87 | 848.69 | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/6/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/14/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.63 | -- | 851.57 | 848.79 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/13/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/1/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/7/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.86 | 847.82 | 851.29 | 848.04 | 848.03 | -- | 839.92 | -- | -- | 846.15 | 833.99 | -- |
| 11/8/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

# Table A-1
## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | P1 | P12 | P13 | P15 | P2 | P23 | P3 | P4 | P5 | P6 | S-1 | S-1A | S-2 | TWINLK | U1 | U1A | U2 | U2A | U3 | U4 | U4N | U5 | U6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/27/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.03 | -- | 851.59 | 847.14 | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/30/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.29 | -- | 852.72 | 849.69 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/30/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.43 | -- | 851.67 | 848.59 | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/14/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.37 | 848.37 | 851.65 | 848.59 | 848.63 | -- | 840.08 | -- | -- | 846.15 | 838.16 | -- |
| 3/20/2015 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.51 | -- | 851.67 | 847.64 | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/30/2015 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.83 | -- | 851.70 | 848.14 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/1/2015 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.35 | -- | 842.62 | 848.59 | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/5/2015 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.31 | 848.25 | 842.17 | 848.39 | 848.48 | -- | 834.65 | -- | -- | 844.45 | 842.31 | -- |
| 2/5/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.38 | -- | 851.63 | 848.39 | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/30/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.5 | -- | 842.45 | 847.99 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/12/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.13 | -- | 842.87 | 849.39 | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/10/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.22 | 849.14 | 842.92 | 849.49 | 849.43 | -- | 835.27 | -- | -- | 844.74 | 843.07 | -- |

-- Not measured

See Table 3-18 for data qualifiers and footnotes.

## Table A-1

## 1984 - 2016 Upper Aquifer Water Levels

## Joslyn Manufacturing and Supply Company

## Brooklyn Center, MN

## (elevations in ft./MSL)

| Location | U6N | U7 | U7N | U8 | U11 | U12 | W2N | W5 | W6 | W6N | W7 | W7N | W9 | W10 | W101 | W104 | W111 | W112 | W113 | W121 | W122 | W122R | W123 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/11/1984 | -- | -- | -- | -- | -- | -- | -- | -- | 850.17 | -- | 850.54 | -- | 850.14 | 850.40 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/28/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 849.24 | -- | -- | -- | -- | -- |
| 1/29/1985 | -- | -- | -- | -- | -- | -- | -- | 850.28 | 849.81 | -- | 850.22 | -- | 849.67 | 850.06 | 851.71 | 851.00 | 850.31 | -- | -- | -- | -- | -- | -- |
| 3/25/1985 | -- | -- | -- | -- | -- | -- | -- | 850.61 | 850.32 | -- | 850.83 | -- | 850.11 | 850.67 | 852.48 | 853.11 | 850.95 | 849.56 | 855.20 | 849.20 | -- | -- | 849.30 |
| 3/26/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | 848.44 | -- | 849.37 |
| 3/27/1985 | -- | -- | -- | -- | -- | -- | -- | -- | 850.28 | -- | 850.82 | -- | -- |  | -- | -- | -- | -- | -- | 847.84 | 848.44 | -- | -- |
| 3/28/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.27 | 850.73 | -- | -- | -- | -- | 855.34 | -- | -- | -- | -- |
| 4/12/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/6/1985 | -- | -- | -- | -- | -- | -- | -- | 851.14 | 850.91 | -- | 851.32 | -- | 850.79 | 851.17 | 852.08 | 852.16 | 851.40 | 850.22 | 851.40 | 849.98 | 849.02 | 849.02 | 850.02 |
| 5/16/1985 | -- | -- | -- | -- | -- | -- | -- | -- | 851.02 | -- | 851.43 | -- | -- | 851.29 | 852.51 | 852.62 | -- | 850.25 | -- | -- | -- | -- | -- |
| 5/22/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.79 |  | -- | -- | 851.41 | -- | -- | -- | -- | -- | -- |
| 2/26/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | -- | -- | 848.70 |
| 3/4/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/18/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | 848.65 | 847.87 | -- | 848.63 |
| 3/20/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.58 | 850.21 | -- | -- | -- | 848.95 | -- | -- | -- | -- | -- |
| 6/2/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | 850.43 | 849.38 | -- | -- |
| 6/3/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.61 | -- | -- | 851.53 | -- | -- | -- | -- | -- | -- | -- | -- | 850.50 |
| 6/4/1986 | -- | -- | -- | -- | -- | -- | -- | -- | 851.25 | -- | -- | -- | 851.14 |  | 851.94 | 851.48 | 851.63 | 850.60 | -- | -- | -- | -- | -- |
| 9/23/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | 849.98 | 849.18 | -- | -- |
| 9/24/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | 853.15 | -- | -- | -- | -- | -- | -- | 850.25 |
| 9/25/1986 | -- | -- | -- | -- | -- | -- | -- | -- | 851.11 | -- | 851.61 | -- | 851.01 | 851.54 | 853.14 | -- | 851.91 | 850.30 | -- | -- | -- | -- | -- |
| 9/26/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | 857.43 | -- | -- | -- | -- |
| 12/9/1986 | -- | -- | -- | -- | -- | -- | -- | -- | 850.24 | -- | -- | -- | -- |  | -- | 851.67 | 850.78 | -- | -- | -- | -- | -- | -- |
| 12/10/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | 849.34 | 848.58 | -- | -- |
| 12/11/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.47 | -- | -- | -- | 849.60 | -- | -- | -- | -- | 849.45 |
| 3/17/1987 | -- | -- | -- | -- | -- | -- | -- | -- | 849.22 | -- | 849.75 | -- | 849.24 | 849.52 | 851.60 | 851.18 | 849.93 | 848.62 | -- | 848.21 | 847.38 | -- | 848.28 |
| 5/4/1987 | -- | -- | -- | -- | -- | -- | -- | -- | 848.82 | -- | 849.26 | -- | 848.65 | 849.11 | 851.07 | 850.54 | 849.38 | 848.00 | 850.57 | 847.81 | 847.22 | -- | 848.11 |
| 7/13/1987 | -- | -- | -- | -- | -- | -- | -- | -- | 847.89 | -- | 848.38 | -- | 847.96 | 848.28 | 850.68 | 847.56 | 848.58 | 847.19 | -- | -- | -- | -- | -- |
| 11/3/1987 | -- | -- | -- | -- | -- | -- | -- | -- | 848.89 | -- | 849.41 | -- | 848.73 | 849.28 | 851.23 | 850.06 | 849.58 | 848.16 | -- | 848.08 | 847.24 | -- | 848.03 |
| 2/1/1988 | -- | -- | -- | -- | -- | -- | -- | -- | 847.80 | -- | 848.38 | -- | 847.67 | 848.14 | 850.88 | 849.70 | 848.52 | 847.09 | -- | 846.96 | 848.14 | -- | 846.91 |
| 2/22/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | 846.96 | -- | -- | -- |
| 2/23/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | -- | -- | 846.80 |
| 2/25/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | 846.13 | -- | -- |
| 2/29/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.14 | -- | -- | -- | 847.09 | -- | -- | -- | -- | -- |
| 10/3/1988 | -- | -- | -- | -- | -- | -- | -- | -- | 846.48 | -- | 846.90 | -- | 846.30 | 846.95 | 849.53 | 847.69 | 847.25 | 845.51 | -- | 845.62 | 844.58 | -- | 845.34 |
| 12/5/1988 | -- | 847.20 | -- | 846.96 | -- | -- | -- | -- | 846.25 | -- | 846.74 | -- | 846.00 | 846.69 | -- | 848.66 | 846.95 | 845.47 | -- | 845.35 | 844.38 | -- | 845.10 |
| 1/16/1989 | -- | 841.52 | -- | 846.56 | -- | -- | -- | -- | 846.92 | -- | 846.43 | -- | 845.56 | 846.33 | -- | 847.90 | 846.67 | 845.19 | -- | -- | 843.90 | -- | 844.96 |
| 2/1/1989 | -- | 846.41 | -- | 846.21 | -- | -- | -- | -- | 846.62 | -- | 846.18 | -- | 845.07 | 846.03 | -- | 847.50 | 846.32 | 844.85 | -- | -- | 843.95 | -- | 844.65 |
| 2/2/1989 | -- | 845.55 | -- | 846.11 | -- | -- | -- | -- | 846.51 | -- | 846.13 | -- | 844.87 | 845.91 | -- | 847.53 | 846.27 | 844.83 | -- | -- | 843.93 | -- | 844.61 |
| 2/3/1989 | -- | -- | -- | -- | -- | -- | -- | -- | 846.51 | -- | -- | -- | 844.81 | 845.88 | -- | -- | 846.24 | 844.80 | -- | -- | 843.93 | -- | -- |
| 2/4/1989 | -- | -- | -- | -- | -- | -- | -- | -- | 846.51 | -- | 846.13 | -- | 844.81 | 845.86 | -- | -- | 846.24 | 844.80 | -- | -- | 843.94 | -- | -- |
| 2/5/1989 | -- | 845.43 | -- | 846.04 | -- | -- | -- | -- | 846.43 | -- | 846.03 | -- | 844.71 | 845.78 | -- | 847.44 | 846.20 | 844.74 | -- | -- | 843.92 | -- | 844.62 |
| 2/6/1989 | -- | 845.45 | -- | 846.04 | -- | -- | -- | -- | 846.45 | -- | 846.05 | -- | 844.72 | 845.83 | -- | 847.44 | 846.18 | 844.77 | -- | -- | 843.95 | -- | 844.62 |

# Table A-1
# 1984 - 2016 Upper Aquifer Water Levels
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN
# (elevations in ft./MSL)

| Location | U6N | U7 | U7N | U8 | U11 | U12 | W2N | W5 | W6 | W6N | W7 | W7N | W9 | W10 | W101 | W104 | W111 | W112 | W113 | W121 | W122 | W122R | W123 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/7/1989 | -- | 845.42 | -- | 846.02 | -- | -- | -- | -- | 846.43 | -- | 846.03 | -- | 844.72 | 845.81 | -- | 847.44 | 846.16 | 844.75 | -- | -- | 843.95 | -- | 844.61 |
| 2/27/1989 | -- | 845.07 | -- | 845.66 | -- | -- | -- | -- | 846.14 | -- | 845.72 | -- | 844.38 | 845.41 | 849.13 | 846.94 | -- | 844.51 | -- | 844.49 | 843.72 | -- | 844.39 |
| 3/9/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | 843.91 | -- | 874.18 |
| 3/10/1989 | -- | 845.02 | -- | 845.67 | -- | -- | -- | -- | -- | -- | 845.67 | -- | 844.30 | 845.39 | -- | 846.86 | -- | 844.36 | -- | 844.48 | -- | -- | -- |
| 3/31/1989 | -- | -- | -- | -- | -- | -- | -- | -- | 846.67 | -- | 846.34 | -- | 844.78 | 846.03 | -- | 850.54 | -- | 844.77 | -- | -- | 843.88 | -- | 844.80 |
| 4/14/1989 | -- | 846.45 | -- | 847.16 | -- | -- | -- | -- | 847.48 | -- | 847.22 | -- | 846.18 | 846.85 | -- | 850.93 | 847.38 | 845.53 | -- | 845.16 | 844.41 | -- | 845.53 |
| 4/28/1989 | -- | 846.92 | -- | 844.10 | -- | -- | -- | -- | 847.73 | -- | 847.46 | -- | 845.90 | 847.20 | -- | 851.28 | -- | 845.80 | -- | 845.57 | 844.77 | -- | 845.76 |
| 5/12/1989 | -- | 847.26 | -- | 847.92 | -- | -- | -- | -- | 848.12 | -- | 848.06 | -- | 846.32 | 847.61 | -- | 851.93 | -- | 846.18 | -- | 845.96 | 845.08 | -- | 846.15 |
| 5/31/1989 | -- | 847.53 | -- | 846.59 | -- | -- | -- | -- | 848.60 | -- | -- | -- | 846.67 | 847.97 | -- | 851.59 | -- | 846.60 | -- | 846.40 | 845.73 | -- | 846.55 |
| 6/6/1989 | -- | 847.47 | -- | -- | -- | -- | -- | -- | 848.79 | -- | 848.45 | -- | 847.05 | 848.26 | -- | 850.58 | -- | 852.15* | -- | 851.72* | 845.60 | -- | 851.39 |
| 6/29/1989 | -- | 847.43 | -- | 845.24 | -- | -- | -- | -- | 848.45 | -- | 848.06 | -- | 846.74 | 847.91 | -- | 849.54 | -- | 846.75 | -- | 846.58 | 846.43 | -- | 846.67 |
| 7/18/1989 | -- | 846.96 | -- | 844.76 | -- | -- | -- | -- | 848.13 | -- | 847.58 | -- | 846.39 | 847.56 | -- | 847.29 | -- | 846.41 | -- | 846.52 | 845.53 | -- | 846.29 |
| 8/2/1989 | -- | 846.94 | -- | 844.53 | -- | -- | -- | -- | 847.87 | -- | 847.45 | -- | 846.52 | 847.38 | 849.88 | 845.89 | 849.28 | 846.37 | -- | 846.43 | 845.43 | -- | 846.18 |
| 9/5/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 846.00 | -- | -- | -- | -- | 845.98 |
| 9/29/1989 | -- | 846.62 | -- | -- | -- | -- | -- | -- | 847.67 | -- | 847.23 | -- | 845.93 | 847.16 | 849.09 | 844.76 | -- | 845.93 | -- | 846.06 | 845.03 | -- | 845.73 |
| 11/3/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 845.32 | -- | -- | -- | -- | 845.13 |
| 12/1/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 844.95 | -- | -- | -- | -- | 844.76 |
| 1/5/1990 | -- | 845.07 | -- | 845.66 | -- | -- | -- | -- | DRY | -- | 845.67 | -- | 844.40 | 845.45 | 847.43 | 846.60 | 845.78 | 844.42 | -- | 844.53 | 843.69 | -- | 844.26 |
| 2/2/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 844.07 | -- | -- | -- | -- | 843.96 |
| 3/9/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 843.77 | -- | -- | 843.03 | -- | 843.69 |
| 4/2/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.63 | 850.35 | 851.66 | -- | 845.32 | -- | -- | 844.02 | -- | 845.26 |
| 5/1/1990 | -- | 847.20 | -- | 847.60 | -- | -- | -- | -- | 847.69 | -- | 847.50 | -- | 845.89 | 847.25 | 850.92 | 851.63 | -- | 845.72 | 853.99 | 845.61 | 844.69 | -- | 845.65 |
| 6/4/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 846.44 | -- | -- | 845.45 | -- | 846.46 |
| 6/22/1990 | -- | -- | -- | -- | -- | -- | -- | -- | 849.45 | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | 846.36 | -- | 847.65 |
| 8/27/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | 847.25 | -- | -- |
| 9/7/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/29/1990 | -- | 847.96 | -- | 848.34 | -- | -- | -- | -- | 848.55 | -- | 848.21 | -- | 846.73 | 848.05 | 850.47 | 849.94 | 848.28 | 846.93 | 854.44 | 847.10 | 846.17 | -- | 846.79 |
| 12/6/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 846.22 | -- | -- | 845.53 | -- | 846.07 |
| 1/10/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 845.73 | -- | -- | 845.02 | -- | 845.60 |
| 2/7/1991 | -- | -- | -- | 843.30 | -- | -- | -- | -- | 846.96 | -- | 846.62 | -- | 845.07 | 845.31 | 849.46 | 849.11 | 846.88 | 845.33 | 851.52 | 845.47 | 844.67 | -- | 845.23 |
| 3/11/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 845.40 | -- | -- | 844.34 | -- | 844.91 |
| 5/14/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 848.02 | -- | -- | 847.01 | -- | 848.12 |
| 6/14/1991 | -- | 849.80 | -- | 846.68 | -- | -- | -- | -- | 851.29 | -- | 849.69 | -- | 849.09 | 850.55 | 851.54 | 851.50 | 850.31 | 848.95 | 859.36 | 849.58 | 848.83 | -- | 849.75 |
| 7/12/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 850.91 | -- | -- | 847.70 | -- | 849.71 |
| 8/20/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 849.32 | -- | -- | 848.65 | -- | 849.37 |
| 9/16/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 850.37 | -- | -- | 849.32 | -- | 850.38 |
| 9/30/1991 | -- | 850.40 | -- | -- | -- | -- | -- | -- | 851.54 | -- | 850.97 | -- | 849.74 | 850.79 | 851.55 | 851.87 | 851.08 | 850.06 | -- | 850.12 | 849.28 | -- | 850.05 |
| 10/16/1991 | -- | 849.54 | -- | -- | -- | -- | -- | -- | 851.15 | -- | 850.62 | -- | 849.30 | 850.38 | 851.41 | 851.94 | 850.69 | 849.69 | -- | 849.66 | 848.93 | -- | 849.65 |
| 11/19/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 849.38 | -- | -- | 848.52 | -- | 849.41 |
| 12/12/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 849.53 | -- | -- | 847.78 | -- | 849.54 |
| 1/6/1992 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 849.29 | -- | -- | 848.52 | -- | 849.26 |
| 2/4/1992 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 849.05 | -- | -- | 848.30 | -- | 849.01 |
| 3/30/1992 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 849.43 | -- | -- | 848.66 | -- | 847.48 |

# Table A-1
# 1984 - 2016 Upper Aquifer Water Levels
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN
# (elevations in ft./MSL)

| Location | U6N | U7 | U7N | U8 | U11 | U12 | W2N | W5 | W6 | W6N | W7 | W7N | W9 | W10 | W101 | W104 | W111 | W112 | W113 | W121 | W122 | W122R | W123 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4/24/1992 | -- | 849.60 | -- | 850.70 | -- | -- | -- | -- | 851.14 | -- | 850.47 | -- | 849.25 | 850.40 | 851.88 | 852.50 | 850.89 | 849.53 | -- | 849.34 | 848.74 | -- | 849.57 |
| 6/17/1992 | -- | 849.20 | -- | 850.38 | -- | -- | -- | -- | 850.80 | -- | 850.35 | -- | 848.92 | 850.07 | 852.21 | 851.30 | -- | 849.32 | -- | 849.11 | 848.47 | -- | 849.38 |
| 9/3/1992 | -- | 842.35 | -- | 850.26 | -- | -- | -- | -- | 850.81 | -- | 850.28 | -- | 848.96 | 849.99 | 851.03 | 852.40 | -- | 849.30 | -- | 849.09 | 848.55 | -- | 849.30 |
| 10/12/1992 | -- | 843.34 | -- | 850.59 | -- | -- | -- | -- | 851.11 | -- | 850.65 | -- | 849.28 | 850.34 | 851.66 | 851.95 | -- | 849.53 | -- | 849.34 | 848.69 | -- | 849.58 |
| 1/13/1993 | -- | 848.66 | -- | 846.20 | -- | -- | -- | -- | 850.25 | -- | 849.79 | -- | 848.44 | 849.47 | 850.68 | 851.27 | -- | 848.71 | -- | 848.63 | 848.00 | -- | 848.61 |
| 4/13/1993 | -- | 849.79 | -- | 846.84 | -- | -- | -- | -- | 850.47 | -- | 850.12 | -- | 848.59 | 849.76 | 851.86 | 852.63 | -- | 848.90 | -- | 848.65 | 848.15 | -- | 849.00 |
| 7/19/1993 | -- | 850.81 | -- | 847.18 | -- | -- | -- | -- | 852.02 | -- | 851.46 | -- | 850.24 | 851.21 | 851.65 | 851.81 | -- | 850.44 | -- | 850.48 | 849.39 | -- | 850.41 |
| 10/18/1993 | -- | 849.73 | -- | 847.42 | -- | -- | -- | -- | 848.76 | -- | 850.70 | -- | 849.30 | 850.34 | 851.56 | 851.93 | -- | 849.64 | -- | 849.44 | 848.76 | -- | 849.62 |
| 2/5/1994 | -- | 849.10 | -- | 847.56 | -- | -- | -- | -- | -- | -- | 850.07 | -- | 848.95 | 849.80 | 850.99 | 851.37 | -- | 848.87 | -- | 848.69 | 847.99 | -- | 848.81 |
| 5/31/1994 | -- | 850.28 | -- | 846.48 | -- | -- | -- | -- | 850.62 | -- | 851.00 | -- | 850.12 | 850.86 | 851.16 | 850.97 | -- | 850.07 | -- | 849.90 | 849.08 | -- | 849.98 |
| 8/1/1994 | -- | 849.20 | -- | 846.42 | -- | -- | -- | -- | 849.74 | -- | 850.22 | -- | 848.94 | 849.94 | 850.86 | 849.03* | -- | 849.27 | -- | 849.06 | 848.49 | -- | 849.26 |
| 9/28/1994 | -- | 849.14 | -- | 846.30 | -- | -- | -- | -- | 849.60 | -- | 850.12 | -- | 848.92 | 849.83 | 851.28 | 849.25* | -- | 849.05 | -- | 848.79 | 848.21 | -- | 849.02 |
| 2/1/1995 | -- | 848.52 | -- | 845.34 | -- | -- | -- | -- | 848.83 | -- | 849.42 | -- | 848.00 | 849.06 | 850.43 | 850.96 | -- | 848.28 | -- | 848.14 | 847.49 | -- | 848.18 |
| 4/3/1995 | -- | 851.09 | -- | 845.75 | -- | -- | -- | -- | 849.26 | -- | 849.97 | -- | 848.42 | 849.58 | 851.65 | 852.48 | -- | 848.68 | -- | 848.33 | 847.86 | -- | 848.68 |
| 7/6/1995 | -- | 850.30 | -- | 846.75 | -- | -- | -- | -- | 850.63 | -- | 851.15 | -- | 849.88 | 850.96 | 852.16 | 852.36 | -- | 850.06 | -- | 850.01 | 849.04 | -- | 850.03 |
| 10/18/1995 | -- | 849.75 | -- | 850.53 | -- | -- | -- | -- | 849.94 | -- | 850.50 | -- | 849.17 | 850.21 | 851.40 | 851.71 | -- | 849.43 | -- | 849.21 | 848.59 | -- | 849.40 |
| 2/8/1996 | -- | 849.25 | -- | 846.96 | -- | -- | -- | -- | 849.14 | -- | 849.75 | -- | 848.31 | 849.38 | 851.15 | 851.40 | -- | 848.51 | -- | 848.38 | 847.70 | -- | 848.41 |
| 4/24/1996 | -- | -- | -- | -- | -- | -- | -- | -- | 849.87 | -- | 850.47 | -- | -- |  | 851.74 | 852.54 | -- | 849.27 | -- | -- | 848.39 | -- | -- |
| 5/14/1996 | -- | -- | -- | -- | -- | -- | -- | -- | 850.00 | -- | -- | -- | -- | 850.26 | 851.85 | -- | -- | -- | -- | 849.15 | -- | -- | 849.40 |
| 9/6/1996 | -- | -- | -- | -- | -- | -- | -- | -- | 851.25 | -- | 849.30 | -- | -- |  | 848.40 | -- | -- | 848.38 | -- | -- | 847.56 | -- | -- |
| 10/1/1996 | -- | 848.77 | -- | -- | -- | -- | -- | -- | 850.80 | -- | 848.82 | -- | 847.68 | 848.57 | 848.38 | 847.14 | -- | 847.87 | -- | 847.76 | 847.09 | -- | 847.74 |
| 1/2/1997 | -- | -- | -- | -- | -- | -- | -- | -- | 848.02 * | -- | 849.92 | -- | -- |  | 851.35 | 851.86 | -- | 848.92 | -- | -- | 848.09 | -- | -- |
| 3/31/1997 | -- | 849.72 | -- | -- | -- | -- | -- | -- | 850.19 | -- | 850.50 | -- | -- |  | 851.86 | 852.80 | -- | 849.08 | -- | -- | 848.05 | -- | -- |
| 7/9/1997 | -- | -- | -- | -- | -- | -- | -- | -- | 850.52 | -- | 850.81 | -- | -- |  | 851.88 | 852.03 | -- | 849.49 | -- | -- | 848.48 | -- | -- |
| 9/12/1997 | -- | -- | -- | -- | -- | -- | -- | -- | 850.78 | -- | 850.95 | -- | -- |  | 851.33 | 851.13 | -- | 849.91 | -- | -- | 849.05 | -- | -- |
| 10/1/1997 | -- | 849.95 | -- | 841.58 | -- | -- | -- | -- | 850.50 | -- | 850.76 | -- | 849.44 | 850.31 | 851.31 | 850.84 | -- | 849.67 | -- | 849.46 | 848.90 | -- | 849.67 |
| 1/7/1998 | -- | -- | -- | -- | -- | -- | -- | -- | 849.47 | -- | 850.00 | -- | -- |  | 850.92 | 850.77 | -- | 848.84 | -- | -- | 848.21 | -- | -- |
| 4/1/1998 | -- | -- | -- | -- | -- | -- | -- | -- | 849.82 | -- | 850.59 | -- | -- |  | 852.51 | 852.90 | -- | 849.07 | -- | -- | 848.42 | -- | -- |
| 7/1/1998 | -- | -- | -- | -- | -- | -- | -- | -- | 850.26 | -- | 850.78 | -- | -- |  | 851.75 | 850.69 | -- | 849.62 | -- | -- | 849.00 | -- | -- |
| 11/18/1998 | -- | 849.07 | -- | 850.95 | -- | -- | -- | -- | 849.45 | -- | 850.02 | -- | 848.96 | 849.66 | 852.06 | 850.94 | -- | 848.76 | -- | 848.71 | 848.07 | -- | 848.76 |
| 2/25/1999 | -- | -- | -- | -- | -- | -- | -- | -- | 848.59 | -- | 849.19 | -- | -- |  | 850.99 | 850.59 | -- | 847.82 | -- | -- | 847.17 | -- | -- |
| 5/31/1999 | -- | -- | -- | -- | -- | -- | -- | -- | 850.51 | -- | 850.94 | -- | -- |  | 851.53 | 851.34 | -- | 849.86 | -- | -- | 849.21 | -- | -- |
| 11/15/1999 | 849.40 | -- | 849.52 | 849.41 | -- | -- | 849.68 | -- | -- | 848.80 | -- | 849.37 | 848.76 | 849.33 | 850.88 | 850.32 | -- | 848.49 | -- | 848.51 | 847.87 | -- | 848.41 |
| 3/1/2000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.91 | 848.63 | -- | -- |  | 851.62 | 851.42 | -- | 847.43 | -- | -- | 846.81 | -- | -- |
| 6/2/2000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.20 | 848.87 | -- | -- |  | 851.51 | 850.71 | -- | 847.72 | -- | -- | 846.96 | -- | -- |
| 9/6/2000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.19 | 849.87 | -- | -- |  | 852.00 | 850.83 | -- | 848.85 | -- | -- | 848.29 | -- | -- |
| 9/26/2000 | 848.89 | -- | 849.03 | -- | -- | -- | 849.76 | -- | -- | -- | -- | -- | -- |  | 851.16 | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/27/2000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | 849.30 | -- | 848.88 | -- | -- | -- | -- | -- |
| 9/28/2000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.35 | -- | -- | -- | -- | -- | 848.80 | 848.33 | -- | 848.83 |
| 3/6/2001 | -- | -- | -- | -- | 847.77 | 846.36 | -- | -- | -- | 847.80 | 848.38 | -- | -- |  | 851.22 | 850.50 | -- | 847.48 | -- | -- | 846.88 | -- | -- |
| 7/3/2001 | -- | -- | -- | -- | 850.54 | 849.40 | -- | -- | -- | 850.60 | 851.00 | -- | -- |  | 851.51 | 850.92 | -- | 850.36 | -- | -- | 849.61 | -- | -- |
| 10/16/2001 | 849.37 | -- | 849.52 | 844.17 | -- | 848.62 | 850.25 | -- | -- | 849.36 | 849.92 | -- | -- | 849.54 | 851.73 | -- | -- | -- | -- | 849.03 | 848.66 | -- | -- |
| 10/17/2001 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | 851.30 | -- | -- | -- | -- | -- | -- | 849.21 |

# Table A-1
## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | U6N | U7 | U7N | U8 | U11 | U12 | W2N | W5 | W6 | W6N | W7 | W7N | W9 | W10 | W101 | W104 | W111 | W112 | W113 | W121 | W122 | W122R | W123 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/19/2001 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | 849.15 | -- | -- | -- | -- | -- |
| 12/15/2001 | 850.55 | -- | 843.31 | 854.80 | -- | -- | 850.39 | -- | -- | 849.37 | 849.88 | -- | -- | 849.59 | 851.76 | 851.92 | -- | -- | -- | -- | -- | -- | -- |
| 1/31/2002 | -- | -- | -- | -- | 847.47 | 848.37 | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/28/2002 | -- | -- | -- | -- | 846.26 | 847.57 | -- | -- | -- | 848.48 | 849.15 | -- | -- |  | 851.52 | 851.46 | -- | 848.18 | -- | -- | 847.66 | -- | -- |
| 3/26/2002 | -- | -- | -- | -- | 846.20 | 847.44 | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/8/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | -- | 847.89 | -- | -- |
| 4/29/2002 | -- | -- | -- | -- | 847.02 | 848.32 | -- | -- | -- | 849.23 | 850.09 | -- | -- |  | 852.27 | 852.73 | -- | 848.92 | -- | -- | -- | -- | -- |
| 5/15/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |  | -- | -- | -- | -- | -- | 849.69 | -- | -- | -- |
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| 10/28/2002 | 849.42 | -- | 844.02 | 850.78 | 848.28 | 851.27 | 850.98 | -- | -- | 850.21 | 850.71 | -- | -- | 841.42 | 852.00 | 852.10 | -- | 850.05 | -- | -- | -- | -- | 850.04 |
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| Location | U6N | U7 | U7N | U8 | U11 | U12 | W2N | W5 | W6 | W6N | W7 | W7N | W9 | W10 | W101 | W104 | W111 | W112 | W113 | W121 | W122 | W122R | W123 |
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| 11/7/2005 | 848.02 | -- | 849.35 | 850.00 | 846.82 | 847.72 | 850.48 | -- | -- | 849.48 | 850.13 | -- | -- | 849.60 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
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| 10/16/2006 | 846.67 | -- | 848.70 | 849.35 | 846.12 | 847.05 | 849.74 | -- | -- | 848.80 | 849.43 | -- | -- | 848.92 | 851.52 | 851.16 | -- | -- | -- | -- | -- | -- | -- |
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| Location | U6N | U7 | U7N | U8 | U11 | U12 | W2N | W5 | W6 | W6N | W7 | W7N | W9 | W10 | W101 | W104 | W111 | W112 | W113 | W121 | W122 | W122R | W123 |
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| 2/25/2009 | 846.47 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.33 | -- | -- |  | 851.09 | 850.63 | -- | -- | -- | -- | -- | -- | -- |
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## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | U6N | U7 | U7N | U8 | U11 | U12 | W2N | W5 | W6 | W6N | W7 | W7N | W9 | W10 | W101 | W104 | W111 | W112 | W113 | W121 | W122 | W122R | W123 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/27/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 847.84 | 848.63 | -- | -- | -- | 851.81 | 851.13 | -- | -- | -- | -- | -- | -- | -- |
| 6/30/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.05 | 851.72 | -- | -- | -- | 852.27 | 852.68 | -- | -- | -- | -- | -- | -- | -- |
| 9/30/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.35 | 850.01 | -- | -- | -- | 851.37 | 850.61 | -- | -- | -- | -- | -- | -- | -- |
| 10/14/2014 | 836.67 | -- | 847.92 | 849.75 | 843.57 | 841.82 | 850.24 | -- | -- | 849.35 | 849.93 | -- | -- | 850.35 | 851.37 | 851.83 | -- | -- | -- | -- | -- | -- | -- |
| 3/20/2015 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.39 | 849.08 | -- | -- | -- | 851.42 | 851.13 | -- | -- | -- | -- | -- | -- | -- |
| 6/30/2015 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.87 | 849.48 | -- | -- | -- | 851.52 | 851.18 | -- | -- | -- | -- | -- | -- | -- |
| 9/1/2015 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.18 | 849.73 | -- | -- | -- | 851.40 | 850.83 | -- | -- | -- | -- | -- | -- | -- |
| 10/5/2015 | 836.72 | -- | 847.17 | 849.40 | 842.37 | 841.72 | 849.84 | -- | -- | 849.00 | 849.63 | -- | -- | 848.62 | 851.32 | 851.21 | -- | -- | -- | -- | -- | -- | -- |
| 2/5/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.05 | 849.71 | -- | -- | -- | 851.62 | 851.82 | -- | -- | -- | -- | -- | -- | -- |
| 6/30/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.33 | 849.83 | -- | -- | -- | 850.97 | 851.4 | -- | -- | -- | -- | -- | -- | -- |
| 9/12/2016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.53 | 850.93 | -- | -- | -- | 851.59 | 852.14 | -- | -- | -- | -- | -- | -- | -- |
| 10/10/2016 | 841.32 | -- | 848.02 | 850.8 | 846.42 | 842.32 | 851.19 | -- | -- | 850.59 | 848.12 | -- | -- | 848.35 | 851.65 | 852.23 | -- | -- | -- | -- | -- | -- | -- |

-- Not measured
See Table 3-18 for data qualifiers and footnotes.

# Table A-1
# 1984 - 2016 Upper Aquifer Water Levels
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN
# (elevations in ft./MSL)

| Location | W124 | W125 | W125N | W125R | W126 | W127 | W127N | W128 | W129 | W130 | W131 | W132 | W2 | W201 | W223 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/11/1984 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.80 | -- | -- |
| 1/28/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/29/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.47 | -- | -- |
| 3/25/1985 | 856.20 | -- | -- | -- | 848.63 | -- | -- | -- | -- | -- | -- | -- | 851.16 | 851.39 | -- |
| 3/26/1985 | 856.26 | 848.94 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/27/1985 | -- | -- | -- | -- | 848.65 | -- | -- | -- | -- | -- | -- | -- | 851.18 | -- | -- |
| 3/28/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.57 | -- |
| 4/12/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.68 | -- |
| 5/6/1985 | 848.22 | 848.85 | -- | 848.85 | 848.95 | -- | -- | -- | -- | -- | -- | -- | 851.52 | 851.90 | -- |
| 5/16/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/22/1985 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.45 | -- | -- |
| 2/26/1986 | -- | -- | -- | -- | -- | 849.52 | -- | 849.99 | 850.46 | -- | -- | -- | -- | -- | -- |
| 3/4/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/18/1986 | 846.11 | 846.69 | -- | -- | 846.26 | 849.57 | -- | 850.18 | 851.05 | -- | -- | -- | -- | -- | -- |
| 3/20/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/2/1986 | 848.90 | 849.40 | -- | -- | 849.35 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/3/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.66 | -- | -- |
| 6/4/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/23/1986 | 848.21 | -- | -- | -- | 849.87 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/24/1986 | -- | 854.06 | -- | -- | -- | -- | -- | 851.68 | -- | -- | -- | -- | -- | 852.28 | 850.11 |
| 9/25/1986 | -- | -- | -- | -- | -- | 851.02 | -- | -- | 852.29 | -- | -- | -- | 852.05 | -- | -- |
| 9/26/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/9/1986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.04 | -- |
| 12/10/1986 | 847.65 | 848.17 | -- | -- | 847.91 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/11/1986 | -- | -- | -- | -- | -- | 850.12 | -- | 850.44 | 851.38 | -- | -- | -- | -- | -- | 849.20 |
| 3/17/1987 | 845.90 | 846.22 | -- | -- | 845.53 | 849.14 | -- | 849.64 | 850.82 | -- | -- | -- | 850.03 | 850.27 | 848.07 |
| 5/4/1987 | 845.37 | 845.93 | -- | -- | 845.09 | 848.64 | -- | 849.08 | 849.91 | -- | -- | -- | 849.51 | 849.98 | 847.63 |
| 7/13/1987 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.77 | 849.03 | 846.77 |
| 11/3/1987 | 845.59 | 846.99 | -- | -- | 845.23 | 848.73 | -- | 850.05 | 849.37 | -- | -- | -- | 849.79 | 849.96 | 847.81 |
| 2/1/1988 | 849.70 | 844.45 | -- | -- | 843.83 | 847.66 | -- | 848.16 | 848.70 | -- | -- | -- | 848.67 | 848.92 | 846.67 |
| 2/22/1988 | -- | -- | -- | -- | 843.83 | 847.66 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/23/1988 | 844.45 | -- | -- | -- | -- | -- | -- | 848.16 | -- | -- | -- | -- | 848.67 | -- | -- |
| 2/25/1988 | -- | 844.72 | -- | -- | -- | -- | -- | -- | 848.70 | -- | -- | -- | -- | -- | 846.67 |
| 2/29/1988 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/3/1988 | 842.87 | 843.27 | -- | -- | 841.89 | 846.15 | -- | 847.13 | 847.14 | -- | -- | -- | 847.21 | -- | 845.15 |
| 12/5/1988 | -- | 842.93 | -- | -- | 841.91 | 845.99 | -- | 846.68 | 847.83 | -- | -- | -- | 846.83 | -- | 844.96 |
| 1/16/1989 | -- | -- | -- | -- | -- | -- | -- | 846.31 | 847.03 | -- | -- | -- | 846.85 | -- | 844.77 |
| 2/1/1989 | -- | -- | -- | -- | -- | -- | -- | 845.99 | 847.09 | -- | -- | -- | 846.52 | -- | 843.87 |
| 2/2/1989 | -- | -- | -- | -- | -- | -- | -- | 845.98 | 847.09 | -- | -- | -- | 846.61 | -- | 844.47 |
| 2/3/1989 | -- | -- | -- | -- | -- | -- | -- | 845.98 | -- | -- | -- | -- | 846.55 | -- | -- |
| 2/4/1989 | -- | -- | -- | -- | -- | -- | -- | 846.00 | -- | -- | -- | -- | 846.54 | -- | -- |
| 2/5/1989 | -- | -- | -- | -- | -- | -- | -- | 845.91 | 847.22 | -- | -- | -- | 846.48 | -- | 844.40 |
| 2/6/1989 | -- | -- | -- | -- | -- | -- | -- | 845.94 | 847.40 | -- | -- | -- | 846.47 | -- | 844.64 |

# Table A-1
# 1984 - 2016 Upper Aquifer Water Levels
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN
# (elevations in ft./MSL)

| Location | W124 | W125 | W125N | W125R | W126 | W127 | W127N | W128 | W129 | W130 | W131 | W132 | W2 | W201 | W223 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/7/1989 | -- | -- | -- | -- | -- | -- | -- | 845.95 | 847.38 | -- | -- | -- | 846.45 | -- | 844.55 |
| 2/27/1989 | 842.23 | 842.62 | -- | -- | 841.44 | 845.05 | -- | 845.68 | 846.77 | -- | -- | -- | DRY | 846.49 | 844.18 |
| 3/9/1989 | -- | -- | -- | -- | -- | -- | -- | 845.90 | 846.76 | -- | -- | -- | -- | -- | 843.82 |
| 3/10/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 846.07 | -- | -- |
| 3/31/1989 | -- | -- | -- | -- | -- | -- | -- | 846.32 | 849.18 | -- | -- | -- | 847.10 | -- | 844.41 |
| 4/14/1989 | -- | -- | -- | -- | -- | -- | -- | 847.16 | 850.43 | -- | -- | -- | 847.83 | -- | 845.27 |
| 4/28/1989 | -- | -- | -- | -- | -- | -- | -- | 847.39 | 849.41 | -- | -- | -- | 848.20 | -- | 845.43 |
| 5/12/1989 | -- | -- | -- | -- | -- | -- | -- | 847.76 | 849.55 | -- | -- | -- | 848.64 | -- | 845.81 |
| 5/31/1989 | -- | -- | -- | -- | -- | -- | -- | 848.10 | 849.50 | -- | -- | -- | 848.91 | -- | 846.42 |
| 6/6/1989 | -- | -- | -- | -- | -- | -- | -- | 852.22* | 848.83 | -- | -- | -- | 848.82 | -- | 846.62 |
| 6/29/1989 | -- | -- | -- | -- | -- | -- | -- | 848.03 | 848.68 | -- | -- | -- | 848.80 | -- | 846.38 |
| 7/18/1989 | -- | -- | -- | -- | -- | -- | -- | 847.50 | 847.66 | -- | -- | -- | 848.32 | -- | 846.05 |
| 8/2/1989 | 843.65 | 844.11 | -- | -- | 842.82 | 846.82 | -- | 847.38 | 847.65 | -- | -- | -- | 848.25 | 848.47 | 845.93 |
| 9/5/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/29/1989 | 843.30 | 844.13 | -- | -- | 842.46 | 846.47 | -- | 847.04 | 846.79 | -- | -- | -- | 848.16 | 848.28 | 845.48 |
| 11/3/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/1/1989 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/5/1990 | 842.23 | 844.28 | -- | -- | 841.53 | 844.99 | -- | 846.83 | 846.31 | -- | -- | -- | DRY | 846.53 | 844.10 |
| 2/2/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/9/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/2/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/1/1990 | 842.62 | 843.10 | -- | -- | 842.33 | 846.62 | -- | 847.36 | 849.77 | 846.62 | 847.82 | -- | 846.38 | 848.75 | 845.33 |
| 6/4/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/22/1990 | 843.90 | 844.55 | -- | -- | -- | 848.55 | -- | 849.35 | -- | -- | -- | -- | -- | -- | -- |
| 8/27/1990 | 845.31 | 845.80 | -- | -- | -- | -- | -- | 849.29 | -- | -- | -- | -- | -- | -- | -- |
| 9/7/1990 | 845.18 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/29/1990 | 844.52 | 844.80 | -- | -- | 844.03 | 847.51 | -- | 848.11 | 848.39 | 847.60 | 848.48 | -- | 848.92 | 849.26 | 846.60 |
| 12/6/1990 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/10/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/7/1991 | 843.26 | 843.46 | -- | -- | 842.79 | 845.95 | -- | -- | 847.46 | 845.89 | 846.86 | -- | DRY | 847.57 | 845.05 |
| 3/11/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/14/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/14/1991 | 846.84 | 848.54 | -- | -- | 848.89 | 850.19 | -- | 850.40 | 850.76 | 849.18 | 850.60 | -- | 849.21 | 850.94 | 849.44 |
| 7/12/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/20/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/16/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/30/1991 | 848.87 | 849.24 | -- | -- | 849.24 | 850.54 | -- | 850.86 | 851.35 | 850.52 | 851.01 | -- | 850.83 | 851.51 | 849.77 |
| 10/16/1991 | 848.39 | 848.70 | -- | -- | 848.62 | 850.12 | -- | 850.47 | 850.88 | 850.02 | 850.70 | -- | 850.48 | 851.17 | 849.39 |
| 11/19/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/12/1991 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/6/1992 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/4/1992 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/30/1992 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

# Table A-1
## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | W124 | W125 | W125N | W125R | W126 | W127 | W127N | W128 | W129 | W130 | W131 | W132 | W2 | W201 | W223 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4/24/1992 | 847.75 | 848.42 | -- | -- | 849.30 | 850.19 | -- | 850.72 | 851.83 | 849.99 | 850.82 | -- | 851.13 | 851.49 | 849.26 |
| 6/17/1992 | 847.24 | 847.71 | -- | -- | 849.21 | 849.82 | -- | 850.29 | 851.42 | 849.69 | 850.49 | -- | 850.84 | 851.22 | 849.06 |
| 9/3/1992 | 847.54 | 848.06 | -- | -- | 848.03 | 849.84 | -- | 850.25 | 849.95 | 849.68 | 850.35 | -- | 850.10 | 850.92 | 847.03 |
| 10/12/1992 | 847.92 | 848.58 | -- | -- | 849.43 | 850.17 | -- | 850.60 | 851.26 | 852.00 | 851.73 | -- | 851.01 | 851.33 | 849.26 |
| 1/13/1993 | 846.87 | 847.24 | -- | -- | 847.06 | 849.30 | -- | 849.79 | 849.99 | 849.13 | 849.86 | -- | 850.19 | 850.57 | 848.46 |
| 4/13/1993 | 846.90 | 847.74 | -- | -- | 848.90 | 849.57 | -- | 850.08 | 851.51 | 849.38 | 850.31 | -- | 850.58 | 850.90 | 848.72 |
| 7/19/1993 | 849.23 | 849.57 | -- | -- | 849.61 | 851.05 | -- | 851.41 | 851.84 | 850.96 | 851.48 | -- | 851.70 | 851.96 | 850.06 |
| 10/18/1993 | 848.00 | 848.50 | -- | -- | 848.71 | 850.21 | -- | 850.69 | 851.09 | 850.03 | 850.76 | -- | 850.99 | 851.18 | 849.33 |
| 2/5/1994 | 846.66 | 847.08 | -- | -- | 846.88 | 849.51 | -- | 850.03 | 850.27 | 849.48 | 850.18 | -- | 850.39 | 850.79 | 848.56 |
| 5/31/1994 | 848.32 | 848.80 | -- | -- | 848.85 | 850.55 | -- | 850.92 | 851.04 | 850.63 | 851.03 | -- | 850.77 | 851.51 | 849.70 |
| 8/1/1994 | 847.54 | 848.07 | -- | -- | 848.13 | 849.79 | -- | 850.22 | 849.49 * | 849.63 | 849.27 * | -- | 850.50 | 850.72 | 849.00 |
| 9/28/1994 | 846.93 | 847.59 | -- | -- | 847.90 | 849.62 | -- | 850.10 | 849.83 * | 849.52 | 850.21 | -- | 850.46 | 850.87 | 848.75 |
| 2/1/1995 | 846.03 | 846.37 | -- | -- | 846.10 | 848.85 | -- | 849.38 | 849.69 | 848.71 | 849.52 | -- | 849.82 | 850.22 | 847.98 |
| 4/3/1995 | 846.33 | 847.16 | -- | -- | 848.10 | 849.37 | -- | 849.90 | 851.24 | 849.15 | 850.07 | -- | 850.41 | 850.80 | 848.48 |
| 7/6/1995 | 848.37 | 848.94 | -- | -- | 849.94 | 850.61 | -- | 851.06 | 851.82 | 850.62 | 851.30 | -- | 851.56 | 851.74 | 849.70 |
| 10/18/1995 | 847.70 | 848.27 | -- | -- | 848.86 | 849.96 | -- | 850.44 | 850.91 | 849.86 | 850.64 | -- | 850.82 | 851.20 | 849.13 |
| 2/8/1996 | 846.32 | 846.63 | -- | -- | 846.39 | 849.12 | -- | 849.69 | 850.07 | 849.03 | 849.92 | -- | -- | 850.51 | 848.21 |
| 4/24/1996 | -- | -- | -- | -- | -- | -- | -- | -- | 851.37 | -- | 850.62 | -- | -- | 851.18 | -- |
| 5/14/1996 | -- | -- | -- | -- | -- | -- | -- | 850.50 | -- | -- | -- | -- | -- | -- | -- |
| 9/6/1996 | -- | -- | -- | -- | -- | -- | -- | -- | 848.70 | -- | 849.40 | -- | -- | 849.91 | -- |
| 10/1/1996 | 845.57 | 845.87 | -- | -- | 845.48 | 848.34 | -- | 848.80 | 848.65 | 848.34 | 848.95 | -- | 849.17 | 849.56 | 847.54 |
| 1/2/1997 | -- | -- | -- | -- | -- | -- | -- | -- | 850.39 | -- | 850.04 | -- | -- | 850.61 | -- |
| 3/31/1997 | -- | -- | -- | -- | -- | -- | -- | -- | 852.10 | -- | 850.92 | -- | -- | 851.41 | -- |
| 7/9/1997 | -- | -- | -- | -- | -- | -- | -- | -- | 851.59 | -- | 851.02 | -- | -- | 851.40 | -- |
| 9/12/1997 | -- | -- | -- | -- | -- | -- | -- | -- | 850.86 | -- | 851.06 | -- | -- | 851.30 | -- |
| 10/1/1997 | 848.10 | 848.59 | -- | -- | 848.74 | 850.29 | -- | 850.68 | 850.81 | 850.03 | 850.69 | -- | 850.98 | 851.32 | 849.48 |
| 1/7/1998 | -- | -- | -- | -- | -- | -- | -- | -- | 850.30 | -- | 850.03 | -- | -- | -- | -- |
| 4/1/1998 | -- | -- | -- | -- | -- | -- | -- | -- | 852.30 | -- | 850.76 | -- | -- | -- | -- |
| 7/1/1998 | -- | -- | -- | -- | -- | -- | -- | -- | 850.76 | -- | 850.87 | -- | -- | -- | -- |
| 11/18/1998 | 846.70 | 847.02 | -- | -- | 847.15 | 849.50 | -- | 850.09 | 850.39 | 849.26 | 850.15 | -- | 850.37 | 850.70 | 848.59 |
| 2/25/1999 | -- | -- | -- | -- | -- | -- | -- | -- | 849.76 | -- | 849.31 | -- | -- | -- | -- |
| 5/31/1999 | -- | -- | -- | -- | -- | -- | -- | -- | 851.33 | -- | 851.01 | -- | -- | -- | -- |
| 11/15/1999 | 846.52 | -- | -- | -- | 846.27 | 849.11 | -- | 849.65 | 849.80 | 848.97 | -- | -- | -- | 850.30 | 848.31 |
| 3/1/2000 | -- | -- | -- | -- | -- | -- | -- | -- | 851.76 | -- | -- | -- | -- | -- | -- |
| 6/2/2000 | -- | -- | -- | -- | -- | -- | -- | -- | 851.36 | -- | -- | -- | -- | -- | -- |
| 9/6/2000 | -- | -- | -- | -- | -- | -- | -- | -- | 851.82 | -- | -- | -- | -- | -- | -- |
| 9/26/2000 | 847.17 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.34 | -- |
| 9/27/2000 | -- | -- | -- | -- | -- | -- | -- | -- | 849.93 | -- | -- | -- | -- | -- | -- |
| 9/28/2000 | -- | -- | -- | -- | 847.50 | 849.36 | -- | 849.75 | -- | 849.31 | -- | -- | -- | -- | 848.72 |
| 3/6/2001 | -- | -- | -- | -- | -- | -- | -- | -- | 849.78 | -- | -- | -- | -- | -- | -- |
| 7/3/2001 | -- | -- | -- | -- | -- | -- | -- | -- | 851.36 | -- | -- | -- | -- | -- | -- |
| 10/16/2001 | 847.64 | 848.15 | -- | -- | -- | 849.77 | -- | 850.25 | -- | 849.48 | -- | -- | -- | 850.87 | 849.04 |
| 10/17/2001 | -- | -- | -- | -- | 848.26 | -- | -- | -- | 851.10 | -- | -- | -- | -- | -- | -- |

# Table A-1
# 1984 - 2016 Upper Aquifer Water Levels
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN
# (elevations in ft./MSL)

| Location | W124 | W125 | W125N | W125R | W126 | W127 | W127N | W128 | W129 | W130 | W131 | W132 | W2 | W201 | W223 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/19/2001 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/15/2001 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/31/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/28/2002 | -- | -- | -- | -- | -- | -- | -- | -- | 850.63 | -- | -- | -- | -- | -- | -- |
| 3/26/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/8/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/29/2002 | -- | -- | -- | -- | -- | -- | -- | -- | 852.13 | -- | -- | -- | -- | -- | -- |
| 5/15/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/30/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/30/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/1/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/2/2002 | -- | -- | -- | -- | -- | -- | -- | -- | FLOODED | -- | -- | -- | -- | -- | -- |
| 8/30/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/30/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/28/2002 | 847.64 | 848.88 | -- | -- | 848.26 | 850.65 | -- | 851.09 | 851.96 | 850.41 | -- | -- | -- | 851.56 | 849.90 |
| 12/3/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/30/2002 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/4/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/3/2003 | -- | -- | -- | -- | -- | -- | -- | -- | 849.98 | -- | -- | -- | -- | -- | -- |
| 4/1/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/2/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/7/2003 | -- | -- | -- | -- | -- | -- | -- | -- | 852.18 | -- | -- | -- | -- | -- | 850.00 |
| 7/2/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/4/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/2/2003 | -- | -- | -- | -- | 845.94 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/3/2003 | -- | -- | -- | -- | -- | -- | -- | -- | 849.26 | -- | -- | -- | -- | -- | -- |
| 9/4/2003 | -- | -- | -- | -- | -- | 846.01 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/9/2003 | -- | -- | -- | -- | 845.35 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/22/2003 | 845.23 | 846.75 | -- | -- | 844.79 | 843.25 | -- | 847.89 | 850.18 | 845.05 | -- | -- | -- | 849.01 | -- |
| 9/25/2003 | -- | -- | -- | -- | 844.81 | 843.24 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/27/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/2/2003 | -- | -- | -- | -- | 844.17 | 844.35 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/6/2003 | -- | -- | -- | -- | -- | 844.74 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/13/2003 | -- | -- | -- | -- | -- | 845.05 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 11/3/2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/16/2003 | 843.54 | 843.92 | -- | -- | 843.61 | -- | 846.95 | 848.01 | 849.68 | 846.51 | -- | 846.07 | -- | 848.79 | -- |
| 1/9/2004 | -- | -- | -- | -- | -- | -- | -- | -- | 849.21 | -- | -- | 846.34 | -- | -- | -- |
| 2/3/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/9/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/1/2004 | -- | -- | -- | -- | -- | -- | -- | -- | 851.05 | -- | -- | 846.97 | -- | -- | -- |
| 5/10/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/7/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/30/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

# Table A-1
## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | W124 | W125 | W125N | W125R | W126 | W127 | W127N | W128 | W129 | W130 | W131 | W132 | W2 | W201 | W223 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8/2/2004 | -- | -- | -- | -- | -- | -- | -- | -- | 849.68 | -- | -- | 848.47 | -- | -- | -- |
| 8/31/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/6/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/18/2004 | 845.76 | 847.15 | -- | -- | 845.81 | -- | 848.72 | 849.52 | 850.40 | 848.54 | -- | 848.04 | -- | 850.17 | -- |
| 11/2/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/1/2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/5/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/2/2005 | -- | -- | -- | -- | -- | -- | -- | -- | 849.06 | -- | -- | 847.62 | -- | -- | -- |
| 3/3/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/1/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/4/2005 | -- | -- | -- | -- | 846.51 | -- | -- | -- | 850.81 | -- | -- | 848.25 | -- | -- | -- |
| 6/3/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/7/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/5/2005 | -- | -- | -- | -- | 846.51 | -- | -- | -- | 849.61 | -- | -- | 848.33 | -- | -- | -- |
| 9/1/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/7/2005 | -- | -- | -- | -- | -- | -- | 848.61 | 849.54 | 852.91 | -- | -- | -- | -- | -- | -- |
| 10/21/2005 | -- | -- | -- | -- | -- | -- | 848.68 | 850.03 | 851.46 | -- | -- | -- | -- | -- | -- |
| 11/2/2005 | -- | -- | -- | -- | -- | -- | 849.92 | 850.63 | 851.16 | -- | -- | -- | -- | -- | -- |
| 11/7/2005 | 847.98 | -- | -- | -- | 848.76 | -- | -- | -- | -- | 849.56 | -- | 849.17 | -- | 851.11 | -- |
| 12/12/2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/9/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/10/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/1/2006 | -- | -- | 846.66 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/19/2006 | -- | -- | -- | -- | 846.58 | -- | -- | -- | 850.71 | -- | -- | 848.50 | -- | -- | -- |
| 4/14/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/9/2006 | -- | -- | -- | -- | 850.50 | -- | -- | -- | 852.81 | -- | -- | 849.67 | -- | -- | -- |
| 6/5/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/7/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/15/2006 | -- | -- | -- | -- | 846.84 | -- | -- | -- | 850.36 | -- | -- | 848.64 | -- | -- | -- |
| 9/6/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/9/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10/16/2006 | 846.69 | -- | 846.93 | -- | 847.04 | -- | 849.12 | 849.83 | 850.44 | 848.89 | -- | 848.57 | -- | 850.41 | -- |
| 11/14/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/7/2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/2/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/12/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/12/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/15/2007 | -- | -- | -- | -- | 848.33 | -- | -- | -- | 852.16 | -- | -- | 848.08 | -- | -- | -- |
| 4/10/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/11/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/8/2007 | -- | -- | -- | -- | -- | -- | -- | -- | 850.56 | 849.56 | -- | 849.17 | -- | -- | -- |
| 6/28/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/7/2007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

## Table A-1
## 1984 - 2016 Upper Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | W124 | W125 | W125N | W125R | W126 | W127 | W127N | W128 | W129 | W130 | W131 | W132 | W2 | W201 | W223 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/12/2007 | -- | -- | -- | -- | -- | -- | -- | -- | 850.06 | 848.48 | -- | 848.12 | -- | -- | -- |
| 11/6/2007 | 847.74 | -- | 848.18 | -- | 848.89 | -- | 850.08 | 850.83 | 851.41 | 849.91 | -- | 849.60 | -- | 851.31 | -- |
| 3/19/2008 | -- | -- | -- | -- | -- | -- | -- | -- | 851.16 | 848.61 | -- | 849.25 | -- | -- | -- |
| 6/14/2008 | -- | -- | -- | -- | -- | -- | -- | -- | 852.04 | 850.01 | -- | 849.68 | -- | -- | -- |
| 9/4/2008 | -- | -- | -- | -- | -- | -- | -- | -- | 849.57 | 848.81 | -- | 848.39 | -- | -- | -- |
| 10/6/2008 | 845.86 | -- | 846.00 | -- | 845.86 | -- | 848.80 | 849.58 | 849.76 | 848.66 | -- | 848.25 | -- | 850.03 | -- |
| 2/25/2009 | -- | -- | -- | -- | -- | -- | -- | -- | 849.73 | 847.70 | -- | 847.27 | -- | -- | -- |
| 6/11/2009 | -- | -- | -- | -- | -- | -- | -- | -- | 849.45 | 847.84 | -- | 847.52 | -- | -- | -- |
| 9/29/2009 | 844.60 | -- | 844.81 | -- | 844.86 | -- | 847.70 | DRY | 848.81 | 847.31 | -- | 846.98 | -- | 849.31 | -- |
| 3/9/2010 | -- | -- | -- | -- | -- | -- | -- | -- | 848.55 | 847.06 | -- | 846.69 | -- | -- | -- |
| 6/4/2010 | -- | -- | -- | -- | -- | -- | -- | -- | 849.16 | 848.05 | -- | 847.59 | -- | -- | -- |
| 8/9/2010 | -- | -- | -- | -- | -- | -- | -- | -- | 849.10 | 848.61 | -- | 848.21 | -- | -- | -- |
| 10/5/2010 | 847.03 | -- | 847.48 | -- | 848.06 | -- | 849.42 | 850.14 | 850.47 | 849.41 | -- | 849.11 | -- | 850.66 | -- |
| 3/22/2011 | -- | -- | -- | -- | -- | -- | -- | -- | 852.66 | 848.96 | -- | 848.52 | -- | -- | -- |
| 6/6/2011 | -- | -- | -- | -- | -- | -- | -- | -- | 851.86 | 850.60 | -- | 850.17 | -- | -- | -- |
| 9/11/2011 | -- | -- | -- | -- | -- | -- | -- | -- | 851.44 | 850.03 | -- | 849.77 | -- | -- | -- |
| 10/11/2011 | -- | -- | 847.38 | -- | 847.88 | -- | 849.52 | -- | 851.29 | 849.36 | -- | 849.07 | -- | 850.76 | -- |
| 3/16/2012 | -- | -- | -- | -- | -- | -- | -- | -- | 851.56 | 848.49 | -- | 848.12 | -- | -- | -- |
| 6/9/2012 | -- | -- | -- | -- | -- | -- | -- | -- | 851.34 | 850.21 | -- | 849.91 | -- | -- | -- |
| 8/7/2012 | -- | -- | -- | -- | -- | -- | 849.89 | -- | -- | -- | -- | 849.52 | -- | -- | -- |
| 8/13/2012 | -- | -- | -- | -- | -- | -- | 849.05 | -- | -- | -- | -- | 848.91 | -- | -- | -- |
| 8/14/2012 | -- | -- | -- | -- | -- | -- | 848.87 | -- | -- | -- | -- | 848.80 | -- | -- | -- |
| 8/15/2012 | -- | -- | -- | -- | -- | -- | 848.76 | -- | -- | -- | -- | 848.71 | -- | -- | -- |
| 8/17/2012 | -- | -- | -- | -- | -- | -- | 848.65 | -- | -- | -- | -- | 848.51 | -- | -- | -- |
| 8/20/2012 | -- | -- | -- | -- | -- | -- | 847.81 | -- | -- | -- | -- | 848.03 | -- | -- | -- |
| 8/21/2012 | -- | -- | -- | -- | -- | -- | 848.19 | -- | -- | -- | -- | 848.08 | -- | -- | -- |
| 8/22/2012 | -- | -- | -- | -- | -- | -- | 848.70 | -- | -- | -- | -- | 848.28 | -- | -- | -- |
| 8/23/2012 | -- | -- | -- | -- | -- | -- | 848.96 | -- | -- | -- | -- | 848.45 | -- | -- | -- |
| 8/24/2012 | -- | -- | -- | -- | -- | -- | 849.16 | -- | -- | -- | -- | 848.54 | -- | -- | -- |
| 9/27/2012 | -- | -- | -- | -- | -- | -- | -- | -- | 848.61 | 848.61 | -- | 848.27 | -- | -- | -- |
| 10/15/2012 | -- | -- | 845.97 | -- | 845.90 | -- | 848.47 | -- | 848.46 | 848.36 | -- | 848.02 | -- | 849.71 | -- |
| 1/3/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.54 |
| 2/8/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.19 |
| 3/7/2013 | -- | -- | -- | -- | -- | -- | -- | -- | 848.91 | 847.38 | -- | 847.02 | -- | -- | 847.94 |
| 4/9/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 848.77 |
| 5/13/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.12 |
| 5/30/2013 | -- | -- | -- | -- | -- | -- | -- | -- | 851.76 | 849.70 | -- | 849.30 | -- | -- | -- |
| 8/6/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 850.44 |
| 8/14/2013 | -- | -- | -- | -- | -- | -- | -- | -- | 850.25 | 849.69 | -- | 849.34 | -- | -- | -- |
| 9/13/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.44 |
| 10/1/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.31 |
| 10/7/2013 | -- | -- | 846.58 | -- | 848.20 | -- | 848.97 | -- | 849.49 | 848.72 | -- | 848.41 | -- | 850.39 | 849.34 |
| 11/8/2013 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 849.59 |

# Table A-1
# 1984 - 2016 Upper Aquifer Water Levels
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN
# (elevations in ft./MSL)

| Location | W124 | W125 | W125N | W125R | W126 | W127 | W127N | W128 | W129 | W130 | W131 | W132 | W2 | W201 | W223 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/27/2014 | -- | -- | -- | -- | -- | -- | -- | -- | 850.94 | 848.06 | -- | 847.62 | -- | -- | -- |
| 6/30/2014 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 851.16 | -- | 850.59 | -- | -- | -- |
| 9/30/2014 | -- | -- | -- | -- | -- | -- | -- | -- | 850.45 | 849.49 | -- | 849.15 | -- | -- | -- |
| 10/14/2014 | -- | -- | -- | 847.58 | 848.00 | -- | 849.59 | -- | 850.39 | 849.41 | -- | 849.09 | -- | -- | -- |
| 3/20/2015 | -- | -- | -- | -- | -- | -- | -- | -- | 850.81 | 848.44 | -- | 848.12 | -- | -- | -- |
| 6/30/2015 | -- | -- | -- | -- | -- | -- | -- | -- | 850.41 | 848.91 | -- | 848.59 | -- | -- | -- |
| 9/1/2015 | -- | -- | -- | -- | -- | -- | -- | -- | 850.46 | 849.33 | -- | 848.99 | -- | -- | -- |
| 10/5/2015 | -- | -- | 847.35 | -- | 847.56 | -- | 849.42 | -- | 849.93 | 849.14 | -- | 848.87 | -- | 850.61 | -- |
| 2/5/2016 | -- | -- | -- | -- | -- | -- | -- | -- | 850.83 | 849.19 | -- | 848.82 | -- | -- | -- |
| 6/30/2016 | -- | -- | -- | -- | -- | -- | -- | -- | 849.91 | 849.41 | -- | 849.11 | -- | -- | -- |
| 9/12/2016 | -- | -- | -- | -- | -- | -- | -- | -- | 852.04 | 850.61 | -- | 850.2 | -- | -- | -- |
| 10/10/2016 | -- | -- | 848.93 | -- | 849.64 | -- | 850.77 | -- | 852.16 | 850.69 | -- | 850.31 | -- | 851.84 | -- |

# Table A-2
## 1984 - 2016 Middle Sand Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | W206 | W207 | W209 | W251 | W252 | W252N | W253 | W253 OFF | W253 ON | W254 | W255 | W255 OFF | W255 ON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/29/1985 | 849.64 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/25/1985 | 850.28 | 850.90 | 850.06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/28/1985 | -- | 850.98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/6/1985 | 850.87 | 851.40 | 850.68 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/16/1985 | -- | 851.54 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/3/1986 | 851.22 | 851.63 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/4/1986 | -- | -- | 850.99 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/24/1986 | 851.06 | 851.81 | 850.89 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/9/1986 | 850.23 | -- | 850.02 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/17/1987 | 849.26 | 849.91 | 849.01 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/4/1987 | 848.75 | 849.34 | 848.52 | 849.24 | 849.31 | -- | 847.22 | -- | -- | 847.32 | -- | -- | -- |
| 7/13/1987 | 847.84 | 848.49 | 847.63 | 848.50 | 848.44 | -- | 846.20 | -- | -- | 846.41 | -- | -- | -- |
| 11/3/1987 | 848.89 | 849.51 | 848.71 | -- | -- | -- | 847.38 | -- | -- | 847.52 | -- | -- | -- |
| 2/1/1988 | 847.81 | 848.47 | 847.59 | -- | 848.34 | -- | 846.02 | -- | -- | 846.60 | -- | -- | -- |
| 2/23/1988 | -- | 848.47 | 847.59 | -- | -- | -- | -- | -- | -- | 846.60 | -- | -- | -- |
| 2/25/1988 | -- | -- | -- | -- | 848.34 | -- | -- | -- | -- | -- | -- | -- | -- |
| 2/29/1988 | -- | -- | -- | -- | -- | -- | 845.02 | -- | -- | -- | -- | -- | -- |
| 10/3/1988 | 846.26 | 847.21 | 846.16 | -- | 847.09 | -- | -- | -- | -- | 845.17 | -- | -- | -- |
| 12/5/1988 | -- | -- | -- | -- | 846.93 | -- | -- | -- | -- | -- | 845.09 | -- | -- |
| 1/16/1989 | -- | -- | 845.67 | -- | 845.87 | -- | 844.67 | -- | -- | 844.51 | 844.70 | -- | -- |
| 2/1/1989 | -- | -- | 845.34 | -- | 845.61 | -- | 844.36 | -- | -- | 844.15 | 844.38 | -- | -- |
| 2/2/1989 | -- | -- | 845.22 | -- | 845.49 | -- | 842.72 | -- | -- | 843.24 | 833.42 | -- | -- |
| 2/3/1989 | -- | -- | -- | -- | -- | -- | 843.01 | -- | -- | -- | -- | -- | -- |
| 2/4/1989 | -- | -- | -- | -- | -- | -- | 843.12 | -- | -- | -- | -- | -- | -- |
| 2/5/1989 | -- | -- | 845.09 | -- | 845.37 | -- | 843.06 | -- | -- | 843.44 | 835.62 | -- | -- |
| 2/6/1989 | -- | -- | 845.10 | -- | 845.44 | -- | 843.15 | -- | -- | 843.50 | 835.55 | -- | -- |
| 2/7/1989 | -- | -- | 845.10 | -- | 845.41 | -- | 843.13 | -- | -- | 843.50 | 835.72 | -- | -- |
| 2/27/1989 | 845.06 | 845.76 | 844.83 | -- | 845.05 | -- | 842.80 | -- | -- | 843.20 | 834.31 | -- | -- |
| 3/9/1989 | -- | -- | 844.83 | -- | 845.21 | -- | -- | -- | -- | 843.26 | 835.21 | -- | -- |
| 3/31/1989 | -- | -- | 845.17 | -- | 845.74 | -- | -- | -- | -- | 843.86 | -- | -- | -- |
| 4/14/1989 | -- | -- | 846.02 | -- | 846.52 | -- | 844.14 | -- | -- | 844.56 | 835.80 | -- | -- |
| 4/28/1989 | -- | -- | 846.28 | -- | 846.85 | -- | 844.41 | -- | -- | 844.80 | 836.28 | -- | -- |
| 5/12/1989 | -- | -- | 846.90 | -- | 847.50 | -- | 844.68 | -- | -- | 845.08 | 836.11 | -- | -- |
| 5/31/1989 | -- | -- | 847.24 | -- | -- | -- | -- | -- | -- | 845.38 | 840.93 | -- | -- |
| 6/6/1989 | -- | -- | 847.42 | -- | 847.86 | -- | -- | -- | -- | 845.66 | -- | -- | -- |
| 6/29/1989 | -- | -- | 847.09 | -- | 847.43 | -- | 844.87 | -- | -- | 849.20--* | -- | -- | -- |
| 7/18/1989 | -- | -- | 846.93 | -- | 847.11 | -- | -- | -- | -- | 844.67 | -- | -- | -- |
| 8/2/1989 | 846.83 | 847.51 | 846.58 | -- | 847.48 | -- | 844.07 | -- | -- | 844.44 | 836.78 | -- | -- |
| 9/29/1989 | 846.54 | 847.35 | 846.31 | -- | 846.65 | -- | 844.83 | -- | -- | 844.58 | 846.12 | -- | -- |
| 1/5/1990 | 845.03 | 863.79 | 844.72 | -- | 845.02 | -- | 839.88 | -- | -- | 843.40 | 843.55 | -- | -- |
| 5/1/1990 | 846.70 | 847.69 | 846.31 | -- | 846.97 | -- | 843.18 | -- | -- | 845.27 | 844.33 | -- | -- |
| 10/29/1990 | 847.53 | 848.33 | 847.14 | -- | 847.64 | -- | 841.92 | -- | -- | 845.82 | 845.92 | -- | -- |
| 2/7/1991 | 845.93 | 845.72 | 845.54 | -- | 846.05 | -- | 841.88 | -- | -- | 844.01 | -- | -- | -- |
| 6/14/1991 | 850.15 | 849.52 | 849.65 | -- | 849.85 | -- | 847.92 | -- | -- | 848.18 | 847.82 | -- | -- |
| 9/30/1991 | 850.45 | 850.90 | 850.20 | -- | -- | -- | -- | -- | -- | 848.62 | -- | -- | -- |
| 10/16/1991 | 850.09 | 850.57 | 849.81 | -- | -- | -- | -- | -- | -- | 848.45 | -- | -- | -- |
| 4/24/1992 | 850.11 | 850.66 | 849.77 | 850.74 | -- | -- | -- | -- | -- | 848.37 | 840.89 | -- | -- |
| 6/17/1992 | 849.75 | 850.34 | 849.45 | 850.42 | -- | -- | 847.81 | -- | -- | 847.91 | 839.49 | -- | -- |
| 9/3/1992 | 849.76 | 850.21 | 849.48 | 848.82 * | -- | -- | 848.34 | -- | -- | 848.07 | 841.26 | -- | -- |
| 10/12/1992 | 850.05 | 850.60 | 849.78 | 850.59 | 831.14 | -- | 848.99 | -- | -- | 848.50 | 846.61 | -- | -- |
| 1/13/1993 | 849.20 | 849.74 | 848.90 | 849.52 | 849.60 | -- | 845.73 | -- | -- | 847.68 | 845.48 | -- | -- |
| 4/13/1993 | 849.45 | 850.17 | 849.10 | 850.12 | 849.98 | -- | 844.98 | -- | -- | 847.72 | 847.54 | -- | -- |
| 7/19/1993 | 850.79 | 851.36 | 850.69 | 851.21 | 851.28 | -- | 846.70 | -- | -- | 848.75 | 842.26 | -- | -- |
| 10/18/1993 | 850.12 | 850.63 | 849.84 | 850.45 | 850.54 | -- | 848.11 | -- | -- | 848.60 | 845.35 | -- | -- |
| 2/5/1994 | 849.52 | 850.04 | 849.29 | 849.73 | 849.91 | -- | 848.12 | -- | -- | 848.04 | 842.95 | -- | -- |
| 5/31/1994 | 850.57 | 850.92 | 850.38 | 850.79 | 850.84 | -- | 848.14 | -- | -- | 848.28 | 834.24 | -- | -- |
| 8/1/1994 | 849.71 | 850.15 | 849.41 | 849.58 | 850.08 | -- | 847.03 | -- | -- | 847.73 | 843.05 | -- | -- |
| 9/28/1994 | 849.55 | 850.06 | 849.30 | 849.92 | -- | -- | 845.75 | -- | -- | 847.62 | 840.77 | -- | -- |
| 2/1/1995 | 848.81 | 849.39 | 848.49 | 849.27 | 849.48 | -- | 846.71 | -- | -- | 847.39 | 843.45 | -- | -- |
| 4/3/1995 | 849.25 | 849.97 | 848.95 | 849.81 | 850.01 | -- | 847.94 | -- | -- | 848.00 | 843.43 | -- | -- |
| 7/6/1995 | 850.58 | 851.16 | 850.32 | 851.07 | 851.25 | -- | 846.65 | -- | -- | 848.52 | 838.02 | -- | -- |

## Table A-2
## 1984 - 2016 Middle Sand Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | W206 | W207 | W209 | W251 | W252 | W252N | W253 | W253 OFF | W253 ON | W254 | W255 | W255 OFF | W255 ON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/18/1995 | 849.89 | 850.48 | 849.66 | 850.56 | 850.58 | -- | 848.26 | -- | -- | 848.52 | 848.62 | -- | -- |
| 2/8/1996 | 849.10 | 849.76 | 848.76 | 849.71 | 849.84 | -- | 846.23 | -- | -- | 847.28 | 832.45 | -- | -- |
| 4/24/1996 | 849.81 | -- | -- | -- | 849.33 | -- | 847.10 | -- | -- | 848.19 | 838.87 | -- | -- |
| 5/14/1996 | -- | -- | 849.67 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/6/1996 | 848.77 | -- | -- | -- | 849.33 | -- | 841.87 | -- | -- | 846.07 | 834.74 | -- | -- |
| 10/1/1996 | 848.33 | 848.81 | 848.19 | 848.79 | 848.91 | -- | 841.92 | -- | -- | 845.91 | 834.26 | -- | -- |
| 1/2/1997 | 849.38 | -- | -- | 849.84 | 849.96 | -- | 841.74 | -- | -- | 847.17 | 834.74 | -- | -- |
| 3/31/1997 | 849.83 | -- | -- | -- | 850.81 | -- | 845.09 | -- | -- | 848.26 | 841.30 | -- | -- |
| 5/8/1997 | -- | -- | -- | 850.69 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5/23/1997 | -- | -- | -- | 850.34 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 6/23/1997 | -- | -- | -- | 849.74 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/1/1997 | -- | -- | -- | 849.86 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 7/9/1997 | 850.15 | -- | -- | -- | 850.95 | -- | 842.73 | -- | -- | 848.38 | 840.88 | -- | -- |
| 7/29/1997 | -- | -- | -- | 851.90 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/1/1997 | -- | -- | -- | 851.79 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 8/21/1997 | -- | -- | -- | 850.69 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 9/12/1997 | 850.37 | -- | -- | -- | 851.02 | -- | 840.86 | -- | -- | 848.44 | 839.12 | -- | -- |
| 10/1/1997 | 850.08 | 850.66 | 849.90 | -- | 850.79 | -- | 839.99 | -- | -- | 848.36 | 838.93 | -- | -- |
| 11/16/1997 | -- | -- | -- | 850.48 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12/4/1997 | -- | -- | -- | 850.26 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/7/1998 | -- | -- | -- | 849.95 | 849.97 | -- | 842.21 | -- | -- | 848.20 | 835.64 | -- | -- |
| 4/1/1998 | -- | -- | -- | -- | 850.62 | -- | 842.94 | -- | -- | 848.80 | 835.87 | -- | -- |
| 7/1/1998 | -- | -- | -- | -- | 850.77 | -- | 848.36 | -- | -- | 848.78 | 833.79 | -- | -- |
| 11/18/1998 | 849.43 | 850.11 | 849.02 | 849.82 | 850.04 | -- | 847.87 | -- | -- | 848.25 | 842.59 | -- | -- |
| 2/25/1999 | -- | -- | -- | 849.25 | 849.22 | -- | 847.14 | -- | -- | 847.51 | 831.65 | -- | -- |
| 5/31/1999 | -- | -- | -- | 850.95 | 850.92 | -- | 825.46 | -- | -- | 848.34 | 834.27 | -- | -- |
| 11/15/1999 | -- | -- | 848.72 | 849.65 | -- | 849.82 | -- | -- | -- | 847.86 | 847.49 | -- | -- |
| 2/2/2000 | -- | -- | -- | -- | -- | -- | -- | 847.24 | -- | -- | -- | -- | 834.36 |
| 3/1/2000 | -- | -- | -- | -- | -- | 849.04 | -- | -- | 819.49 | 847.29 | -- | 846.89 | -- |
| 3/31/2000 | -- | -- | -- | -- | -- | -- | -- | 847.41 | -- | -- | -- | -- | 833.95 |
| 5/2/2000 | -- | -- | -- | -- | -- | -- | -- | -- | 819.63 | -- | -- | 846.74 | -- |
| 6/2/2000 | -- | -- | -- | -- | -- | 849.32 | -- | 847.28 | -- | 847.27 | -- | -- | 834.09 |
| 9/6/2000 | -- | -- | -- | -- | -- | 850.32 | -- | -- | 821.68 | 848.14 | -- | 847.72 | -- |
| 9/26/2000 | -- | -- | -- | 849.64 | -- | -- | -- | -- | 816.86 | -- | -- | 847.23 | -- |
| 9/27/2000 | -- | -- | -- | -- | -- | 849.84 | -- | -- | -- | 847.69 | -- | -- | -- |
| 10/31/2000 | -- | -- | -- | -- | -- | -- | -- | 849.83 BQE | 816.88 | -- | -- | 847.09 | 825.09 BQE |
| 12/7/2000 | -- | -- | -- | -- | -- | -- | -- | 847.53 | 817.18 BQE | -- | -- | 847.84 BQE | 826.34 |
| 1/3/2001 | -- | -- | -- | -- | -- | -- | -- | 848.00 | 816.03 BQE | -- | -- | 847.05 BQE | 824.97 |
| 3/6/2001 | -- | -- | -- | 848.59 | -- | 848.87 | -- | 846.88 BQE | 815.23 | 847.14 | -- | 846.69 | 824.73 BQE |
| 4/2/2001 | -- | -- | -- | -- | -- | -- | -- | 847.33 | 816.18 BQE | -- | -- | 847.11 BQE | 826.09 |
| 4/27/2001 | -- | -- | -- | -- | -- | -- | -- | 849.93 BQE | 816.83 | -- | -- | 849.31 | 827.19 BQE |
| 5/30/2001 | -- | -- | -- | -- | -- | -- | -- | 849.81 | 815.68 BQE | -- | -- | 849.36 BQE | 827.39 |
| 7/3/2001 | -- | -- | -- | -- | -- | 851.41 | -- | -- | 814.58 | 849.12 | -- | 848.76 | -- |
| 7/31/2001 | -- | -- | -- | -- | -- | -- | -- | 848.43 | 814.53 BQE | -- | -- | 848.05 BQE | 826.39 |
| 9/4/2001 | -- | -- | -- | -- | -- | -- | -- | 848.18 BQE | 806.63 | -- | -- | 847.80 | 825.09 BQE |
| 10/2/2001 | -- | -- | -- | -- | -- | -- | -- | 848.37 | -- | -- | -- | -- | 826.24 |
| 10/16/2001 | -- | -- | -- | -- | -- | -- | -- | -- | 807.07 | -- | -- | 847.97 | -- |
| 10/18/2001 | -- | -- | -- | -- | -- | 850.32 | -- | -- | -- | 841.83 | -- | -- | -- |
| 11/1/2001 | -- | -- | -- | -- | -- | -- | -- | 848.17 BQE | 806.51 | -- | -- | 847.88 | 825.39 BQE |
| 12/4/2001 | -- | -- | -- | -- | -- | -- | -- | 848.33 | 807.48 BQE | -- | -- | 847.99 BQE | 825.96 |
| 12/15/2001 | -- | -- | -- | 844.36 | -- | -- | -- | -- | 806.48 | -- | -- | 848.09 | -- |
| 12/31/2001 | -- | -- | -- | -- | -- | -- | -- | 848.18 BQE | 805.78 | -- | -- | 847.89 | 824.79 BQE |
| 1/31/2002 | -- | -- | -- | -- | -- | -- | -- | 847.83 | 806.91 BQE | -- | -- | 847.49 BQE | 825.25 |
| 2/28/2002 | -- | -- | -- | -- | -- | 849.57 | -- | 847.99 BQE | 805.74 | 847.69 | -- | 847.02 | 823.82 BQE |
| 3/26/2002 | -- | -- | -- | -- | -- | -- | -- | 847.97 | 806.19 BQE | -- | -- | 847.00 BQE | 824.75 |
| 4/29/2002 | -- | -- | -- | -- | -- | 850.52 | -- | 848.38 BQE | 805.73 | 848.49 | -- | 848.09 | 824.87 BQE |
| 5/30/2002 | -- | -- | -- | -- | -- | 851.02 | -- | 848.68 | 825.73 BQE | 848.90 | -- | 848.39 BQE | 826.04 |
| 6/30/2002 | -- | -- | -- | -- | -- | 851.96 | -- | 849.48 BQE | 806.78 | 849.57 | -- | 849.19 | 825.63 BQE |
| 8/2/2002 | -- | -- | -- | -- | -- | 851.66 | -- | 849.25 | 806.83 BQE | 849.38 | -- | 848.87 BQE | 826.49 |
| 8/30/2002 | -- | -- | -- | -- | -- | 851.27 | -- | 849.04 BQE | 805.90 | 849.13 | -- | 848.74 | 825.24 BQE |
| 9/30/2002 | -- | -- | -- | -- | -- | 850.97 | -- | 848.88 | 806.63 BQU | 847.57 | -- | 848.62 BQU | 825.86 |

# Table A-2
# 1984 - 2016 Middle Sand Water Levels
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN
# (elevations in ft./MSL)

| Location | W206 | W207 | W209 | W251 | W252 | W252N | W253 | W253 OFF | W253 ON | W254 | W255 | W255 OFF | W255 ON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/28/2002 | -- | -- | -- | -- | -- | 851.12 | -- | 849.18 BQE | 805.48 | 847.75 | -- | 848.84 | 825.34 BQE |
| 12/3/2002 | -- | -- | -- | -- | -- | 850.52 | -- | 848.58 | 805.60 BQE | 848.42 | -- | 848.24 BQE | 825.41 |
| 12/30/2002 | -- | -- | -- | -- | -- | 850.37 | -- | 848.58 BQE | -- | 848.34 | -- | 848.24 | 824.49 BQE |
| 2/4/2003 | -- | -- | -- | -- | -- | 850.14 | -- | 848.23 | 805.93 BQE | 848.12 | -- | 847.89 BQE | 824.63 |
| 3/3/2003 | -- | -- | -- | -- | -- | 849.92 | -- | 848.03 BQE | -- | 847.85 | -- | 847.72 | 823.49 BQE |
| 4/1/2003 | -- | -- | -- | -- | -- | 850.09 | -- | 848.11 | -- | 848.02 | -- | 847.76 BQE | 824.13 |
| 5/2/2003 | -- | -- | -- | -- | -- | 850.57 | -- | 848.42 BQE | 805.18 | 848.27 | -- | 848.09 | 823.74 BQE |
| 6/7/2003 | -- | -- | -- | -- | -- | 851.17 | -- | 848.95 | 805.18 BQE | 848.92 | -- | 848.68 BQE | 824.93 |
| 7/2/2003 | -- | -- | -- | -- | -- | 851.85 | -- | 849.51 BQE | 805.18 | 849.47 | -- | 849.27 | 825.35 BQE |
| 8/4/2003 | -- | -- | -- | -- | -- | 850.57 | -- | 848.24 | -- | 848.22 | -- | 847.96 BQE | 824.14 |
| 9/3/2003 | -- | -- | -- | -- | -- | 848.82 | -- | 846.74 BQE | -- | 846.59 | -- | 846.49 | 822.19 BQE |
| 9/22/2003 | -- | -- | -- | -- | -- | 847.67 | -- | 846.05 | -- | 845.93 | -- |  | 821.70 |
| 10/13/2003 | -- | -- | -- | -- | -- | 847.59 | -- | 845.98 | -- | 845.90 | -- | 845.64 | 821.69 |
| 11/3/2003 | -- | -- | -- | -- | -- | 848.14 | -- | 846.48 BQE | -- | 846.26 | -- | 846.09 | 821.46 BQE |
| 12/16/2003 | -- | -- | -- | 847.74 | -- | 847.98 | -- | 846.28 | -- | 846.27 | -- | 846.04 | 821.29 |
| 1/9/2004 | -- | -- | -- | -- | -- | 848.02 | -- | 846.38 BQE | -- | 846.19 | -- | 845.99 | 821.05 BQE |
| 2/3/2004 | -- | -- | -- | -- | -- | -- | -- | 846.13 | 805.53 BQE | -- | -- | 845.86 BQE | 821.19 |
| 3/9/2004 | -- | -- | -- | -- | -- | -- | -- | 846.43 BQE | -- | -- | -- | 846.16 | 820.79 BQE |
| 4/1/2004 | -- | -- | -- | -- | -- | 848.70 | -- | 846.96 | 805.98 BQE | 846.95 | -- | 846.69 BQE | 821.74 |
| 5/10/2004 | -- | -- | -- | -- | -- | -- | -- | 847.07 BQE | -- | -- | -- | 846.79 | 821.09 BQE |
| 6/7/2004 | -- | -- | -- | -- | -- | -- | -- | 848.28 | 805.88 BQE | -- | -- | 847.99 BQE | 822.78 |
| 6/30/2004 | -- | -- | -- | -- | -- | -- | -- | 847.88 BQE | -- | -- | -- | 847.79 | 821.98 BQE |
| 8/2/2004 | -- | -- | -- | -- | -- | 849.84 | -- | 847.78 | 805.43 | 847.74 | -- | 847.49 | 822.01 |
| 8/31/2004 | -- | -- | -- | -- | -- | -- | -- | 847.27 BQE | -- | -- | -- | 846.94 | 821.14 BQE |
| 10/6/2004 | -- | -- | -- | -- | -- | -- | -- | 847.63 | -- | -- | -- | 847.29 BQE | 822.17 |
| 10/18/2004 | -- | -- | -- | 849.29 | -- | 849.56 | -- | 848.23 | -- | 847.82 | -- | 847.77 | -- |
| 11/2/2004 | -- | -- | -- | -- | -- | -- | -- | 848.08 BQE | 805.68 | -- | -- | 847.79 | 822.14 BQE |
| 12/1/2004 | -- | -- | -- | -- | -- | -- | -- | 847.88 | 805.53 BQE | -- | -- | 847.54 BQE | 821.64 |
| 1/5/2005 | -- | -- | -- | -- | -- | -- | -- | 847.52 BQE | -- | -- | -- | 847.19 | 820.94 BQE |
| 2/2/2005 | -- | -- | -- | -- | -- | 848.89 | -- | 847.08 | -- | 846.98 | -- | 846.74 BQE | 820.54 |
| 3/3/2005 | -- | -- | -- | -- | -- | -- | -- | 847.38 BQE | 805.43 | -- | -- | 847.19 | 820.93 BQE |
| 4/1/2005 | -- | -- | -- | -- | -- | -- | -- | 847.37 | -- | -- | -- | 846.92 BQE | 820.34 |
| 5/4/2005 | -- | -- | -- | -- | -- | 849.70 | -- | 847.85 BQE | -- | 847.65 | -- | 847.49 | 820.58 BQE |
| 6/3/2005 | -- | -- | -- | -- | -- | -- | -- | 847.88 | 821.54 | -- | -- | 847.57 BQE | -- |
| 7/7/2005 | -- | -- | -- | -- | -- | -- | -- | 848.26 BQE | -- | -- | -- | 847.92 | 821.14 BQE |
| 8/5/2005 | -- | -- | -- | -- | -- | 849.62 | -- | 847.38 | -- | 847.32 | -- | 847.09 BQE | 820.28 |
| 9/1/2005 | -- | -- | -- | -- | -- | -- | -- | 847.53 BQE | -- | -- | -- | 847.19 | 820.34 BQE |
| 10/7/2005 | -- | -- | -- | -- | -- | -- | -- | 848.98 | -- | -- | -- | 848.69 BQE | 822.69 |
| 11/2/2005 | -- | -- | -- | 850.44 | -- | -- | 848.98 | 848.98 BQE | 805.66 | -- | 822.49 | 848.59 | 822.49 BQE |
| 11/7/2005 | -- | -- | -- | -- | -- | 850.51 | -- | -- | -- | 848.61 | -- | -- | -- |
| 12/12/2005 | -- | -- | -- | -- | -- | -- | -- | 848.47 | 806.18 BQE | -- | -- | 849.02 BQE | 821.29 |
| 1/9/2006 | -- | -- | -- | -- | -- | -- | -- | 848.31 BQE | 805.43 | -- | -- | 847.99 | 821.74 BQE |
| 2/10/2006 | -- | -- | -- | -- | -- | -- | -- | 848.10 | 807.08 BQE | -- | -- | 847.76 BQE | 822.38 |
| 3/19/2006 | -- | -- | -- | -- | -- | 849.80 | -- | 848.04 BQE | 805.61 | 847.88 | -- | 847.74 | -- |
| 4/14/2006 | -- | -- | -- | -- | -- | -- | -- | 848.83 | 806.88 BQE | -- | -- | 848.49 BQE | 821.64 |
| 5/9/2006 | -- | -- | -- | -- | -- | 851.38 | -- | 849.46 BQE | 807.33 | 849.42 | -- | 849.14 | 821.49 BQE |
| 6/5/2006 | -- | -- | -- | -- | -- | -- | -- | 848.61 | 805.96 BQE | -- | -- | 848.29 BQE | 820.89 |
| 7/7/2006 | -- | -- | -- | -- | -- | -- | -- | 848.18 BQE | -- | -- | -- | 847.74 | 820.22 BQE |
| 8/15/2006 | -- | -- | -- | -- | -- | 849.88 | -- | 847.81 | 805.43 BQE | 847.72 | -- | 847.44 BQE | 820.92 |
| 9/6/2006 | -- | -- | -- | -- | -- | -- | -- | 848.13 BQE | 805.63 | -- | -- | 847.79 | 821.18 BQE |
| 10/9/2006 | -- | -- | -- | -- | -- | -- | -- | 847.96 | BQE | -- | -- | 847.58 BQE | 820.34 |
| 10/16/2006 | -- | -- | -- | 849.34 | -- | 849.82 | -- | 847.96 | -- | 847.92 | -- | -- | 820.34 |
| 11/14/2006 | -- | -- | -- | -- | -- | -- | -- | 847.96 BQE | 805.98 | -- | -- | 847.59 | 819.94 BQE |
| 12/7/2006 | -- | -- | -- | -- | -- | -- | -- | 847.83 | 806.03 BQE | -- | -- | 847.39 BQE | 819.49 |
| 1/2/2007 | -- | -- | -- | -- | -- | -- | -- | 848.58 BQE | 807.03 | -- | -- | 847.79 | 848.09 BQE |
| 2/12/2007 | -- | -- | -- | -- | -- | -- | -- | 847.63 | 806.18 BQE | -- | -- | 847.29 BQE | 818.79 |
| 3/12/2007 | -- | -- | -- | -- | -- | -- | -- | 847.63 BQE | 807.08 | -- | -- | 847.25 | 818.59 BQE |
| 3/15/2007 | -- | -- | -- | -- | -- | 849.65 | -- | 847.63 BQE | -- | 847.76 | -- |  | 818.59 BQE |
| 4/10/2007 | -- | -- | -- | -- | -- | -- | -- | 848.71 | 806.93 BQE | -- | -- | 848.27 BQE | 819.59 |
| 5/11/2007 | -- | -- | -- | -- | -- | -- | -- | 848.68 BQE | 807.78 | -- | -- | 848.29 | 819.34 BQE |
| 6/8/2007 | -- | -- | -- | -- | -- | -- | -- | 848.18 | -- | -- | -- |  | 819.79 |

## Table A-2

## 1984 - 2016 Middle Sand Water Levels

## Joslyn Manufacturing and Supply Company

## Brooklyn Center, MN

## (elevations in ft./MSL)

| Location | W206 | W207 | W209 | W251 | W252 | W252N | W253 | W253 OFF | W253 ON | W254 | W255 | W255 OFF | W255 ON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/28/2007 | -- | -- | -- | -- | -- | -- | -- | 847.35 | 805.51 BQE | -- | -- | 847.02 BQE | 819.07 |
| 8/7/2007 | -- | -- | -- | -- | -- | -- | -- | 846.86 BQE | 806.93 | -- | -- | 846.49 | 816.39 BQE |
| 9/12/2007 | -- | -- | -- | -- | -- | -- | -- | 847.36 | -- | -- | -- |  | 817.49 |
| 9/29/2007 | -- | -- | -- | -- | -- | -- | -- | 848.43 | 807.33 BQE | -- | -- | 848.04 BQE | 818.12 |
| 11/6/2007 | -- | -- | -- | 850.54 | -- | 850.77 | -- | 848.98 BQE | 808.18 | 848.82 | -- | 848.58 | 818.39 BQE |
| 12/10/2007 | -- | -- | -- | -- | -- | -- | -- | 849.08 | -- | -- | -- | 848.59 | -- |
| 12/27/2007 | -- | -- | -- | -- | -- | -- | -- | -- | 805.97 | -- | -- | 847.94 | -- |
| 2/15/2008 | -- | -- | -- | -- | -- | -- | -- | 847.73 | BQE | -- | -- | 847.49 BQE | 817.99 |
| 3/19/2008 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 817.24 |
| 4/1/2008 | -- | -- | -- | -- | -- | -- | -- | 847.79 BQE | -- | -- | -- | 847.40 | 817.22 BQE |
| 5/13/2008 | -- | -- | -- | -- | -- | -- | -- | 849.10 | -- | -- | -- | -- | 818.39 |
| 6/14/2008 | -- | -- | -- | -- | -- | -- | -- | 849.18 BQE | 806.48 | -- | -- | 848.79 | 818.31 BQE |
| 6/29/2008 | -- | -- | -- | -- | -- | -- | -- | 848.61 BQE | 806.57 | -- | -- | 848.19 | 817.69 BQE |
| 8/14/2008 | -- | -- | -- | -- | -- | -- | -- | 847.62 |  | -- | -- | -- | 816.89 |
| 9/4/2008 | -- | -- | -- | -- | -- | -- | -- | -- | 805.83 | -- | -- | 847.12 | -- |
| 9/24/2008 | -- | -- | -- | -- | -- | -- | -- | 847.73 BQE | 806.18 | -- | -- | 847.24 | 816.00 BQE |
| 10/6/2008 | -- | -- | -- | 849.33 | -- | 849.47 | 847.73 | -- | -- | 847.45 | 816.00 | -- | -- |
| 11/11/2008 | -- | -- | -- | -- | -- | -- | -- | 847.65 | -- | -- | -- | -- | 821.05 |
| 12/7/2008 | -- | -- | -- | -- | -- | -- | -- | -- | 805.58 | -- | -- | 846.92 | -- |
| 12/26/2008 | -- | -- | -- | -- | -- | -- | -- | 847.28 BQE | 805.83 | -- | -- | 846.85 | 816.79 BQE |
| 2/11/2009 | -- | -- | -- | -- | -- | -- | -- | 846.98 | -- | -- | -- | -- | 817.09 |
| 3/9/2009 | -- | -- | -- | -- | -- | -- | -- | 847.10 | 806.33 BQE | -- | -- | 846.69 BQE | 816.69 |
| 3/27/2009 | -- | -- | -- | -- | -- | -- | -- | 847.54 BQE | 806.37 | -- | -- | 847.09 | 815.96 BQE |
| 5/8/2009 | -- | -- | -- | -- | -- | -- | -- | 847.37 | -- | -- | -- | -- | 815.54 |
| 6/10/2009 | -- | -- | -- | -- | -- | -- | -- | -- | 806.36 BQE | -- | -- | 846.19 BQE | -- |
| 7/1/2009 | -- | -- | -- | -- | -- | -- | -- | 846.78 BQE | 805.88 | -- | -- | 846.14 | 813.49 BQE |
| 8/11/2009 | -- | -- | -- | -- | -- | -- | -- | 846.28 | -- | -- | -- | -- | 813.74 |
| 9/9/2009 | -- | -- | -- | -- | -- | -- | -- | 846.50 | 805.88 BQE | -- | -- | 846.14 BQE | 813.89 |
| 9/29/2009 | -- | -- | -- | 847.99 | -- | 848.17 | 805.38 | -- | -- | 846.16 | 812.09 | -- | -- |
| 10/2/2009 | -- | -- | -- | -- | -- | -- | -- | 849.18 BQE | 805.38 | -- | -- | 846.07 | 812.09 BQE |
| 11/2/2009 | -- | -- | -- | -- | -- | -- | -- | 847.18 | -- | -- | -- | -- | 813.79 |
| 12/4/2009 | -- | -- | -- | -- | -- | -- | -- | 846.98 | 806.63 BQE | -- | -- | 846.71 BQE | 813.14 |
| 12/29/2009 | -- | -- | -- | -- | -- | -- | -- | 846.68 BQE | 805.98 | -- | -- | 846.24 | 812.19 BQE |
| 2/18/2010 | -- | -- | -- | -- | -- | -- | -- | -- | 807.08 | -- | -- | 845.84 | -- |
| 3/30/2010 | -- | -- | -- | -- | -- | -- | -- | 847.49 BQE | 807.18 | -- | -- | 846.94 | 808.69 BQE |
| 5/20/2010 | -- | -- | -- | -- | -- | -- | -- | 847.18 | -- | -- | -- | -- | 809.04 |
| 6/4/2010 | -- | -- | -- | 848.60 | -- | -- | -- | 846.88 | -- | -- | -- | 846.85 BQE | 808.49 |
| 6/25/2010 | -- | -- | -- | -- | -- | -- | -- | 847.18 BQE | 806.60 | -- | -- | 846.77 | 808.09 BQE |
| 8/6/2010 | -- | -- | -- | -- | -- | -- | -- | 847.37 | -- | -- | -- | -- | 809.19 |
| 9/8/2010 | -- | -- | -- | -- | -- | -- | -- | 847.88 | 807.33 BQE | -- | -- | 847.61 BQE | 808.79 |
| 10/4/2010 | -- | -- | -- | -- | -- | -- | -- | 848.26 BQE | 806.98 | -- | -- | 847.84 | 807.39 BQE |
| 10/5/2010 | -- | -- | -- | 850.11 | -- | 850.37 | -- | -- | -- | 848.07 | -- | -- | -- |
| 11/12/2010 | -- | -- | -- | -- | -- | -- | -- | 848.16 | -- | -- | -- | -- | 809.19 |
| 12/20/2010 | -- | -- | -- | -- | -- | -- | -- | 848.11 | 807.35 BQE | -- | -- | 849.81 BQE | 808.09 |
| 1/5/2011 | -- | -- | -- | 849.64 | -- | -- | -- | 848.20 BQE | 808.28 | -- | -- | 847.78 | 807.29 BQE |
| 2/15/2011 | -- | -- | -- | 849.19 | -- | -- | -- | 847.80 | -- | -- | -- | -- | 807.09 |
| 3/1/2011 | -- | -- | -- | 849.34 | -- | -- | -- | 848.00 | 808.85 BQE | -- | -- | 848.09 BQE | 806.72 |
| 4/5/2011 | -- | -- | -- | 850.48 | -- | -- | -- | 849.23 BQE | 808.63 | -- | -- | 848.54 | 806.39 BQE |
| 5/10/2011 | -- | -- | -- | 850.89 | -- | -- | -- | 849.39 BQE | -- | -- | -- | -- | 807.79 |
| 6/6/2011 | -- | -- | -- | 851.26 | -- | -- | -- | 851.26 | 851.26 BQE | -- | -- | 851.26 BQE | 851.26 |
| 7/7/2011 | -- | -- | -- | 850.74 | -- | -- | -- | 849.10 BQE | 808.18 | -- | -- | 848.51 | 806.49 BQE |
| 8/9/2011 | -- | -- | -- | 851.44 | -- | -- | -- | 849.76 | -- | -- | -- | -- | 807.89 |
| 9/11/2011 | -- | -- | -- | 850.64 | -- | -- | -- | 848.88 | 808.28 BQE | -- | -- | 848.39 BQE | 806.49 |
| 10/7/2011 | -- | -- | -- | 850.04 | -- | -- | -- | 848.38 BQE | 808.93 | -- | -- | 847.92 | 806.49 BQE |
| 10/11/2011 | -- | -- | -- | 850.04 | -- | 850.22 | 808.93 | -- | -- | 848.17 | 847.92 | -- | -- |
| 11/7/2011 | -- | -- | -- | 849.74 | -- | -- | -- | 848.28 | -- | -- | -- | -- | 806.49 |
| 12/12/2011 | -- | -- | -- | 849.44 | -- | -- | -- | 848.08 | 808.88 BQE | -- | -- | 849.69 BQE | 806.49 |
| 1/3/2012 | -- | -- | -- | 848.54 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1/3/2012 | -- | -- | -- | -- | -- | -- | -- | 847.69 | -- | -- | -- | 847.14 | -- |
| 1/3/2012 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 806.49 BQE |
| 1/5/2012 | -- | -- | -- | 849.35 | -- | -- | -- | 848.07 BQE | 808.18 | -- | -- | 847.54 | 806.49 BQE |

## Table A-2
## 1984 - 2016 Middle Sand Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | W206 | W207 | W209 | W251 | W252 | W252N | W253 | W253 OFF | W253 ON | W254 | W255 | W255 OFF | W255 ON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/16/2012 | -- | -- | -- | 848.94 | -- | -- | -- | 847.69 | -- | -- | -- | -- | 806.49 |
| 3/13/2012 | -- | -- | -- | 849.24 | -- | -- | -- | 848.07 | 808.78 BQE | -- | -- | 847.49 BQE | 806.49 |
| 4/12/2012 | -- | -- | -- | 849.44 | -- | -- | -- | 848.18 BQE | 808.78 | -- | -- | 847.59 | 806.49 BQE |
| 5/18/2012 | -- | -- | -- | 850.44 | -- | -- | -- | 848.83 | -- | -- | -- | -- | 806.49 |
| 6/9/2012 | -- | -- | -- | 850.94 | -- | -- | -- | 849.08 | 809.73 BQE | -- | -- | 848.99 BQE | 806.59 |
| 7/3/2012 | -- | -- | -- | 850.87 | -- | -- | -- | 849.03 BQE | 806.18 | -- | -- | 848.34 | 806.49 BQE |
| 8/3/2012 | -- | -- | -- | 850.24 | -- | -- | -- | 848.53 | -- | -- | -- | -- | 807.49 |
| 9/18/2012 | -- | -- | -- | 849.29 | -- | -- | -- | 847.58 | 805.18 BQE | -- | -- | 847.14 BQE | 806.49 |
| 10/9/2012 | -- | -- | -- | 848.93 | -- | -- | -- | 847.53 BQE | 805.18 | -- | -- | 846.79 | 806.49 BQE |
| 10/15/2012 | -- | -- | -- | 848.93 | -- | 849.12 | 847.53 | -- | -- | 847.17 | 806.49 | -- | -- |
| 11/1/2012 | -- | -- | -- | 848.89 | -- | -- | -- | 847.51 | -- | -- | -- | -- | 806.49 |
| 12/7/2012 | -- | -- | -- | 848.64 | -- | -- | -- | 847.57 | 806.18 BQE | -- | -- | 847.02 BQE | 805.49 |
| 1/3/2013 | -- | -- | -- | 848.54 | -- | -- | -- | 847.69 BQE | -- | -- | -- | 847.14 | 806.49 BQE |
| 2/8/2013 | -- | -- | -- | 848.19 | -- | -- | -- | 846.84 | -- | -- | -- | -- | 806.49 |
| 3/7/2013 | -- | -- | -- | 847.94 | -- | -- | -- | 846.65 | 805.18 BQE | -- | -- | 846.06 BQE | 806.49 |
| 4/9/2013 | -- | -- | -- | 848.77 | -- | -- | -- | 847.68 BQE | 805.18 | -- | -- | 847.09 | 806.49 BQE |
| 5/13/2013 | -- | -- | -- | 850.12 | -- | -- | -- | 848.60 | -- | -- | -- | -- | 806.49 |
| 6/15/2013 | -- | -- | -- | 850.44 | -- | -- | -- | -- | 805.18 | -- | -- | 848.39 | -- |
| 7/2/2013 | -- | -- | -- | 851.34 | -- | -- | -- | 849.78 BQE | -- | -- | -- | 849.09 | 806.49 |
| 8/6/2013 | -- | -- | -- | 850.44 | -- | -- | -- | 848.83 | -- | -- | -- | -- | 806.49 |
| 9/13/2013 | -- | -- | -- | 849.44 | -- | -- | -- | -- | 805.18 | -- | -- | 847.19 BQE | -- |
| 10/1/2013 | -- | -- | -- | 849.31 | -- | -- | -- | 847.78 BQE | 805.18 | -- | -- | 847.08 | 806.49 BQE |
| 10/7/2013 | -- | -- | -- | 849.34 | 849.63 | -- | 847.81 | -- | -- | 847.77 | 806.49 | -- | -- |
| 11/8/2013 | -- | -- | -- | 849.59 | -- | -- | -- | 848.30 | -- | -- | -- | -- | 806.49 |
| 12/2/2013 | -- | -- | -- | 849.34 | -- | -- | -- | 848.38 | 805.18 BQE | -- | -- | 847.42 BQE | 806.49 |
| 1/3/2014 | -- | -- | -- | 849.07 | -- | -- | -- | 847.91 BQE | 805.18 | -- | -- | 847.09 | 806.49 BQE |
| 2/13/2014 | -- | -- | -- | 848.54 | -- | -- | -- | 847.38 | -- | -- | -- | -- | 806.49 |
| 3/8/2014 | -- | -- | -- | -- | -- | -- | -- | 847.28 | 847.78 BQE | -- | -- | 805.49 BQE | 806.49 |
| 3/27/2014 | -- | -- | -- | 848.84 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4/2/2014 | -- | -- | -- | 848.99 | -- | -- | -- | -- | 805.18 | -- | -- | 847.14 | -- |
| 5/23/2014 | -- | -- | -- | 851.49 | -- | -- | -- | -- | 805.18 | -- | -- | 849.35 | -- |
| 6/30/2014 | -- | -- | -- | 851.83 | -- | -- | -- | -- | 805.18 | -- | -- | 849.69 | -- |
| 7/31/2014 | -- | -- | -- | 850.99 | -- | -- | -- | 849.58 | -- | -- | -- | -- | 806.49 |
| 8/29/2014 | -- | -- | -- | 850.54 | -- | -- | -- | 849.18 | 805.18 BQE | -- | -- | 848.38 BQE | 806.49 |
| 9/30/2014 | -- | -- | -- | 850.16 | -- | -- | -- | -- | 805.18 | -- | -- | 848.09 | -- |
| 10/14/2014 | -- | -- | -- | 850.03 | -- | 850.45 | 848.85 | -- | -- | 848.64 | 806.49 | -- | -- |
| 12/5/2014 | -- | -- | -- | 849.69 | -- | -- | -- | 848.33 | 805.18 BQE | -- | -- | 847.88 BQE | 806.49 |
| 1/15/2015 | -- | -- | -- | 849.62 | -- | -- | -- | 848.68 BQE | 805.18 | -- | -- | 847.89 | 806.49 BQE |
| 2/11/2015 | -- | -- | -- | 849.34 | -- | -- | -- | 848.37 | -- | -- | -- | -- | 806.49 |
| 3/5/2015 | -- | -- | -- | 849.11 | -- | -- | -- | 848.16 | -- | -- | -- | -- | 806.49 |
| 3/31/2015 | -- | -- | -- | 849.21 | -- | -- | -- | 848.23 | 805.18 BQE | -- | -- | 847.86 BQE | 806.49 |
| 5/1/2015 | -- | -- | -- | 849.19 | -- | -- | -- | 847.91 BQE | 805.18 | -- | -- | 847.14 | 806.49 BQE |
| 6/5/2015 | -- | -- | -- | 849.64 | -- | -- | -- | 848.36 | -- | -- | -- | -- | 806.49 |
| 6/30/2015 | -- | -- | -- | 849.64 | -- | -- | -- | 848.18 | -- | -- | -- | -- | 806.49 |
| 8/6/2015 | -- | -- | -- | 849.99 | -- | -- | -- | 848.50 | -- | -- | -- | -- | 806.49 |
| 9/1/2015 | -- | -- | -- | 849.84 | -- | -- | -- | 848.53 | 805.18 BQE | -- | -- | 847.99 BQE | -- |
| 9/30/2015 | -- | -- | -- | 849.88 | -- | -- | -- | 849.68 BQE | 805.18 | -- | -- | 847.79 | 806.49 BQE |
| 10/5/2015 | -- | -- | -- | 849.92 | -- | 850.10 | 849.71 | -- | -- | 848.17 | 806.49 | -- | -- |
| 11/9/2015 | -- | -- | -- | 849.84 | -- | -- | -- | 848.68 | -- | -- | -- | -- | 806.49 |
| 12/1/2015 | -- | -- | -- | 850.44 | -- | -- | -- | 849.38 | -- | -- | -- | -- | 806.49 |
| 1/6/2016 | -- | -- | -- | 850.09 | -- | -- | -- | 849.08 | -- | -- | -- | -- | 806.49 |
| 2/1/2016 | -- | -- | -- | 849.79 | -- | -- | -- | 848.78 | -- | -- | -- | -- | 806.49 |
| 2/29/2016 | -- | -- | -- | 849.83 | -- | -- | -- | 848.71 | 806.18 BQE | -- | -- | 844.84 BQE | 807.14 |
| 4/1/2016 | -- | -- | -- | 850.14 | -- | -- | -- | 848.86 BQE | 805.18 | -- | -- | 848.19 | 806.49 BQE |
| 5/2/2016 | -- | -- | -- | 850.44 | -- | -- | -- | 849.28 | -- | -- | -- | 806.49 | -- |
| 6/1/2016 | -- | -- | -- | 850.18 | -- | -- | -- | 849.03 | -- | -- | -- | -- | 806.49 |
| 7/1/2016 | -- | -- | -- | 849.93 | -- | -- | -- | 848.18 | -- | -- | -- | -- | 806.49 |
| 8/5/2016 | -- | -- | -- | 850.72 | -- | -- | -- | 849.18 | -- | -- | -- | -- | 806.49 |

# Table A-2

## 1984 - 2016 Middle Sand Water Levels

## Joslyn Manufacturing and Supply Company

## Brooklyn Center, MN

## (elevations in ft./MSL)

| Location | W206 | W207 | W209 | W251 | W252 | W252N | W253 | W253 OFF | W253 ON | W254 | W255 | W255 OFF | W255 ON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/8/2016 | -- | -- | -- | 851.24 | -- | -- | -- | 849.68 | 805.18 BQE | -- | -- | 849.89 BQE | 806.49 |
| 9/30/2016 | -- | -- | -- | 851.49 | -- | -- | -- | 851.14 BQE | 805.18 | -- | -- | 849.71 | 806.49 BQE |
| 10/10/2016 | -- | -- | -- | 851.54 | -- | 851.37 | 851.28 | -- | -- | 849.63 | 806.49 | -- | -- |
| 11/8/2016 | -- | -- | -- | 850.79 | -- | -- | -- | 849.48 | -- | -- | -- | -- | 806.49 |
| 12/1/2016 | -- | -- | -- | 851.07 | -- | -- | -- | 849.73 | -- | -- | -- | -- | 806.49 |

-- Not measured

See Table 3-18 for data qualifiers and footnotes.

# Table A-3
## 1984-2016 Lower Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | S-3 | W300 | W300SP | W300SPN | W301 | W307 | W308 | W323 | W328 |
|---|---|---|---|---|---|---|---|---|---|
| 12/2/1984 | -- | 847.10 | -- | -- | -- | -- | -- | -- | -- |
| 3/25/1985 | -- | 847.35 | -- | -- | 851.27 | 848.53 | -- | -- | -- |
| 3/27/1985 | -- | -- | -- | -- | -- | 848.73 | -- | -- | -- |
| 3/28/1985 | -- | -- | -- | -- | 851.42 | -- | -- | -- | -- |
| 5/6/1985 | -- | 847.39 | -- | -- | 851.77 | 848.80 | -- | -- | -- |
| 2/26/1986 | -- | -- | -- | -- | -- | -- | -- | -- | 848.11 |
| 3/20/1986 | -- | -- | -- | -- | 851.07 | 848.32 | -- | -- | 848.39 |
| 9/23/1986 | -- | -- | -- | -- | 852.26 | 849.31 | -- | -- | 849.74 |
| 12/10/1986 | -- | 847.85 | -- | -- | 850.96 | -- | 848.46 | -- | 848.60 |
| 3/17/1987 | -- | 846.38 | -- | -- | 850.25 | 847.65 | -- | 843.82 | 847.79 |
| 5/4/1987 | -- | -- | 844.88 | -- | 849.68 | 847.65 | -- | 841.80 | 847.06 |
| 7/13/1987 | -- | -- | 844.87 | -- | 849.13 | 846.03 | -- | 841.50 | 846.17 |
| 11/3/1987 | -- | -- | -- | -- | 849.91 | 847.01 | -- | 843.02 | 847.31 |
| 2/1/1988 | -- | -- | 843.60 | -- | 848.48 | 846.32 | -- | 842.28 | 846.44 |
| 2/23/1988 | -- | -- | 843.60 | -- | -- | -- | -- | -- | -- |
| 2/25/1988 | -- | -- | -- | -- | 848.84 | 846.32 | -- | 842.28 | 846.44 |
| 10/3/1988 | -- | -- | 843.56 | -- | -- | 844.85 | -- | 840.46 | 844.93 |
| 12/5/1988 | -- | -- | 848.82 | -- | 847.71 | 844.91 | -- | -- | 844.96 |
| 2/27/1989 | -- | -- | -- | -- | 846.49 | 843.78 | -- | 840.15 | 843.97 |
| 8/2/1989 | -- | -- | 843.36 | -- | 848.37 | 844.71 | -- | 839.38 | 844.78 |
| 9/29/1989 | -- | -- | 843.48 | -- | 848.18 | 844.66 | -- | 839.80 | 844.81 |
| 1/5/1990 | -- | -- | 842.70 | -- | 846.49 | 843.71 | -- | 839.96 | 843.94 |
| 5/1/1990 | -- | -- | 844.28 | -- | 848.68 | 845.36 | -- | 840.94 | 845.49 |
| 10/29/1990 | -- | -- | 844.85 | -- | 849.16 | 845.92 | -- | 841.62 | 846.13 |
| 2/7/1991 | -- | -- | -- | -- | 847.53 | 844.78 | -- | 840.95 | 844.89 |
| 6/14/1991 | -- | -- | 846.64 | -- | 850.96 | 847.81 | -- | 843.56 | 848.10 |
| 9/30/1991 | -- | -- | 847.51 | -- | 851.39 | 848.63 | -- | 844.47 | 848.72 |
| 10/16/1991 | -- | -- | 847.33 | -- | 851.07 | 848.48 | -- | 844.38 | 848.51 |
| 4/24/1992 | -- | -- | -- | -- | 851.41 | -- | -- | 845.29 | 849.11 |
| 5/26/1992 | -- | -- | 847.17 | -- | -- | 848.29 | -- | -- | -- |
| 6/17/1992 | -- | -- | 847.06 | -- | 851.14 | 848.34 | -- | 844.21 | 848.46 |
| 9/3/1992 | -- | -- | 847.22 | -- | 850.90 | 848.30 | -- | 844.51 | 848.48 |
| 10/12/1992 | -- | -- | 847.39 | -- | 851.24 | 848.48 | -- | 844.29 | 848.64 |
| 1/13/1993 | -- | -- | 847.03 | -- | 850.84 | 848.06 | -- | 844.41 | 848.09 |
| 4/13/1993 | -- | -- | 847.01 | -- | 850.79 | 848.22 | -- | 844.25 | 848.26 |
| 7/19/1993 | -- | -- | 848.12 | -- | 851.86 | 849.16 | -- | 845.39 | 849.40 |
| 10/18/1993 | -- | -- | 847.86 | -- | 851.13 | 848.91 | -- | 844.97 | 848.83 |
| 2/5/1994 | -- | -- | 847.29 | -- | 850.73 | 848.50 | -- | 844.80 | 848.51 |
| 5/31/1994 | -- | -- | 847.58 | -- | 851.42 | 848.89 | -- | 844.70 | 848.83 |
| 8/1/1994 | -- | -- | 846.73 | -- | 850.66 | 847.82 | -- | 843.48 | 847.95 |
| 9/28/1994 | -- | -- | 846.96 | -- | 850.81 | 848.18 | -- | 844.10 | 848.16 |
| 2/1/1995 | -- | -- | 846.62 | -- | 850.18 | 847.81 | -- | 844.09 | 847.84 |
| 4/3/1995 | -- | -- | 847.23 | -- | 850.77 | 848.19 | -- | 844.52 | 848.36 |
| 7/6/1995 | -- | -- | 847.78 | -- | 851.66 | 848.85 | -- | 844.66 | 848.88 |
| 10/18/1995 | -- | -- | 847.60 | -- | 851.14 | 848.65 | -- | 844.87 | 848.76 |
| 2/8/1996 | -- | -- | 846.77 | -- | 850.48 | 847.96 | -- | 844.07 | 848.10 |
| 4/24/1996 | -- | -- | 847.56 | -- | 851.08 | 848.72 | -- | -- | -- |
| 9/6/1996 | -- | -- | 845.68 | -- | 849.80 | 846.71 | -- | -- | -- |
| 10/1/1996 | -- | -- | 845.65 | -- | 849.48 | 846.63 | -- | 842.68 | 846.89 |
| 1/2/1997 | -- | -- | 847.10 | -- | 850.55 | 848.01 | -- | 844.31 | 847.93 |
| 3/31/1997 | -- | -- | 847.92 | -- | 851.33 | 848.81 | -- | 845.00 | 848.80 |
| 7/9/1997 | -- | -- | 847.99 | -- | 851.36 | 848.96 | -- | -- | -- |
| 9/12/1997 | -- | -- | 848.08 | -- | 851.24 | 848.81 | -- | -- | -- |
| 10/1/1997 | -- | -- | 847.83 | -- | 851.25 | 848.77 | -- | 844.83 | 848.85 |
| 1/7/1998 | -- | -- | 847.49 | -- | 850.67 | 848.20 | -- | -- | -- |
| 4/1/1998 | -- | -- | 848.06 | -- | 851.63 | 848.79 | -- | -- | -- |
| 7/1/1998 | -- | -- | 847.87 | -- | 851.43 | 848.54 | -- | -- | -- |
| 11/18/1998 | -- | -- | 847.43 | -- | 850.67 | 847.97 | -- | 844.42 | 848.33 |
| 2/25/1999 | -- | -- | 846.73 | -- | 849.98 | 847.44 | -- | -- | -- |
| 5/31/1999 | -- | -- | 847.82 | -- | 851.23 | 848.44 | -- | -- | -- |
| 11/15/1999 | -- | -- | 846.95 | -- | 850.23 | -- | -- | 843.99 | 847.93 |
| 3/1/2000 | -- | -- | 846.45 | -- | 849.79 | -- | -- | -- | -- |

# Table A-3
## 1984-2016 Lower Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | S-3 | W300 | W300SP | W300SPN | W301 | W307 | W308 | W323 | W328 |
|---|---|---|---|---|---|---|---|---|---|
| 6/2/2000 | -- | -- | 846.23 | -- | 850.13 | -- | -- | -- | -- |
| 9/6/2000 | -- | -- | 847.12 | -- | 850.83 | -- | -- | -- | -- |
| 9/27/2000 | -- | -- | 846.56 | -- | -- | -- | -- | -- | -- |
| 9/28/2000 | -- | -- | -- | -- | 850.18 | -- | -- | 843.43 | 847.63 |
| 3/6/2001 | -- | -- | 846.07 | -- | 850.63 | -- | -- | -- | -- |
| 7/3/2001 | -- | -- | 848.07 | -- | 851.54 | -- | -- | -- | -- |
| 10/18/2001 | -- | -- | 847.47 | -- | -- | -- | -- | -- | -- |
| 10/19/2001 | -- | -- | -- | -- | 850.77 | -- | -- | 844.60 | 848.48 |
| 12/15/2001 | -- | 848.73 | -- | -- | -- | -- | -- | -- | -- |
| 2/28/2002 | -- | -- | 846.91 | -- | 850.18 | -- | -- | -- | -- |
| 3/26/2002 | -- | -- | 846.93 | -- | -- | -- | -- | -- | -- |
| 4/29/2002 | -- | -- | 847.68 | -- | 851.13 | -- | -- | 844.79 | 848.75 |
| 5/15/2002 | -- | -- | 848.44 | -- | -- | -- | -- | -- | -- |
| 5/30/2002 | -- | -- | 847.82 | -- | -- | -- | -- | 844.69 | 848.91 |
| 6/30/2002 | -- | -- | 848.47 | -- | -- | -- | -- | 845.29 | 849.65 |
| 8/2/2002 | -- | -- | 848.31 | -- | 851.96 | -- | -- | 845.18 | 849.47 |
| 8/30/2002 | -- | -- | 848.31 | -- | -- | -- | -- | 845.47 | 849.43 |
| 9/30/2002 | -- | -- | -- | 846.87 | -- | -- | -- | 845.49 | 849.25 |
| 10/28/2002 | -- | -- | 847.04 | -- | 851.52 | -- | -- | 845.74 | 849.40 |
| 12/3/2002 | -- | -- | 847.74 | -- | -- | -- | -- | 845.19 | 848.90 |
| 12/30/2002 | -- | -- | -- | 847.69 | -- | -- | -- | 845.29 | 848.85 |
| 2/4/2003 | -- | -- | -- | 847.41 | -- | -- | -- | 844.99 | 848.55 |
| 3/3/2003 | -- | -- | -- | 847.16 | 850.41 | -- | -- | 846.89 | 848.35 |
| 4/1/2003 | -- | -- | -- | 847.27 | -- | -- | -- | 846.89 | 848.46 |
| 5/2/2003 | -- | -- | -- | 847.46 | -- | -- | -- | 846.69 | 848.70 |
| 6/7/2003 | -- | -- | -- | 848.02 | 851.50 | -- | -- | 847.09 | 849.23 |
| 7/2/2003 | -- | -- | -- | 848.56 | -- | -- | -- | 845.71 | 849.78 |
| 8/4/2003 | -- | -- | 847.29 | -- | -- | -- | -- | -- | 848.55 |
| 9/3/2003 | -- | -- | -- | 845.83 | 849.73 | -- | -- | -- | 847.10 |
| 9/22/2003 | -- | -- | -- | 845.55 | 849.21 | -- | -- | -- | 846.60 |
| 10/13/2003 | -- | -- | -- | 845.46 | -- | -- | -- | -- | 846.60 |
| 11/3/2003 | -- | -- | -- | 845.81 | -- | -- | -- | -- | 846.95 |
| 12/16/2003 | -- | -- | -- | 845.76 | 848.94 | -- | -- | -- | 846.85 |
| 1/9/2004 | -- | -- | -- | 845.62 | 848.78 | -- | -- | -- | 846.74 |
| 4/1/2004 | -- | -- | -- | 846.31 | 849.64 | -- | -- | -- | 847.48 |
| 8/2/2004 | -- | -- | -- | 846.90 | 850.39 | -- | -- | -- | 848.10 |
| 10/18/2004 | -- | -- | -- | 846.91 | 850.13 | -- | -- | -- | 847.77 |
| 11/2/2004 | -- | -- | -- | 847.26 | -- | -- | -- | -- | 848.40 |
| 12/1/2004 | -- | -- | -- | 847.06 | -- | -- | -- | -- | 848.22 |
| 1/5/2005 | -- | -- | -- | 846.71 | -- | -- | -- | -- | 847.85 |
| 2/2/2005 | -- | -- | -- | 846.26 | 849.52 | -- | -- | -- | 847.40 |
| 3/3/2005 | -- | -- | -- | 846.55 | -- | -- | -- | -- | 847.70 |
| 4/1/2005 | -- | -- | -- | 846.51 | -- | -- | -- | -- | 847.65 |
| 5/4/2005 | -- | -- | -- | 846.96 | 850.35 | -- | -- | -- | 848.15 |
| 6/3/2005 | -- | -- | -- | 847.01 | -- | -- | -- | -- | 848.18 |
| 7/7/2005 | -- | -- | -- | 847.31 | -- | -- | -- | -- | 848.50 |
| 8/5/2005 | -- | -- | -- | 846.41 | 850.13 | -- | -- | -- | 847.70 |
| 9/1/2005 | -- | -- | -- | 846.55 | -- | -- | -- | -- | 847.80 |
| 10/7/2005 | -- | -- | -- | 848.24 | -- | -- | -- | -- | 849.18 |
| 11/2/2005 | -- | -- | -- | 848.16 | -- | -- | -- | -- | 849.25 |
| 11/7/2005 | -- | -- | -- | -- | 851.13 | -- | -- | -- | -- |
| 12/12/2005 | -- | -- | -- | 847.66 | -- | -- | -- | -- | 848.77 |
| 1/9/2006 | -- | -- | -- | 847.46 | -- | -- | -- | -- | 848.60 |
| 2/10/2006 | -- | -- | -- | 847.21 | -- | -- | -- | -- | 848.45 |
| 3/1/2006 | 841.34 | -- | -- | -- | -- | -- | -- | -- | -- |
| 3/19/2006 | -- | -- | -- | 847.25 | 850.44 | -- | -- | -- | 848.36 |
| 4/14/2006 | -- | -- | -- | 848.01 | -- | -- | -- | -- | 849.15 |
| 5/9/2006 | -- | -- | -- | 848.81 | 852.22 | -- | -- | -- | 849.93 |
| 6/5/2006 | -- | -- | -- | 847.62 | -- | -- | -- | -- | 848.85 |
| 7/7/2006 | -- | -- | -- | 847.01 | -- | -- | -- | -- | 848.30 |
| 8/15/2006 | -- | -- | -- | 846.80 | 850.43 | -- | -- | -- | 848.06 |
| 9/6/2006 | -- | -- | -- | 847.16 | -- | -- | -- | -- | 848.44 |

# Table A-3
## 1984-2016 Lower Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | S-3 | W300 | W300SP | W300SPN | W301 | W307 | W308 | W323 | W328 |
|---|---|---|---|---|---|---|---|---|---|
| 10/9/2006 | -- | -- | -- | 847.01 | -- | -- | -- | -- | 848.20 |
| 10/16/2006 | 841.53 | -- | -- | 847.21 | 850.38 | -- | -- | -- | 848.30 |
| 11/14/2006 | -- | -- | -- | 847.16 | -- | -- | -- | -- | 848.26 |
| 12/7/2006 | -- | -- | -- | 846.96 | -- | -- | -- | -- | 848.10 |
| 1/2/2007 | -- | -- | -- | 847.41 | -- | -- | -- | -- | 848.54 |
| 2/12/2007 | -- | -- | -- | 846.80 | -- | -- | -- | -- | 847.94 |
| 3/12/2007 | -- | -- | -- | 846.81 | -- | -- | -- | -- | 847.90 |
| 3/15/2007 | -- | -- | -- | 846.81 | 850.50 | -- | -- | -- | 847.90 |
| 4/10/2007 | -- | -- | -- | 847.90 | -- | -- | -- | -- | 849.00 |
| 5/11/2007 | -- | -- | -- | 847.70 | -- | -- | -- | -- | 848.86 |
| 6/8/2007 | -- | -- | -- | 847.18 | -- | -- | -- | -- | 848.35 |
| 6/28/2007 | -- | -- | -- | 846.23 | -- | -- | -- | -- | 847.32 |
| 8/7/2007 | -- | -- | -- | 845.76 | -- | -- | -- | -- | 846.95 |
| 9/12/2007 | -- | -- | -- | 846.33 | -- | -- | -- | -- | 847.57 |
| 9/29/2007 | -- | -- | -- | 847.56 | -- | -- | -- | -- | 848.75 |
| 11/6/2007 | 842.58 | -- | -- | 848.06 | 851.20 | -- | -- | -- | 849.20 |
| 12/10/2007 | -- | -- | -- | 847.71 | -- | -- | -- | -- | 848.80 |
| 12/27/2007 | -- | -- | -- | 847.41 | -- | -- | -- | -- | 848.55 |
| 2/15/2008 | -- | -- | -- | 847.00 | -- | -- | -- | -- | 848.06 |
| 3/19/2008 | -- | -- | -- | 846.71 | -- | -- | -- | -- | 847.85 |
| 4/1/2008 | -- | -- | -- | 846.91 | -- | -- | -- | -- | 848.05 |
| 5/13/2008 | -- | -- | -- | 848.22 | -- | -- | -- | -- | 849.40 |
| 6/14/2008 | -- | -- | -- | 848.21 | -- | -- | -- | -- | 849.45 |
| 6/29/2008 | -- | -- | -- | 847.51 | -- | -- | -- | -- | 848.75 |
| 8/14/2008 | -- | -- | -- | 846.51 | -- | -- | -- | -- | 847.85 |
| 9/4/2008 | -- | -- | -- | 846.51 | -- | -- | -- | -- | 847.74 |
| 9/24/2008 | -- | -- | -- | 846.71 | -- | -- | -- | -- | 847.91 |
| 10/6/2008 | 841.32 | -- | -- | 846.67 | 850.01 | -- | -- | -- | 847.93 |
| 11/11/2008 | -- | -- | -- | 846.71 | -- | -- | -- | -- | 847.85 |
| 12/7/2008 | -- | -- | -- | 846.54 | -- | -- | -- | -- | 847.65 |
| 12/26/2008 | -- | -- | -- | 846.41 | -- | -- | -- | -- | 847.52 |
| 2/11/2009 | -- | -- | -- | 846.09 | -- | -- | -- | -- | 847.20 |
| 3/9/2009 | -- | -- | -- | 846.21 | -- | -- | -- | -- | 847.35 |
| 3/27/2009 | -- | -- | -- | 846.70 | -- | -- | -- | -- | 847.85 |
| 5/8/2009 | -- | -- | -- | 846.31 | -- | -- | -- | -- | 847.45 |
| 6/10/2009 | -- | -- | -- | 845.61 | -- | -- | -- | -- | 846.60 |
| 7/1/2009 | -- | -- | -- | 845.61 | -- | -- | -- | -- | 846.81 |
| 8/11/2009 | -- | -- | -- | 845.16 | -- | -- | -- | -- | 846.35 |
| 9/9/2009 | -- | -- | -- | 845.36 | -- | -- | -- | -- | 846.65 |
| 9/29/2009 | 839.68 | -- | -- | 845.31 | 849.33 | -- | -- | -- | 846.65 |
| 10/2/2009 | -- | -- | -- | 845.31 | -- | -- | -- | -- | 846.65 |
| 11/2/2009 | -- | -- | -- | 846.21 | -- | -- | -- | -- | 847.37 |
| 12/4/2009 | -- | -- | -- | 846.03 | -- | -- | -- | -- | 847.15 |
| 12/29/2009 | -- | -- | -- | 845.83 | -- | -- | -- | -- | 846.90 |
| 2/18/2010 | -- | -- | -- | 845.46 | -- | -- | -- | -- | 846.47 |
| 3/30/2010 | -- | -- | -- | 846.41 | -- | -- | -- | -- | 847.50 |
| 5/20/2010 | -- | -- | -- | 846.29 | -- | -- | -- | -- | 847.45 |
| 6/4/2010 | -- | -- | -- | 845.91 | -- | -- | -- | -- | 847.05 |
| 6/25/2010 | -- | -- | -- | 846.16 | -- | -- | -- | -- | 847.31 |
| 8/6/2010 | -- | -- | -- | 846.31 | -- | -- | -- | -- | 847.55 |
| 9/8/2010 | -- | -- | -- | 846.92 | -- | -- | -- | -- | 848.12 |
| 10/4/2010 | -- | -- | -- | 846.63 | -- | -- | -- | -- | 848.45 |
| 10/5/2010 | 841.78 | -- | -- | -- | 850.43 | -- | -- | -- | -- |
| 11/12/2010 | -- | -- | -- | 847.21 | -- | -- | -- | -- | 848.30 |
| 12/20/2010 | -- | -- | -- | 847.19 | -- | -- | -- | -- | 848.25 |
| 1/5/2011 | -- | -- | -- | 847.31 | -- | -- | -- | -- | 848.43 |
| 2/15/2011 | -- | -- | -- | 846.91 | -- | -- | -- | -- | 848.00 |
| 3/1/2011 | -- | -- | -- | 847.11 | -- | -- | -- | -- | 848.20 |
| 4/5/2011 | -- | -- | -- | 848.16 | -- | -- | -- | -- | 849.24 |
| 5/10/2011 | -- | -- | -- | 848.51 | -- | -- | -- | -- | 849.60 |
| 6/6/2011 | -- | -- | -- | 851.26 | -- | -- | -- | -- | 851.26 |
| 7/7/2011 | -- | -- | -- | 847.96 | -- | -- | -- | -- | 849.15 |

## Table A-3
## 1984-2016 Lower Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | S-3 | W300 | W300SP | W300SPN | W301 | W307 | W308 | W323 | W328 |
|---|---|---|---|---|---|---|---|---|---|
| 8/9/2011 | -- | -- | -- | 848.69 | -- | -- | -- | -- | 849.94 |
| 9/11/2011 | -- | -- | -- | 847.71 | -- | -- | -- | -- | 848.97 |
| 10/7/2011 | -- | -- | -- | 847.36 | -- | -- | -- | -- | 848.58 |
| 10/11/2011 | 841.43 | -- | -- | 847.31 | 851.33 | -- | -- | -- | 848.58 |
| 11/7/2011 | -- | -- | -- | 847.27 | -- | -- | -- | -- | 848.48 |
| 12/12/2011 | -- | -- | -- | 847.21 | -- | -- | -- | -- | 848.35 |
| 1/3/2012 | -- | -- | -- | 846.40 | -- | -- | -- | -- | 847.47 |
| 1/5/2012 | -- | -- | -- | 847.11 | -- | -- | -- | -- | 848.24 |
| 2/16/2012 | -- | -- | -- | 846.73 | -- | -- | -- | -- | 847.95 |
| 3/13/2012 | -- | -- | -- | 847.13 | -- | -- | -- | -- | 848.27 |
| 4/12/2012 | -- | -- | -- | 847.06 | -- | -- | -- | -- | 848.25 |
| 5/18/2012 | -- | -- | -- | 847.71 | -- | -- | -- | -- | 849.00 |
| 6/9/2012 | -- | -- | -- | 847.89 | -- | -- | -- | -- | 849.08 |
| 7/3/2012 | -- | -- | -- | 847.76 | -- | -- | -- | -- | 848.95 |
| 8/3/2012 | -- | -- | -- | 847.42 | -- | -- | -- | -- | 848.60 |
| 9/18/2012 | -- | -- | -- | 846.40 | -- | -- | -- | -- | 847.63 |
| 10/9/2012 | -- | -- | -- | 846.22 | -- | -- | -- | -- | 847.47 |
| 10/15/2012 | 840.98 | -- | -- | 846.31 | 849.83 | -- | -- | -- | 847.65 |
| 11/1/2012 | -- | -- | -- | 846.51 | -- | -- | -- | -- | 847.70 |
| 12/7/2012 | -- | -- | -- | 846.56 | -- | -- | -- | -- | 847.60 |
| 1/3/2013 | -- | -- | -- | 846.40 | -- | -- | -- | -- | 847.47 |
| 2/8/2013 | -- | -- | -- | 845.88 | -- | -- | -- | -- | 847.38 |
| 3/7/2013 | -- | -- | -- | 845.61 | -- | -- | -- | -- | 846.74 |
| 4/9/2013 | -- | -- | -- | 846.81 | -- | -- | -- | -- | 847.94 |
| 5/13/2013 | -- | -- | -- | 847.52 | -- | -- | -- | -- | 848.65 |
| 6/15/2013 | -- | -- | -- | 847.94 | -- | -- | -- | -- | 849.11 |
| 7/2/2013 | -- | -- | -- | 848.66 | -- | -- | -- | -- | 849.85 |
| 8/6/2013 | -- | -- | -- | 847.63 | -- | -- | -- | -- | 848.85 |
| 9/13/2013 | -- | -- | -- | 846.51 | -- | -- | -- | -- | 847.76 |
| 10/1/2013 | -- | -- | -- | 846.56 | -- | -- | -- | -- | 847.75 |
| 10/7/2013 | 841.53 | -- | -- | 846.78 | 850.33 | -- | -- | -- | 848.30 |
| 11/8/2013 | -- | -- | -- | 847.21 | -- | -- | -- | -- | 848.35 |
| 12/2/2013 | -- | -- | -- | 847.11 | -- | -- | -- | -- | 848.24 |
| 1/3/2014 | -- | -- | -- | 846.71 | -- | -- | -- | -- | 847.81 |
| 2/13/2014 | -- | -- | -- | 846.23 | -- | -- | -- | -- | 847.35 |
| 3/8/2014 | -- | -- | -- | -- | -- | -- | -- | -- | 847.40 |
| 3/27/2014 | -- | -- | -- | 846.47 | -- | -- | -- | -- | -- |
| 4/2/2014 | -- | -- | -- | 846.71 | -- | -- | -- | -- | 847.87 |
| 5/23/2014 | -- | -- | -- | 848.91 | -- | -- | -- | -- | 850.10 |
| 6/30/2014 | -- | -- | -- | 849.28 | -- | -- | -- | -- | 850.45 |
| 7/31/2014 | -- | -- | -- | 848.31 | -- | -- | -- | -- | 849.52 |
| 8/29/2014 | -- | -- | -- | 847.84 | -- | -- | -- | -- | 849.13 |
| 9/30/2014 | -- | -- | -- | 847.51 | -- | -- | -- | -- | 848.74 |
| 10/14/2014 | 842.23 | -- | -- | 847.61 | 850.68 | -- | -- | -- | 848.74 |
| 12/5/2014 | -- | -- | -- | 847.06 | -- | -- | -- | -- | 848.20 |
| 1/15/2015 | -- | -- | -- | 847.46 | -- | -- | -- | -- | 848.63 |
| 2/11/2015 | -- | -- | -- | 847.21 | -- | -- | -- | -- | 848.43 |
| 3/5/2015 | -- | -- | -- | 847.18 | -- | -- | -- | -- | 848.20 |
| 3/31/2015 | -- | -- | -- | 847.11 | -- | -- | -- | -- | 848.23 |
| 5/1/2015 | -- | -- | -- | 846.60 | -- | -- | -- | -- | 847.75 |
| 6/5/2015 | -- | -- | -- | 847.31 | -- | -- | -- | -- | 848.43 |
| 6/30/2015 | -- | -- | -- | 847.01 | -- | -- | -- | -- | 848.15 |
| 8/6/2015 | -- | -- | -- | 847.21 | -- | -- | -- | -- | 848.38 |
| 9/1/2015 | -- | -- | -- | 847.31 | -- | -- | -- | -- | 848.45 |
| 9/30/2015 | -- | -- | -- | 847.31 | -- | -- | -- | -- | 848.48 |
| 10/5/2015 | 842.43 | -- | -- | 847.36 | 850.41 | -- | -- | -- | 848.60 |
| 11/9/2015 | -- | -- | -- | 847.56 | -- | -- | -- | -- | 848.64 |
| 12/1/2015 | -- | -- | -- | 848.16 | -- | -- | -- | -- | 849.25 |
| 1/6/2016 | -- | -- | -- | 848.01 | -- | -- | -- | -- | 849.15 |
| 2/1/2016 | -- | -- | -- | 847.66 | -- | -- | -- | -- | 848.8 |

# Table A-3
## 1984-2016 Lower Aquifer Water Levels
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN
## (elevations in ft./MSL)

| Location | S-3 | W300 | W300SP | W300SPN | W301 | W307 | W308 | W323 | W328 |
|---|---|---|---|---|---|---|---|---|---|
| 2/29/2016 | -- | -- | -- | 847.59 | -- | -- | -- | -- | 848.7 |
| 4/1/2016 | -- | -- | -- | 847.81 | -- | -- | -- | -- | 848.93 |
| 5/2/2016 | -- | -- | -- | 848.06 | -- | -- | -- | -- | 849.22 |
| 6/1/2016 | -- | -- | -- | 847.79 | -- | -- | -- | -- | 848.9 |
| 7/1/2016 | -- | -- | -- | 847.16 | -- | -- | -- | -- | 848.35 |
| 8/5/2016 | -- | -- | -- | 848.24 | -- | -- | -- | -- | 849.4 |
| 9/8/2016 | -- | -- | -- | 848.9 | -- | -- | -- | -- | 850.03 |
| 9/30/2016 | -- | -- | -- | 849.18 | -- | -- | -- | -- | 850.35 |
| 10/10/2016 | 843.83 | -- | -- | 848.96 | 829.73 | -- | -- | -- | 850.05 |
| 11/8/2016 | -- | -- | -- | 848.61 | -- | -- | -- | -- | 849.74 |
| 12/1/2016 | -- | -- | -- | 848.91 | -- | -- | -- | -- | 850.04 |

-- Not measured

See Table 3-18 for data qualifiers and footnotes.

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U1 | 7/07/1988 | N | < 10 ug/l | **32 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 12/29/1988 | N | < 10 ug/l | **20 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 2/27/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U1 | 8/03/1989 | N | < 10 ug/l | **28 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 5/04/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U1 | 10/30/1990 | N | < 10 ug/l | **27 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 10/17/1991 | N | < 10 ug/l | **21 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 10/14/1992 | N | < 10 ug/l<br>< 10 ug/l | **19 ug/l**<br>**19 ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| U1 | 10/20/1993 | N | < 10 ug/l | **13 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 10/14/1994 | N | < 10 ug/l | **17 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 12/08/1995 | N | < 0.96 ug/l | **16 ug/l** | < 0.96 ug/l | < 0.96 ug/l | < 0.96 ug/l | < 0.96 ug/l | < 0.96 ug/l | < 0.96 ug/l | < 0.96 ug/l | < 0.96 ug/l |
| U1 | 10/02/1996 | N | < 30 ug/l<br>2 j ug/l | **10 j* ug/l**<br>**19 ug/l** | < 30 * ug/l<br>6 j ug/l | < 30 ug/l<br>< 10 ug/l | < 30 ug/l<br>< 10 ug/l | < 30 ug/l<br>< 10 ug/l | < 30 ug/l<br>< 10 ug/l | < 30 ug/l<br>< 10 ug/l | < 30 ug/l<br>< 10 ug/l | < 30 ug/l<br>< 10 ug/l |
| U1 | 10/03/1997 | N | < 10 ug/l | **1 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 11/19/1998 | N | -- | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 11/19/1999 | N | < 0.1 ug/l | **0.38 ug/l** | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U1 | 9/27/2000 | N | < 0.1 ug/l | **1.5 ug/l** | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U1 | 9/27/2000 | FD | < 0.1 ug/l | **1.6 ug/l** | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U1 | 10/19/2001 | N | **0.0087 ug/l** | **2.6 ug/l** | **0.045 ug/l** | **0.044 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 11/01/2002 | N | < 0.0034 ug/l | **0.20 ug/l** | < 0.0034 ug/l | **0.011 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 12/21/2003 | N | **0.030 b ug/l** | **0.59 ug/l** | **0.016 ug/l** | **0.027 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 10/29/2004 | N | < 0.0035 ug/l | **0.22 ug/l** | **0.014 ug/l** | **0.049 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| U1 | 11/10/2005 | N | **0.0087 ug/l** | **0.22 ug/l** | **0.015 ug/l** | **0.039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 10/21/2006 | N | **0.010 ug/l** | **0.23 ug/l** | **0.014 ug/l** | **0.040 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 9/16/2007 | N | **0.0047 ug/l** | **0.22 ug/l** | **0.0082 b ug/l** | **0.027 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 11/09/2007 | N | < 0.0034 ug/l | **0.15 ug/l** | < 0.0068 ug/l | **0.027 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 3/19/2008 | N | < 0.0034 ug/l | **0.098 ug/l** | < 0.0034 ug/l | **0.014 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 6/14/2008 | N | < 0.0033 ug/l | **0.13 ug/l** | < 0.0044 ug/l | **0.020 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 9/04/2008 | N | < 0.0033 ug/l | **0.13 ug/l** | < 0.0033 ug/l | **0.014 ug/l** | < 0.0033 * ug/l | < 0.0033 ug/l | < 0.0033 * ug/l | < 0.0033 * ug/l | < 0.0033 * ug/l | < 0.0033 * ug/l |
| U1 | 10/10/2008 | N | **0.0037 ug/l** | **0.050 ug/l** | < 0.0034 ug/l | **0.020 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 2/25/2009 | N | < 0.0033 ug/l | **0.12 ug/l** | < 0.0033 ug/l | **0.012 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 6/10/2009 | N | **0.0040 ug/l** | **0.12 ug/l** | **0.0075 ug/l** | **0.050 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 9/09/2009 | N | **0.0049 ug/l** | **0.17 ug/l** | **0.0055 ug/l** | **0.037 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 10/05/2009 | N | **0.0036 b ug/l** | **0.18 ug/l** | **0.0052 b ug/l** | **0.031 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 10/05/2009 | FD | **0.0039 b ug/l** | **0.18 ug/l** | **0.0059 b ug/l** | **0.035 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 3/09/2010 | N | **0.0065 ug/l** | **0.27 ug/l** | **0.0084 ug/l** | **0.048 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| Parameter | | | 2- Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U1 | 6/04/2010 | N | **0.0057 b ug/l** | **0.25 ug/l** | **0.0061 ug/l** | **0.036 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 8/09/2010 | N | **0.0039 ug/l** | **0.24 ug/l** | **0.0051 ug/l** | **0.029 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 10/05/2010 | N | < 0.0033 ug/l | **0.19 ug/l** | **0.0046 ug/l** | **0.023 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 3/22/2011 | N | < 0.0034 ug/l | **0.17 ug/l** | **0.0061 ug/l** | **0.027 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 6/06/2011 | N | < 0.0034 ug/l | **0.071 ug/l** | **0.0040 ug/l** | **0.015 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 9/11/2011 | N | < 0.0034 ug/l | **0.014 ug/l** | < 0.0034 ug/l | **0.013 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 10/15/2011 | N | < 0.0033 ug/l | **0.024 ug/l** | < 0.0033 ug/l | **0.012 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 10/15/2011 | FD | < 0.0034 ug/l | **0.022 ug/l** | < 0.0034 ug/l | **0.013 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 3/16/2012 | N | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | **0.011 ug/l** | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l |
| U1 | 6/09/2012 | N | < 0.0036 ug/l | **0.0094 ug/l** | < 0.0036 ug/l | **0.013 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| U1 | 9/27/2012 | N | < 0.0034 ug/l | **1.0 ug/l** | **0.0080 ug/l** | **0.043 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 10/17/2012 | N | < 0.0033 h ug/l | **0.012 h ug/l** | **0.0035 h ug/l** | **0.024 h ug/l** | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l |
| U1 | 3/07/2013 | N | **0.0049 ug/l** | **0.028 ug/l** | **0.0055 ug/l** | **0.030 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 5/30/2013 | N | < 0.0033 ug/l | **0.023 ug/l** | **0.0042 ug/l** | **0.026 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 8/14/2013 | N | < 0.0033 ug/l | **0.021 ug/l** | **0.0044 ug/l** | **0.023 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 10/08/2013 | N | < 0.0035 ug/l | **0.023 ug/l** | **0.0050 ug/l** | **0.031 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| U1 | 3/27/2014 | N | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l |
| U1 | 6/30/2014 | N | **0.0045 ug/l** | **0.023 ug/l** | **0.0055 ug/l** | **0.034 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 BQX ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 9/30/2014 | N | < 0.0034 ug/l | **0.020 ug/l** | **0.0052 ug/l** | **0.021 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 10/16/2014 | N | < 0.0034 ug/l | **0.018 ug/l** | **0.0043 ug/l** | **0.019 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 3/20/2015 | N | < 0.0037 ug/l | **0.015 ug/l** | **0.0044 ug/l** | **0.019 ug/l** | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l |
| U1 | 6/30/2015 | N | < 0.0033 h ug/l | **0.0060 h ug/l** | **0.0039 h ug/l** | **0.021 h ug/l** | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l |
| U1 | 9/01/2015 | N | < 0.0034 ug/l | **0.0086 ug/l** | < 0.0034 ug/l | **0.019 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 c ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 10/07/2015 | N | < 0.0034 ug/l | **0.012 ug/l** | < 0.0034 ug/l | **0.018 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1 | 2/04/2016 | N | < 0.0033 ug/l | **0.0047 ug/l** | < 0.0033 ug/l | **0.011 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 6/30/2016 | N | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | **0.020 h ug/l** | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 ch ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l |
| U1 | 9/12/2016 | N | < 0.0033 ug/l | **0.0040 ug/l** | < 0.0033 ug/l | **0.011 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1 | 10/18/2016 | N | **0.0038 ug/l** | **0.0096 ug/l** | **0.0049 ug/l** | **0.030 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 c ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| U1A | 10/01/1997 | N | < 10 ug/l | **11 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1A | 11/18/1998 | N | < 10 ug/l | **6 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | -- | < 10 ug/l | < 10 ug/l |
| U1A | 12/10/1999 | N | < 0.1 ug/l | **5.1 ug/l** | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U1A | 9/26/2000 | N | < 0.1 ug/l | **5.4 ug/l** | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U1A | 10/16/2001 | N | **0.0092 ug/l** | **5.1 ug/l** | **0.056 ug/l** | **0.088 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1A | 11/01/2002 | N | < 0.10 ug/l | **3.5 ug/l** | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l |
| U1A | 12/16/2003 | N | < 0.020 ug/l | **0.94 ug/l** | **0.031 ug/l** | **0.038 ug/l** | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l |
| U1A | 10/29/2004 | N | **9.9 ug/l** | **110 ug/l** | **2.1 ug/l** | **2.4 ug/l** | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l |
| U1A | 2/10/2005 | N | < 0.0034 ug/l | **0.61 ug/l** | **0.016 ug/l** | **0.057 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U1A | 2/10/2005 | FD | < 0.017 ug/l | **2.5 ug/l** | **0.069 ug/l** | **0.26 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U1A | 11/12/2005 | N | **0.0046 ug/l** | **0.25 ug/l** | < 0.015 ug/l | **0.057 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1A | 10/18/2006 | N | < 0.0034 ug/l | **0.18 ug/l** | **0.0075 ug/l** | **0.045 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1A | 10/02/2009 | N | **0.0060 ug/l** | **1.5 ug/l** | **0.016 ug/l** | **0.087 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1A | 10/12/2010 | N | < 0.0033 ug/l | **0.083 ug/l** | **0.0079 ug/l** | **0.058 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1A | 10/16/2011 | N | < 0.0033 ug/l | **1.4 ug/l** | **0.011 ug/l** | **0.052 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1A | 3/16/2012 | N | < 0.0033 ug/l | **1.1 ug/l** | **0.0080 ug/l** | **0.049 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1A | 6/09/2012 | N | < 0.0033 ug/l | **1.3 ug/l** | **0.011 ug/l** | **0.036 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1A | 9/27/2012 | N | < 0.0034 ug/l | **0.015 ug/l** | < 0.0034 ug/l | **0.020 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1A | 10/18/2012 | N | **0.0037 ug/l** | **0.97 ug/l** | **0.013 ug/l** | **0.057 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1A | 10/08/2013 | N | **0.0045 b ug/l** | **1.5 ug/l** | **0.018 ug/l** | **0.069 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1A | 10/16/2014 | N | **0.0052 ug/l** | **1.4 ug/l** | **0.023 ug/l** | **0.067 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U1A | 10/07/2015 | N | < 0.0034 ug/l | **0.78 ug/l** | **0.012 ug/l** | **0.039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U1A | 10/18/2016 | N | **0.0044 ug/l** | **0.35 ug/l** | **0.012 ug/l** | **0.062 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U2 | 7/07/1988 | N | < 10 ug/l | **42 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 12/29/1988 | N | < 10 ug/l | **77 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 2/27/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U2 | 8/03/1989 | N | < 10 ug/l | **67 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 5/04/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U2 | 6/22/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U2 | 10/30/1990 | N | < 10 ug/l | **46 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 10/17/1991 | N | < 10 ug/l | **19 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 12/03/1992 | N | < 20 ug/l | **7 j* ug/l** | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l |
| U2 | 10/18/1993 | N | < 10 ug/l | **12 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 9/28/1994 | N | < 10 ug/l | **13 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 10/18/1995 | N | < 30 ug/l | **6 j ug/l** | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l |
| U2 | 10/02/1996 | N | < 10 ug/l | **2 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 10/03/1997 | N | < 10 ug/l | **2 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 11/19/1998 | N | -- | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 11/19/1999 | N | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U2 | 9/27/2000 | N | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U2A | 10/01/1997 | N | < 10 ug/l | **11 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2A | 11/18/1998 | N | < 10 ug/l | **6 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | -- | < 10 ug/l | < 10 ug/l |
| U2A | 11/19/1999 | N | **0.9 j ug/l** | **10 ug/l** | < 10 ug/l | **0.3 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2A | 11/19/1999 | FD | **1 j ug/l** | **11 ug/l** | < 10 ug/l | **0.3 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2A | 12/10/1999 | N | < 10 ug/l | **12 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2A | 9/26/2000 | N | < 9.6 ug/l | **11 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U2A | 10/16/2001 | N | < 9.6 ug/l | **12 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U2A | 11/01/2002 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U2A | 12/16/2003 | N | < 9.9 ug/l | **10 ug/l** | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l |
| U2A | 10/29/2004 | N | **0.38 ug/l** | **9.5 ug/l** | **0.086 ug/l** | **0.16 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| U2A | 11/12/2005 | N | **0.36 ug/l** | **8.0 ug/l** | **0.13 ug/l** | **0.19 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l |
| U2A | 10/18/2006 | N | **0.14 ug/l** | **6.8 ug/l** | **0.061 ug/l** | **0.14 ug/l** | < 0.0066 ug/l | < 0.0066 ug/l | < 0.0066 ug/l | < 0.0066 ug/l | < 0.0066 ug/l | < 0.0066 ug/l |
| U2A | 11/13/2007 | N | **0.082 b ug/l** | **4.7 ug/l** | **0.049 ug/l** | **0.13 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U2A | 10/16/2008 | N | **0.095 ug/l** | **5.3 ug/l** | **0.035 ug/l** | **0.12 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U2A | 10/13/2010 | N | **0.0052 ug/l** | **7.3 ug/l** | < 0.029 ug/l | **0.076 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U2A | 10/16/2011 | N | **0.0082 b ug/l** | **4.9 ug/l** | **0.026 ug/l** | **0.083 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U2A | 10/18/2012 | N | **0.0096 ug/l** | **3.3 ug/l** | **0.028 ug/l** | < 0.11 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| U2A | 10/11/2013 | N | **0.017 ug/l** | **3.8 ug/l** | **0.032 ug/l** | **0.14 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| U2A | 10/21/2014 | N | **0.012 ug/l** | **3.0 ug/l** | **0.037 ug/l** | **0.10 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U2A | 10/14/2015 | N | < 0.017 ug/l | **2.6 ug/l** | **0.057 ug/l** | **0.053 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 c ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U2A | 10/11/2016 | N | < 0.034 ug/l | **0.76 ug/l** | **0.063 ug/l** | **0.11 ug/l** | **0.036 ug/l** | **0.035 ug/l** | **0.035 c ug/l** | **0.041 ug/l** | **0.034 ug/l** | **0.042 ug/l** |
| U3 | 7/06/1988 | N | **31 ug/l** | **59 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U3 | 12/29/1988 | N | < 10 ug/l<br>< 10 ug/l | **60 ug/l**<br>**73 ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| U3 | 2/27/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U3 | 8/03/1989 | N | **10 ug/l** | **69 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U3 | 5/04/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U3 | 10/30/1990 | N | **2 j ug/l** | **90 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U3 | 10/17/1991 | N | < 30 ug/l | **51 ug/l** | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l |
| U3 | 10/14/1992 | N | < 25 ug/l | **71 ug/l** | < 25 ug/l | < 25 ug/l | < 25 ug/l | < 25 ug/l | < 25 ug/l | < 25 ug/l | < 25 ug/l | < 25 ug/l |
| U3 | 10/18/1993 | N | < 100 ug/l | **33 j ug/l** | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l |
| U3 | 9/29/1994 | N | **5 j ug/l** | **71 ug/l** | < 15 ug/l | < 15 ug/l | < 15 ug/l | < 15 ug/l | < 15 ug/l | < 15 ug/l | < 15 ug/l | < 15 ug/l |
| U3 | 10/18/1995 | N | < 100 ug/l | **56 j ug/l** | < 100 ug/l | < 100 ug/l | < 100 ug/l | **17 j ug/l** | **12 j ug/l** | < 100 ug/l | **16 j ug/l** | < 100 ug/l |
| U3 | 10/02/1996 | N | < 10 ug/l | **36 * ug/l** | < 10 * ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U3 | 10/01/1997 | N | **3 j ug/l** | **56 ug/l** | **1 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U3 | 11/18/1998 | N | **2 j ug/l** | **43 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | -- | < 10 ug/l | < 10 ug/l |
| U3 | 11/19/1999 | N | **2 j ug/l** | **83 ug/l** | **2 j ug/l** | **1 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | **0.6 j ug/l** | < 10 ug/l | < 10 ug/l |
| U3 | 12/10/1999 | N | < 10 ug/l | **69 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U4 | 7/06/1988 | N | < 10 ug/l | **45 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U4 | 12/29/1988 | N | < 10 pp ug/l | **81 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U4 | 2/27/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U4 | 8/03/1989 | N | < 50 pp ug/l | **94 ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| U4 | 5/04/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U4 | 10/30/1990 | N | **15 ug/l** | **71 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U4 | 10/17/1991 | N | < 75 ug/l | **93 ug/l** | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l |
| U4 | 9/17/1992 | N | **16 j ug/l** | **110 ug/l** | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l |
| U4 | 10/14/1992 | N | **25 j ug/l** | **120 ug/l** | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l |
| U4 | 10/27/1992 | N | **22 ug/l** | **160 ug/l** | **2 j ug/l** | **2 j ug/l** | **1 j ug/l** | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l |
| U4 | 10/18/1993 | N | **21 j ug/l** | **95 ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| U4 | 9/28/1994 | N | **43 j ug/l** | **140 ug/l** | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l |
| U4 | 10/18/1995 | N | **26 j ug/l** | **120 j ug/l** | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l |
| U4 | 10/02/1996 | N | **38 ug/l** | **120 ug/l** | **2 j ug/l** | **2 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U4 | 10/01/1997 | N | **22 ug/l** | **75 ug/l** | **2 j ug/l** | **2 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U4 | 11/18/1998 | N | **30 ug/l** | **110 ug/l** | **2 j ug/l** | **2 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | -- | < 10 ug/l | < 10 ug/l |
| U4 | 1/14/2000 | N | < 10 ug/l | **85 ug/l** | **1 j ug/l** | **2 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U4 | 9/26/2000 | N | **15 ug/l** | **94 ug/l** | < 12 ug/l | < 12 ug/l | < 12 ug/l | < 12 ug/l | < 12 ug/l | < 12 ug/l | < 12 ug/l | < 12 ug/l |
| U4 | 10/16/2001 | N | **54 ug/l** | **130 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U4 | 5/15/2002 | N | **0.023 b ug/l** | **0.094 ug/l** | < 0.011 ug/l | < 0.011 ug/l | < 0.011 ug/l | < 0.011 ug/l | < 0.011 ug/l | < 0.011 ug/l | < 0.011 ug/l | < 0.011 ug/l |
| U4N | 11/01/2002 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U4N | 12/16/2003 | N | < 9.6 ug/l | **17 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U4N | 10/29/2004 | N | **1.9 ug/l** | **17 ug/l** | **0.14 ug/l** | **0.33 ug/l** | **0.0086 ug/l** | < 0.0086 ug/l | < 0.0086 ug/l | < 0.0086 ug/l | < 0.0086 ug/l | < 0.0086 ug/l |
| U4N | 11/12/2005 | N | **2.3 ug/l** | **23 ug/l** | **0.28 ug/l** | **0.50 ug/l** | **0.058 ug/l** | **0.087 ug/l** | **0.085 ug/l** | **0.060 ug/l** | **0.061 ug/l** | **0.066 ug/l** |
| U4N | 10/18/2006 | N | **3.9 ug/l** | **49 ug/l** | **0.49 ug/l** | **0.52 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U4N | 11/13/2007 | N | **1.2 ug/l** | **29 ug/l** | **0.31 ug/l** | **0.47 ug/l** | < 0.032 ug/l | < 0.032 ug/l | < 0.032 ug/l | < 0.032 ug/l | < 0.032 ug/l | < 0.032 ug/l |
| U4N | 10/16/2008 | N | **1.4 ug/l** | **33 ug/l** | **0.31 ug/l** | **0.52 ug/l** | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l |
| U4N | 10/02/2009 | N | **2.5 ug/l** | **36 ug/l** | **0.33 ug/l** | **0.39 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| U4N | 10/12/2010 | N | **1.1 ug/l** | **31 ug/l** | **0.24 ug/l** | **0.45 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U4N | 10/16/2011 | N | **1.5 ug/l** | **31 ug/l** | **0.26 ug/l** | **0.48 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U4N | 10/18/2012 | N | < 0.017 ug/l | **24 ug/l** | **0.35 ug/l** | **0.44 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U4N | 10/11/2013 | N | **3.9 ug/l** | **43 ug/l** | **0.43 ug/l** | **0.79 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U4N | 10/21/2014 | N | **2.5 ug/l** | **28 ug/l** | **0.15 ug/l** | **0.40 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.020 ug/l** |
| U4N | 10/14/2015 | N | **2.7 ug/l** | **33 ug/l** | **0.61 ug/l** | **0.52 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 c ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U4N | 10/11/2016 | N | **2.2 ug/l** | **33 ug/l** | **0.35 ug/l** | **0.63 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U5 | 7/07/1988 | N | **220 ug/l** | **150 ug/l** | < 10 ug/l | < 10 pp ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U5 | 12/29/1988 | N | **160 ug/l** | **170 ug/l** | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l |
| U5 | 2/27/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U5 | 8/03/1989 | N | **78 ug/l** | **130 ug/l** | < 10 ug/l | < 10 pp ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U5 | 6/22/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U5 | 10/30/1990 | N | **57 ug/l** | **220 ug/l** | < 20 ug/l | **6 j ug/l** | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l |
| U5 | 12/03/1992 | N | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U5 | 10/18/1993 | N | < 10 ug/l | **91 ug/l** | **2 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U5 | 9/28/1994 | N | **13 j ug/l** | **210 ug/l** | < 40 ug/l | **5 j ug/l** | < 40 ug/l | < 40 ug/l | < 40 ug/l | < 40 ug/l | < 40 ug/l | < 40 ug/l |
| U5 | 10/18/1995 | N | < 400 ug/l | **110 j ug/l** | < 400 ug/l | < 400 ug/l | < 400 ug/l | < 400 ug/l | < 400 ug/l | < 400 ug/l | < 400 ug/l | < 400 ug/l |
| U5 | 10/01/1997 | N | **28 ug/l** | **170 ug/l** | **2 j ug/l** | **6 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U5 | 11/18/1998 | N | **15 ug/l** | **220 ug/l** | **3 j ug/l** | **6 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | -- | < 10 ug/l | < 10 ug/l |
| U5 | 11/19/1999 | N | **22 ug/l** | **270 ug/l** | **3 j ug/l** | **7 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U5 | 9/26/2000 | N | **38 ug/l** | **270 ug/l** | < 9.5 ug/l | < 9.5 ug/l | < 9.5 ug/l | < 9.5 ug/l | < 9.5 ug/l | < 9.5 ug/l | < 9.5 ug/l | < 9.5 ug/l |
| U5 | 10/16/2001 | N | **37 ug/l** | **160 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U5 | 11/01/2002 | N | < 9.6 ug/l | **87 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U5 | 12/16/2003 | N | < 10 ug/l | **210 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U5 | 10/29/2004 | N | **0.021 b ug/l** | **66 ug/l** | **3.9 ug/l** | **0.79 ug/l** | **0.079 ug/l** | **0.078 ug/l** | **0.14 ug/l** | **0.047 ug/l** | **0.059 ug/l** | **0.046 ug/l** |
| U5 | 11/12/2005 | N | < 0.034 ug/l | **18 ug/l** | **5.0 ug/l** | **1.8 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | **0.10 ug/l** |
| U5 | 10/18/2006 | N | **9.5 ug/l** | **170 ug/l** | **1.7 ug/l** | **4.0 ug/l** | **0.089 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | **0.073 ug/l** |
| U5 | 11/13/2007 | N | < 0.032 ug/l | **37 ug/l** | **6.1 ug/l** | **1.0 ug/l** | **0.12 ug/l** | **0.088 ug/l** | **0.15 ug/l** | **0.044 ug/l** | **0.059 ug/l** | **0.089 ug/l** |
| U5 | 10/16/2008 | N | **0.39 ug/l** | **160 ug/l** | **1.7 ug/l** | **2.9 ug/l** | **0.16 ug/l** | **0.043 ug/l** | **0.073 ug/l** | **0.024 ug/l** | **0.026 ug/l** | **0.071 ug/l** |
| U5 | 10/02/2009 | N | **0.27 ug/l** | **170 ug/l** | **1.6 ug/l** | **4.1 ug/l** | **0.13 ug/l** | **0.0084 ug/l** | **0.015 ug/l** | **0.0048 ug/l** | **0.0057 ug/l** | **0.031 ug/l** |
| U5 | 10/12/2010 | N | **0.53 ug/l** | **230 ug/l** | **1.9 ug/l** | **4.7 ug/l** | **0.14 ug/l** | **0.014 ug/l** | **0.022 ug/l** | **0.0054 ug/l** | **0.0075 ug/l** | **0.098 ug/l** |
| U5 | 10/16/2011 | N | **0.033 b ug/l** | **76 ug/l** | **2.2 ug/l** | **0.82 ug/l** | **0.064 ug/l** | **0.023 ug/l** | **0.043 ug/l** | < 0.017 ug/l | < 0.017 ug/l | **0.078 ug/l** |
| U5 | 10/18/2012 | N | **1.5 ug/l** | **170 ug/l** | **1.5 ug/l** | **2.7 ug/l** | **0.12 ug/l** | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | **0.038 ug/l** |
| U5 | 10/11/2013 | N | **0.96 ug/l** | **170 ug/l** | **1.8 ug/l** | **4.1 ug/l** | **0.24 ug/l** | < 0.034 ug/l | **0.046 ug/l** | < 0.034 ug/l | < 0.034 ug/l | **0.10 ug/l** |
| U5 | 10/21/2014 | N | **0.84 ug/l** | **170 ug/l** | **1.4 ug/l** | **3.0 ug/l** | **0.18 ug/l** | **0.027 ug/l** | **0.039 ug/l** | **0.014 ug/l** | **0.013 ug/l** | **0.11 ug/l** |
| U5 | 10/14/2015 | N | **0.38 ug/l** | **160 ug/l** | **1.8 ug/l** | **2.8 ug/l** | **0.14 ug/l** | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | **0.10 ug/l** |
| U5 | 10/11/2016 | N | **0.32 ug/l** | **120 ug/l** | **1.3 ug/l** | **2.2 ug/l** | **0.14 ug/l** | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | **0.052 ug/l** |
| U6 | 7/06/1988 | N | **58 ug/l** | **26 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U6 | 12/29/1988 | N | < 10 pp ug/l | **17 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U6 | 2/27/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U6 | 8/03/1989 | N | **21 ug/l** | **30 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U6 | 6/22/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U6 | 10/30/1990 | N | **43 ug/l** | **36 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U6 | 10/17/1991 | N | **22 j ug/l** | **30 j ug/l** | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l |
| U6 | 9/17/1992 | N | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l |
| U6 | 10/14/1992 | N | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l |
| U6 | 10/27/1992 | N | **47 ug/l** | **31 ug/l** | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l |
| U6 | 10/18/1993 | N | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l |
| U6 | 9/28/1994 | N | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l |
| U6 | 10/18/1995 | N | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l |
| U6 | 10/02/1996 | N | **54 j ug/l** | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U6 | 10/01/1997 | N | **88 ug/l** | **16 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U6 | 11/18/1998 | N | **37 ug/l** | **16 ug/l** | **1 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | -- | < 10 ug/l | < 10 ug/l |
| U6N | 1/14/2000 | N | **94 ug/l** | **240 ug/l** | **3 j ug/l** | **12 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U6N | 9/26/2000 | N | **42 ug/l** | **98 ug/l** | < 9.6 ug/l | **11 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U6N | 10/16/2001 | N | **27 ug/l** | **89 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U6N | 11/01/2002 | N | **34 ug/l** | **91 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U6N | 12/16/2003 | N | **33 ug/l** | **80 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U6N | 10/29/2004 | N | **0.033 ug/l** | **41 ug/l** | **0.63 ug/l** | **0.64 ug/l** | **0.018 ug/l** | < 0.0086 ug/l | < 0.0086 ug/l | < 0.0086 ug/l | < 0.0086 ug/l | < 0.0086 ug/l |
| U6N | 2/10/2005 | N | **85 ug/l** | **310 ug/l** | **0.54 ug/l** | **16 ug/l** | **0.28 ug/l** | **0.033 ug/l** | **0.062 ug/l** | **0.0087 ug/l** | **0.018 ug/l** | **0.082 ug/l** |
| U6N | 11/12/2005 | N | **22 ug/l** | **49 ug/l** | **0.74 ug/l** | **3.6 ug/l** | **0.29 ug/l** | **0.039 ug/l** | **0.040 ug/l** | < 0.034 ug/l | **0.059 ug/l** | **0.18 ug/l** |
| U6N | 10/18/2006 | N | **18 ug/l** | **56 ug/l** | **0.58 ug/l** | **2.6 ug/l** | **0.45 ug/l** | **0.13 ug/l** | **0.17 ug/l** | **0.049 ug/l** | **0.14 ug/l** | **0.27 ug/l** |
| U6N | 11/13/2007 | N | **1.6 ug/l** | **48 ug/l** | **0.60 ug/l** | **2.3 ug/l** | **0.64 ug/l** | **0.36 ug/l** | **0.59 ug/l** | **0.14 ug/l** | **0.20 ug/l** | **0.40 ug/l** |
| U6N | 10/16/2008 | N | **16 ug/l** | **65 ug/l** | **0.62 ug/l** | **2.4 ug/l** | **0.39 ug/l** | **0.053 ug/l** | **0.097 ug/l** | < 0.034 ug/l | < 0.034 ug/l | **0.097 ug/l** |
| U6N | 10/02/2009 | N | **4.1 ug/l** | **47 ug/l** | **0.57 ug/l** | **2.1 ug/l** | **0.43 ug/l** | **0.059 ug/l** | **0.13 ug/l** | < 0.033 ug/l | **0.033 ug/l** | **0.089 ug/l** |
| U6N | 10/12/2010 | N | **13 ug/l** | **53 ug/l** | **0.97 ug/l** | **3.7 ug/l** | **5.8 ug/l** | **4.5 ug/l** | **5.6 ug/l** | **1.5 ug/l** | **2.7 ug/l** | **3.1 ug/l** |
| U6N | 10/16/2011 | N | **7.8 ug/l** | **34 ug/l** | **0.64 ug/l** | **3.6 ug/l** | **11 ug/l** | **7.6 ug/l** | **13 ug/l** | **3.5 ug/l** | **4.6 ug/l** | **5.8 ug/l** |
| U6N | 10/18/2012 | N | **0.025 ug/l** | **40 ug/l** | **0.47 ug/l** | **1.2 ug/l** | **0.74 ug/l** | **0.32 ug/l** | **0.45 ug/l** | **0.11 ug/l** | **0.17 ug/l** | **0.25 ug/l** |
| U6N | 10/11/2013 | N | **0.48 ug/l** | **44 ug/l** | **0.58 ug/l** | **2.0 ug/l** | **0.57 ug/l** | **0.076 ug/l** | **0.15 ug/l** | < 0.033 ug/l | **0.047 ug/l** | **0.13 ug/l** |
| U6N | 10/21/2014 | N | < 0.065 ug/l | **28 ug/l** | **0.47 ug/l** | **1.3 ug/l** | **2.8 ug/l** | **1.9 ug/l** | **2.9 ug/l** | **0.80 ug/l** | **1.0 ug/l** | **1.5 ug/l** |
| U6N | 10/14/2015 | N | **5.1 ug/l** | **29 ug/l** | **0.54 ug/l** | **1.7 ug/l** | **3.6 ug/l** | **2.6 ug/l** | **4.2 c ug/l** | **1.1 ug/l** | **1.5 ug/l** | **2.8 ug/l** |
| U6N | 10/11/2016 | N | **8.2 ug/l** | **28 ug/l** | **0.44 ug/l** | **1.4 ug/l** | **0.47 ug/l** | **0.13 ug/l** | **0.25 c ug/l** | **0.057 ug/l** | **0.083 ug/l** | **0.14 ug/l** |
| U7 | 7/06/1988 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U7 | 12/29/1988 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U7 | 2/27/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U7 | 8/03/1989 | N | < 10 ug/l | **69 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U7 | 5/04/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U7 | 10/30/1990 | N | < 10 ug/l | **81 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U7 | 10/17/1991 | N | < 10 ug/l | **57 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U7 | 12/03/1992 | N | < 20 ug/l | **12 j* ug/l** | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l |
| U7 | 10/18/1993 | N | < 20 ug/l | **12 j ug/l** | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l |
| U7 | 9/28/1994 | N | < 15 ug/l<br>< 10 ug/l | **21 ug/l**<br>**24 ug/l** | < 15 ug/l<br>< 10 ug/l | < 15 ug/l<br>< 10 ug/l | < 15 ug/l<br>< 10 ug/l | < 15 ug/l<br>< 10 ug/l | < 15 ug/l<br>< 10 ug/l | < 15 ug/l<br>< 10 ug/l | < 15 ug/l<br>< 10 ug/l | < 15 ug/l<br>< 10 ug/l |
| U7 | 10/18/1995 | N | < 70 ug/l | **22 j ug/l** | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l |
| U7 | 10/02/1996 | N | < 50 ug/l | **13 j* ug/l** | < 50 * ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| U7 | 10/01/1997 | N | < 10 ug/l | **25 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U7 | 11/18/1998 | N | < 120 ug/l | **18 j ug/l** | < 120 ug/l | < 120 ug/l | < 120 ug/l | < 120 ug/l | < 120 ug/l | -- | < 120 ug/l | < 120 ug/l |
| U7N | 1/14/2000 | N | **7 j ug/l** | **38 ug/l** | **0.7 j ug/l** | **2 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U7N | 9/26/2000 | N | **17 ug/l** | **110 ug/l** | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l |
| U7N | 10/16/2001 | N | **14 ug/l** | **110 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U7N | 11/01/2002 | N | < 9.7 ug/l | **110 ug/l** | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l |
| U7N | 12/16/2003 | N | < 9.9 ug/l | **88 ug/l** | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l |
| U7N | 10/29/2004 | N | **4.1 ug/l** | **80 ug/l** | **0.59 ug/l** | **1.4 ug/l** | **0.037 ug/l** | < 0.0086 ug/l | < 0.0086 ug/l | < 0.0086 ug/l | < 0.0086 ug/l | **0.013 ug/l** |
| U7N | 11/12/2005 | N | **6.3 ug/l** | **85 ug/l** | **0.90 ug/l** | **1.9 ug/l** | **0.070 ug/l** | **0.030 ug/l** | **0.030 ug/l** | < 0.017 ug/l | **0.026 ug/l** | **0.054 ug/l** |
| U7N | 10/18/2006 | N | **5.4 ug/l** | **91 ug/l** | **0.58 ug/l** | **1.5 ug/l** | **0.053 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | **0.032 ug/l** |
| U7N | 11/13/2007 | N | **3.1 ug/l** | **79 ug/l** | **0.50 ug/l** | **0.98 ug/l** | **0.049 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U7N | 10/16/2008 | N | **3.8 ug/l** | **75 ug/l** | **0.46 ug/l** | **1.2 ug/l** | **0.065 ug/l** | < 0.0067 ug/l | < 0.0067 ug/l | < 0.0067 ug/l | < 0.0067 ug/l | **0.016 ug/l** |
| U7N | 10/02/2009 | N | **3.5 ug/l** | **100 ug/l** | **0.48 ug/l** | **1.1 ug/l** | **0.071 ug/l** | < 0.0033 ug/l | **0.0034 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.014 ug/l** |
| U7N | 10/12/2010 | N | **4.4 ug/l** | **87 ug/l** | **0.56 ug/l** | **1.1 ug/l** | **0.086 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | **0.019 ug/l** |
| U7N | 10/16/2011 | N | **3.1 ug/l** | **62 ug/l** | **0.54 ug/l** | **1.9 ug/l** | **0.11 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | **0.033 ug/l** |
| U7N | 10/18/2012 | N | **2.0 ug/l** | **74 ug/l** | **0.38 ug/l** | **0.83 ug/l** | **0.061 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.010 ug/l** |
| U7N | 10/11/2013 | N | **2.6 ug/l** | **95 ug/l** | **0.68 ug/l** | **1.7 ug/l** | **0.11 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U7N | 10/21/2014 | N | **3.0 ug/l** | **75 ug/l** | **0.43 ug/l** | **0.75 ug/l** | **0.090 ug/l** | < 0.0033 ug/l | **0.0045 c ug/l** | < 0.0033 ug/l | < 0.0033 c ug/l | **0.030 ug/l** |
| U7N | 10/14/2015 | N | **3.0 ug/l** | **96 ug/l** | **1.0 ug/l** | **1.5 ug/l** | **0.10 ug/l** | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U7N | 10/11/2016 | N | **1.9 ug/l** | **69 ug/l** | **0.60 ug/l** | **1.0 ug/l** | **0.075 ug/l** | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U8 | 12/29/1988 | N | < 10 ug/l | **140 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U8 | 2/27/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| U8 | 8/03/1989 | N | **65 ug/l** | **150 ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| U8 | 12/03/1992 | N | **110 * ug/l** | **280 * ug/l** | < 40 ug/l | **62 * ug/l** | **91 * ug/l** | **33 j* ug/l** | **45 * ug/l** | < 40 ug/l | **32 j* ug/l** | **54 c* ug/l** |
| U8 | 10/18/1993 | N | **33 j ug/l** | **69 ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| U8 | 9/28/1994 | N | **380 ug/l** | **740 ug/l** | < 150 ug/l | **140 j ug/l** | **200 ug/l** | **89 j ug/l** | **110 j ug/l** | **29 j ug/l** | **82 j ug/l** | **180 c ug/l** |
| U8 | 10/20/1995 | N | **130 j ug/l** | **280 ug/l** | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l |
| U8 | 10/02/1996 | N | **140 j ug/l** | **210 ug/l** | < 150 ug/l | **17 j ug/l** | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l |
| U8 | 10/01/1997 | N | **730 ug/l** | **710 ug/l** | **16 ug/l** | **100 j ug/l** | **110 ug/l** | **55 ug/l** | **61 ug/l** | **21 ug/l** | **49 ug/l** | **87 c ug/l** |
| U8 | 2/02/2000 | N | **710 ug/l** | **860 ug/l** | **14 ug/l** | **170 ug/l** | **160 ug/l** | **74 ug/l** | **120 ug/l** | **27 ug/l** | **39 ug/l** | **110 ug/l** |
| U8 | 9/26/2000 | N | **690 ug/l** | **930 ug/l** | **17 ug/l** | **210 ug/l** | **250 ug/l** | **83 ug/l** | **100 ug/l** | **25 ug/l** | **72 ug/l** | **200 ug/l** |
| U8 | 10/16/2001 | N | **140 ug/l** | **360 ug/l** | < 9.6 ug/l | **19 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U8 | 12/22/2003 | N | **160 ug/l** | **250 ug/l** | **5.7 ug/l** | **27 ug/l** | **36 ug/l** | **18 ug/l** | **24 ug/l** | **5.1 ug/l** | **16 ug/l** | **20 ug/l** |
| U11 | 10/18/2001 | N | < 10 ug/l | **130 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U11 | 11/01/2002 | N | **22 ug/l** | **120 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U11 | 11/01/2002 | FD | **23 ug/l** | **120 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U11 | 12/16/2003 | N | **63 ug/l** | **150 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U11 | 10/29/2004 | N | **0.0035 b ug/l** | **0.023 ug/l** | **0.0079 ug/l** | **0.043 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| U11 | 2/10/2005 | N | **66 ug/l** | **530 ug/l** | **1.5 ug/l** | **1.3 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| U11 | 11/12/2005 | N | **14 ug/l** | **120 ug/l** | **2.2 ug/l** | **2.1 ug/l** | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| U11 | 10/18/2006 | N | **6.9 ug/l** | **75 ug/l** | **1.3 ug/l** | **1.2 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l |
| U11 | 11/13/2007 | N | **6.7 ug/l** | **90 ug/l** | **1.3 ug/l** | **1.2 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U11 | 11/13/2007 | FD | **6.4 ug/l** | **87 ug/l** | **1.3 ug/l** | **1.3 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l |
| U11 | 10/16/2008 | N | **5.2 ug/l** | **88 ug/l** | **1.7 ug/l** | **1.5 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U11 | 10/16/2008 | FD | **4.1 ug/l** | **78 ug/l** | **1.4 ug/l** | **1.4 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U11 | 10/02/2009 | N | **11 ug/l** | **94 ug/l** | **1.8 ug/l** | **1.6 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U11 | 10/12/2010 | N | **18 ug/l** | **87 ug/l** | **2.3 ug/l** | **2.1 ug/l** | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l |
| U11 | 10/12/2010 | FD | **18 ug/l** | **100 ug/l** | **2.3 ug/l** | **2.0 ug/l** | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l | < 0.17 ug/l |
| U11 | 10/16/2011 | N | **6.8 ug/l** | **86 ug/l** | **1.5 ug/l** | **1.6 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U11 | 10/18/2012 | N | **0.030 * ug/l** | **17 * ug/l** | **0.62 * ug/l** | **0.65 * ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U11 | 10/11/2013 | N | **11 ug/l** | **95 ug/l** | **1.7 ug/l** | **1.7 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l |
| U11 | 10/21/2014 | N | **7.2 ug/l** | **76 ug/l** | **1.9 ug/l** | **1.4 ug/l** | < 0.065 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.065 ug/l |
| U11 | 10/14/2015 | N | **11 ug/l** | **110 ug/l** | **2.6 ug/l** | **1.6 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U11 | 10/11/2016 | N | **5.6 ug/l** | **79 ug/l** | **1.6 ug/l** | **1.4 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U11 | 10/11/2016 | FD | **4.7 ug/l** | **76 ug/l** | **1.5 ug/l** | **1.2 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| U12 | 10/16/2001 | N | < 9.7 ug/l | **61 ug/l** | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l | < 9.7 ug/l |
| U12 | 11/01/2002 | N | < 9.6 ug/l | **54 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| U12 | 12/16/2003 | N | < 10 ug/l | **68 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U12 | 10/29/2004 | N | **18 ug/l** | **63 ug/l** | **0.79 ug/l** | **3.5 ug/l** | **0.23 ug/l** | **0.019 ug/l** | **0.036 ug/l** | < 0.017 ug/l | < 0.017 ug/l | **0.071 ug/l** |
| U12 | 11/12/2005 | N | < 0.068 ug/l | **76 ug/l** | **1.2 ug/l** | **1.2 ug/l** | < 0.068 ug/l | < 0.068 ug/l | < 0.068 ug/l | < 0.068 ug/l | < 0.068 ug/l | < 0.068 ug/l |
| U12 | 10/21/2006 | N | **0.030 ug/l** | **54 ug/l** | **0.75 ug/l** | **0.64 ug/l** | **0.020 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.014 ug/l** |
| U12 | 11/13/2007 | N | < 0.017 ug/l | **50 ug/l** | **0.79 ug/l** | **0.55 ug/l** | **0.018 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U12 | 10/16/2008 | N | < 0.036 ug/l | **65 ug/l** | **1.1 ug/l** | **0.70 ug/l** | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l |
| U12 | 10/02/2009 | N | **0.013 ug/l** | **43 ug/l** | **0.59 ug/l** | **0.57 ug/l** | **0.23 ug/l** | **0.074 ug/l** | **0.11 ug/l** | **0.032 ug/l** | **0.089 ug/l** | **0.33 ug/l** |
| U12 | 10/12/2010 | N | **0.018 ug/l** | **62 ug/l** | **0.65 ug/l** | **0.62 ug/l** | **0.019 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0064 ug/l** |
| U12 | 10/16/2011 | N | < 0.018 ug/l | **34 ug/l** | **0.70 ug/l** | **0.57 ug/l** | **0.019 ug/l** | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l |
| U12 | 10/18/2012 | N | **0.0095 ug/l** | **43 ug/l** | **0.42 ug/l** | **0.47 ug/l** | **0.018 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.011 ug/l** |
| U12 | 10/11/2013 | N | **0.012 ug/l** | **53 ug/l** | **0.59 ug/l** | **0.64 ug/l** | **0.024 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | **0.014 * ug/l** |
| U12 | 10/21/2014 | N | **0.012 ug/l** | **48 ug/l** | **0.62 ug/l** | **0.57 ug/l** | **0.020 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.017 ug/l |
| U12 | 10/14/2015 | N | < 0.017 ug/l | **48 ug/l** | **0.83 ug/l** | **0.60 ug/l** | **0.023 ug/l** | < 0.017 ug/l | < 0.017 c ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| U12 | 10/11/2016 | N | < 0.033 ug/l | **56 ug/l** | **0.86 ug/l** | **0.67 ug/l** | < 0.033 ug/l | < 0.033 ug/l | < 0.033 c ug/l | < 0.033 ug/l | < 0.033 ug/l | < 0.033 ug/l |
| W6 | 12/27/1984 | N | **4.2 ug/l** | **0.95 ug/l** | **1.7 ug/l** | < 0.20 ug/l | < 0.20 ug/l | < 0.20 ug/l | < 0.20 ug/l | < 0.20 ug/l | < 0.20 ug/l | < 0.20 ug/l |
| W6 | 3/27/1985 | N | **19 ug/l** | **1.1 ug/l** | < 0.5 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l |
| W6 | 5/16/1985 | N | **0.58 ug/l** | **0.11 ug/l** | < 0.010 ug/l | **0.034 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | **0.030 c ug/l** |
| W6 | 6/04/1986 | N | **0.013 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W6 | 7/29/1987 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| W6 | 10/06/1988 | N | **6.6 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W6 | 12/12/1988 | N | **15 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W6 | 6/22/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W6 | 10/30/1990 | N | **4 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W6 | 10/17/1991 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W6 | 10/13/1992 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W6 | 10/19/1993 | N | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | < 0.0120 ug/l |
| W6 | 9/30/1994 | N | **0.007 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.010 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | **0.005 ug/l** | **0.009 c ug/l** |
| W6 | 10/20/1995 | N | **0.012 ug/l** | **0.012 ug/l** | < 0.003 ug/l | **0.038 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.006 c ug/l** |
| W6 | 10/03/1996 | N | **0.003 b ug/l** | **0.004 ug/l** | < 0.003 ug/l | **0.012 ug/l** | **0.012 ug/l** | **0.015 ug/l** | **0.016 ug/l** | **0.010 ug/l** | **0.011 ug/l** | **0.028 c ug/l** |
| W6 | 10/06/1997 | N | **0.019 ug/l** | **0.19 e ug/l** | **0.010 ug/l** | **0.011 ug/l** | **0.006 ug/l** | **0.004 ug/l** | **0.012 ug/l** | **0.004 ug/l** | **0.008 ug/l** | **0.017 c ug/l** |
| W6 | 11/21/1998 | N | < 0.003 ug/l | **0.003 ug/l** | < 0.003 ug/l | **0.13 e ug/l** | **0.026 ug/l** | **0.032 ug/l** | **0.037 ug/l** | -- | **0.034 ug/l** | **0.085 c ug/l** |
| W6N | 11/17/1999 | N | **0.016 b ug/l** | **0.008 ug/l** | **0.008 ug/l** | **0.061 ug/l** | **0.050 b ug/l** | **0.066 ug/l** | **0.086 b ug/l** | **0.057 ug/l** | **0.084 b ug/l** | **0.090 b ug/l** |
| W6N | 9/28/2000 | N | **0.007 b ug/l** | **0.004 ug/l** | < 0.003 ug/l | **0.032 ug/l** | **0.003 b ug/l** | **0.003 ug/l** | **0.006 ug/l** | **0.003 ug/l** | **0.004 ug/l** | **0.007 b ug/l** |
| W6N | 10/16/2001 | N | **0.0034 ug/l** | **0.0087 ug/l** | < 0.0033 ug/l | **0.035 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W6N | 10/29/2002 | N | **0.0036 b ug/l** | **0.0043 ug/l** | **0.0039 ug/l** | **0.011 ug/l** | **0.0038 ug/l** | **0.0035 ug/l** | **0.0038 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0034 ug/l** |
| W6N | 12/17/2003 | N | **0.029 b ug/l** | **0.40 ug/l** | **0.026 ug/l** | **0.094 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0046 ug/l** |
| W6N | 12/17/2003 | FD | **0.027 b ug/l** | **0.46 ug/l** | **0.032 ug/l** | **0.11 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0064 ug/l** |
| W6N | 10/19/2004 | N | **0.0041 ug/l** | < 0.014 ug/l | **0.0036 ug/l** | **0.075 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0035 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/21/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0069 ug/l** | **0.074 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 11/08/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0043 ug/l** | **0.039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/18/2006 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.071 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/18/2006 | FD | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.067 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W6N | 11/07/2007 | N | < 0.0034 ug/l | **0.0038 ug/l** | **0.0037 ug/l** | < 0.069 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/09/2008 | N | **0.0045 ug/l** | < 0.0036 ug/l | **0.0056 ug/l** | < 0.071 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0041 ug/l |
| W6N | 9/29/2009 | N | **0.010 b ug/l** | **0.021 ug/l** | **0.013 ug/l** | **0.14 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W6N | 6/04/2010 | N | **0.0061 b ug/l** | **0.0044 ug/l** | **0.0060 ug/l** | **0.083 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 6/04/2010 | FD | **0.0054 b ug/l** | < 0.0034 ug/l | **0.0070 ug/l** | **0.080 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/05/2010 | N | **0.0068 ug/l** | **0.0077 ug/l** | **0.0091 ug/l** | < 0.12 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W6N | 6/06/2011 | N | **0.0098 ug/l** | **0.0088 ug/l** | **0.0096 ug/l** | < 0.17 ug/l | < 0.0047 ug/l | < 0.0034 ug/l | **0.0037 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/14/2011 | N | < 0.0033 ug/l | **0.051 ug/l** | < 0.0033 ug/l | **0.047 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W6N | 6/09/2012 | N | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l | **0.12 * ug/l** | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l | < 0.036 ug/l |
| W6N | 8/07/2012 | N | **0.0038 b ug/l** | **0.0057 ug/l** | **0.0055 ug/l** | **0.064 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 8/24/2012 | N | **0.0068 ug/l** | **0.011 ug/l** | **0.0079 ug/l** | < 0.11 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/18/2012 | N | **0.0050 ug/l** | **0.031 ug/l** | **0.0075 ug/l** | < 0.11 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 5/30/2013 | N | **0.020 * ug/l** | **0.025 ug/l** | **0.017 * ug/l** | < 0.26 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/10/2013 | N | **0.0042 ug/l** | **0.0070 ug/l** | **0.0075 ug/l** | **0.13 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 6/30/2014 | N | **0.011 ug/l** | **0.0056 * ug/l** | **0.013 ug/l** | **0.17 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 BQX ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W6N | 10/16/2014 | N | **0.0046 ug/l** | **0.0045 * ug/l** | **0.0083 ug/l** | **0.096 ug/l** | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 ug/l |
| W6N | 7/15/2015 | N | **0.014 * ug/l** | **0.0053 * ug/l** | **0.014 ug/l** | **0.14 ug/l** | **0.023 ug/l** | **0.011 ug/l** | **0.017 ug/l** | **0.0038 ug/l** | **0.0091 ug/l** | **0.028 ug/l** |
| W6N | 10/07/2015 | N | **0.0075 b ug/l** | **0.011 ug/l** | **0.022 ug/l** | **0.16 * ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/07/2015 | FD | **0.0068 b* ug/l** | **0.013 ug/l** | **0.014 ug/l** | **0.11 * ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 6/30/2016 | N | < 0.017 h ug/l | < 0.017 h ug/l | < 0.017 h ug/l | **0.16 h ug/l** | < 0.017 h ug/l | < 0.017 h ug/l | < 0.017 ch ug/l | < 0.017 h ug/l | < 0.017 h ug/l | < 0.017 h ug/l |
| W6N | 10/14/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.0065 ug/l** | **0.14 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W7 | 12/25/1984 | N | **0.055 ug/l** | < 0.013 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 c ug/l |
| W7 | 12/27/1984 | N | **0.060 ug/l** | < 0.013 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W7 | 3/27/1985 | N | **22 ug/l** | **0.17 ug/l** | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| W7 | 5/16/1985 | N | **3.2 ug/l** | **0.058 ug/l** | < 0.010 ug/l | **0.027 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W7 | 6/03/1986 | N | **0.80 ug/l** | **0.066 ug/l** | < 0.0020 ug/l | **0.022 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | **0.0091 c ug/l** |
| W7 | 8/06/1987 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| W7 | 10/06/1988 | N | **9.7 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W7 | 10/17/2012 | N | < 0.034 h ug/l | **0.11 h ug/l** | < 0.034 h ug/l | **0.29 h ug/l** | **0.035 h ug/l** | < 0.034 h ug/l | < 0.034 h ug/l | < 0.034 h ug/l | < 0.034 h ug/l | < 0.034 h ug/l |
| W7 | 5/30/2013 | N | **0.032 ug/l** | **0.20 ug/l** | < 0.030 ug/l | < 0.50 ug/l | **0.0052 * ug/l** | < 0.0034 ug/l | **0.013 * ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0079 * ug/l** |
| W7 | 10/10/2013 | N | < 0.034 ug/l | **0.28 ug/l** | **0.043 * ug/l** | **0.50 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l |
| W7 | 6/30/2014 | N | **0.027 ug/l** | **0.065 * ug/l** | **0.027 * ug/l** | **0.28 * ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 BQX ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| W7 | 10/17/2014 | N | **0.038 ug/l** | **0.12 ug/l** | **0.032 ug/l** | **0.47 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| W7 | 10/17/2014 | FD | **0.028 ug/l** | **0.078 ug/l** | **0.025 ug/l** | **0.39 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| W7 | 7/15/2015 | N | **0.021 * ug/l** | **0.12 ug/l** | **0.035 * ug/l** | **0.43 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| W7 | 10/07/2015 | N | **0.036 * ug/l** | **0.11 ug/l** | **0.052 * ug/l** | **0.24 ug/l** | **0.0044 ug/l** | < 0.0033 ug/l | **0.0048 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.012 ug/l** |
| W7 | 6/30/2016 | N | **0.019 h ug/l** | **0.062 h ug/l** | **0.025 h ug/l** | **0.55 h ug/l** | < 0.017 h ug/l | < 0.017 h ug/l | < 0.017 ch ug/l | < 0.017 h ug/l | < 0.017 h ug/l | < 0.017 h ug/l |
| W7 | 10/19/2016 | N | < 0.067 ug/l | **0.13 * ug/l** | < 0.067 ug/l | **0.48 ug/l** | < 0.067 ug/l | < 0.067 ug/l | < 0.067 c ug/l | < 0.067 ug/l | < 0.067 ug/l | < 0.067 ug/l |
| W10 | 12/11/1984 | N | < 0.080 ug/l | **2.8 ug/l** | < 0.040 ug/l | **0.055 ug/l** | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l |
| W10 | 3/28/1985 | N | < 0.10 ug/l | **5.9 ug/l** | < 0.050 ug/l | **0.13 ug/l** | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| W10 | 5/16/1985 | N | **0.040 ug/l** | **7.1 ug/l** | **0.077 ug/l** | **0.10 ug/l** | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l |
| W10 | 12/13/1985 | N | **5.5 ug/l**<br>**2.9 ug/l** | **3.6 ug/l**<br>**3.3 ug/l** | < 0.5 ug/l<br>< 0.5 ug/l | < 0.5 ug/l<br>< 0.5 ug/l | < 0.5 ug/l<br>< 0.5 ug/l | < 0.5 ug/l<br>< 0.5 ug/l | < 0.5 ug/l<br>< 0.5 ug/l | < 0.5 ug/l<br>< 0.5 ug/l | < 0.5 ug/l<br>< 0.5 ug/l | < 0.5 ug/l<br>< 0.5 ug/l |
| W10 | 3/20/1986 | N | **0.017 ug/l** | **1.4 ug/l** | < 0.0020 ug/l | **0.032 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W10 | 6/03/1986 | N | **0.046 ug/l** | **4.5 ug/l** | < 0.0080 ug/l | **0.290 ug/l** | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l |
| W10 | 9/25/1986 | N | < 1.0 ug/l | **3.7 ug/l** | < 0.5 ug/l | **0.3 ug/l** | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W10 | 12/11/1986 | N | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l |
| W10 | 3/19/1987 | N | < 0.6 ug/l | **5.0 ug/l** | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l |
| W10 | 5/06/1987 | N | < 0.5 ug/l | **1.4 ug/l** | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W10 | 7/30/1987 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| W10 | 11/05/1987 | N | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l |
| W10 | 2/29/1988 | N | < 6.0 ug/l<br>< 6.0 ug/l | **3.4 ug/l**<br>**4.5 pp ug/l** | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W10 | 10/06/1988 | N | < 6.0 ug/l | **6.9 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W10 | 12/12/1988 | N | < 10 ug/l<br>< 10 ug/l | **23 ug/l**<br>**18 ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| W10 | 2/28/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W10 | 8/04/1989 | N | < 10 ug/l | **22 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W10 | 5/02/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W10 | 10/30/1990 | N | < 10 ug/l | **42 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W10 | 10/17/1991 | N | < 10 ug/l | **20 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W10 | 10/13/1992 | N | < 10 ug/l | **51 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W10 | 10/19/1993 | N | < 10 ug/l<br>< 10 ug/l | **26 ug/l**<br>**8 j ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| W10 | 9/30/1994 | N | < 10 ug/l | **38 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W10 | 10/20/1995 | N | < 1.2 ug/l | **14 ug/l** | < 1.2 ug/l | < 1.2 ug/l | < 1.2 ug/l | < 1.2 ug/l | < 1.2 ug/l | < 1.2 ug/l | < 1.2 ug/l | < 1.2 ug/l |
| W10 | 10/03/1996 | N | < 1.8 ug/l<br>< 1.8 ug/l | **34 ug/l**<br>**31 ug/l** | < 1.8 ug/l<br>< 1.8 ug/l | < 1.8 ug/l<br>< 1.8 ug/l | < 1.8 ug/l<br>< 1.8 ug/l | < 1.8 ug/l<br>< 1.8 ug/l | < 1.8 ug/l<br>< 1.8 ug/l | < 1.8 ug/l<br>< 1.8 ug/l | < 1.8 ug/l<br>< 1.8 ug/l | < 1.8 ug/l<br>< 1.8 ug/l |
| W10 | 10/06/1997 | N | **0.18 e ug/l** | **28 ug/l** | **0.47 e ug/l** | **0.14 e ug/l** | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.006 c ug/l** |
| W10 | 11/21/1998 | N | < 0.003 ug/l | **31 ug/l** | < 0.003 ug/l | **0.21 e ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W10 | 11/18/1999 | N | **0.016 jb ug/l** | **18 ug/l** | **0.070 ug/l** | **0.23 b ug/l** | **0.008 ug/l** | **0.006 ug/l** | **0.015 ug/l** | **0.006 ug/l** | **0.010 ug/l** | **0.023 ug/l** |
| W10 | 9/28/2000 | N | **0.024 b ug/l** | **22 ug/l** | **0.086 ug/l** | **0.24 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.009 b ug/l** |
| W10 | 10/18/2001 | N | **0.3 ug/l** | **19 ug/l** | **0.15 ug/l** | **1.2 ug/l** | **0.11 ug/l** | **0.034 ug/l** | **0.067 ug/l** | **0.012 ug/l** | **0.023 ug/l** | **0.13 ug/l** |
| W10 | 10/29/2002 | N | **0.051 b ug/l** | **2.7 ug/l** | **0.027 ug/l** | **0.25 ug/l** | **0.074 ug/l** | **0.034 ug/l** | **0.043 ug/l** | **0.017 ug/l** | **0.030 ug/l** | **0.074 ug/l** |
| W10 | 12/21/2003 | N | **0.11 ug/l** | **11 ug/l** | **0.12 ug/l** | **0.56 ug/l** | **0.059 ug/l** | **0.0073 ug/l** | **0.010 ug/l** | < 0.0034 ug/l | **0.0081 ug/l** | **0.069 ug/l** |
| W10 | 10/21/2004 | N | **0.13 ug/l** | **15 ug/l** | **0.16 ug/l** | **0.57 ug/l** | **0.02 ug/l** | **0.0068 ug/l** | **0.02 ug/l** | **0.0046 ug/l** | < 0.0034 ug/l | **0.025 ug/l** |
| W10 | 11/09/2005 | N | **0.55 ug/l** | **11 ug/l** | **0.18 ug/l** | **0.82 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | **0.023 ug/l** |
| W10 | 10/20/2006 | N | **0.43 ug/l** | **12 ug/l** | **0.22 ug/l** | **0.64 ug/l** | **0.017 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.021 ug/l** |
| W10 | 11/07/2007 | N | **0.18 ug/l** | **12 ug/l** | **0.24 ug/l** | **0.56 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l |
| W10 | 10/14/2008 | N | **0.30 ug/l** | **12 ug/l** | **0.17 ug/l** | **0.62 ug/l** | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l |
| W10 | 9/29/2009 | N | **0.067 ug/l** | **5.7 ug/l** | **0.093 ug/l** | **0.61 ug/l** | **0.014 ug/l** | **0.0075 ug/l** | **0.013 ug/l** | **0.0039 ug/l** | **0.0050 ug/l** | **0.015 ug/l** |
| W10 | 10/06/2010 | N | **0.49 ug/l** | **31 ug/l** | **0.67 ug/l** | **0.53 ug/l** | **0.0098 ug/l** | **0.0037 ug/l** | **0.012 * ug/l** | < 0.0033 ug/l | < 0.0033 * ug/l | **0.0088 ug/l** |
| W10 | 10/14/2011 | N | **0.12 ug/l** | **28 ug/l** | **0.76 ug/l** | **0.58 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| W10 | 10/18/2012 | N | **0.28 ug/l** | **50 ug/l** | **0.70 ug/l** | **0.81 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l |
| W10 | 10/10/2013 | N | **0.82 ug/l** | **40 ug/l** | **0.66 ug/l** | **1.1 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l |
| W10 | 10/17/2014 | N | **0.26 ug/l** | **30 ug/l** | **0.44 ug/l** | **0.70 ug/l** | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l |
| W10 | 10/07/2015 | N | **0.15 ug/l** | **36 ug/l** | **0.58 ug/l** | **0.56 ug/l** | **0.058 ug/l** | **0.011 ug/l** | **0.020 ug/l** | **0.0037 ug/l** | **0.016 ug/l** | **0.096 ug/l** |
| W10 | 10/19/2016 | N | **0.13 ug/l** | **35 ug/l** | **0.73 ug/l** | **0.93 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 c ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l |
| W104 | 1/24/1985 | N | **0.61 ug/l** | **0.036 ug/l** | < 0.010 ug/l | **0.011 ug/l** | **0.017 ug/l** | **0.014 ug/l** | **0.069 c ug/l** | < 0.010 ug/l | ND c ug/l | **0.029 c ug/l** |
| W104 | 5/16/1985 | N | **0.030 ug/l** | < 0.0065 ug/l | < 0.0050 ug/l | **0.0088 ug/l** | **0.0058 ug/l** | < 0.0050 ug/l | **0.019 c ug/l** | < 0.0050 ug/l | ND c ug/l | **0.012 c ug/l** |
| W104 | 6/04/1986 | N | **0.028 ug/l** | **0.0089 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W104 | 7/29/1987 | N | **0.0023 ug/l** | **0.0036 ug/l** | < 0.001 ug/l | **0.023 ug/l** | **0.018 ug/l** | **0.010 ug/l** | **0.032 c ug/l** | **0.0053 ug/l** | **0.032 c ug/l** | **0.018 c ug/l** |
| W104 | 10/05/1988 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | **0.0057 ug/l** | **0.0024 ug/l** | **0.0018 ug/l** | **0.0052 c ug/l** | < 0.0010 ug/l | ND c ug/l | **0.0042 c ug/l** |
| W104 | 12/09/1988 | N | **0.0049 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W104 | 8/04/1989 | N | **0.0052 ug/l** | **0.0052 ug/l** | < 0.0010 ug/l | **0.013 ug/l** | **0.011 ug/l** | **0.0073 ug/l** | **0.014 c ug/l** | < 0.0010 ug/l | **0.014 c ug/l** | **0.015 c ug/l** |
| W104 | 5/02/1990 | N | < 0.0040 ug/l | < 0.0026 ug/l | < 0.0020 ug/l | **0.019 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | **0.0052 c ug/l** |
| W104 | 10/31/1990 | N | **0.0047 b ug/l** | **0.0023 b ug/l** | < 0.0010 ug/l | **0.0098 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | **0.0034 c ug/l** | **0.0013 ug/l** | **0.0034 c ug/l** | **0.0033 c ug/l** |
| W104 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | **0.011 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | **0.0074 c ug/l** | < 0.0030 ug/l | **0.0074 c ug/l** | < 0.0060 ug/l |
| W104 | 10/14/1992 | N | **0.0065 b ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | **0.010 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | **0.0035 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l |
| W104 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | **0.00976 ug/l** | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l |
| W104 | 9/30/1994 | N | **0.011 b ug/l** | **0.006 ug/l** | < 0.006 ug/l | **0.016 ug/l** | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W104 | 10/20/1995 | N | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | **0.018 ug/l** | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l |
| W104 | 10/03/1996 | N | **0.008 b ug/l** | **0.005 ug/l** | < 0.003 ug/l | **0.022 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W104 | 10/06/1997 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.012 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W104 | 11/21/1998 | N | **0.005 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W104 | 11/17/1999 | N | **0.007 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.17 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.005 b ug/l** |
| W104 | 9/27/2000 | N | **0.007 b ug/l** | **0.003 ug/l** | < 0.003 ug/l | **0.36 ug/l** | **0.011 ug/l** | **0.006 ug/l** | **0.011 b ug/l** | **0.006 b ug/l** | **0.007 ug/l** | **0.017 b ug/l** |
| W104 | 10/17/2001 | N | **0.01 b ug/l** | < 0.0034 ug/l | **0.0044 ug/l** | **0.67 ug/l** | **0.0059 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W104 | 10/29/2002 | N | **0.0053 b ug/l** | < 0.0034 ug/l | **0.0057 ug/l** | < 0.0034 ug/l | **0.0060 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0059 ug/l** |
| W104 | 12/18/2003 | N | **0.017 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.34 ug/l** | **0.0037 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0037 ug/l** |
| W104 | 10/20/2004 | N | **0.0051 b ug/l** | < 0.0034 ug/l | **0.0087 ug/l** | **1.3 ug/l** | **0.0092 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.0034 ug/l |
| W104 | 11/09/2005 | N | **0.018 ug/l** | **0.0053 ug/l** | **0.019 ug/l** | **3.4 ug/l** | < 0.0034 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | **0.020 ug/l** |
| W104 | 10/19/2006 | N | **0.019 b ug/l** | < 0.0072 ug/l | **0.018 ug/l** | **2.5 ug/l** | < 0.0072 ug/l | < 0.0072 ug/l | < 0.0072 ug/l | < 0.0072 ug/l | < 0.0072 ug/l | **0.016 ug/l** |
| W104 | 11/07/2007 | N | **0.019 ug/l** | **0.013 ug/l** | **0.025 ug/l** | **3.5 ug/l** | **0.025 ug/l** | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l | **0.012 ug/l** |
| W104 | 10/09/2008 | N | **0.014 ug/l** | **0.0074 ug/l** | **0.018 ug/l** | **2.9 ug/l** | < 0.018 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.018 ug/l |
| W104 | 9/29/2009 | N | **0.013 b ug/l** | **0.0082 ug/l** | **0.016 ug/l** | **1.5 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.016 ug/l |
| W104 | 10/07/2010 | N | **0.013 ug/l** | **0.0063 ug/l** | **0.020 ug/l** | **1.4 ug/l** | **0.029 ug/l** | **0.040 ug/l** | **0.070 * ug/l** | **0.027 ug/l** | < 0.0036 * ug/l | **0.026 ug/l** |
| W104 | 10/15/2011 | N | **0.024 b ug/l** | **0.0054 ug/l** | **0.032 ug/l** | **5.0 ug/l** | **0.24 ug/l** | **0.11 ug/l** | **0.24 ug/l** | **0.064 ug/l** | **0.10 ug/l** | **0.16 ug/l** |
| W104 | 10/19/2012 | N | **0.024 h ug/l** | **0.014 h ug/l** | **0.044 h ug/l** | **3.4 h ug/l** | **0.063 h ug/l** | < 0.0071 h ug/l | **0.051 h ug/l** | **0.023 h ug/l** | **0.028 h ug/l** | **0.049 h ug/l** |
| W104 | 10/10/2013 | N | **0.013 ug/l** | **0.0098 ug/l** | **0.030 ug/l** | **2.7 ug/l** | **0.030 ug/l** | **0.0075 ug/l** | **0.015 ug/l** | < 0.0070 ug/l | **0.018 ug/l** | **0.0099 ug/l** |
| W104 | 10/17/2014 | N | < 0.018 ug/l | < 0.018 ug/l | **0.029 ug/l** | **3.5 ug/l** | **0.044 ug/l** | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l |
| W104 | 10/08/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0035 ug/l** | **0.59 ug/l** | **0.013 ug/l** | **0.0088 ug/l** | **0.019 ug/l** | **0.0065 ug/l** | **0.0068 ug/l** | **0.010 ug/l** |
| W104 | 10/20/2016 | N | **0.0054 ug/l** | < 0.0037 ug/l | **0.013 ug/l** | **1.9 ug/l** | < 0.0037 ug/l | < 0.0037 ug/l | < 0.0037 c ug/l | < 0.0037 ug/l | < 0.0037 ug/l | **0.018 ug/l** |
| W111 | 1/24/1985 | N | **1400 ug/l** | < 1.3 ug/l | < 1.0 ug/l | **7.0 ug/l** | **1.8 ug/l** | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | **3.0 c ug/l** |
| W111 | 5/22/1985 | N | **670 ug/l** | **39 ug/l** | < 5.0 ug/l | < 5.0 ug/l | < 5.0 ug/l | < 5.0 ug/l | < 5.0 ug/l | < 5.0 ug/l | < 5.0 ug/l | < 5.0 ug/l |
| W111 | 6/04/1986 | N | **500 ug/l** | **42 ug/l** | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l |
| W111 | 7/30/1987 | N | **370 ug/l** | **64 ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| W111 | 10/06/1988 | N | **150 ug/l** | **52 ug/l** | < 30.0 ug/l | < 30.0 ug/l | < 30.0 ug/l | < 30.0 ug/l | < 30.0 ug/l | < 30.0 ug/l | < 30.0 ug/l | < 30.0 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W112 | 1/28/1985 | N | **0.30 ug/l** | **16 ug/l** | **0.25 ug/l** | **0.18 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W112 | 5/16/1985 | N | < 1.0 ug/l | **7.0 ug/l** | **1.2 ug/l** | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l |
| W112 | 12/13/1985 | N | **0.3 ug/l** | **20 ug/l** | **0.9 ug/l** | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 1.0 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W112 | 3/20/1986 | N | < 0.032 ug/l | **24 ug/l** | < 0.016 ug/l | < 0.016 ug/l | < 0.016 ug/l | < 0.016 ug/l | < 0.016 ug/l | < 0.016 ug/l | < 0.016 ug/l | < 0.016 ug/l |
| W112 | 6/04/1986 | N | < 2.0 ug/l | **25 ug/l** | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l |
| W112 | 9/25/1986 | N | < 2.0 ug/l | **35 ug/l** | **1.2 ug/l** | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l |
| W112 | 12/11/1986 | N | < 2.9 ug/l | **75 ug/l** | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l |
| W112 | 3/19/1987 | N | < 0.6 ug/l | **60 ug/l** | **1.8 ug/l** | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l |
| W112 | 5/06/1987 | N | < 10 ug/l | **56 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W112 | 7/30/1987 | N | < 50 ug/l | **77 ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| W112 | 11/05/1987 | N | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l |
| W112 | 2/29/1988 | N | < 6.0 ug/l | **39 ug/l** | < 6.0 pp ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W112 | 10/06/1988 | N | < 6.0 ug/l | **28 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W112 | 12/12/1988 | N | < 10 ug/l | **26 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W112 | 2/28/1989 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W112 | 8/04/1989 | N | < 10 ug/l<br>< 10 ug/l | **12 ug/l**<br>**< 10 pp ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| W112 | 5/03/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W112 | 10/30/1990 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| W112 | 10/17/1991 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W112 | 10/13/1992 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W112 | 10/19/1993 | N | **0.00473 ug/l** | **0.00377 ug/l** | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | **0.00401 ug/l** | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l |
| W112 | 9/30/1994 | N | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l |
| W112 | 10/20/1995 | N | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l |
| W112 | 10/03/1996 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | **0.066 ug/l** | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W112 | 10/06/1997 | N | **0.029 ug/l** | **0.009 ug/l** | < 0.003 ug/l | **0.034 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W112 | 11/21/1998 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.037 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W112 | 11/21/1998 | FD | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.053 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W112 | 11/17/1999 | N | **0.009 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.019 ug/l** | **0.006 b ug/l** | **0.003 ug/l** | **0.006 b ug/l** | **0.004 ug/l** | **0.005 b ug/l** | **0.008 b ug/l** |
| W112 | 9/27/2000 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.008 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** |
| W112 | 10/19/2001 | N | < 0.0033 ug/l | **0.0046 ug/l** | < 0.0033 ug/l | **0.01 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W112 | 10/29/2002 | N | **0.0059 b ug/l** | **0.0046 ug/l** | **0.0042 ug/l** | **0.0039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W112 | 9/04/2003 | N | -- | < 0.51 ug/l | < 1.0 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| W112 | 9/15/2003 | N | -- | < 0.51 ug/l | < 1.0 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| W112 | 10/01/2003 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W112 | 10/08/2003 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W113 | 3/28/1985 | N | **850 ug/l** | **500 ug/l** | < 10 ug/l | **95 ug/l** | **58 ug/l** | **20 ug/l** | **50 c ug/l** | < 10 ug/l | ND c ug/l | **63 c ug/l** |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W113 | 5/22/1985 | N | **8900 ug/l** | **6600 ug/l** | < 200 ug/l | **2700 ug/l** | **2000 ug/l** | **800 ug/l** | **1500 c ug/l** | < 200 ug/l | ND c ug/l | **1500 c ug/l** |
| W113 | 6/04/1986 | N | **2900 ug/l** | **2600 ug/l** | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l | < 1.0 ug/l |
| W113 | 12/07/1987 | N | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l |
| W121 | 3/27/1985 | N | **0.012 ug/l** | **0.012 ug/l** | < 0.0010 ug/l | **0.0016 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 3/28/1985 | N | < 0.010 ug/l | < 0.0065 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l |
| W121 | 5/06/1985 | N | **0.0058 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 12/13/1985 | N | **0.0098 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 3/18/1986 | N | **0.0027 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 6/02/1986 | N | **0.0093 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 9/23/1986 | N | **0.0031 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 12/10/1986 | N | **0.0071 ug/l** | **0.0034 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0011 c ug/l** |
| W121 | 3/18/1987 | N | **0.0080 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 5/05/1987 | N | **0.0040 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 7/28/1987 | N | **0.0026 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W121 | 11/03/1987 | N | **0.0051 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W121 | 2/22/1988 | N | **0.0084 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W121 | 10/04/1988 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 12/09/1988 | N | **0.022 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 8/03/1989 | N | < 0.0020 ug/l<br>0.0024 ug/l | < 0.0013 ug/l<br>< 0.0013 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l |
| W121 | 5/01/1990 | N | **0.0027 s ug/l**<br>**0.0026 s ug/l** | < 0.0013 ug/l<br>< 0.0013 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l |
| W121 | 10/30/1990 | N | **0.0038 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W121 | 10/17/1991 | N | **0.0049 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | **0.0039 ug/l** | **0.0072 ug/l** | **0.0066 ug/l** | < 0.0060 ug/l | **0.0091 ug/l** | < 0.0060 ug/l | **0.0063 c ug/l** |
| W121 | 10/13/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l |
| W121 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l |
| W121 | 9/29/1994 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.005 ug/l** | **0.006 ug/l** | **0.006 ug/l** | **0.005 ug/l** | **0.005 ug/l** | **0.006 c ug/l** |
| W121 | 10/20/1995 | N | **0.018 ug/l** | **0.078 ug/l** | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l |
| W121 | 10/03/1996 | N | **0.015 b ug/l**<br>**0.022 b ug/l** | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l |
| W121 | 10/06/1997 | N | **0.006 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W121 | 11/19/1998 | N | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W121 | 11/17/1999 | N | **0.007 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 ug/l** | **0.006 b ug/l** | < 0.003 ug/l | **0.006 b ug/l** | < 0.003 ug/l | **0.005 b ug/l** | **0.008 b ug/l** |
| W121 | 11/17/1999 | FD | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W121 | 9/28/2000 | N | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.005 b ug/l** |
| W121 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W121 | 5/15/2002 | N | **0.0055 b ug/l** | **0.0035 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W122 | 3/26/1985 | N | < 0.050 ug/l | **2.3 ug/l** | **0.048 ug/l** | **0.064 ug/l** | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W122 | 5/06/1985 | N | < 0.020 ug/l | **2.1 ug/l** | < 0.010 ug/l | **0.069 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W122 | 12/13/1985 | N | **0.024 ug/l** | **0.68 ug/l** | < 0.0050 ug/l | **0.022 ug/l** | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l |
| W122 | 3/18/1986 | N | **0.014 ug/l** | **0.26 ug/l** | < 0.0020 ug/l | **0.013 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0010 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W122 | 6/02/1986 | N | **0.0057 ug/l** | **0.370 ug/l** | < 0.0010 ug/l | **0.045 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W122 | 9/23/1986 | N | **0.0045 ug/l** | **0.17 ug/l** | **0.010 ug/l** | **0.016 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W122 | 12/10/1986 | N | **0.019 ug/l** | **0.14 ug/l** | < 0.0025 ug/l | **0.064 ug/l** | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l |
| W122 | 3/19/1987 | N | < 0.0020 ug/l | **0.0140 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | **0.0019 ug/l** | < 0.0010 ug/l | **0.0022 c ug/l** | < 0.0010 ug/l | **0.0022 c ug/l** | **0.0024 c ug/l** |
| W122 | 5/06/1987 | N | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W122 | 7/29/1987 | N | < 10 ug/l | **18 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W122 | 11/04/1987 | N | < 6 ug/l<br>< 6 ug/l | **14 ug/l**<br>**12 ug/l** | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l |
| W122 | 2/25/1988 | N | < 6.0 ug/l | **19.2 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W122 | 10/06/1988 | N | < 6.0 ug/l | **9.8 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W122 | 12/12/1988 | N | < 6.0 ug/l | < 6.0 pp ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W122 | 2/28/1989 | N | < 6 ug/l<br>< 6 ug/l | < 6 pp ug/l<br>< 6 pp ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l |
| W122 | 8/03/1989 | N | < 0.080 ug/l | **5.1 ug/l** | < 0.040 ug/l | **0.22 ug/l** | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l |
| W122 | 5/01/1990 | N | < 0.080 ug/l | **1.7 ug/l** | **0.046 ug/l** | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l |
| W122 | 6/22/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W122 | 10/31/1990 | N | < 0.10 ug/l | **2.6 ug/l** | < 0.052 ug/l | **0.072 ug/l** | < 0.052 ug/l | < 0.052 ug/l | < 0.052 ug/l | < 0.052 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| W122 | 10/17/1991 | N | < 0.030 ug/l | **0.22 ug/l** | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.060 ug/l | < 0.030 ug/l | < 0.060 ug/l | < 0.060 ug/l |
| W122 | 10/13/1992 | N | **0.0035 ug/l** | **0.12 ug/l** | **0.0038 ug/l** | **0.012 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l |
| W122 | 10/19/1993 | N | **0.00402 ug/l** | **0.00428 ug/l** | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l |
| W122 | 9/29/1994 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W122 | 10/19/1995 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W122 | 10/03/1996 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W122 | 10/06/1997 | N | **0.006 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W122 | 11/20/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W122 | 11/17/1999 | N | **0.013 b ug/l** | **0.003 ug/l** | < 0.003 ug/l | **0.017 ug/l** | **0.005 b ug/l** | < 0.003 ug/l | **0.004 b ug/l** | < 0.003 ug/l | **0.004 b ug/l** | **0.008 b ug/l** |
| W122 | 9/28/2000 | N | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.010 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** |
| W122 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0092 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W122 | 4/08/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0053 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W123 | 3/26/1985 | N | < 0.020 ug/l<br>< 0.020 ug/l | < 0.013 ug/l<br>< 0.013 ug/l | < 0.010 ug/l<br>< 0.010 ug/l | < 0.010 ug/l<br>< 0.010 ug/l | < 0.010 ug/l<br>< 0.010 ug/l | < 0.010 ug/l<br>< 0.010 ug/l | < 0.010 ug/l<br>< 0.010 ug/l | < 0.010 ug/l<br>< 0.010 ug/l | < 0.010 ug/l<br>< 0.010 ug/l | < 0.010 ug/l<br>< 0.010 ug/l |
| W123 | 5/07/1985 | N | **0.024 ug/l** | < 0.0065 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l |
| W123 | 3/18/1986 | N | **0.0071 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W123 | 6/03/1986 | N | **0.0077 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W123 | 9/24/1986 | N | < 0.0040 ug/l | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W123 | 12/11/1986 | N | **0.011 ug/l** | < 0.0065 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l |
| W123 | 3/18/1987 | N | **0.0086 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W123 | 5/05/1987 | N | **0.0071 ug/l** | < 0.0033 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l |
| W123 | 7/29/1987 | N | **0.0032 ug/l**<br>**0.0089 ug/l** | < 0.0013 ug/l<br>< 0.0013 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l |
| W123 | 11/04/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W123 | 2/23/1988 | N | **0.032 ug/l** | **0.0023 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0012 c ug/l** | < 0.001 ug/l | ND c ug/l | < 0.001 ug/l |
| W123 | 10/05/1988 | N | **0.0079 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W123 | 12/12/1988 | N | < 0.020 ug/l | **0.30 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W123 | 2/28/1989 | N | < 0.0040 ug/l | **0.14 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W123 | 8/03/1989 | N | < 0.020 ug/l<br>< 0.040 ug/l | < 0.013 ug/l<br>0.031 ug/l | < 0.010 ug/l<br>< 0.020 ug/l | < 0.010 ug/l<br>< 0.020 ug/l | < 0.010 ug/l<br>< 0.020 ug/l | < 0.010 ug/l<br>< 0.020 ug/l | < 0.010 ug/l<br>< 0.020 ug/l | < 0.010 ug/l<br>< 0.020 ug/l | < 0.010 ug/l<br>< 0.020 ug/l | < 0.010 ug/l<br>< 0.020 ug/l |
| W123 | 6/22/1990 | N | **0.0031 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W123 | 10/30/1990 | N | **0.0042 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W123 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0060 ug/l |
| W123 | 10/13/1992 | N | **0.0034 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l |
| W123 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l |
| W123 | 9/29/1994 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W123 | 10/19/1995 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W123 | 10/03/1996 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W123 | 10/06/1997 | N | **0.012 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W123 | 11/21/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W123 | 11/17/1999 | N | **0.009 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.008 ug/l** | **0.005 b ug/l** | < 0.003 ug/l | **0.004 b ug/l** | < 0.003 ug/l | **0.004 b ug/l** | **0.006 b ug/l** |
| W123 | 9/28/2000 | N | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W123 | 10/17/2001 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W123 | 10/17/2001 | FD | **0.0043 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W123 | 10/29/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W123 | 6/07/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W124 | 3/26/1985 | N | **0.014 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 5/06/1985 | N | **0.0081 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0050 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 12/13/1985 | N | **0.036 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W124 | 3/18/1986 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 6/02/1986 | N | **0.012 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 9/23/1986 | N | **0.0072 ug/l** | **0.0016 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 12/10/1986 | N | **0.027 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 3/18/1987 | N | **0.018 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 5/05/1987 | N | **0.0029 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 8/06/1987 | N | **0.0029 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| Parameter | | | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W124 | 11/03/1987 | N | **0.0038 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | **0.001 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W124 | 2/23/1988 | N | **0.0095 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W124 | 10/04/1988 | N | **0.0042 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 8/03/1989 | N | **0.0023 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 6/22/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W124 | 10/30/1990 | N | **0.0027 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0060 ug/l |
| W124 | 11/08/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0035 ug/l** | **0.0069 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W125 | 3/26/1985 | N | < 0.020 ug/l | < 0.013 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W125 | 5/06/1985 | N | **0.017 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0017 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W125 | 12/13/1985 | N | **0.053 ug/l** | **0.0037 ug/l** | **0.0049 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W125 | 3/18/1986 | N | **0.0075 ug/l**<br>**< 0.0020 ug/l** | < 0.0013 ug/l<br>0.0063 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l |
| W125 | 6/02/1986 | N | **0.0065 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0024 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W125 | 9/24/1986 | N | **0.0068 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W125 | 12/10/1986 | N | **0.028 ug/l** | < 0.0033 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l |
| W125 | 3/18/1987 | N | **0.0038 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0010 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W125 | 5/05/1987 | N | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W125 | 7/28/1987 | N | < 0.002 ug/l | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W125 | 11/04/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W125 | 2/25/1988 | N | **0.009 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.018 ug/l** | **0.0012 ug/l** | **0.0039 c ug/l** | **0.0012 ug/l** | ND c ug/l | **0.0023 c ug/l** |
| W125 | 10/04/1988 | N | < 0.0080 ug/l<br>< 0.0080 ug/l | < 0.0052 ug/l<br>< 0.0052 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l |
| W125 | 12/12/1988 | N | < 0.020 ug/l | < 0.013 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W125 | 2/28/1989 | N | **0.020 ug/l**<br>**< 0.0080 ug/l** | < 0.0044 ug/l<br>< 0.0052 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l |
| W125 | 8/03/1989 | N | < 0.0040 ug/l<br>< 0.0020 ug/l | < 0.0026 ug/l<br>< 0.0013 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l |
| W125 | 6/22/1990 | N | **0.0047 ug/l**<br>**< 0.0040 ug/l** | **0.0029 ug/l**<br>**< 0.0026 ug/l** | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l |
| W125 | 10/30/1990 | N | **0.0057 ug/l**<br>**0.0048 ug/l** | **0.0038 ug/l**<br>**< 0.0026 ug/l** | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>0.0027 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l |
| W125 | 10/17/1991 | N | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.024 ug/l | < 0.012 ug/l | < 0.024 ug/l | < 0.024 ug/l |
| W125 | 10/13/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l |
| W125 | 10/19/1993 | N | **0.00345 ug/l** | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l |
| W125 | 9/29/1994 | N | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W125 | 10/19/1995 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W125 | 10/03/1996 | N | **0.022 b ug/l** | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W125 | 10/06/1997 | N | **0.005 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W125 | 11/20/1998 | N | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W125 | 11/17/1999 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.012 ug/l** | **0.006 b ug/l** | < 0.003 ug/l | **0.004 b ug/l** | < 0.003 ug/l | **0.005 b ug/l** | **0.008 b ug/l** |
| W125 | 9/27/2000 | N | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.042 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.005 b ug/l** |
| W125 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.021 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W125 | 10/30/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.013 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W126 | 3/27/1985 | N | **0.014 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.025 ug/l** | **0.0018 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0036 c ug/l** |
| W126 | 3/28/1985 | N | **0.023 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | **0.012 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W126 | 5/07/1985 | N | **0.041 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0013 ug/l** | < 0.0019 ug/l | < 0.0010 ug/l | **0.0047 c ug/l** | < 0.0010 ug/l | ND c ug/l | **0.0010 c ug/l** |
| W126 | 12/13/1985 | N | **0.052 ug/l** | **0.0014 ug/l** | **0.0011 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W126 | 3/18/1986 | N | **0.0079 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0010 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W126 | 6/02/1986 | N | **0.0022 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W126 | 9/23/1986 | N | **0.0068 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0012 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W126 | 12/10/1986 | N | **0.014 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0022 ug/l** | **0.0031 ug/l** | **0.0047 c ug/l** | **0.0024 ug/l** | ND c ug/l | **0.0037 c ug/l** |
| W126 | 3/18/1987 | N | **0.0071 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W126 | 5/05/1987 | N | **0.0082 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W126 | 7/28/1987 | N | **0.0032 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W126 | 11/03/1987 | N | **0.0057 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | **0.001 ug/l** | **0.0031 ug/l** | **0.0031 ug/l** | **0.010 c ug/l** | **0.0041 ug/l** | **0.010 c ug/l** | **0.0044 c ug/l** |
| W126 | 2/22/1988 | N | **0.024 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0019 ug/l** | **0.0059 c ug/l** | **0.003 ug/l** | ND c ug/l | < 0.001 ug/l |
| W126 | 10/04/1988 | N | **0.0042 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W126 | 12/09/1988 | N | **0.018 ug/l** | < 0.0013 ug/l | **0.0016 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W126 | 8/04/1989 | N | **0.0023 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0051 ug/l** | **0.0048 ug/l** | **0.011 c ug/l** | **0.0052 ug/l** | **0.011 c ug/l** | **0.0064 c ug/l** |
| W126 | 5/01/1990 | N | **0.012 s ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0039 ug/l** | **0.0072 ug/l** | **0.013 c ug/l** | **0.0063 ug/l** | **0.013 c ug/l** | **0.0069 c ug/l** |
| W126 | 10/31/1990 | N | **0.0045 b ug/l** | **0.010 b ug/l** | **0.0032 ug/l** | **0.022 ug/l** | **0.014 ug/l** | **0.0095 ug/l** | **0.036 c ug/l** | **0.0091 ug/l** | **0.036 c ug/l** | **0.031 c ug/l** |
| W126 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | **0.018 ug/l** | **0.044 ug/l** | **0.054 c ug/l** | **0.038 ug/l** | **0.054 c ug/l** | **0.026 c ug/l** |
| W126 | 10/13/1992 | N | **0.0030 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | **0.017 ug/l** | **0.029 ug/l** | **0.047 ug/l** | **0.035 ug/l** | **0.032 ug/l** | **0.025 c ug/l** |
| W126 | 10/19/1993 | N | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | **0.00659 ug/l** | **0.0436 ug/l** | **0.0670 ug/l** | **0.0676 ug/l** | **0.0788 ug/l** | **0.0635 ug/l** | **0.0577 c ug/l** |
| W126 | 9/29/1994 | N | **0.007 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.012 ug/l** | **0.015 ug/l** | **0.020 ug/l** | **0.016 ug/l** | **0.013 ug/l** | **0.016 c ug/l** |
| W126 | 10/20/1995 | N | < 0.024 ug/l<br>< 0.012 ug/l | **0.025 ug/l**<br>**0.036 ug/l** | < 0.024 ug/l<br>< 0.012 ug/l | < 0.024 ug/l<br>< 0.012 ug/l | **0.032 ug/l**<br>**0.029 ug/l** | **0.050 ug/l**<br>**0.043 ug/l** | **0.068 ug/l**<br>**0.059 ug/l** | **0.078 ug/l**<br>**0.060 ug/l** | **0.051 ug/l**<br>**0.035 ug/l** | **0.052 c ug/l**<br>**0.044 c ug/l** |
| W126 | 10/03/1996 | N | **0.006 b ug/l** | < 0.006 ug/l | < 0.006 ug/l | **0.010 ug/l** | **0.060 ug/l** | **0.087 ug/l** | **0.10 ug/l** | **0.10 ug/l** | **0.082 ug/l** | **0.098 c ug/l** |
| W126 | 10/06/1997 | N | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.008 ug/l** | **0.013 ug/l** | **0.016 ug/l** | **0.018 ug/l** | **0.013 ug/l** | **0.013 c ug/l** |
| W126 | 11/20/1998 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | **0.026 ug/l** | < 0.006 ug/l | -- | < 0.006 ug/l | **0.022 c ug/l** |
| W126 | 11/17/1999 | N | **0.005 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.007 ug/l** | **0.010 b ug/l** | **0.017 ug/l** | **0.021 b ug/l** | **0.023 ug/l** | **0.021 b ug/l** | **0.016 b ug/l** |
| W126 | 9/28/2000 | N | **0.007 b ug/l** | **0.003 ug/l** | < 0.003 ug/l | **0.010 ug/l** | **0.016 ug/l** | **0.019 ug/l** | **0.026 ug/l** | **0.022 ug/l** | **0.019 ug/l** | **0.025 b ug/l** |
| W126 | 10/18/2001 | N | **0.0089 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0097 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0059 ug/l** | **0.0038 ug/l** | < 0.0034 ug/l | **0.0036 ug/l** |
| W126 | 10/31/2002 | N | **0.0061 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0037 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W126 | 12/18/2003 | N | **0.0046 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W126 | 10/20/2004 | N | **0.0054 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.027 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W126 | 11/09/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.017 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127 | 3/18/1986 | N | **0.052 ug/l** | **0.035 ug/l** | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0010 ug/l | < 0.0040 ug/l | < 0.0040 ug/l |
| W127 | 6/03/1986 | N | **0.160 ug/l** | **0.490 ug/l** | < 0.0080 ug/l | **0.027 ug/l** | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l |
| W127 | 9/25/1986 | N | **0.0086 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W127 | 12/11/1986 | N | **0.025 ug/l**<br>**0.026 ug/l** | < 0.0033 ug/l<br>0.0013 ug/l | < 0.0025 ug/l<br>< 0.0010 ug/l | < 0.0025 ug/l<br>< 0.0010 ug/l | < 0.0025 ug/l<br>< 0.0010 ug/l | < 0.0025 ug/l<br>< 0.0010 ug/l | < 0.0025 ug/l<br>< 0.0010 ug/l | < 0.0025 ug/l<br>< 0.0010 ug/l | < 0.0025 ug/l<br>< 0.0010 ug/l | < 0.0025 ug/l<br>< 0.0010 ug/l |
| W127 | 3/19/1987 | N | **0.0062 ug/l** | < 0.0033 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l |
| W127 | 5/06/1987 | N | **0.0036 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W127 | 7/29/1987 | N | < 0.002 ug/l | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0028 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0047 c ug/l** |
| W127 | 11/04/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W127 | 2/22/1988 | N | **0.026 ug/l** | **0.0025 ug/l** | **0.0014 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W127 | 10/04/1988 | N | **0.012 ug/l**<br>**0.0049 ug/l** | < 0.0026 ug/l<br>< 0.0013 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l |
| W127 | 12/09/1988 | N | **0.021 ug/l** | < 0.0052 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l |
| W127 | 8/04/1989 | N | **0.0054 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W127 | 6/22/1990 | N | **0.0029 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W127 | 10/30/1990 | N | **0.0039 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0018 c ug/l** |
| W127 | 10/17/1991 | N | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0060 ug/l<br>< 0.0060 ug/l | **0.019 ug/l**<br>**< 0.0030 ug/l** | < 0.0060 ug/l<br>< 0.0060 ug/l | < 0.0060 ug/l<br>< 0.0060 ug/l |
| W127 | 10/13/1992 | N | **0.0061 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l |
| W127 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l |
| W127 | 9/29/1994 | N | **0.005 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W127 | 10/19/1995 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W127 | 10/03/1996 | N | **0.007 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W127 | 10/03/1997 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W127 | 11/20/1998 | N | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W127 | 11/17/1999 | N | **0.005 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W127 | 9/28/2000 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W127 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W127 | 10/29/2002 | N | **0.0037 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127 | 9/04/2003 | N | -- | < 0.53 ug/l | < 1.1 ug/l | < 0.053 ug/l | < 0.053 ug/l | < 0.053 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| W127 | 9/15/2003 | N | -- | < 0.50 ug/l | < 1.0 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| W127 | 9/27/2003 | N | -- | < 0.55 ug/l | < 1.1 ug/l | < 0.055 ug/l | < 0.055 ug/l | < 0.055 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.055 ug/l | < 0.055 ug/l |
| W127 | 10/01/2003 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W127 | 10/08/2003 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W127 | 10/13/2003 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W127 | 11/05/2003 | N | -- | < 0.51 ug/l | < 1.0 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W127 | 11/14/2003 | N | -- | < 0.53 ug/l<br>< 0.53 ug/l | < 1.1 ug/l<br>< 1.1 ug/l | < 0.053 ug/l<br>< 0.053 ug/l | < 0.053 ug/l<br>< 0.053 ug/l | < 0.053 ug/l<br>< 0.053 ug/l | < 0.11 ug/l<br>< 0.11 ug/l | < 0.11 ug/l<br>< 0.11 ug/l | < 0.053 ug/l<br>< 0.053 ug/l | < 0.053 ug/l<br>< 0.053 ug/l |
| W127 | 12/17/2003 | N | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l |
| W127N | 12/17/2003 | N | **0.0036 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 10/19/2004 | N | **0.0037 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 11/08/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 10/19/2006 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 8/07/2012 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W127N | 8/17/2012 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W127N | 8/24/2012 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 10/09/2013 | N | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l |
| W127N | 10/14/2014 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0041 ug/l** | **0.0061 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0092 ug/l** |
| W127N | 10/06/2015 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W127N | 10/18/2016 | N | < 0.0033 ug/l | **0.0053 ug/l** | < 0.0033 ug/l | **0.0047 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W128 | 3/21/1986 | N | **0.0096 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W128 | 6/02/1986 | N | **0.0021 ug/l**<br>**0.0030 ug/l** | < 0.0013 ug/l<br>< 0.0013 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l |
| W128 | 9/24/1986 | N | **0.016 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W128 | 12/11/1986 | N | **0.024 ug/l** | **0.0022 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W128 | 3/19/1987 | N | **0.010 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W128 | 5/06/1987 | N | **0.0063 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W128 | 7/29/1987 | N | **0.0024 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W128 | 11/03/1987 | N | **0.0097 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | **0.0014 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W128 | 2/23/1988 | N | **0.021 ug/l**<br>**0.012 ug/l** | **0.0017 s ug/l**<br>**0.0024 ug/l** | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | < 0.001 ug/l<br>< 0.001 ug/l |
| W128 | 10/04/1988 | N | **0.0036 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W128 | 6/22/1990 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| W128 | 10/18/1995 | N | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.009 ug/l** | **0.025 ug/l** | **0.016 ug/l** | **0.021 ug/l** | **0.009 ug/l** | **0.015 ug/l** | **0.029 c ug/l** |
| W128 | 10/03/1996 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.004 ug/l** | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.004 c ug/l** |
| W128 | 10/02/1997 | N | **0.012 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W128 | 11/20/1998 | N | **0.005 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W128 | 11/17/1999 | N | **0.010 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.012 ug/l** | **0.019 b ug/l** | **0.022 ug/l** | **0.023 b ug/l** | **0.010 ug/l** | **0.023 b ug/l** | **0.043 b ug/l** |
| W128 | 9/28/2000 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.005 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** |
| W128 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W128 | 10/29/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W128 | 12/17/2003 | N | < 2 ug/l<br>0.0035 b ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l |
| W128 | 10/20/2004 | N | < 0.0034 ug/l | < 0.013 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W128 | 10/21/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0040 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W128 | 11/08/2005 | N | **0.0035 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W128 | 10/19/2006 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0035 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W129 | 3/18/1986 | N | **0.53 ug/l** | **0.38 ug/l** | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0010 ug/l | < 0.0040 ug/l | < 0.0040 ug/l |
| W129 | 6/03/1986 | N | **0.0065 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0025 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W129 | 9/25/1986 | N | **0.78 ug/l** | **0.11 ug/l** | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l | < 0.0080 ug/l |
| W129 | 12/11/1986 | N | **15 ug/l** | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l |
| W129 | 3/19/1987 | N | < 0.0050 ug/l<br>0.021 ug/l | < 0.0033 ug/l<br>< 0.0065 ug/l | **0.044 ug/l**<br>**0.0066 ug/l** | < 0.0025 ug/l<br>< 0.0050 ug/l | < 0.0025 ug/l<br>< 0.0050 ug/l | < 0.0025 ug/l<br>< 0.0050 ug/l | < 0.0025 ug/l<br>< 0.0050 ug/l | < 0.0025 ug/l<br>< 0.0050 ug/l | < 0.0025 ug/l<br>< 0.0050 ug/l | < 0.0025 ug/l<br>< 0.0050 ug/l |
| W129 | 5/06/1987 | N | **18 ug/l** | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W129 | 7/29/1987 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W129 | 11/04/1987 | N | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l |
| W129 | 2/25/1988 | N | **0.039 ug/l** | < 0.0026 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l |
| W129 | 10/03/1988 | N | **0.0048 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W129 | 12/12/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W129 | 8/04/1989 | N | **0.0040 ug/l** | **0.0092 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W129 | 5/02/1990 | N | < 0.0040 ug/l | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W129 | 10/30/1990 | N | **0.0057 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0018 c ug/l** | < 0.0010 ug/l | **0.0018 c ug/l** | **0.0016 c ug/l** |
| W129 | 10/17/1991 | N | **0.0084 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | **0.0043 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0060 ug/l |
| W129 | 10/13/1992 | N | **0.015 ug/l** | **0.0056 ug/l** | < 0.0030 ug/l | **0.017 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l |
| W129 | 10/19/1993 | N | < 0.0360 ug/l | < 0.0360 ug/l | < 0.0360 ug/l | < 0.0360 ug/l | < 0.0360 ug/l | < 0.0360 ug/l | < 0.0360 ug/l | < 0.0360 ug/l | < 0.0360 ug/l | < 0.0720 ug/l |
| W129 | 9/29/1994 | N | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l |
| W129 | 10/19/1995 | N | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l |
| W129 | 10/03/1996 | N | **0.009 b ug/l** | **0.009 ug/l** | < 0.003 ug/l | **0.008 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.005 c ug/l** |
| W129 | 10/03/1997 | N | **0.34 e ug/l** | **0.13 e ug/l** | **0.027 ug/l** | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W129 | 11/20/1998 | N | **0.20 ug/l** | **0.024 ug/l** | < 0.003 ug/l | **0.008 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W129 | 11/17/1999 | N | **0.013 b ug/l** | **0.056 ug/l** | < 0.003 ug/l | **0.030 ug/l** | < 0.003 ug/l | **0.020 ug/l** | **0.005 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.007 b ug/l** |
| W129 | 9/27/2000 | N | **0.006 b ug/l** | **0.028 ug/l** | < 0.003 ug/l | **0.086 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.003 b ug/l** |
| W129 | 10/17/2001 | N | **0.018 b ug/l** | **0.1 ug/l** | < 0.0034 ug/l | **0.18 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W129 | 10/29/2002 | N | **0.054 b ug/l** | **0.029 ug/l** | **0.0078 ug/l** | **0.045 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W129 | 12/18/2003 | N | **0.012 b ug/l** | **0.0097 ug/l** | **0.0051 ug/l** | **0.080 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W129 | 10/20/2004 | N | **0.012 b ug/l** | **0.015 ug/l** | **0.011 ug/l** | **0.54 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W129 | 10/21/2005 | N | **0.018 ug/l** | < 0.0068 ug/l | **0.035 ug/l** | **1.5 * ug/l** | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l | < 0.0068 ug/l |
| W129 | 11/09/2005 | N | **0.017 ug/l** | **0.056 ug/l** | < 0.029 ug/l | **0.46 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W129 | 10/19/2006 | N | **0.10 b ug/l** | **0.046 ug/l** | < 0.030 ug/l | **0.44 ug/l** | < 0.0071 ug/l | < 0.0071 ug/l | < 0.0071 ug/l | < 0.0071 ug/l | < 0.0071 ug/l | < 0.0071 ug/l |
| W130 | 5/01/1990 | N | **0.013 s ug/l**<br>**0.0048 s ug/l** | **0.0027 ug/l**<br>**0.0019 ug/l** | < 0.0010 ug/l<br>< 0.0010 ug/l | **0.0019 ug/l**<br>**< 0.0010 ug/l** | **0.0023 ug/l**<br>**< 0.0010 ug/l** | **0.0027 ug/l**<br>**< 0.0010 ug/l** | **0.0054 c ug/l**<br>**< 0.0010 ug/l** | < 0.0010 ug/l<br>< 0.0010 ug/l | **0.0054 c ug/l**<br>**< 0.0010 ug/l** | **0.0036 c ug/l**<br>**< 0.0010 ug/l** |
| W130 | 10/31/1990 | N | **0.0056 b ug/l** | **0.0019 b ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W130 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0060 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W130 | 10/13/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l |
| W130 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l |
| W130 | 9/29/1994 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W130 | 10/19/1995 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W130 | 10/03/1996 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W130 | 10/06/1997 | N | **0.012 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W130 | 11/20/1998 | N | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W130 | 11/17/1999 | N | **0.008 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.005 ug/l** | **0.004 b ug/l** | < 0.003 ug/l | **0.004 b ug/l** | < 0.003 ug/l | **0.003 b ug/l** | **0.006 b ug/l** |
| W130 | 9/28/2000 | N | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.003 b ug/l** |
| W130 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W130 | 10/30/2002 | N | **0.0043 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 12/17/2003 | N | < 2 ug/l<br>0.0048 b ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l |
| W130 | 10/19/2004 | N | < 0.0034 ug/l | < 0.0046 ug/l | < 0.0034 ug/l | **0.013 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 11/09/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0074 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 10/19/2006 | N | **0.0052 b ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | **0.011 ug/l** | < 0.0036 ug/l | < 0.0036 * ug/l | < 0.0036 * ug/l | < 0.0036 * ug/l | < 0.0036 * ug/l | < 0.0036 ug/l |
| W130 | 11/07/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0050 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 10/09/2008 | N | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | **0.0059 ug/l**<br>**0.0054 ug/l** | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l |
| W130 | 9/29/2009 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0088 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 10/05/2010 | N | **0.0037 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0087 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W130 | 10/11/2011 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.0050 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| W130 | 10/16/2012 | N | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | **0.0075 h ug/l** | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l |
| W130 | 10/09/2013 | N | **0.0043 ug/l** | **0.022 ug/l** | < 0.0043 ug/l | **0.013 ug/l** | **0.035 ug/l** | **0.018 ug/l** | **0.027 ug/l** | **0.0085 ug/l** | **0.015 ug/l** | **0.037 ug/l** |
| W130 | 10/15/2014 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0078 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W130 | 10/15/2014 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0080 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 10/07/2015 | N | < 0.0035 ug/l | **0.0063 ug/l** | < 0.0035 ug/l | **0.0059 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W130 | 10/14/2016 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.013 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 c ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W131 | 5/02/1990 | N | < 0.080 ug/l | **0.81 ug/l** | < 0.040 ug/l | **0.24 ug/l** | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l | < 0.040 ug/l |
| W131 | 10/31/1990 | N | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l |
| W131 | 10/17/1991 | N | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.060 ug/l | < 0.030 ug/l | < 0.060 ug/l | < 0.060 ug/l |
| W131 | 10/14/1992 | N | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l |
| W131 | 10/19/1993 | N | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.840 ug/l |
| W131 | 11/07/1994 | N | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l |
| W131 | 10/19/1995 | N | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l |
| W131 | 10/03/1996 | N | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l |
| W131 | 10/06/1997 | N | **5.4 ug/l**<br>**4.1 ug/l** | **4.5 ug/l**<br>**4.2 e ug/l** | **0.010 ug/l**<br>**0.007 ug/l** | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>< 0.003 ug/l | **0.003 ug/l**<br>**< 0.003 ug/l** | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>< 0.003 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | **Parameter** | **2-Methylnaphthalene** | **Acenaphthene** | **Acenaphthylene** | **Anthracene** | **Benz(a) anthracene** | **Benzo(a) pyrene** | **Benzo(b) fluoranthene** | **Benzo(g,h,i) perylene** | **Benzo(k) fluoranthene** | **Chrysene** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W131 | 11/21/1998 | N | **0.005 b ug/l** | **0.014 ug/l** | **0.018 ug/l** | **0.13 e ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l |
| W132 | 12/17/2003 | N | < 2 ug/l<br>0.0055 b ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>0.0038 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l |
| W132 | 10/19/2004 | N | **0.0065 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.074 ug/l** | **0.0084 ug/l** | **0.0085 ug/l** | **0.019 ug/l** | **0.011 ug/l** | **0.012 ug/l** | **0.015 ug/l** |
| W132 | 11/08/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.024 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 10/19/2006 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.088 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| W132 | 11/07/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.034 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 11/07/2007 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.044 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 10/09/2008 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.011 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 9/29/2009 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.015 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 10/05/2010 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.032 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 10/11/2011 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.044 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 8/07/2012 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.039 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 8/24/2012 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.041 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 10/16/2012 | N | **0.0049 bh ug/l** | < 0.0034 h ug/l | < 0.0034 h ug/l | **0.050 h ug/l** | < 0.0034 h ug/l | **0.0042 h ug/l** | **0.0064 h ug/l** | **0.0035 h ug/l** | < 0.0034 h ug/l | **0.0050 h ug/l** |
| W132 | 10/10/2013 | N | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | **0.084 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W132 | 10/14/2014 | N | **0.0042 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.048 ug/l** | **0.0084 ug/l** | **0.0062 ug/l** | **0.014 ug/l** | **0.0059 ug/l** | **0.0051 ug/l** | **0.0093 ug/l** |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2- Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| W132 | 10/07/2015 | N | < 0.0033 ug/l | **0.013 ug/l** | < 0.0033 ug/l | **0.029 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 10/14/2016 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.055 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 c ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 10/14/2016 | FD | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.054 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-1 | 7/14/2003 | N | -- | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| S-1 | 8/01/2003 | N | -- | < 0.53 ug/l | < 1.1 ug/l | **0.12 ug/l** | < 0.053 ug/l | < 0.053 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| S-1 | 9/04/2003 | N | -- | < 0.54 ug/l | < 1.1 ug/l | **0.091 ug/l** | < 0.054 ug/l | < 0.054 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.054 ug/l | < 0.054 ug/l |
| S-1 | 9/15/2003 | N | -- | < 0.55 ug/l | < 1.1 ug/l | < 0.055 ug/l | < 0.055 ug/l | < 0.055 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.055 ug/l | < 0.055 ug/l |
| S-1 | 9/22/2003 | N | -- | < 0.53 ug/l | < 1.1 ug/l | < 0.053 ug/l | < 0.053 ug/l | < 0.053 ug/l | < 0.11 ug/l | < 0.11 ug/l | **0.053 ug/l** | < 0.053 ug/l |
| S-1 | 9/27/2003 | N | -- | < 0.51 ug/l | < 1.0 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 10/01/2003 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| S-1 | 10/08/2003 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| S-1 | 10/13/2003 | N | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| S-1 | 10/24/2003 | N | -- | < 0.51 ug/l | < 1.0 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 10/30/2003 | N | -- | < 0.52 ug/l | < 1.0 ug/l | < 0.052 ug/l | < 0.052 ug/l | < 0.052 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 11/05/2003 | N | -- | < 0.050 ug/l | < 1.0 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| S-1 | 11/14/2003 | N | -- | < 0.50 ug/l | < 1.0 ug/l | **0.17 ug/l** | < 0.050 ug/l | < 0.050 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| S-1 | 12/04/2003 | N | -- | < 0.54 ug/l | < 1.1 ug/l | **0.16 ug/l** | < 0.054 ug/l | < 0.054 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.054 ug/l | < 0.054 ug/l |
| S-1 | 12/18/2003 | N | **0.0061 b ug/l** | **0.057 ug/l** | **0.011 ug/l** | **0.031 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-1 | 1/21/2004 | N | -- | < 0.52 ug/l | < 1.0 ug/l | **0.12 ug/l** | < 0.052 ug/l | < 0.052 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 2/26/2004 | N | -- | < 0.52 ug/l | < 1.0 ug/l | **0.11 ug/l** | < 0.052 ug/l | < 0.052 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 3/31/2004 | N | -- | < 0.52 ug/l | < 1.0 ug/l | < 0.052 ug/l | < 0.052 ug/l | < 0.052 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 4/13/2004 | N | -- | < 0.52 ug/l | < 1.0 ug/l | **0.12 ug/l** | < 0.052 ug/l | < 0.052 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 5/04/2004 | N | -- | < 0.53 ug/l | < 1.1 ug/l | **0.11 ug/l** | < 0.053 ug/l | < 0.053 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| S-1 | 6/04/2004 | N | -- | < 0.51 ug/l | < 1.0 ug/l | **0.094 ug/l** | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 7/19/2004 | N | -- | < 0.51 ug/l | < 1.0 ug/l | **0.15 ug/l** | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 8/02/2004 | N | -- | < 0.50 ug/l | < 1.0 ug/l | **0.14 ug/l** | < 0.050 ug/l | < 0.050 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| S-1 | 9/01/2004 | N | -- | < 0.51 ug/l | < 1.0 ug/l | **0.13 ug/l** | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 10/01/2004 | N | -- | < 0.53 ug/l | < 1.1 ug/l | **0.11 ug/l** | < 0.053 ug/l | < 0.053 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| S-1 | 10/19/2004 | N | **0.0042 b ug/l** | **0.014 ug/l** | **0.0068 ug/l** | **0.037 ug/l** | < 0.0034 ug/l | **0.0035 ug/l** | **0.0039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0004 ug/l** |
| S-1 | 11/05/2004 | N | -- | < 0.51 ug/l | < 1.0 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.051 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 12/21/2004 | N | -- | < 0.52 ug/l | < 1.0 ug/l | **0.095 ug/l** | < 0.052 ug/l | < 0.052 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 11/09/2005 | N | **0.0039 ug/l** | **0.013 ug/l** | < 0.011 ug/l | **0.047 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-1 | 10/20/2006 | N | **0.0044 b ug/l** | **0.013 ug/l** | **0.0081 ug/l** | **0.033 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-1 | 11/09/2007 | N | < 0.0034 ug/l | **0.0070 ug/l** | < 0.0042 ug/l | **0.018 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-1 | 10/14/2008 | N | < 0.0034 ug/l | **0.011 ug/l** | < 0.0034 ug/l | **0.025 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-1A | 6/04/2010 | N | **0.0053 b ug/l** | **0.044 ug/l** | **0.0056 ug/l** | **0.036 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | |
| S-1A | 10/05/2010 | N | < 0.0034 ug/l | **0.018 ug/l** | < 0.0043 ug/l | **0.030 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-1A | 10/11/2011 | N | **0.0037 ug/l** | **0.020 ug/l** | **0.0038 ug/l** | **0.022 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| S-1A | 10/11/2011 | FD | < 0.0033 ug/l | **0.019 ug/l** | **0.0038 ug/l** | **0.020 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-1A | 10/16/2012 | N | < 0.0035 h ug/l | **0.012 h ug/l** | < 0.0035 h ug/l | **0.023 h ug/l** | < 0.0035 h ug/l | < 0.0035 h ug/l | < 0.0035 h ug/l | < 0.0035 h ug/l | < 0.0035 h ug/l | < 0.0035 h ug/l |
| S-1A | 10/08/2013 | N | < 0.0034 ug/l | **0.013 ug/l** | **0.0053 ug/l** | **0.034 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-1A | 10/15/2014 | N | < 0.0034 ug/l | **0.0077 ug/l** | **0.0035 ug/l** | **0.023 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-1A | 10/06/2015 | N | < 0.0033 ug/l | **0.0057 ug/l** | < 0.0033 ug/l | **0.019 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-1A | 10/13/2016 | N | < 0.0033 ug/l | **0.0066 ug/l** | **0.0049 ug/l** | **0.024 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-2 | 3/01/2006 | N | **0.0034 ug/l** | **0.019 ug/l** | **0.0088 ug/l** | **0.043 ug/l** | **0.0035 ug/l** | **0.0025 j ug/l** | **0.0036 ug/l** | **0.0022 j ug/l** | **0.0024 j ug/l** | **0.0037 ug/l** |
| S-2 | 3/01/2006 | FD | **0.0034 ug/l** | **0.019 ug/l** | **0.0095 ug/l** | **0.045 ug/l** | **0.0044 ug/l** | **0.0034 j ug/l** | **0.0044 ug/l** | **0.0027 j ug/l** | **0.0030 j ug/l** | **0.0050 ug/l** |
| S-2 | 10/21/2006 | N | **0.0057 ug/l** | **0.011 ug/l** | < 0.0073 ug/l | **0.040 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-2 | 11/08/2007 | N | < 0.0034 ug/l | **0.0075 ug/l** | < 0.0055 ug/l | **0.023 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-2 | 10/14/2008 | N | < 0.0033 ug/l | **0.0053 ug/l** | < 0.0041 ug/l | **0.027 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-2 | 9/30/2009 | N | < 0.0033 ug/l | **0.0066 ug/l** | < 0.0033 ug/l | **0.023 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-2 | 10/05/2010 | N | < 0.0034 ug/l | **0.0063 ug/l** | < 0.0034 ug/l | **0.022 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-2 | 10/11/2011 | N | **0.0035 ug/l** | **0.0057 ug/l** | < 0.0033 ug/l | **0.017 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-2 | 10/16/2012 | N | < 0.41 h ug/l | < 0.021 h ug/l | **0.58 h ug/l** | **0.039 h ug/l** | **0.021 h ug/l** | **0.013 h ug/l** | **0.014 h ug/l** | **0.0072 h ug/l** | **0.021 h ug/l** | **0.018 h ug/l** |
| S-2 | 10/08/2013 | N | < 0.0034 ug/l | **0.0060 ug/l** | **0.0043 ug/l** | **0.028 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-2 | 10/08/2013 | FD | < 0.0035 ug/l | **0.0096 ug/l** | **0.0046 ug/l** | **0.027 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| S-2 | 10/15/2014 | N | < 0.0034 ug/l | **0.0039 ug/l** | < 0.0034 ug/l | **0.020 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-2 | 10/06/2015 | N | < 0.0033 ug/l | **0.0040 ug/l** | < 0.0033 ug/l | **0.015 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-2 | 10/13/2016 | N | < 0.0033 ug/l | **0.0038 ug/l** | **0.0036 ug/l** | **0.020 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |

See Table 3-18 for data qualifiers and footnotes.

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U1 | 7/07/1988 | N | -- | < 10 ug/l | < 10 pp ug/l | < 10 ug/l | < 10 ug/l | < 50 pp ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 12/29/1988 | N | < 10 ug/l | < 10 ug/l | < 10 pp ug/l | < 10 ug/l | < 10 ug/l | < 5 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 2/27/1989 | N | -- | -- | -- | -- | -- | **20 ug/l** | -- | -- |
| U1 | 8/03/1989 | N | < 10 ug/l | < 10 ug/l | **10 ug/l** | < 10 ug/l | < 10 ug/l | **430 ug/l** | < 10 pp ug/l | < 10 ug/l |
| U1 | 5/04/1990 | N | -- | -- | -- | -- | -- | **430 ug/l** | -- | -- |
| U1 | 10/30/1990 | N | < 10 ug/l | < 10 ug/l | **9 j ug/l** | < 10 ug/l | < 10 ug/l | **28 ug/l** | **3 j ug/l** | < 10 ug/l |
| U1 | 10/17/1991 | N | < 10 ug/l | < 10 ug/l | **9 j ug/l** | < 10 ug/l | < 10 ug/l | **24 ug/l** | **3 j ug/l** | < 10 ug/l |
| U1 | 10/14/1992 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **8 j ug/l**<br>**7 j ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| U1 | 10/20/1993 | N | < 10 ug/l | < 10 ug/l | **4 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 10/14/1994 | N | < 10 ug/l | < 10 ug/l | **6 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 12/08/1995 | N | < 0.96 ug/l | < 0.96 ug/l | **4.4 ug/l** | < 0.96 ug/l | < 0.96 ug/l | **55 ug/l** | < 0.96 ug/l | < 0.96 ug/l |
| U1 | 10/02/1996 | N | < 30 ug/l<br>< 10 ug/l | < 30 ug/l<br>< 10 ug/l | **4 j* ug/l**<br>**5 j ug/l** | < 30 ug/l<br>< 10 ug/l | < 30 * ug/l<br>3 j ug/l | **120 ug/l**<br>**130 ug/l** | < 30 ug/l<br>< 10 ug/l | < 30 ug/l<br>< 10 ug/l |
| U1 | 10/03/1997 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1 | 11/19/1998 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | -- | < 10 ug/l |
| U1 | 11/19/1999 | N | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 3.0 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U1 | 9/27/2000 | N | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 3 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U1 | 9/27/2000 | FD | < 0.1 ug/l | < 0.1 ug/l | **0.15 ug/l** | < 0.1 ug/l | < 0.1 ug/l | < 3 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U1 | 10/19/2001 | N | < 0.0033 ug/l | **0.05 b ug/l** | **0.35 ug/l** | < 0.0033 ug/l | **0.064 ug/l** | < 3 ug/l | **0.015 b ug/l** | **0.02 ug/l** |
| U1 | 11/01/2002 | N | < 0.0034 ug/l | **0.016 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0053 b* ug/l** | < 3.0 ug/l | < 0.0034 ug/l | **0.015 ug/l** |
| U1 | 12/21/2003 | N | < 0.0034 ug/l | **0.041 ug/l** | **0.017 ug/l** | < 0.0034 ug/l | **0.042 b ug/l** | < 3.0 ug/l | **0.0088 ug/l** | **0.023 ug/l** |
| U1 | 10/29/2004 | N | < 0.0035 ug/l | **0.029 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | **0.0091 b ug/l** | < 2.0 * ug/l | **0.0039 ug/l** | **0.013 ug/l** |
| U1 | 11/10/2005 | N | < 0.0034 ug/l | **0.038 ug/l** | **0.011 ug/l** | < 0.0034 ug/l | **0.023 b ug/l** | < 3.0 ug/l | **0.0077 ug/l** | **0.020 ug/l** |
| U1 | 10/21/2006 | N | < 0.0034 ug/l | **0.028 ug/l** | **0.0077 ug/l** | < 0.0034 ug/l | **0.025 b ug/l** | < 3.0 ug/l | **0.0083 ug/l** | **0.021 ug/l** |
| U1 | 9/16/2007 | N | < 0.0033 ug/l | **0.021 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.016 ug/l** | < 2.9 ug/l | **0.0082 ug/l** | **0.013 ug/l** |
| U1 | 11/09/2007 | N | < 0.0034 ug/l | **0.018 ug/l** | < 0.015 ug/l | < 0.0034 ug/l | **0.015 b ug/l** | < 1.0 ug/l | **0.0063 b ug/l** | **0.013 ug/l** |
| U1 | 3/19/2008 | N | < 0.0034 ug/l | **0.018 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0058 ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.018 ug/l** |
| U1 | 6/14/2008 | N | < 0.0033 ug/l | **0.014 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.021 ug/l** | < 0.95 ug/l | < 0.0033 ug/l | **0.014 ug/l** |
| U1 | 9/04/2008 | N | < 0.0033 ug/l | **0.011 * ug/l** | < 0.0033 * ug/l | < 0.0033 ug/l | **0.014 ug/l** | < 0.97 ug/l | < 0.0033 * ug/l | **0.011 * ug/l** |
| U1 | 10/10/2008 | N | < 0.0034 ug/l | **0.011 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.011 ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.010 ug/l** |
| U1 | 2/25/2009 | N | < 0.0033 ug/l | **0.0088 ug/l** | < 0.0092 ug/l | < 0.0033 ug/l | **0.0075 ug/l** | < 0.96 ug/l | < 0.0033 ug/l | **0.012 ug/l** |
| U1 | 6/10/2009 | N | < 0.0034 ug/l | **0.011 ug/l** | < 0.013 ug/l | < 0.0034 ug/l | **0.025 ug/l** | < 0.99 ug/l | < 0.0034 ug/l | **0.015 ug/l** |
| U1 | 9/09/2009 | N | < 0.0034 ug/l | **0.015 ug/l** | < 0.015 ug/l | < 0.0034 ug/l | **0.014 ug/l** | < 0.98 ug/l | < 0.0034 ug/l | **0.016 ug/l** |
| U1 | 10/05/2009 | N | < 0.0033 ug/l | **0.016 ug/l** | < 0.015 ug/l | < 0.0033 ug/l | **0.013 b ug/l** | < 0.96 ug/l | < 0.0046 ug/l | **0.013 ug/l** |
| U1 | 10/05/2009 | FD | < 0.0034 ug/l | **0.018 ug/l** | < 0.016 ug/l | < 0.0034 ug/l | **0.017 b ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.014 ug/l** |
| U1 | 3/09/2010 | N | < 0.0034 ug/l | **0.016 ug/l** | < 0.018 ug/l | < 0.0034 ug/l | **0.098 ug/l** | < 0.98 ug/l | < 0.0034 ug/l | **0.022 ug/l** |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U1 | 6/04/2010 | N | < 0.0034 ug/l | **0.014 ug/l** | < 0.015 ug/l | < 0.0034 ug/l | **0.013 b ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.018 ug/l** |
| U1 | 8/09/2010 | N | < 0.0033 ug/l | **0.015 ug/l** | < 0.011 ug/l | < 0.0033 ug/l | **0.023 b ug/l** | < 0.97 ug/l | < 0.0041 ug/l | **0.013 ug/l** |
| U1 | 10/05/2010 | N | < 0.0033 ug/l | **0.015 ug/l** | < 0.014 ug/l | < 0.0033 ug/l | **0.025 b ug/l** | < 0.96 ug/l | **0.0042 ug/l** | **0.015 ug/l** |
| U1 | 3/22/2011 | N | < 0.0034 ug/l | **0.016 ug/l** | < 0.015 ug/l | < 0.0034 ug/l | **0.013 ug/l** | < 1.0 ug/l | **0.0052 ug/l** | **0.016 ug/l** |
| U1 | 6/06/2011 | N | < 0.0034 ug/l | **0.015 ug/l** | < 0.012 ug/l | < 0.0034 ug/l | **0.0056 ug/l** | < 1.0 ug/l | < 0.0044 ug/l | **0.014 ug/l** |
| U1 | 9/11/2011 | N | < 0.0034 ug/l | **0.021 ug/l** | < 0.0095 ug/l | < 0.0034 ug/l | **0.0075 ug/l** | < 0.98 ug/l | **0.0059 ug/l** | **0.016 ug/l** |
| U1 | 10/15/2011 | N | < 0.0033 ug/l | **0.0096 ug/l** | < 0.0087 ug/l | < 0.0033 ug/l | **0.035 b ug/l** | < 0.97 ug/l | < 0.0033 ug/l | **0.0099 ug/l** |
| U1 | 10/15/2011 | FD | < 0.0034 ug/l | **0.0090 ug/l** | < 0.011 ug/l | < 0.0034 ug/l | **0.050 b ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.010 ug/l** |
| U1 | 3/16/2012 | N | < 0.0037 ug/l | **0.0054 ug/l** | < 0.0085 ug/l | < 0.0037 ug/l | **0.025 ug/l** | < 1.1 ug/l | < 0.0037 ug/l | **0.013 ug/l** |
| U1 | 6/09/2012 | N | < 0.0036 ug/l | **0.014 ug/l** | **0.011 * ug/l** | < 0.0036 ug/l | **0.024 ug/l** | < 1.1 ug/l | < 0.0036 ug/l | **0.015 ug/l** |
| U1 | 9/27/2012 | N | < 0.0034 ug/l | **0.040 ug/l** | < 0.011 ug/l | < 0.0034 ug/l | **0.039 ug/l** | < 1.0 ug/l | **0.0042 * ug/l** | **0.020 ug/l** |
| U1 | 10/17/2012 | N | < 0.0033 h ug/l | **0.011 h ug/l** | < 0.013 h ug/l | < 0.0033 h ug/l | **0.020 bh ug/l** | < 0.95 h ug/l | < 0.0033 h ug/l | **0.013 h ug/l** |
| U1 | 3/07/2013 | N | < 0.0034 ug/l | **0.010 ug/l** | **0.012 * ug/l** | < 0.0034 ug/l | **0.056 ug/l** | < 0.99 ug/l | **0.0041 ug/l** | **0.015 ug/l** |
| U1 | 5/30/2013 | N | < 0.0033 ug/l | **0.011 ug/l** | < 0.012 ug/l | < 0.0033 ug/l | **0.0091 ug/l** | < 0.95 ug/l | **0.0037 * ug/l** | **0.013 ug/l** |
| U1 | 8/14/2013 | N | < 0.0033 ug/l | **0.011 ug/l** | < 0.013 ug/l | < 0.0033 ug/l | **0.015 ug/l** | < 0.97 ug/l | **0.0050 ug/l** | **0.014 ug/l** |
| U1 | 10/08/2013 | N | < 0.0035 ug/l | **0.011 ug/l** | < 0.013 ug/l | < 0.0035 ug/l | **0.037 b ug/l** | < 1.1 ug/l | **0.0054 * ug/l** | **0.015 ug/l** |
| U1 | 3/27/2014 | N | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 11 ug/l | < 27 ug/l | < 11 ug/l | < 11 ug/l |
| U1 | 6/30/2014 | N | < 0.0033 ug/l | **0.015 ug/l** | < 0.013 ug/l | < 0.0033 ug/l | **0.032 ug/l** | < 0.97 ug/l | **0.0041 * ug/l** | **0.013 ug/l** |
| U1 | 9/30/2014 | N | < 0.0034 ug/l | **0.0097 ug/l** | < 0.011 ug/l | < 0.0034 ug/l | **0.012 ug/l** | < 0.99 ug/l | **0.0063 ug/l** | **0.015 ug/l** |
| U1 | 10/16/2014 | N | < 0.0034 ug/l | **0.0083 ug/l** | **0.0088 * ug/l** | < 0.0034 ug/l | **0.010 ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.014 ug/l** |
| U1 | 3/20/2015 | N | < 0.0037 ug/l | **0.0063 ug/l** | **0.0072 * ug/l** | < 0.0037 ug/l | **0.0099 ug/l** | < 1.1 ug/l | **0.0046 ug/l** | **0.011 ug/l** |
| U1 | 6/30/2015 | N | < 0.0033 h ug/l | **0.0051 h ug/l** | < 0.0088 h ug/l | < 0.0033 h ug/l | **0.0040 h ug/l** | < 0.96 h ug/l | < 0.0033 h ug/l | **0.013 h ug/l** |
| U1 | 9/01/2015 | N | < 0.0034 ug/l | **0.0054 ug/l** | **0.0095 * ug/l** | < 0.0034 ug/l | **0.0060 ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.0096 ug/l** |
| U1 | 10/07/2015 | N | < 0.0034 ug/l | **0.0068 ug/l** | **0.0094 * ug/l** | < 0.0034 ug/l | **0.0052 b ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.013 ug/l** |
| U1 | 2/04/2016 | N | < 0.0033 ug/l | **0.0040 ug/l** | **0.0061 ug/l** | < 0.0033 ug/l | **0.0082 ug/l** | < 0.29 ug/l | < 0.0033 ug/l | **0.0078 ug/l** |
| U1 | 6/30/2016 | N | < 0.0034 h ug/l | **0.0051 h ug/l** | **0.0075 h* ug/l** | < 0.0034 h ug/l | **0.0077 bh ug/l** | < 0.20 h ug/l | < 0.0034 h ug/l | **0.0085 h ug/l** |
| U1 | 9/12/2016 | N | < 0.0033 ug/l | **0.0053 ug/l** | **0.0067 ug/l** | < 0.0033 ug/l | **0.0050 ug/l** | < 0.29 ug/l | < 0.0033 ug/l | **0.0085 ug/l** |
| U1 | 10/18/2016 | N | < 0.0035 ug/l | **0.0067 ug/l** | **0.015 * ug/l** | < 0.0035 ug/l | **0.0097 ug/l** | < 0.31 ug/l | **0.0045 ug/l** | **0.013 ug/l** |
| U1A | 10/01/1997 | N | < 10 ug/l | < 10 ug/l | **2 j ug/l** | < 10 ug/l | < 10 ug/l | **18 j ug/l** | < 10 ug/l | < 10 ug/l |
| U1A | 11/18/1998 | N | < 10 ug/l | < 10 ug/l | **1 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U1A | 12/10/1999 | N | < 0.1 ug/l | < 0.1 ug/l | **0.5 ug/l** | < 0.1 ug/l | < 0.1 ug/l | **2.5 ug/l** | < 0.1 ug/l | < 0.1 ug/l |
| U1A | 9/26/2000 | N | < 0.1 ug/l | < 0.1 ug/l | **0.46 ug/l** | < 0.1 ug/l | < 0.1 ug/l | **4.2 ug/l** | < 0.1 ug/l | < 0.1 ug/l |
| U1A | 10/16/2001 | N | < 0.0033 ug/l | **0.075 ug/l** | **0.2 ug/l** | < 0.0033 ug/l | **0.029 b ug/l** | < 3 ug/l | **0.013 b ug/l** | **0.029 ug/l** |
| U1A | 11/01/2002 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.10 * ug/l | < 3.0 ug/l | < 0.10 ug/l | < 0.10 ug/l |
| U1A | 12/16/2003 | N | < 0.020 ug/l | **0.044 ug/l** | < 0.020 ug/l | < 0.020 ug/l | **0.027 b ug/l** | < 0.96 * ug/l | < 0.020 ug/l | < 0.020 ug/l |
| U1A | 10/29/2004 | N | < 0.17 ug/l | **3.9 ug/l** | **53 ug/l** | < 0.17 ug/l | **240 ug/l** | **750 j* ug/l** | **57 ug/l** | **1.6 ug/l** |
| U1A | 2/10/2005 | N | < 0.0034 ug/l | **0.037 ug/l** | **0.016 ug/l** | < 0.0034 ug/l | **0.022 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | **0.014 ug/l** |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U1A | 2/10/2005 | FD | < 0.017 ug/l | **0.15 ug/l** | < 0.017 ug/l | < 0.017 ug/l | **0.072 b ug/l** | < 15 ug/l | **0.030 b ug/l** | **0.062 ug/l** |
| U1A | 11/12/2005 | N | < 0.0034 ug/l | **0.049 ug/l** | **0.0049 ug/l** | < 0.0034 ug/l | **0.014 b ug/l** | < 3.0 ug/l | < 0.0062 ug/l | **0.020 ug/l** |
| U1A | 10/18/2006 | N | < 0.0034 ug/l | **0.030 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0067 ug/l** | < 3.0 ug/l | **0.0047 ug/l** | **0.014 ug/l** |
| U1A | 10/02/2009 | N | < 0.0034 ug/l | **0.060 ug/l** | **0.015 ug/l** | < 0.0034 ug/l | **0.025 ug/l** | < 1.0 ug/l | **0.011 ug/l** | **0.021 ug/l** |
| U1A | 10/12/2010 | N | < 0.0033 ug/l | **0.030 ug/l** | **0.026 * ug/l** | < 0.0033 ug/l | **0.12 ug/l** | **2.4 ug/l** | **0.0064 ug/l** | **0.014 ug/l** |
| U1A | 10/16/2011 | N | < 0.0033 ug/l | **0.045 ug/l** | < 0.012 ug/l | < 0.0033 ug/l | **0.066 b ug/l** | **1.4 ug/l** | < 0.0065 ug/l | **0.018 ug/l** |
| U1A | 3/16/2012 | N | < 0.0033 ug/l | **0.044 ug/l** | < 0.010 ug/l | < 0.0033 ug/l | **0.042 ug/l** | < 0.97 ug/l | **0.0047 * ug/l** | **0.022 ug/l** |
| U1A | 6/09/2012 | N | < 0.0033 ug/l | **0.043 ug/l** | **0.012 * ug/l** | < 0.0033 ug/l | **0.024 ug/l** | < 0.95 ug/l | < 0.0050 ug/l | **0.021 ug/l** |
| U1A | 9/27/2012 | N | < 0.0034 ug/l | **0.0078 ug/l** | < 0.012 ug/l | < 0.0034 ug/l | **0.028 ug/l** | < 0.98 ug/l | < 0.0034 ug/l | **0.012 ug/l** |
| U1A | 10/18/2012 | N | < 0.0034 ug/l | **0.035 ug/l** | **0.014 ug/l** | < 0.0034 ug/l | **0.029 ug/l** | < 1.0 ug/l | < 0.0064 ug/l | **0.021 ug/l** |
| U1A | 10/08/2013 | N | < 0.0034 ug/l | **0.026 ug/l** | < 0.015 ug/l | < 0.0034 ug/l | **0.073 b ug/l** | < 0.99 ug/l | **0.0054 * ug/l** | **0.028 ug/l** |
| U1A | 10/16/2014 | N | < 0.0033 ug/l | **0.018 ug/l** | **0.011 ug/l** | < 0.0033 ug/l | **0.019 ug/l** | < 0.95 ug/l | **0.0080 * ug/l** | **0.024 ug/l** |
| U1A | 10/07/2015 | N | < 0.0034 ug/l | **0.0097 ug/l** | **0.011 * ug/l** | < 0.0034 ug/l | **0.011 b ug/l** | < 0.99 ug/l | **0.0044 b* ug/l** | **0.022 ug/l** |
| U1A | 10/18/2016 | N | < 0.0033 ug/l | < 0.012 ug/l | **0.0087 ug/l** | < 0.0033 ug/l | **0.013 ug/l** | < 0.29 ug/l | **0.0071 ug/l** | **0.021 ug/l** |
| U2 | 7/07/1988 | N | -- | < 10 ug/l | **16 ug/l** | < 10 ug/l | **20 ug/l** | **360 ug/l** | **12 ug/l** | < 10 ug/l |
| U2 | 12/29/1988 | N | < 10 ug/l | < 10 ug/l | **24 ug/l** | < 10 ug/l | **33 ug/l** | **480 ug/l** | **18 ug/l** | < 10 ug/l |
| U2 | 2/27/1989 | N | -- | -- | -- | -- | -- | **1600 ug/l** | -- | -- |
| U2 | 8/03/1989 | N | < 10 ug/l | < 10 ug/l | **29 ug/l** | < 10 ug/l | **45 ug/l** | **7300 ug/l** | **18 ug/l** | < 10 ug/l |
| U2 | 5/04/1990 | N | -- | -- | -- | -- | -- | **1700 ug/l** | -- | -- |
| U2 | 6/22/1990 | N | -- | -- | -- | -- | -- | **1400 ug/l** | -- | -- |
| U2 | 10/30/1990 | N | < 10 ug/l | < 10 ug/l | **23 ug/l** | < 10 ug/l | **24 ug/l** | **520 ug/l** | **16 ug/l** | < 10 ug/l |
| U2 | 10/17/1991 | N | < 10 ug/l | < 10 ug/l | **11 ug/l** | < 10 ug/l | < 10 ug/l | **290 ug/l** | **3 j ug/l** | < 10 ug/l |
| U2 | 12/03/1992 | N | < 20 ug/l | < 20 ug/l | **6 j* ug/l** | < 20 ug/l | < 20 ug/l | **330 ug/l** | < 20 ug/l | < 20 ug/l |
| U2 | 10/18/1993 | N | < 10 ug/l | < 10 ug/l | **7 j ug/l** | < 10 ug/l | < 10 ug/l | **270 ug/l** | < 10 ug/l | < 10 ug/l |
| U2 | 9/28/1994 | N | < 10 ug/l | < 10 ug/l | **6 j ug/l** | < 10 ug/l | < 10 ug/l | **170 ug/l** | **1 j ug/l** | < 10 ug/l |
| U2 | 10/18/1995 | N | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | **240 h* ug/l** | < 30 ug/l | < 30 ug/l |
| U2 | 10/02/1996 | N | < 10 ug/l | < 10 ug/l | **1 j ug/l** | < 10 ug/l | **2 j ug/l** | **5 j ug/l** | < 10 ug/l | < 10 ug/l |
| U2 | 10/03/1997 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| U2 | 11/19/1998 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | -- | < 10 ug/l |
| U2 | 11/19/1999 | N | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 3.0 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U2 | 9/27/2000 | N | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 0.1 ug/l | < 3 ug/l | < 0.1 ug/l | < 0.1 ug/l |
| U2A | 10/01/1997 | N | < 10 ug/l | < 10 ug/l | **2 j ug/l** | < 10 ug/l | **4 j ug/l** | **230 ug/l** | < 10 ug/l | < 10 ug/l |
| U2A | 11/18/1998 | N | < 10 ug/l | < 10 ug/l | **2 j ug/l** | < 10 ug/l | **1 j ug/l** | **370 ug/l** | < 10 ug/l | < 10 ug/l |
| U2A | 11/19/1999 | N | < 10 ug/l | **1 j ug/l** | **4 j ug/l** | < 10 ug/l | **5 j ug/l** | **570 ug/l** | **0.4 j ug/l** | **0.5 j ug/l** |
| U2A | 11/19/1999 | FD | < 10 ug/l | **0.8 j ug/l** | **5 j ug/l** | < 10 ug/l | **5 j ug/l** | **600 ug/l** | **0.4 j ug/l** | **0.5 j ug/l** |
| U2A | 12/10/1999 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **520 ug/l** | < 10 ug/l | < 10 ug/l |
| U2A | 9/26/2000 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | **150 ug/l** | < 9.6 ug/l | < 9.6 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U2A | 10/16/2001 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | **460 ug/l** | < 9.6 ug/l | < 9.6 ug/l |
| U2A | 11/01/2002 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 * ug/l | **390 ug/l** | < 9.6 ug/l | < 9.6 ug/l |
| U2A | 12/16/2003 | N | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | < 9.9 ug/l | **220 ug/l** | < 9.9 ug/l | < 9.9 ug/l |
| U2A | 10/29/2004 | N | < 0.0035 ug/l | **0.29 ug/l** | **1.6 ug/l** | < 0.0035 ug/l | **1.5 ug/l** | **130 * ug/l** | **0.019 ug/l** | **0.14 ug/l** |
| U2A | 11/12/2005 | N | < 0.034 ug/l | **0.33 ug/l** | **1.6 ug/l** | < 0.034 ug/l | **1.9 ug/l** | **160 ug/l** | **0.061 ug/l** | **0.20 ug/l** |
| U2A | 10/18/2006 | N | < 0.0066 ug/l | **0.29 ug/l** | **1.1 ug/l** | < 0.0066 ug/l | **1.5 ug/l** | **230 ug/l** | **0.039 ug/l** | **0.16 ug/l** |
| U2A | 11/13/2007 | N | < 0.017 ug/l | **0.28 ug/l** | **0.51 ug/l** | < 0.017 ug/l | **0.99 b ug/l** | **240 ug/l** | **0.025 ug/l** | **0.12 ug/l** |
| U2A | 10/16/2008 | N | < 0.0033 ug/l | **0.29 ug/l** | **0.32 ug/l** | < 0.0033 ug/l | **0.62 ug/l** | **200 ug/l** | **0.039 ug/l** | **0.13 ug/l** |
| U2A | 10/13/2010 | N | < 0.0034 ug/l | **0.26 ug/l** | < 0.026 ug/l | < 0.0034 ug/l | **0.047 b ug/l** | < 0.99 ug/l | < 0.011 ug/l | **0.12 ug/l** |
| U2A | 10/16/2011 | N | < 0.0033 ug/l | **0.22 ug/l** | **0.078 ug/l** | < 0.0033 ug/l | **0.16 b ug/l** | **140 ug/l** | < 0.028 ug/l | **0.11 ug/l** |
| U2A | 10/18/2012 | N | < 0.0035 ug/l | **0.18 ug/l** | **0.13 ug/l** | < 0.0035 ug/l | **0.13 ug/l** | **190 ug/l** | < 0.019 ug/l | **0.11 ug/l** |
| U2A | 10/11/2013 | N | < 0.0036 ug/l | **0.26 ug/l** | **0.21 ug/l** | < 0.0036 ug/l | **0.39 ug/l** | **190 ug/l** | **0.031 ug/l** | **0.16 ug/l** |
| U2A | 10/21/2014 | N | < 0.0034 ug/l | **0.18 ug/l** | **0.16 ug/l** | < 0.0034 ug/l | **0.18 ug/l** | **100 ug/l** | **0.026 ug/l** | **0.10 ug/l** |
| U2A | 10/14/2015 | N | < 0.017 ug/l | **0.16 ug/l** | **0.097 ug/l** | < 0.017 ug/l | **0.19 ug/l** | **190 ug/l** | < 0.017 ug/l | **0.11 ug/l** |
| U2A | 10/11/2016 | N | **0.036 ug/l** | **0.084 ug/l** | **0.050 ug/l** | **0.035 ug/l** | **0.066 ug/l** | **46 ug/l** | **0.046 ug/l** | **0.10 ug/l** |
| U3 | 7/06/1988 | N | -- | < 10 ug/l | **27 ug/l** | < 10 ug/l | **44 ug/l** | **790 ug/l** | **15 ug/l** | < 10 ug/l |
| U3 | 12/29/1988 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **25 ug/l**<br>**35 ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **15 ug/l**<br>**21 ug/l** | < 10 ug/l<br>< 10 ug/l |
| U3 | 2/27/1989 | N | -- | -- | -- | -- | -- | **1100 ug/l** | -- | -- |
| U3 | 8/03/1989 | N | < 10 ug/l | < 10 ug/l | **28 ug/l** | < 10 ug/l | **210 ug/l** | **410 ug/l** | **27 ug/l** | < 10 ug/l |
| U3 | 5/04/1990 | N | -- | -- | -- | -- | -- | **220 ug/l** | -- | -- |
| U3 | 10/30/1990 | N | < 10 ug/l | **3 j ug/l** | **37 ug/l** | < 10 ug/l | **170 ug/l** | **440 ug/l** | **35 ug/l** | < 10 ug/l |
| U3 | 10/17/1991 | N | < 30 ug/l | < 30 ug/l | **24 j ug/l** | < 30 ug/l | **76 ug/l** | **670 ug/l** | **19 j ug/l** | < 30 ug/l |
| U3 | 10/14/1992 | N | < 25 ug/l | < 25 ug/l | **31 ug/l** | < 25 ug/l | **190 ug/l** | **580 ug/l** | **26 ug/l** | < 25 ug/l |
| U3 | 10/18/1993 | N | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | **140 ug/l** | **460 ug/l** | < 100 ug/l | < 100 ug/l |
| U3 | 9/29/1994 | N | < 15 ug/l | **7 j ug/l** | **31 ug/l** | < 15 ug/l | **150 ug/l** | **140 ug/l** | **25 ug/l** | **5 j ug/l** |
| U3 | 10/18/1995 | N | **25 j ug/l** | < 100 ug/l | **26 j ug/l** | **22 j ug/l** | **99 j ug/l** | **250 jh ug/l** | **19 j ug/l** | < 100 ug/l |
| U3 | 10/02/1996 | N | < 10 ug/l | **3 j ug/l** | **22 * ug/l** | < 10 ug/l | **13 * ug/l** | **770 h ug/l** | **19 ug/l** | **2 j ug/l** |
| U3 | 10/01/1997 | N | < 10 ug/l | **3 j ug/l** | **29 ug/l** | < 10 ug/l | **160 ug/l** | **450 ug/l** | **20 ug/l** | **1 j ug/l** |
| U3 | 11/18/1998 | N | < 10 ug/l | **3 j ug/l** | **21 ug/l** | < 10 ug/l | **57 ug/l** | **660 ug/l** | **17 ug/l** | **2 j ug/l** |
| U3 | 11/19/1999 | N | < 10 ug/l | **5 j ug/l** | **38 ug/l** | < 10 ug/l | **120 ug/l** | **680 ug/l** | **27 ug/l** | **3 j ug/l** |
| U3 | 12/10/1999 | N | < 10 ug/l | < 10 ug/l | **18 ug/l** | < 10 ug/l | < 10 ug/l | **720 ug/l** | < 10 ug/l | < 10 ug/l |
| U4 | 7/06/1988 | N | -- | < 10 ug/l | < 10 ug/l | < 10 ug/l | **17 ug/l** | **270 ug/l** | < 10 ug/l | < 10 ug/l |
| U4 | 12/29/1988 | N | < 10 ug/l | < 10 ug/l | **43 ug/l** | < 10 ug/l | **100 ug/l** | **620 ug/l** | **21 ug/l** | < 10 ug/l |
| U4 | 2/27/1989 | N | -- | -- | -- | -- | -- | **1600 ug/l** | -- | -- |
| U4 | 8/03/1989 | N | < 50 ug/l | < 50 ug/l | < 50 pp ug/l | < 50 ug/l | **200 ug/l** | **6400 ug/l** | < 50 ug/l | < 50 ug/l |
| U4 | 5/04/1990 | N | -- | -- | -- | -- | -- | **1800 ug/l** | -- | -- |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U4 | 10/30/1990 | N | < 10 ug/l | < 10 ug/l | **33 ug/l** | < 10 ug/l | **170 ug/l** | **2200 ug/l** | **23 ug/l** | < 10 ug/l |
| U4 | 10/17/1991 | N | < 75 ug/l | < 75 ug/l | **45 j ug/l** | < 75 ug/l | **240 ug/l** | **3500 ug/l** | < 75 ug/l | < 75 ug/l |
| U4 | 9/17/1992 | N | < 60 ug/l | **22 j ug/l** | **56 j ug/l** | < 60 ug/l | **130 ug/l** | **1100 ug/l** | **66 ug/l** | **18 j ug/l** |
| U4 | 10/14/1992 | N | < 30 ug/l | < 30 ug/l | **59 ug/l** | < 30 ug/l | **310 ug/l** | **1400 ug/l** | **50 ug/l** | < 30 ug/l |
| U4 | 10/27/1992 | N | < 6 ug/l | **4 j ug/l** | **110 ug/l** | < 6 ug/l | **180 ug/l** | **1600 ug/l** | **81 ug/l** | **2 j ug/l** |
| U4 | 10/18/1993 | N | < 50 ug/l | < 50 ug/l | **48 j ug/l** | < 50 ug/l | **300 ug/l** | **480 ug/l** | **39 j ug/l** | < 50 ug/l |
| U4 | 9/28/1994 | N | < 80 ug/l | < 80 ug/l | **65 j ug/l** | < 80 ug/l | **600 ug/l** | **1300 ug/l** | **63 j ug/l** | < 80 ug/l |
| U4 | 10/18/1995 | N | < 250 ug/l | < 250 ug/l | **61 j ug/l** | < 250 ug/l | **190 j ug/l** | **490 jh ug/l** | **58 j ug/l** | < 250 ug/l |
| U4 | 10/02/1996 | N | < 10 ug/l | **3 j ug/l** | **52 ug/l** | < 10 ug/l | **430 ug/l** | **400 ug/l** | **60 ug/l** | **1 j ug/l** |
| U4 | 10/01/1997 | N | < 10 ug/l | **2 j ug/l** | **44 ug/l** | < 10 ug/l | **180 ug/l** | **330 ug/l** | **42 ug/l** | < 10 ug/l |
| U4 | 11/18/1998 | N | < 10 ug/l | **3 j ug/l** | **54 ug/l** | < 10 ug/l | **340 ug/l** | **520 ug/l** | **53 ug/l** | **1 j ug/l** |
| U4 | 1/14/2000 | N | < 10 ug/l | **3 j ug/l** | **49 ug/l** | < 10 ug/l | < 10 ug/l | **420 ug/l** | **28 ug/l** | **1 j ug/l** |
| U4 | 9/26/2000 | N | < 12 ug/l | < 12 ug/l | **52 ug/l** | < 12 ug/l | **110 ug/l** | **300 ug/l** | **43 ug/l** | < 12 ug/l |
| U4 | 10/16/2001 | N | < 9.6 ug/l | < 9.6 ug/l | **72 ug/l** | < 9.6 ug/l | **360 ug/l** | **1200 ug/l** | **61 ug/l** | < 9.6 ug/l |
| U4 | 5/15/2002 | N | < 0.011 ug/l | < 0.011 ug/l | **0.044 ug/l** | < 0.011 ug/l | **0.24 b ug/l** | **0.65 ug/l** | **0.037 b ug/l** | < 0.011 ug/l |
| U4N | 11/01/2002 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 * ug/l | **330 ug/l** | < 9.6 ug/l | < 9.6 ug/l |
| U4N | 12/16/2003 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | **39 ug/l** | **210 ug/l** | < 9.6 ug/l | < 9.6 ug/l |
| U4N | 10/29/2004 | N | < 0.0086 ug/l | **0.022 ug/l** | **4.0 ug/l** | < 0.0086 ug/l | **29 ug/l** | **180 * ug/l** | **1.3 ug/l** | **0.02 ug/l** |
| U4N | 11/12/2005 | N | < 0.017 ug/l | **0.075 ug/l** | **8.1 ug/l** | **0.070 ug/l** | **38 ug/l** | **130 ug/l** | **3.1 ug/l** | **0.091 ug/l** |
| U4N | 10/18/2006 | N | < 0.017 ug/l | **0.27 ug/l** | **20 ug/l** | < 0.017 ug/l | **96 ug/l** | **160 ug/l** | **6.5 ug/l** | **0.12 ug/l** |
| U4N | 11/13/2007 | N | < 0.032 ug/l | **0.23 ug/l** | **9.0 ug/l** | < 0.032 ug/l | **31 ug/l** | **160 ug/l** | **4.2 ug/l** | **0.098 ug/l** |
| U4N | 10/16/2008 | N | < 0.0068 ug/l | **0.26 ug/l** | **11 ug/l** | < 0.0068 ug/l | **60 ug/l** | **160 ug/l** | **5.3 ug/l** | **0.13 ug/l** |
| U4N | 10/02/2009 | N | < 0.0033 ug/l | **0.30 ug/l** | **16 ug/l** | < 0.0033 ug/l | **84 ug/l** | **230 ug/l** | **5.1 ug/l** | **0.13 ug/l** |
| U4N | 10/12/2010 | N | < 0.017 ug/l | **0.37 ug/l** | **8.4 ug/l** | < 0.017 ug/l | **47 ug/l** | **160 ug/l** | **4.3 ug/l** | **0.16 ug/l** |
| U4N | 10/16/2011 | N | < 0.017 ug/l | **0.40 ug/l** | **8.5 ug/l** | < 0.017 ug/l | **59 ug/l** | **170 ug/l** | **4.1 ug/l** | **0.17 ug/l** |
| U4N | 10/18/2012 | N | < 0.017 ug/l | **0.43 ug/l** | **6.1 ug/l** | < 0.017 ug/l | **0.053 * ug/l** | **140 ug/l** | **0.87 ug/l** | **0.22 ug/l** |
| U4N | 10/11/2013 | N | < 0.033 ug/l | **0.70 ug/l** | **12 ug/l** | < 0.033 ug/l | **110 ug/l** | **220 ug/l** | **5.8 ug/l** | **0.32 ug/l** |
| U4N | 10/21/2014 | N | < 0.0034 ug/l | **0.38 ug/l** | **8.5 ug/l** | < 0.0034 ug/l | **80 ug/l** | **110 ug/l** | **3.9 ug/l** | **0.16 ug/l** |
| U4N | 10/14/2015 | N | < 0.017 ug/l | **0.68 ug/l** | **9.3 ug/l** | < 0.017 ug/l | **56 ug/l** | **150 ug/l** | **4.6 ug/l** | **0.28 ug/l** |
| U4N | 10/11/2016 | N | < 0.033 ug/l | **0.81 ug/l** | **9.1 ug/l** | < 0.033 ug/l | **47 ug/l** | **110 ug/l** | **4.4 ug/l** | **0.29 ug/l** |
| U5 | 7/07/1988 | N | -- | < 10 ug/l | **79 ug/l** | < 10 ug/l | **690 ug/l** | **3400 ug/l** | **76 ug/l** | < 10 ug/l |
| U5 | 12/29/1988 | N | < 100 ug/l | < 100 ug/l | < 100 pp ug/l | < 100 ug/l | **440 ug/l** | **1400 ug/l** | < 100 pp ug/l | < 100 ug/l |
| U5 | 2/27/1989 | N | -- | -- | -- | -- | -- | **50000 ug/l** | -- | -- |
| U5 | 8/03/1989 | N | < 10 ug/l | < 10 pp ug/l | **66 ug/l** | < 10 ug/l | **220 ug/l** | **12000 ug/l** | **47 ug/l** | < 10 ug/l |
| U5 | 6/22/1990 | N | -- | -- | -- | -- | -- | **810 ug/l** | -- | -- |
| U5 | 10/30/1990 | N | < 20 ug/l | **11 j ug/l** | **120 ug/l** | < 20 ug/l | **360 ug/l** | **350 ug/l** | **82 ug/l** | **5 j ug/l** |
| U5 | 12/03/1992 | N | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | **1300 ug/l** | < 70 ug/l | < 70 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U5 | 10/18/1993 | N | < 10 ug/l | **36 ug/l** | **32 ug/l** | < 10 ug/l | < 10 ug/l | **35 ug/l** | **3 j ug/l** | **15 ug/l** |
| U5 | 9/28/1994 | N | < 40 ug/l | **15 j ug/l** | **100 ug/l** | < 40 ug/l | **150 ug/l** | **850 ug/l** | **31 j ug/l** | **8 j ug/l** |
| U5 | 10/18/1995 | N | < 400 ug/l | < 400 ug/l | **57 j ug/l** | < 400 ug/l | **75 j ug/l** | **1400 h ug/l** | **50 j ug/l** | < 400 ug/l |
| U5 | 10/01/1997 | N | < 10 ug/l | **12 ug/l** | **86 ug/l** | < 10 ug/l | **140 ug/l** | **390 ug/l** | **65 ug/l** | **6 j ug/l** |
| U5 | 11/18/1998 | N | < 10 ug/l | **14 ug/l** | **110 ug/l** | < 10 ug/l | **99 j ug/l** | **530 ug/l** | **56 ug/l** | **8 j ug/l** |
| U5 | 11/19/1999 | N | < 10 ug/l | **18 ug/l** | **110 ug/l** | < 10 ug/l | **100 ug/l** | **950 ug/l** | **40 ug/l** | **9 j ug/l** |
| U5 | 9/26/2000 | N | < 9.5 ug/l | **18 ug/l** | **110 ug/l** | < 9.5 ug/l | **240 ug/l** | **1500 ug/l** | **46 ug/l** | **10 ug/l** |
| U5 | 10/16/2001 | N | < 9.6 ug/l | **15 ug/l** | **86 ug/l** | < 9.6 ug/l | **140 ug/l** | **1200 ug/l** | **38 ug/l** | < 9.6 ug/l |
| U5 | 11/01/2002 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 * ug/l | **1500 ug/l** | < 9.6 ug/l | < 9.6 ug/l |
| U5 | 12/16/2003 | N | < 10 ug/l | **19 ug/l** | **110 ug/l** | < 10 ug/l | **48 ug/l** | **220 ug/l** | **50 ug/l** | **11 ug/l** |
| U5 | 10/29/2004 | N | **0.021 ug/l** | **5.5 ug/l** | **0.88 ug/l** | **0.048 ug/l** | **0.2 ug/l** | **190 * ug/l** | **0.11 ug/l** | **1.6 ug/l** |
| U5 | 11/12/2005 | N | < 0.034 ug/l | **0.46 ug/l** | **0.22 ug/l** | < 0.034 ug/l | < 1.5 ug/l | **510 ug/l** | **0.11 ug/l** | **0.27 ug/l** |
| U5 | 10/18/2006 | N | < 0.017 ug/l | **16 ug/l** | **83 ug/l** | < 0.017 ug/l | **93 ug/l** | **910 ug/l** | **26 ug/l** | **8.5 ug/l** |
| U5 | 11/13/2007 | N | < 0.032 ug/l | **4.6 ug/l** | **0.56 ug/l** | **0.047 ug/l** | **0.96 b ug/l** | **650 ug/l** | < 0.032 ug/l | **3.3 ug/l** |
| U5 | 10/16/2008 | N | < 0.017 ug/l | **17 ug/l** | **61 ug/l** | **0.026 ug/l** | **0.51 ug/l** | **540 ug/l** | **6.9 ug/l** | **9.7 ug/l** |
| U5 | 10/02/2009 | N | < 0.0033 ug/l | **16 ug/l** | **100 ug/l** | **0.0051 ug/l** | **7.0 ug/l** | **27 ug/l** | **26 ug/l** | **8.3 ug/l** |
| U5 | 10/12/2010 | N | < 0.0033 ug/l | **21 ug/l** | **120 ug/l** | **0.0063 ug/l** | **15 ug/l** | **93 ug/l** | **21 ug/l** | **11 ug/l** |
| U5 | 10/16/2011 | N | < 0.017 ug/l | **8.2 ug/l** | **1.0 ug/l** | < 0.017 ug/l | **0.77 ug/l** | **230 ug/l** | **0.064 ug/l** | **3.9 ug/l** |
| U5 | 10/18/2012 | N | < 0.018 ug/l | **22 ug/l** | **81 ug/l** | < 0.018 ug/l | **15 ug/l** | **110 ug/l** | **20 ug/l** | **8.4 ug/l** |
| U5 | 10/11/2013 | N | < 0.034 ug/l | **27 ug/l** | **87 ug/l** | < 0.034 ug/l | **4.2 ug/l** | **200 ug/l** | **17 ug/l** | **13 ug/l** |
| U5 | 10/21/2014 | N | **0.0041 ug/l** | **21 ug/l** | **81 ug/l** | **0.018 ug/l** | **8.8 ug/l** | **34 ug/l** | **14 ug/l** | **12 ug/l** |
| U5 | 10/14/2015 | N | < 0.033 ug/l | **19 ug/l** | **61 ug/l** | < 0.033 ug/l | **2.2 ug/l** | **8.2 ug/l** | **5.2 ug/l** | **11 ug/l** |
| U5 | 10/11/2016 | N | < 0.033 ug/l | **18 ug/l** | **57 ug/l** | < 0.033 ug/l | **2.1 ug/l** | **16 ug/l** | **2.8 ug/l** | **8.1 ug/l** |
| U6 | 7/06/1988 | N | -- | < 10 ug/l | < 10 ug/l | < 10 ug/l | **15 ug/l** | **3000 ug/l** | < 10 ug/l | < 10 ug/l |
| U6 | 12/29/1988 | N | < 10 ug/l | < 10 ug/l | < 10 pp ug/l | < 10 ug/l | < 10 pp ug/l | **1100 ug/l** | < 10 pp ug/l | < 10 ug/l |
| U6 | 2/27/1989 | N | -- | -- | -- | -- | -- | **5000 ug/l** | -- | -- |
| U6 | 8/03/1989 | N | < 10 ug/l | < 10 ug/l | < 10 pp ug/l | < 10 ug/l | **22 ug/l** | **17000 ug/l** | < 10 ug/l | < 10 ug/l |
| U6 | 6/22/1990 | N | -- | -- | -- | -- | -- | **5100 ug/l** | -- | -- |
| U6 | 10/30/1990 | N | < 10 ug/l | < 10 ug/l | **9 j ug/l** | < 10 ug/l | **42 ug/l** | **6100 ug/l** | **5 j ug/l** | < 10 ug/l |
| U6 | 10/17/1991 | N | < 75 ug/l | < 75 ug/l | < 75 ug/l | < 75 ug/l | **35 j ug/l** | **5200 ug/l** | < 75 ug/l | < 75 ug/l |
| U6 | 9/17/1992 | N | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | **4300 ug/l** | < 250 ug/l | < 250 ug/l |
| U6 | 10/14/1992 | N | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l | < 320 ug/l | **5700 ug/l** | < 320 ug/l | < 320 ug/l |
| U6 | 10/27/1992 | N | < 6 ug/l | < 6 ug/l | **8 ug/l** | < 6 ug/l | **26 ug/l** | **6800 ug/l** | **4 j ug/l** | < 6 ug/l |
| U6 | 10/18/1993 | N | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | **76 j ug/l** | **3500 ug/l** | < 250 ug/l | < 250 ug/l |
| U6 | 9/28/1994 | N | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l | < 380 ug/l | **3500 ug/l** | < 380 ug/l | < 380 ug/l |
| U6 | 10/18/1995 | N | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | < 1400 ug/l | **4000 h ug/l** | < 1400 ug/l | < 1400 ug/l |
| U6 | 10/02/1996 | N | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | **2800 ug/l** | < 500 ug/l | < 500 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U6 | 10/01/1997 | N | < 10 ug/l | < 10 ug/l | **5 j ug/l** | < 10 ug/l | **46 ug/l** | **4300 ug/l** | **5 j ug/l** | < 10 ug/l |
| U6 | 11/18/1998 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **24 ug/l** | **3600 ug/l** | **4 j ug/l** | < 10 ug/l |
| U6N | 1/14/2000 | N | < 10 ug/l | **16 ug/l** | **130 ug/l** | < 10 ug/l | **1100 ug/l** | **1600 ug/l** | **150 ug/l** | **10 j ug/l** |
| U6N | 9/26/2000 | N | < 9.6 ug/l | **17 ug/l** | **73 ug/l** | < 9.6 ug/l | **400 ug/l** | **2400 ug/l** | **90 ug/l** | < 9.6 ug/l |
| U6N | 10/16/2001 | N | < 9.6 ug/l | **14 ug/l** | **53 ug/l** | < 9.6 ug/l | **140 ug/l** | **1400 ug/l** | **62 ug/l** | < 9.6 ug/l |
| U6N | 11/01/2002 | N | < 9.6 ug/l | **14 ug/l** | **53 ug/l** | < 9.6 ug/l | **290 * ug/l** | **1200 ug/l** | **59 ug/l** | < 9.6 ug/l |
| U6N | 12/16/2003 | N | < 9.6 ug/l | **11 ug/l** | **47 ug/l** | < 9.6 ug/l | **190 ug/l** | **2000 ug/l** | **48 ug/l** | < 9.6 ug/l |
| U6N | 10/29/2004 | N | < 0.0086 ug/l | **3.4 ug/l** | **17 ug/l** | < 0.0086 ug/l | **3.7 ug/l** | **55 * ug/l** | **0.024 ug/l** | **1.7 ug/l** |
| U6N | 2/10/2005 | N | < 0.0034 ug/l | **67 ug/l** | **170 ug/l** | **0.0096 ug/l** | **730 ug/l** | **3700 ug/l** | **160 ug/l** | **33 ug/l** |
| U6N | 11/12/2005 | N | < 0.034 ug/l | **12 ug/l** | **27 ug/l** | < 0.034 ug/l | **170 ug/l** | **590 ug/l** | **24 ug/l** | **8.3 ug/l** |
| U6N | 10/18/2006 | N | < 0.033 ug/l | **11 ug/l** | **32 ug/l** | **0.048 ug/l** | **150 ug/l** | **1500 ug/l** | **28 ug/l** | **7.1 ug/l** |
| U6N | 11/13/2007 | N | **0.045 ug/l** | **9.9 ug/l** | **27 ug/l** | **0.14 ug/l** | **6.2 ug/l** | **1300 ug/l** | **18 ug/l** | **5.7 ug/l** |
| U6N | 10/16/2008 | N | < 0.034 ug/l | **13 ug/l** | **38 ug/l** | < 0.034 ug/l | **150 ug/l** | **1400 ug/l** | **33 ug/l** | **7.7 ug/l** |
| U6N | 10/02/2009 | N | < 0.033 ug/l | **11 ug/l** | **31 ug/l** | < 0.033 ug/l | **17 ug/l** | **900 ug/l** | **16 ug/l** | **6.3 ug/l** |
| U6N | 10/12/2010 | N | **0.48 ug/l** | **26 ug/l** | **29 ug/l** | **1.7 ug/l** | **100 ug/l** | **870 ug/l** | **31 ug/l** | **18 ug/l** |
| U6N | 10/16/2011 | N | **1.3 ug/l** | **27 ug/l** | **22 ug/l** | **2.4 ug/l** | **70 ug/l** | **890 ug/l** | **23 ug/l** | **17 ug/l** |
| U6N | 10/18/2012 | N | **0.036 ug/l** | **9.6 ug/l** | **21 ug/l** | **0.12 ug/l** | **0.073 * ug/l** | **1100 ug/l** | **7.6 ug/l** | **7.0 ug/l** |
| U6N | 10/11/2013 | N | < 0.033 ug/l | **13 ug/l** | **25 ug/l** | < 0.033 ug/l | **0.99 ug/l** | **1100 ug/l** | **12 ug/l** | **8.8 ug/l** |
| U6N | 10/21/2014 | N | **0.27 ug/l** | **13 ug/l** | **14 ug/l** | **0.98 ug/l** | **0.78 ug/l** | **260 ug/l** | **6.8 ug/l** | **12 ug/l** |
| U6N | 10/14/2015 | N | **0.28 ug/l** | **18 ug/l** | **15 ug/l** | **1.3 ug/l** | **18 ug/l** | **1400 ug/l** | **11 ug/l** | **12 ug/l** |
| U6N | 10/11/2016 | N | < 0.033 ug/l | **10 ug/l** | **16 ug/l** | **0.055 ug/l** | **25 ug/l** | **650 ug/l** | **13 ug/l** | **5.2 ug/l** |
| U7 | 7/06/1988 | N | -- | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **380 ug/l** | < 10 ug/l | < 10 ug/l |
| U7 | 12/29/1988 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **44 ug/l** | < 10 ug/l | < 10 ug/l |
| U7 | 2/27/1989 | N | -- | -- | -- | -- | -- | **180 ug/l** | -- | -- |
| U7 | 8/03/1989 | N | < 10 ug/l | < 10 pp ug/l | < 10 pp ug/l | < 10 ug/l | **97 ug/l** | **100 ug/l** | < 10 pp ug/l | < 10 pp ug/l |
| U7 | 5/04/1990 | N | -- | -- | -- | -- | -- | **270 ug/l** | -- | -- |
| U7 | 10/30/1990 | N | < 10 ug/l | **7 j ug/l** | **15 ug/l** | < 10 ug/l | **94 ug/l** | **130 ug/l** | **3 j ug/l** | **4 j ug/l** |
| U7 | 10/17/1991 | N | < 10 ug/l | **7 j ug/l** | **14 ug/l** | < 10 ug/l | **7 j ug/l** | **180 ug/l** | **2 j ug/l** | **4 j ug/l** |
| U7 | 12/03/1992 | N | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | **5 j* ug/l** | **520 ug/l** | < 20 ug/l | < 20 ug/l |
| U7 | 10/18/1993 | N | < 20 ug/l | < 20 ug/l | < 20 ug/l | < 20 ug/l | **5 j ug/l** | **240 ug/l** | < 20 ug/l | < 20 ug/l |
| U7 | 9/28/1994 | N | < 15 ug/l<br>< 10 ug/l | **2 j ug/l**<br>**2 j ug/l** | **2 j ug/l**<br>**2 j ug/l** | < 15 ug/l<br>< 10 ug/l | **6 j ug/l**<br>**6 j ug/l** | **480 h ug/l**<br>**430 h ug/l** | **2 j ug/l**<br>**3 j ug/l** | < 15 ug/l<br>1 j ug/l |
| U7 | 10/18/1995 | N | < 70 ug/l | < 70 ug/l | < 70 ug/l | < 70 ug/l | **32 j ug/l** | **310 jh ug/l** | < 70 ug/l | < 70 ug/l |
| U7 | 10/02/1996 | N | < 50 ug/l | < 50 ug/l | < 50 * ug/l | < 50 ug/l | **13 j ug/l** | **280 ug/l** | < 50 ug/l | < 50 ug/l |
| U7 | 10/01/1997 | N | < 10 ug/l | **2 j ug/l** | **3 j ug/l** | < 10 ug/l | **30 ug/l** | **320 ug/l** | **3 j ug/l** | **1 j ug/l** |
| U7 | 11/18/1998 | N | < 120 ug/l | < 120 ug/l | < 120 ug/l | < 120 ug/l | **19 j ug/l** | **880 ug/l** | < 120 ug/l | < 120 ug/l |
| U7N | 1/14/2000 | N | < 10 ug/l | **2 j ug/l** | **21 ug/l** | < 10 ug/l | **41 ug/l** | **740 ug/l** | **4 j ug/l** | **0.9 j ug/l** |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U7N | 9/26/2000 | N | < 9.7 ug/l | **13 ug/l** | **51 ug/l** | < 9.7 ug/l | **120 ug/l** | **130 ug/l** | **38 ug/l** | < 9.7 ug/l |
| U7N | 10/16/2001 | N | < 9.6 ug/l | **12 ug/l** | **47 ug/l** | < 9.6 ug/l | **120 ug/l** | **87 ug/l** | **36 ug/l** | < 9.6 ug/l |
| U7N | 11/01/2002 | N | < 9.7 ug/l | **12 ug/l** | **44 ug/l** | < 9.7 ug/l | **110 * ug/l** | **75 ug/l** | **29 ug/l** | < 9.7 ug/l |
| U7N | 12/16/2003 | N | < 9.9 ug/l | < 9.9 ug/l | **30 ug/l** | < 9.9 ug/l | **85 ug/l** | **83 ug/l** | **23 ug/l** | < 9.9 ug/l |
| U7N | 10/29/2004 | N | < 0.0086 ug/l | **7.8 ug/l** | **23 ug/l** | < 0.0086 ug/l | **32 ug/l** | **49 * ug/l** | **12 ug/l** | **4.3 ug/l** |
| U7N | 11/12/2005 | N | < 0.017 ug/l | **10 ug/l** | **28 ug/l** | < 0.017 ug/l | **78 ug/l** | **40 ug/l** | **13 ug/l** | **7.4 ug/l** |
| U7N | 10/18/2006 | N | < 0.017 ug/l | **9.6 ug/l** | **28 ug/l** | < 0.017 ug/l | **65 ug/l** | **47 ug/l** | **14 ug/l** | **5.4 ug/l** |
| U7N | 11/13/2007 | N | < 0.017 ug/l | **7.3 ug/l** | **23 ug/l** | < 0.017 ug/l | **41 ug/l** | **45 ug/l** | **9.5 ug/l** | **4.0 ug/l** |
| U7N | 10/16/2008 | N | < 0.0067 ug/l | **10 ug/l** | **24 ug/l** | < 0.0067 ug/l | **44 ug/l** | **38 ug/l** | **13 ug/l** | **5.7 ug/l** |
| U7N | 10/02/2009 | N | < 0.0033 ug/l | **11 ug/l** | **35 ug/l** | < 0.0033 ug/l | **42 ug/l** | **61 ug/l** | **11 ug/l** | **5.4 ug/l** |
| U7N | 10/12/2010 | N | < 0.017 ug/l | **12 ug/l** | **30 ug/l** | < 0.017 ug/l | **65 ug/l** | **34 ug/l** | **15 ug/l** | **5.9 ug/l** |
| U7N | 10/16/2011 | N | < 0.017 ug/l | **9.0 ug/l** | **20 ug/l** | < 0.017 ug/l | **32 ug/l** | **24 ug/l** | **11 ug/l** | **6.6 ug/l** |
| U7N | 10/18/2012 | N | < 0.0034 ug/l | **10 ug/l** | **22 ug/l** | < 0.0034 ug/l | **21 ug/l** | **34 ug/l** | **12 ug/l** | **5.5 ug/l** |
| U7N | 10/11/2013 | N | < 0.033 ug/l | **12 ug/l** | **29 ug/l** | < 0.033 ug/l | **37 ug/l** | **82 ug/l** | **16 ug/l** | **7.0 ug/l** |
| U7N | 10/21/2014 | N | < 0.0033 ug/l | **7.0 ug/l** | **23 ug/l** | < 0.0033 ug/l | **41 ug/l** | **44 ug/l** | **12 ug/l** | **5.8 ug/l** |
| U7N | 10/14/2015 | N | < 0.033 ug/l | **13 ug/l** | **23 ug/l** | < 0.033 ug/l | **41 ug/l** | **56 ug/l** | **18 ug/l** | **7.3 ug/l** |
| U7N | 10/11/2016 | N | < 0.033 ug/l | **9.6 ug/l** | **20 ug/l** | < 0.033 ug/l | **32 ug/l** | **53 ug/l** | **13 ug/l** | **4.2 ug/l** |
| U8 | 12/29/1988 | N | < 10 ug/l | < 10 ug/l | **60 ug/l** | < 10 ug/l | **45 ug/l** | < 10 ug/l | < 10 pp ug/l | < 10 ug/l |
| U8 | 2/27/1989 | N | -- | -- | -- | -- | -- | < 17 ug/l | -- | -- |
| U8 | 8/03/1989 | N | < 50 ug/l | < 50 pp ug/l | **80 ug/l** | < 50 ug/l | **650 ug/l** | **60 ug/l** | **77 ug/l** | < 50 pp ug/l |
| U8 | 12/03/1992 | N | < 40 ug/l | **460 * ug/l** | **260 * ug/l** | < 40 ug/l | **480 * ug/l** | **160 ug/l** | **770 * ug/l** | **300 * ug/l** |
| U8 | 10/18/1993 | N | < 50 ug/l | < 50 ug/l | **42 j ug/l** | < 50 ug/l | **320 ug/l** | **38 j ug/l** | **66 ug/l** | < 50 ug/l |
| U8 | 9/28/1994 | N | < 150 ug/l | **840 ug/l** | **620 ug/l** | **28 j ug/l** | **1500 ug/l** | < 150 ug/l | **1700 ug/l** | **670 ug/l** |
| U8 | 10/20/1995 | N | < 250 ug/l | **54 j ug/l** | **150 j ug/l** | < 250 ug/l | **1100 ug/l** | **34 j ug/l** | **240 j ug/l** | **31 j ug/l** |
| U8 | 10/02/1996 | N | < 150 ug/l | **59 j ug/l** | **140 j ug/l** | < 150 ug/l | **720 ug/l** | **25 j ug/l** | **240 ug/l** | **38 j ug/l** |
| U8 | 10/01/1997 | N | **11 ug/l** | **550 ug/l** | **500 ug/l** | **21 ug/l** | **3000 ug/l** | **50 ug/l** | **1100 ug/l** | **400 ug/l** |
| U8 | 2/02/2000 | N | < 10 ug/l | **760 ug/l** | **650 ug/l** | **27 ug/l** | **6000 ug/l** | **67 ug/l** | **1300 ug/l** | **520 ug/l** |
| U8 | 9/26/2000 | N | **11 ug/l** | **920 ug/l** | **800 ug/l** | **26 ug/l** | **4100 ug/l** | **58 ug/l** | **2300 ug/l** | **670 ug/l** |
| U8 | 10/16/2001 | N | < 9.6 ug/l | **60 ug/l** | **150 ug/l** | < 9.6 ug/l | **1300 ug/l** | < 48 ug/l | **170 ug/l** | **39 ug/l** |
| U8 | 12/22/2003 | N | < 3.4 ug/l | **150 ug/l** | **180 ug/l** | **6.1 ug/l** | **1800 ug/l** | **33 ug/l** | **290 ug/l** | **100 ug/l** |
| U11 | 10/18/2001 | N | < 10 ug/l | < 10 ug/l | **68 ug/l** | < 10 ug/l | **20 ug/l** | **940 ug/l** | **52 ug/l** | < 10 ug/l |
| U11 | 11/01/2002 | N | < 9.6 ug/l | < 9.6 ug/l | **60 ug/l** | < 9.6 ug/l | **480 * ug/l** | **1600 ug/l** | **63 ug/l** | < 9.6 ug/l |
| U11 | 11/01/2002 | FD | < 9.6 ug/l | < 9.6 ug/l | **62 ug/l** | < 9.6 ug/l | **570 ug/l** | **1800 ug/l** | **66 ug/l** | < 9.6 ug/l |
| U11 | 12/16/2003 | N | < 9.6 ug/l | < 9.6 ug/l | **81 ug/l** | < 9.6 ug/l | **730 ug/l** | **2100 ug/l** | **81 ug/l** | < 9.6 ug/l |
| U11 | 10/29/2004 | N | < 0.0035 ug/l | **0.021 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | **0.0077 b ug/l** | < 2 * ug/l | **0.0048 ug/l** | **0.0098 ug/l** |
| U11 | 2/10/2005 | N | < 0.0034 ug/l | **2.4 ug/l** | **270 ug/l** | < 0.0034 ug/l | **2000 ug/l** | **4400 ug/l** | **250 ug/l** | **1.4 ug/l** |
| U11 | 11/12/2005 | N | < 0.17 ug/l | **3.3 ug/l** | **52 ug/l** | < 0.17 ug/l | **510 ug/l** | **1200 ug/l** | **50 ug/l** | **1.6 ug/l** |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| U11 | 10/18/2006 | N | < 0.034 ug/l | **2.7 ug/l** | **38 ug/l** | < 0.034 ug/l | **200 ug/l** | **870 ug/l** | **35 ug/l** | **1.1 ug/l** |
| U11 | 11/13/2007 | N | < 0.033 ug/l | **2.6 ug/l** | **44 ug/l** | < 0.033 ug/l | **230 ug/l** | **1100 ug/l** | **31 ug/l** | **1.0 ug/l** |
| U11 | 11/13/2007 | FD | < 0.034 ug/l | **2.7 ug/l** | **45 ug/l** | < 0.034 ug/l | **170 ug/l** | **1100 ug/l** | **34 ug/l** | **1.1 ug/l** |
| U11 | 10/16/2008 | N | < 0.033 ug/l | **3.1 ug/l** | **46 ug/l** | < 0.033 ug/l | **290 ug/l** | **720 ug/l** | **39 ug/l** | **1.4 ug/l** |
| U11 | 10/16/2008 | FD | < 0.017 ug/l | **2.7 ug/l** | **41 ug/l** | < 0.017 ug/l | **260 ug/l** | **890 ug/l** | **35 ug/l** | **1.3 ug/l** |
| U11 | 10/02/2009 | N | < 0.033 ug/l | **3.6 ug/l** | **56 ug/l** | < 0.033 ug/l | **400 ug/l** | **810 ug/l** | **39 ug/l** | **1.3 ug/l** |
| U11 | 10/12/2010 | N | < 0.17 ug/l | **3.3 ug/l** | **47 ug/l** | < 0.17 ug/l | **320 ug/l** | **730 ug/l** | **38 ug/l** | **1.4 ug/l** |
| U11 | 10/12/2010 | FD | < 0.17 ug/l | **3.2 ug/l** | **47 ug/l** | < 0.17 ug/l | **370 ug/l** | **800 ug/l** | **37 ug/l** | **1.4 ug/l** |
| U11 | 10/16/2011 | N | < 0.033 ug/l | **3.4 ug/l** | **44 ug/l** | < 0.033 ug/l | **200 ug/l** | **760 ug/l** | **35 ug/l** | **1.5 ug/l** |
| U11 | 10/18/2012 | N | < 0.017 ug/l | **2.0 * ug/l** | **1.6 ug/l** | < 0.017 ug/l | **0.63 * ug/l** | **650 ug/l** | < 0.060 ug/l | **1.1 * ug/l** |
| U11 | 10/11/2013 | N | < 0.034 ug/l | **4.1 ug/l** | **53 ug/l** | < 0.034 ug/l | **100 ug/l** | **760 ug/l** | **39 ug/l** | **1.8 ug/l** |
| U11 | 10/21/2014 | N | < 0.017 ug/l | **2.8 ug/l** | **35 ug/l** | < 0.017 ug/l | **160 ug/l** | **260 ug/l** | **20 ug/l** | **1.5 ug/l** |
| U11 | 10/14/2015 | N | < 0.033 ug/l | **3.7 ug/l** | **46 ug/l** | < 0.033 ug/l | **140 ug/l** | **1200 ug/l** | **30 ug/l** | **1.6 ug/l** |
| U11 | 10/11/2016 | N | < 0.033 ug/l | **3.5 ug/l** | **38 ug/l** | < 0.033 ug/l | **60 * ug/l** | **480 ug/l** | **23 ug/l** | **1.2 ug/l** |
| U11 | 10/11/2016 | FD | < 0.033 ug/l | **3.4 ug/l** | **37 ug/l** | < 0.033 ug/l | **43 * ug/l** | **570 ug/l** | **20 ug/l** | **1.2 ug/l** |
| U12 | 10/16/2001 | N | < 9.7 ug/l | < 9.7 ug/l | **25 ug/l** | < 9.7 ug/l | < 9.7 ug/l | **400 ug/l** | < 9.7 ug/l | < 9.7 ug/l |
| U12 | 11/01/2002 | N | < 9.6 ug/l | < 9.6 ug/l | **22 ug/l** | < 9.6 ug/l | **14 * ug/l** | **110 ug/l** | **10 ug/l** | < 9.6 ug/l |
| U12 | 12/16/2003 | N | < 10 ug/l | < 10 ug/l | **28 ug/l** | < 10 ug/l | **25 ug/l** | **70 ug/l** | **12 ug/l** | < 10 ug/l |
| U12 | 10/29/2004 | N | < 0.017 ug/l | **12 ug/l** | **35 ug/l** | < 0.017 ug/l | **110 ug/l** | **480 j* ug/l** | **35 ug/l** | **6.5 ug/l** |
| U12 | 11/12/2005 | N | < 0.068 ug/l | **4.1 ug/l** | **27 ug/l** | < 0.068 ug/l | **9.0 ug/l** | < 60 ug/l | **9.9 ug/l** | **2.6 ug/l** |
| U12 | 10/21/2006 | N | < 0.0034 ug/l | **3.3 ug/l** | **25 ug/l** | < 0.0034 ug/l | **28 ug/l** | **71 ug/l** | **11 ug/l** | **1.8 ug/l** |
| U12 | 11/13/2007 | N | < 0.017 ug/l | **2.9 ug/l** | **24 ug/l** | < 0.017 ug/l | **10 ug/l** | **78 ug/l** | **11 ug/l** | **1.6 ug/l** |
| U12 | 10/16/2008 | N | < 0.036 ug/l | **4.0 ug/l** | **32 ug/l** | < 0.036 ug/l | **18 ug/l** | **60 ug/l** | **15 ug/l** | **2.4 ug/l** |
| U12 | 10/02/2009 | N | **0.019 ug/l** | **3.9 ug/l** | **24 ug/l** | **0.034 ug/l** | **1.0 ug/l** | **36 ug/l** | **6.5 ug/l** | **1.4 ug/l** |
| U12 | 10/12/2010 | N | < 0.0033 ug/l | **4.2 ug/l** | **30 ug/l** | < 0.0033 ug/l | **1.3 ug/l** | **22 ug/l** | **4.8 ug/l** | **2.3 ug/l** |
| U12 | 10/16/2011 | N | < 0.018 ug/l | **4.2 ug/l** | **17 ug/l** | < 0.018 ug/l | **1.2 ug/l** | **13 ug/l** | **3.1 ug/l** | **2.2 ug/l** |
| U12 | 10/18/2012 | N | < 0.0033 ug/l | **4.9 ug/l** | **22 ug/l** | < 0.0033 ug/l | **0.93 ug/l** | **17 ug/l** | **1.2 ug/l** | **2.6 ug/l** |
| U12 | 10/11/2013 | N | < 0.0035 ug/l | **4.7 ug/l** | **19 ug/l** | < 0.0035 ug/l | **1.5 ug/l** | **16 ug/l** | **1.3 ug/l** | **2.5 ug/l** |
| U12 | 10/21/2014 | N | < 0.0033 ug/l | **2.9 ug/l** | **23 ug/l** | < 0.0033 ug/l | **0.61 ug/l** | **6.9 ug/l** | **0.41 ug/l** | **2.1 ug/l** |
| U12 | 10/14/2015 | N | < 0.017 ug/l | **4.3 ug/l** | **17 ug/l** | < 0.017 ug/l | **0.48 ug/l** | **10 ug/l** | **0.38 ug/l** | **2.5 ug/l** |
| U12 | 10/11/2016 | N | < 0.033 ug/l | **4.5 ug/l** | **23 ug/l** | < 0.033 ug/l | **2.9 ug/l** | **12 ug/l** | **0.65 ug/l** | **1.9 ug/l** |
| W6 | 12/27/1984 | N | < 0.28 ug/l | < 0.20 ug/l | **2.2 ug/l** | < 0.34 ug/l | **2.3 ug/l** | **12000 ug/l** | < 0.20 ug/l | < 0.20 ug/l |
| W6 | 3/27/1985 | N | < 0.70 ug/l | < 0.50 ug/l | < 0.70 ug/l | < 0.85 ug/l | **32 ug/l** | **4200 ug/l** | < 0.50 ug/l | < 0.50 ug/l |
| W6 | 5/16/1985 | N | < 0.014 ug/l | **0.030 ug/l** | **0.029 ug/l** | < 0.017 ug/l | **0.97 ug/l** | **2100 ug/l** | **0.013 ug/l** | **0.023 ug/l** |
| W6 | 6/04/1986 | N | < 0.0028 ug/l | **0.0049 ug/l** | < 0.0028 ug/l | < 0.0034 ug/l | **0.034 s ug/l** | **290 ug/l** | **0.0054 ug/l** | **0.0046 ug/l** |
| W6 | 7/29/1987 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | **4900 ug/l** | < 50 ug/l | < 50 ug/l |
| W6 | 10/06/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | **29 ug/l** | **25000 ug/l** | < 6.0 ug/l | < 6.0 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | **Parameter** | **Dibenz(a,h) anthracene** | **Fluoranthene** | **Fluorene** | **Indeno(1,2,3-cd) pyrene** | **Naphthalene** | **Pentachlorophenol** | **Phenanthrene** | **Pyrene** |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W6 | 12/12/1988 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **31 ug/l** | **24000 ug/l** | < 10 ug/l | < 10 ug/l |
| W6 | 6/22/1990 | N | -- | -- | -- | -- | -- | **5400 ug/l** | -- | -- |
| W6 | 10/30/1990 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **5 j ug/l** | **6200 ug/l** | < 10 ug/l | < 10 ug/l |
| W6 | 10/17/1991 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W6 | 10/13/1992 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W6 | 10/19/1993 | N | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | **0.00847 b ug/l** | < 6 ug/l | < 0.00600 ug/l | **0.00653 ug/l** |
| W6 | 9/30/1994 | N | < 0.003 ug/l | **0.011 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.011 b ug/l** | **3 ug/l** | **0.011 ug/l** | **0.009 ug/l** |
| W6 | 10/20/1995 | N | < 0.003 ug/l | **0.009 ug/l** | **0.006 ug/l** | < 0.003 ug/l | **0.046 b ug/l** | **2 j ug/l** | **0.010 ug/l** | **0.008 ug/l** |
| W6 | 10/03/1996 | N | < 0.003 ug/l | **0.053 ug/l** | < 0.003 ug/l | **0.007 ug/l** | **0.011 b ug/l** | **230 ug/l** | **0.012 b ug/l** | **0.12 e ug/l** |
| W6 | 10/06/1997 | N | < 0.003 ug/l | **0.027 ug/l** | **0.14 e ug/l** | **0.005 ug/l** | **0.12 e ug/l** | **170 ug/l** | **0.016 b ug/l** | **0.019 ug/l** |
| W6 | 11/21/1998 | N | < 0.003 ug/l | **0.063 ug/l** | **0.089 e ug/l** | **0.019 ug/l** | **0.018 b ug/l** | **35 ug/l** | **0.032 b ug/l** | **0.066 ug/l** |
| W6N | 11/17/1999 | N | **0.013 ug/l** | **0.11 b ug/l** | **0.011 ug/l** | **0.057 ug/l** | **0.029 b ug/l** | **74 ug/l** | **0.055 b ug/l** | **0.13 b ug/l** |
| W6N | 9/28/2000 | N | < 0.003 ug/l | **0.008 b ug/l** | < 0.003 ug/l | **0.003 ug/l** | **0.014 b ug/l** | **68 ug/l** | **0.009 b ug/l** | **0.007 ug/l** |
| W6N | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.014 ug/l** | < 0.0033 ug/l | **0.024 b ug/l** | **120 ug/l** | **0.011 b ug/l** | < 0.0033 ug/l |
| W6N | 10/29/2002 | N | < 0.0034 ug/l | **0.0091 ug/l** | **0.014 ug/l** | **0.0042 ug/l** | **0.0092 b ug/l** | **62 ug/l** | **0.0064 b ug/l** | **0.0057 ug/l** |
| W6N | 12/17/2003 | N | < 0.0034 ug/l | < 0.034 ug/l | **0.19 ug/l** | < 0.0034 ug/l | **0.10 b ug/l** | **1800 ug/l** | **0.091 ug/l** | < 0.0034 ug/l |
| W6N | 12/17/2003 | FD | < 0.0034 ug/l | < 0.034 ug/l | **0.22 ug/l** | < 0.0034 ug/l | **0.11 b ug/l** | **1800 ug/l** | **0.098 ug/l** | < 0.0034 ug/l |
| W6N | 10/19/2004 | N | < 0.0034 ug/l | **0.0066 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0066 ug/l** | **3.6 ug/l** | **0.0086 ug/l** | **0.0056 ug/l** |
| W6N | 10/21/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.014 b ug/l** | **12 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 11/08/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0069 b ug/l** | **9.9 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/18/2006 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0076 ug/l** | **7.6 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 10/18/2006 | FD | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0056 ug/l** | **9.0 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l |
| W6N | 11/07/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0037 ug/l** | < 0.0034 ug/l | **0.023 ug/l** | **120 ug/l** | < 0.0071 ug/l | < 0.0034 ug/l |
| W6N | 10/09/2008 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.012 ug/l** | **46 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l |
| W6N | 9/29/2009 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.18 ug/l** | < 0.0033 ug/l | **0.073 b ug/l** | **530 ug/l** | < 0.012 ug/l | < 0.0033 ug/l |
| W6N | 6/04/2010 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.035 ug/l** | < 0.0034 ug/l | **0.013 b ug/l** | **60 ug/l** | < 0.013 ug/l | < 0.0034 ug/l |
| W6N | 6/04/2010 | FD | < 0.0034 ug/l | < 0.0034 ug/l | **0.030 ug/l** | < 0.0034 ug/l | **0.012 b ug/l** | **61 ug/l** | < 0.011 ug/l | < 0.0034 ug/l |
| W6N | 10/05/2010 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.068 ug/l** | < 0.0033 ug/l | **0.031 b ug/l** | **170 ug/l** | < 0.013 ug/l | < 0.0033 ug/l |
| W6N | 6/06/2011 | N | < 0.0034 ug/l | **0.014 ug/l** | **0.099 ug/l** | < 0.0034 ug/l | **0.048 ug/l** | **460 ug/l** | < 0.0034 ug/l | **0.011 ug/l** |
| W6N | 10/14/2011 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.048 ug/l** | < 0.0033 ug/l | **0.067 ug/l** | **45 ug/l** | **0.0061 ug/l** | < 0.0033 ug/l |
| W6N | 6/09/2012 | N | < 0.036 ug/l | < 0.036 ug/l | **0.081 ug/l** | < 0.036 ug/l | **0.14 * ug/l** | **240 ug/l** | < 0.036 ug/l | < 0.036 ug/l |
| W6N | 8/07/2012 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.047 ug/l** | < 0.0034 ug/l | **0.051 b ug/l** | **100 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l |
| W6N | 8/24/2012 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.088 ug/l** | < 0.0034 ug/l | **0.038 ug/l** | **130 ug/l** | < 0.0097 ug/l | < 0.0034 ug/l |
| W6N | 10/18/2012 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.085 ug/l** | < 0.0034 ug/l | **0.073 ug/l** | **140 ug/l** | < 0.0074 ug/l | < 0.0034 ug/l |
| W6N | 5/30/2013 | N | < 0.0034 ug/l | **0.022 * ug/l** | **0.23 ug/l** | < 0.0034 ug/l | **0.16 ug/l** | **830 ug/l** | < 0.025 ug/l | < 0.0034 ug/l |
| W6N | 10/10/2013 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.14 ug/l** | < 0.0034 ug/l | **0.16 ug/l** | **120 ug/l** | **0.013 * ug/l** | < 0.0034 ug/l |
| W6N | 6/30/2014 | N | < 0.0033 ug/l | **0.0097 ug/l** | **0.12 ug/l** | < 0.0033 ug/l | **0.043 ug/l** | **230 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W6N | 10/16/2014 | N | < 0.0037 ug/l | < 0.0037 ug/l | **0.12 ug/l** | < 0.0037 ug/l | **0.032 ug/l** | **98 ug/l** | **0.010 * ug/l** | < 0.0037 ug/l |
| W6N | 7/15/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.11 ug/l** | **0.0045 ug/l** | **0.052 * ug/l** | **190 ug/l** | **0.032 ug/l** | < 0.0034 ug/l |
| W6N | 10/07/2015 | N | < 0.0034 ug/l | **0.0046 ug/l** | **0.13 ug/l** | < 0.0034 ug/l | **0.053 b ug/l** | **400 ug/l** | **0.0062 b ug/l** | < 0.0034 ug/l |
| W6N | 10/07/2015 | FD | < 0.0034 ug/l | **0.0040 ug/l** | **0.14 ug/l** | < 0.0034 ug/l | **0.045 b ug/l** | **410 ug/l** | **0.0059 b ug/l** | < 0.0034 ug/l |
| W6N | 6/30/2016 | N | < 0.017 h ug/l | < 0.017 h ug/l | **0.12 h ug/l** | < 0.017 h ug/l | **0.020 bh ug/l** | **200 ug/l** | < 0.017 h ug/l | < 0.017 h ug/l |
| W6N | 10/14/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.064 ug/l** | < 0.0033 ug/l | **0.020 ug/l** | **49 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l |
| W7 | 12/25/1984 | N | < 0.014 ug/l | < 0.010 ug/l | < 0.014 ug/l | < 0.017 ug/l | **0.036 ug/l** | **28 ug/l** | < 0.010 ug/l | < 0.010 ug/l |
| W7 | 12/27/1984 | N | < 0.014 ug/l | < 0.010 ug/l | < 0.014 ug/l | < 0.017 ug/l | **0.051 ug/l** | **16 ug/l** | < 0.010 ug/l | < 0.010 ug/l |
| W7 | 3/27/1985 | N | < 0.070 ug/l | < 0.050 ug/l | **0.12 ug/l** | < 0.0085 ug/l | **16 ug/l** | **1000 ug/l** | **0.16 ug/l** | < 0.050 ug/l |
| W7 | 5/16/1985 | N | < 0.014 ug/l | **0.022 ug/l** | **0.10 ug/l** | < 0.017 ug/l | **0.80 ug/l** | **69 ug/l** | **0.044 ug/l** | **0.022 ug/l** |
| W7 | 6/03/1986 | N | < 0.0028 ug/l | **0.012 ug/l** | < 0.0028 ug/l | < 0.0034 ug/l | **2.1 ug/l** | **110 ug/l** | < 0.0020 ug/l | **0.0099 ug/l** |
| W7 | 8/06/1987 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | **7400 ug/l** | < 50 ug/l | < 50 ug/l |
| W7 | 10/06/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | **7.7 ug/l** | **1100 ug/l** | < 6.0 ug/l | < 6.0 ug/l |
| W7 | 10/17/2012 | N | < 0.034 h ug/l | < 0.034 h ug/l | **0.52 h ug/l** | < 0.034 h ug/l | **0.20 bh ug/l** | **1300 h ug/l** | **0.22 h ug/l** | **0.051 h ug/l** |
| W7 | 5/30/2013 | N | < 0.0034 ug/l | **0.11 * ug/l** | **1.6 ug/l** | < 0.0034 ug/l | **0.45 ug/l** | **1100 ug/l** | < 0.54 ug/l | **0.029 * ug/l** |
| W7 | 10/10/2013 | N | < 0.034 ug/l | < 0.034 ug/l | **2.1 ug/l** | < 0.034 ug/l | **0.65 ug/l** | **3300 ug/l** | **0.46 * ug/l** | **0.038 * ug/l** |
| W7 | 6/30/2014 | N | < 0.017 ug/l | **0.019 ug/l** | **1.2 ug/l** | < 0.017 ug/l | **0.21 ug/l** | **740 ug/l** | **0.45 * ug/l** | **0.029 ug/l** |
| W7 | 10/17/2014 | N | < 0.017 ug/l | **0.042 ug/l** | **1.8 ug/l** | < 0.017 ug/l | **0.75 * ug/l** | **1300 * ug/l** | **0.67 ug/l** | **0.041 ug/l** |
| W7 | 10/17/2014 | FD | < 0.017 ug/l | **0.031 ug/l** | **1.4 ug/l** | < 0.017 ug/l | **0.54 * ug/l** | **910 * ug/l** | **0.53 ug/l** | **0.040 ug/l** |
| W7 | 7/15/2015 | N | < 0.017 ug/l | **0.047 ug/l** | **1.9 ug/l** | < 0.017 ug/l | **0.67 ug/l** | **1400 ug/l** | **1.1 ug/l** | **0.044 ug/l** |
| W7 | 10/07/2015 | N | < 0.0033 ug/l | < 0.033 ug/l | **1.5 ug/l** | < 0.0033 ug/l | **0.54 ug/l** | **1900 ug/l** | **1.2 ug/l** | **0.013 ug/l** |
| W7 | 6/30/2016 | N | < 0.017 h ug/l | **0.034 h ug/l** | **1.5 h ug/l** | < 0.017 h ug/l | **0.44 h ug/l** | **840 ug/l** | **0.95 h ug/l** | **0.029 h ug/l** |
| W7 | 10/19/2016 | N | < 0.067 ug/l | < 0.067 ug/l | **1.6 ug/l** | < 0.067 ug/l | **0.58 ug/l** | **1200 ug/l** | **0.91 ug/l** | < 0.067 ug/l |
| W10 | 12/11/1984 | N | < 0.056 ug/l | < 0.040 ug/l | **0.54 ug/l** | < 0.068 ug/l | **16 ug/l** | < 5 pp ug/l | **0.25 ug/l** | < 0.040 ug/l |
| W10 | 3/28/1985 | N | < 0.070 ug/l | **0.062 ug/l** | **0.78 ug/l** | < 0.085 ug/l | **13 ug/l** | **3 pp ug/l** | **0.082 ug/l** | < 0.050 ug/l |
| W10 | 5/16/1985 | N | < 0.035 ug/l | **0.097 ug/l** | **4.4 ug/l** | < 0.043 ug/l | **14 ug/l** | **2.2 pp ug/l** | **3.3 ug/l** | **0.033 ug/l** |
| W10 | 12/13/1985 | N | < 0.7 ug/l<br>< 0.7 ug/l | < 0.5 ug/l<br>< 0.5 ug/l | **1.3 ug/l**<br>**0.8 ug/l** | < 0.9 ug/l<br>< 0.9 ug/l | **15 ug/l**<br>**14 ug/l** | < 5 ug/l<br>< 5 ug/l | **4.8 ug/l**<br>**2.2 ug/l** | < 0.5 ug/l<br>< 0.5 ug/l |
| W10 | 3/20/1986 | N | < 0.0028 ug/l | **0.019 ug/l** | **0.43 ug/l** | < 0.0034 ug/l | **10 ug/l** | < 5 ug/l | **0.32 ug/l** | **0.065 ug/l** |
| W10 | 6/03/1986 | N | < 0.0112 ug/l | **0.110 ug/l** | **1.4 ug/l** | < 0.0136 ug/l | **6.5 ug/l** | **140 ug/l** | **2.7 ug/l** | **0.035 ug/l** |
| W10 | 9/25/1986 | N | < 0.7 ug/l | < 0.5 ug/l | < 0.7 ug/l | < 0.9 ug/l | **8.7 ug/l** | **3600 ug/l** | **3.0 ug/l** | < 0.5 ug/l |
| W10 | 12/11/1986 | N | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | < 2.9 ug/l | **17 ug/l** | **4800 ug/l** | **4 ug/l** | < 2.9 ug/l |
| W10 | 3/19/1987 | N | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | **420 ug/l** | **1.9 ug/l** | < 0.6 ug/l |
| W10 | 5/06/1987 | N | < 0.5 ug/l | < 0.5 ug/l | **0.6 ug/l** | < 0.5 ug/l | **9.1 ug/l** | **2250 ug/l** | **0.6 ug/l** | < 0.5 ug/l |
| W10 | 7/30/1987 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | **7300 ug/l** | < 50 ug/l | < 50 ug/l |
| W10 | 11/05/1987 | N | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | **5900 ug/l** | < 150 ug/l | < 150 ug/l |
| W10 | 2/29/1988 | N | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 pp ug/l<br>2.7 pp ug/l | < 6.0 ug/l<br>< 6.0 ug/l | < 6.0 ug/l<br>< 6.0 ug/l | **7900 ug/l**<br>**11000 ug/l** | < 6.0 pp ug/l<br>3.2 pp ug/l | < 6.0 ug/l<br>< 6.0 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W10 | 10/06/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | **10 ug/l** | **210 ug/l** | < 6.0 ug/l | < 6.0 ug/l |
| W10 | 12/12/1988 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **13 ug/l**<br>**< 10 pp ug/l** | < 10 ug/l<br>< 10 ug/l | **22 ug/l**<br>**21 ug/l** | **590 ug/l**<br>**630 ug/l** | < 10 ug/l<br>< 10 pp ug/l | < 10 ug/l<br>< 10 ug/l |
| W10 | 2/28/1989 | N | -- | -- | -- | -- | -- | **130 ug/l** | -- | -- |
| W10 | 8/04/1989 | N | < 10 ug/l | < 10 ug/l | **11 ug/l** | < 10 ug/l | **42 ug/l** | < 5 ug/l | < 10 pp ug/l | < 10 ug/l |
| W10 | 5/02/1990 | N | -- | -- | -- | -- | -- | < 6 ug/l | -- | -- |
| W10 | 10/30/1990 | N | < 10 ug/l | < 10 ug/l | **5 j ug/l** | < 10 ug/l | **180 ug/l** | < 10 ug/l | **6 j ug/l** | < 10 ug/l |
| W10 | 10/17/1991 | N | < 10 ug/l | < 10 ug/l | **10 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | **9 j ug/l** | < 10 ug/l |
| W10 | 10/13/1992 | N | < 10 ug/l | < 10 ug/l | **32 ug/l** | < 10 ug/l | **26 ug/l** | < 10 ug/l | **19 ug/l** | < 10 ug/l |
| W10 | 10/19/1993 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **9 j ug/l**<br>**6 j ug/l** | < 10 ug/l<br>< 10 ug/l | **65 ug/l**<br>**8 j ug/l** | < 10 ug/l<br>< 10 ug/l | **2 j ug/l**<br>**< 10 ug/l** | < 10 ug/l<br>< 10 ug/l |
| W10 | 9/30/1994 | N | < 10 ug/l | < 10 ug/l | **7 j ug/l** | < 10 ug/l | **13 ug/l** | < 10 ug/l | **1 j ug/l** | < 10 ug/l |
| W10 | 10/20/1995 | N | < 1.2 ug/l | < 1.2 ug/l | **5.9 ug/l** | < 1.2 ug/l | **18 b ug/l** | < 3 ug/l | **2.2 ug/l** | < 1.2 ug/l |
| W10 | 10/03/1996 | N | < 1.8 ug/l<br>< 1.8 ug/l | < 1.8 ug/l<br>< 1.8 ug/l | **10 ug/l**<br>**8.4 ug/l** | < 1.8 ug/l<br>< 1.8 ug/l | **19 b ug/l**<br>**20 b ug/l** | < 3 ug/l<br>< 3 ug/l | **4.1 b ug/l**<br>**2.6 b ug/l** | < 1.8 ug/l<br>< 1.8 ug/l |
| W10 | 10/06/1997 | N | < 0.003 ug/l | **0.064 ug/l** | **5.0 ug/l** | < 0.003 ug/l | **7.8 ug/l** | **6 ug/l** | **1.3 e ug/l** | **0.025 ug/l** |
| W10 | 11/21/1998 | N | < 0.003 ug/l | **0.056 ug/l** | **2.7 ug/l** | < 0.003 ug/l | **0.16 e ug/l** | < 3 ug/l | **0.37 e ug/l** | **0.015 ug/l** |
| W10 | 11/18/1999 | N | < 0.003 ug/l | **0.075 ug/l** | **1.5 ug/l** | **0.007 ug/l** | **0.053 jb ug/l** | < 3 ug/l | **0.15 b ug/l** | **0.041 ug/l** |
| W10 | 9/28/2000 | N | < 0.003 ug/l | **0.026 b ug/l** | **3.0 ug/l** | < 0.003 ug/l | **0.20 b ug/l** | **82 ug/l** | **0.16 ug/l** | **0.012 ug/l** |
| W10 | 10/18/2001 | N | **0.0042 ug/l** | **1.6 ug/l** | **7.2 ug/l** | **0.014 ug/l** | **16 ug/l** | **130 ug/l** | **3.1 ug/l** | **0.93 ug/l** |
| W10 | 10/29/2002 | N | **0.0051 ug/l** | **0.45 ug/l** | **0.94 ug/l** | **0.023 ug/l** | **1.6 ug/l** | **13 ug/l** | **0.48 ug/l** | **0.27 ug/l** |
| W10 | 12/21/2003 | N | < 0.0034 ug/l | **0.91 ug/l** | **3.1 ug/l** | < 0.0034 ug/l | **3.0 ug/l** | **94 ug/l** | **2.7 ug/l** | **0.69 ug/l** |
| W10 | 10/21/2004 | N | < 0.0034 ug/l | **0.3 ug/l** | **4.6 ug/l** | **0.0047 ug/l** | **30 ug/l** | **180 * ug/l** | **1.8 ug/l** | **0.18 ug/l** |
| W10 | 11/09/2005 | N | < 0.017 ug/l | **0.24 ug/l** | **4.4 ug/l** | < 0.017 ug/l | **30 ug/l** | **65 ug/l** | **2.0 ug/l** | **0.15 ug/l** |
| W10 | 10/20/2006 | N | < 0.0036 ug/l | **0.20 ug/l** | **5.0 ug/l** | < 0.0036 ug/l | **9.2 ug/l** | **10 ug/l** | **2.0 ug/l** | **0.19 ug/l** |
| W10 | 11/07/2007 | N | < 0.034 ug/l | **0.23 ug/l** | **5.2 ug/l** | < 0.034 ug/l | **91 ug/l** | **47 ug/l** | **1.8 ug/l** | **0.12 ug/l** |
| W10 | 10/14/2008 | N | < 0.018 ug/l | **0.20 ug/l** | **4.7 ug/l** | < 0.018 ug/l | **7.6 ug/l** | < 5.2 ug/l | **1.7 ug/l** | **0.11 ug/l** |
| W10 | 9/29/2009 | N | < 0.0033 ug/l | **0.22 ug/l** | **3.1 ug/l** | **0.0043 ug/l** | **1.7 ug/l** | **31 ug/l** | **0.28 ug/l** | **0.11 ug/l** |
| W10 | 10/06/2010 | N | < 0.0033 ug/l | **0.22 ug/l** | **13 ug/l** | < 0.0033 ug/l | **12 ug/l** | **58 ug/l** | **1.9 ug/l** | **0.12 ug/l** |
| W10 | 10/14/2011 | N | < 0.017 ug/l | **0.27 ug/l** | **13 ug/l** | < 0.017 ug/l | **7.9 ug/l** | **56 ug/l** | **2.7 ug/l** | **0.14 ug/l** |
| W10 | 10/18/2012 | N | < 0.017 ug/l | **0.26 ug/l** | **20 ug/l** | < 0.017 ug/l | **23 ug/l** | **440 ug/l** | **2.5 ug/l** | **0.13 ug/l** |
| W10 | 10/10/2013 | N | < 0.034 ug/l | **0.30 ug/l** | **16 ug/l** | < 0.034 ug/l | **42 ug/l** | **990 ug/l** | **3.0 ug/l** | **0.22 ug/l** |
| W10 | 10/17/2014 | N | < 0.018 ug/l | **0.20 ug/l** | **13 ug/l** | < 0.018 ug/l | **19 ug/l** | **170 ug/l** | **2.3 ug/l** | **0.12 ug/l** |
| W10 | 10/07/2015 | N | < 0.0033 ug/l | **0.20 ug/l** | **15 ug/l** | **0.0044 ug/l** | **15 ug/l** | **350 ug/l** | **2.7 ug/l** | **0.11 ug/l** |
| W10 | 10/19/2016 | N | < 0.034 ug/l | **0.30 ug/l** | **14 ug/l** | < 0.034 ug/l | **12 ug/l** | **200 ug/l** | **3.4 ug/l** | **0.12 ug/l** |
| W104 | 1/24/1985 | N | < 0.014 ug/l | **0.064 ug/l** | **0.070 ug/l** | < 0.017 ug/l | **0.22 ug/l** | < 5 ug/l | **0.16 ug/l** | **0.081 ug/l** |
| W104 | 5/16/1985 | N | < 0.0070 ug/l | **0.025 ug/l** | **0.0076 ug/l** | < 0.0085 ug/l | **0.036 ug/l** | **3 pp ug/l** | **0.022 ug/l** | **0.024 ug/l** |
| W104 | 6/04/1986 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.220 ug/l** | < 5 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W104 | 7/29/1987 | N | < 0.0014 ug/l | **0.032 ug/l** | **0.0021 ug/l** | **0.0069 ug/l** | **0.0034 ug/l** | **9.6 s ug/l** | **0.014 ug/l** | **0.026 ug/l** |
| W104 | 10/05/1988 | N | < 0.0014 ug/l | **0.0073 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0038 ug/l** | < 6 ug/l | **0.0034 ug/l** | **0.0085 ug/l** |
| W104 | 12/09/1988 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.0075 s ug/l** | < 5 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W104 | 8/04/1989 | N | < 0.0014 ug/l | **0.033 ug/l** | **0.0041 ug/l** | **0.0048 ug/l** | **0.0084 ug/l** | < 5 ug/l | **0.025 ug/l** | **0.035 ug/l** |
| W104 | 5/02/1990 | N | < 0.0028 ug/l | **0.0073 ug/l** | < 0.0028 ug/l | < 0.0034 ug/l | **0.0048 s ug/l** | **4 j ug/l** | **0.0039 s ug/l** | **0.0071 ug/l** |
| W104 | 10/31/1990 | N | < 0.0014 ug/l | **0.0070 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0063 b ug/l** | < 6 ug/l | **0.0055 b ug/l** | **0.0046 ug/l** |
| W104 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0040 ug/l | **2 j ug/l** | < 0.0030 ug/l | < 0.0030 ug/l |
| W104 | 10/14/1992 | N | < 0.0030 ug/l | **0.0053 ug/l** | < 0.0030 ug/l | **0.0034 ug/l** | **0.0088 b ug/l** | < 6 ug/l | **0.0057 ug/l** | **0.0053 ug/l** |
| W104 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | **0.00976 b ug/l** | < 6 ug/l | < 0.00300 ug/l | **0.00442 ug/l** |
| W104 | 9/30/1994 | N | < 0.006 ug/l | **0.007 ug/l** | < 0.006 ug/l | < 0.006 ug/l | **0.014 b ug/l** | < 3 ug/l | **0.011 ug/l** | < 0.006 ug/l |
| W104 | 10/20/1995 | N | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | **0.019 b ug/l** | < 3 ug/l | < 0.012 ug/l | < 0.012 ug/l |
| W104 | 10/03/1996 | N | < 0.003 ug/l | **0.005 b ug/l** | **0.004 ug/l** | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.012 b ug/l** | **0.006 b ug/l** |
| W104 | 10/06/1997 | N | < 0.003 ug/l | **0.007 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | **0.010 b ug/l** | **0.006 ug/l** |
| W104 | 11/21/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W104 | 11/17/1999 | N | < 0.003 ug/l | **0.008 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.003 b ug/l** | < 3 ug/l | **0.007 b ug/l** | **0.007 b ug/l** |
| W104 | 9/27/2000 | N | < 0.003 ug/l | **0.028 b ug/l** | **0.007 ug/l** | **0.005 b ug/l** | **0.011 b ug/l** | < 3 ug/l | **0.023 b ug/l** | **0.023 ug/l** |
| W104 | 10/17/2001 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0042 ug/l** | < 0.0034 ug/l | **0.014 b ug/l** | < 3 ug/l | **0.0058 b ug/l** | < 0.0034 ug/l |
| W104 | 10/29/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0096 b ug/l** | < 3.0 ug/l | **0.36 ug/l** | < 0.0034 ug/l |
| W104 | 12/18/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.020 b ug/l** | < 3.0 ug/l | **0.0097 b ug/l** | **0.0043 ug/l** |
| W104 | 10/20/2004 | N | < 0.034 ug/l | **0.0059 ug/l** | **0.0075 ug/l** | < 0.034 ug/l | < 0.012 ug/l | < 2 ug/l | **0.0077 ug/l** | < 0.0034 ug/l |
| W104 | 11/09/2005 | N | < 0.017 ug/l | **0.026 ug/l** | **0.013 ug/l** | < 0.017 ug/l | **0.034 b ug/l** | < 3.0 ug/l | **0.0068 ug/l** | **0.0063 ug/l** |
| W104 | 10/19/2006 | N | < 0.0072 ug/l | **0.012 ug/l** | < 0.0072 ug/l | < 0.0072 ug/l | **0.021 b ug/l** | < 6.4 ug/l | **0.011 ug/l** | < 0.0072 ug/l |
| W104 | 11/07/2007 | N | < 0.0068 ug/l | **0.022 ug/l** | **0.017 ug/l** | < 0.0068 ug/l | **0.017 ug/l** | < 2.0 ug/l | **0.012 b ug/l** | < 0.0068 ug/l |
| W104 | 10/09/2008 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.0053 ug/l** | < 1.1 ug/l | **0.024 ug/l** | < 0.018 ug/l |
| W104 | 9/29/2009 | N | < 0.0033 ug/l | **0.013 ug/l** | **0.017 ug/l** | < 0.0033 ug/l | **0.0063 b ug/l** | < 0.97 ug/l | **0.0070 ug/l** | < 0.0033 ug/l |
| W104 | 10/07/2010 | N | < 0.0036 ug/l | **0.015 ug/l** | **0.018 ug/l** | **0.032 ug/l** | **0.072 ug/l** | **1.2 ug/l** | **0.029 ug/l** | **0.0075 ug/l** |
| W104 | 10/15/2011 | N | **0.021 ug/l** | **0.39 ug/l** | **0.031 b ug/l** | **0.081 ug/l** | **0.063 b ug/l** | < 1.0 ug/l | **0.083 ug/l** | **0.35 ug/l** |
| W104 | 10/19/2012 | N | **0.018 h ug/l** | **0.048 h ug/l** | **0.038 h ug/l** | **0.028 h ug/l** | **0.020 h ug/l** | < 2.1 h ug/l | **0.037 h ug/l** | **0.048 h ug/l** |
| W104 | 10/10/2013 | N | < 0.0070 ug/l | **0.028 ug/l** | **0.029 ug/l** | < 0.0070 ug/l | **0.085 ug/l** | < 2.1 ug/l | **0.032 * ug/l** | **0.019 ug/l** |
| W104 | 10/17/2014 | N | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | **0.040 b ug/l** | < 5.2 ug/l | < 0.018 ug/l | < 0.018 ug/l |
| W104 | 10/08/2015 | N | < 0.0034 ug/l | **0.0053 ug/l** | < 0.0034 ug/l | **0.0062 ug/l** | **0.0034 b ug/l** | < 1.0 ug/l | **0.0053 b ug/l** | **0.0060 ug/l** |
| W104 | 10/20/2016 | N | < 0.0037 ug/l | **0.0081 ug/l** | **0.015 ug/l** | < 0.0037 ug/l | **0.011 ug/l** | **0.37 ug/l** | < 0.0037 ug/l | < 0.0037 ug/l |
| W111 | 1/24/1985 | N | < 1.4 ug/l | **5.2 ug/l** | **45 ug/l** | < 1.7 ug/l | **480 ug/l** | **6100 ug/l** | **130 ug/l** | **28 ug/l** |
| W111 | 5/22/1985 | N | < 5.0 ug/l | < 5.0 ug/l | **27 ug/l** | < 5.0 ug/l | **150 ug/l** | **2400 ug/l** | **48 ug/l** | **9.0 ug/l** |
| W111 | 6/04/1986 | N | < 1.4 ug/l | < 1.0 ug/l | **26 ug/l** | < 1.7 ug/l | **120 ug/l** | **1800 ug/l** | **39 ug/l** | **8.5 ug/l** |
| W111 | 7/30/1987 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | **69 ug/l** | < 10 ug/l | < 50 ug/l | < 50 ug/l |
| W111 | 10/06/1988 | N | < 30.0 ug/l | < 30.0 ug/l | **14 ug/l** | < 30.0 ug/l | **19 ug/l** | **19 ug/l** | **17 ug/l** | < 30.0 ug/l |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W112 | 1/28/1985 | N | < 0.010 ug/l | **0.082 ug/l** | **5.0 ug/l** | < 0.010 ug/l | **20 ug/l** | **380 ug/l** | **2.3 ug/l** | **0.10 ug/l** |
| W112 | 5/16/1985 | N | < 1.0 ug/l | < 1.0 ug/l | **26 ug/l** | < 1.0 ug/l | **110 ug/l** | **1100 ug/l** | **9.8 ug/l** | < 1.0 ug/l |
| W112 | 12/13/1985 | N | < 0.7 ug/l | < 0.5 ug/l | **5.8 ug/l** | < 0.9 ug/l | **64 ug/l** | **3500 ug/l** | **1.3 ug/l** | < 0.5 ug/l |
| W112 | 3/20/1986 | N | < 0.022 ug/l | < 0.016 ug/l | **6.9 ug/l** | < 0.027 ug/l | **14 ug/l** | **2400 ug/l** | **1.5 ug/l** | < 0.016 ug/l |
| W112 | 6/04/1986 | N | < 1.4 ug/l | < 1.0 ug/l | **6.9 ug/l** | < 1.7 ug/l | **21 ug/l** | **1900 ug/l** | **1.8 ug/l** | < 1.0 ug/l |
| W112 | 9/25/1986 | N | < 1.4 ug/l | < 1.0 ug/l | **8.8 ug/l** | < 1.7 ug/l | **64 ug/l** | **6600 ug/l** | **3.3 ug/l** | < 1.0 ug/l |
| W112 | 12/11/1986 | N | < 2.9 ug/l | < 2.9 ug/l | **20 ug/l** | < 2.9 ug/l | **200 ug/l** | **7900 ug/l** | **7.4 ug/l** | < 2.9 ug/l |
| W112 | 3/19/1987 | N | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | **570 ug/l** | **0.9 ug/l** | < 0.6 ug/l |
| W112 | 5/06/1987 | N | < 10 ug/l | < 10 ug/l | **15 ug/l** | < 10 ug/l | **280 ug/l** | **6700 ug/l** | < 10 ug/l | < 10 ug/l |
| W112 | 7/30/1987 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | **29 pp ug/l** | **9400 ug/l** | < 50 ug/l | < 50 ug/l |
| W112 | 11/05/1987 | N | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | **4400 ug/l** | < 150 ug/l | < 150 ug/l |
| W112 | 2/29/1988 | N | < 6.0 ug/l | < 6.0 ug/l | **12 ug/l** | < 6.0 ug/l | < 6.0 pp ug/l | **4100 ug/l** | < 6.0 pp ug/l | < 6.0 ug/l |
| W112 | 10/06/1988 | N | < 6.0 ug/l | < 6.0 ug/l | **8.1 ug/l** | < 6.0 ug/l | < 6.0 ug/l | **140 ug/l** | < 6.0 pp ug/l | < 6.0 ug/l |
| W112 | 12/12/1988 | N | < 10 ug/l | < 10 ug/l | < 10 pp ug/l | < 10 ug/l | < 10 ug/l | **760 ug/l** | < 10 pp ug/l | < 10 ug/l |
| W112 | 2/28/1989 | N | -- | -- | -- | -- | -- | **700 ug/l** | -- | -- |
| W112 | 8/04/1989 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 pp ug/l<br>< 10 pp ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **430 ug/l**<br>**380 ug/l** | < 10 pp ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| W112 | 5/03/1990 | N | -- | -- | -- | -- | -- | **750 ug/l** | -- | -- |
| W112 | 10/30/1990 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **3 j ug/l**<br>**3 j ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **320 ug/l**<br>**2300 ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| W112 | 10/17/1991 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **35 ug/l** | < 10 ug/l | < 10 ug/l |
| W112 | 10/13/1992 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W112 | 10/19/1993 | N | < 0.00300 ug/l | **0.00882 ug/l** | **0.0112 ug/l** | < 0.00300 ug/l | **0.0237 b ug/l** | < 6 ug/l | **0.004850 ug/l** | **0.00829 ug/l** |
| W112 | 9/30/1994 | N | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | **21 ug/l** | < 0.018 ug/l | < 0.018 ug/l |
| W112 | 10/20/1995 | N | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | **120 ug/l** | < 0.060 ug/l | < 0.060 ug/l |
| W112 | 10/03/1996 | N | < 0.006 ug/l | **0.010 b ug/l** | < 0.006 ug/l | < 0.006 ug/l | **0.025 b ug/l** | **45 ug/l** | **0.007 b ug/l** | **0.008 b ug/l** |
| W112 | 10/06/1997 | N | < 0.003 ug/l | **0.004 ug/l** | **0.023 ug/l** | < 0.003 ug/l | **0.17 ug/l** | **47 ug/l** | **0.008 b ug/l** | < 0.003 ug/l |
| W112 | 11/21/1998 | N | < 0.003 ug/l | < 0.003 ug/l | **0.006 ug/l** | < 0.003 ug/l | **0.009 b ug/l** | **7 ug/l** | < 0.003 ug/l | < 0.003 ug/l |
| W112 | 11/21/1998 | FD | < 0.003 ug/l | **0.004 ug/l** | **0.007 ug/l** | < 0.003 ug/l | **0.014 b ug/l** | **10 ug/l** | < 0.003 ug/l | **0.004 ug/l** |
| W112 | 11/17/1999 | N | < 0.003 ug/l | **0.014 b ug/l** | **0.005 ug/l** | **0.004 ug/l** | **0.006 b ug/l** | < 3 ug/l | **0.019 b ug/l** | **0.012 b ug/l** |
| W112 | 9/27/2000 | N | < 0.003 ug/l | **0.011 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | **0.008 b ug/l** | **0.006 b ug/l** |
| W112 | 10/19/2001 | N | < 0.0033 ug/l | **0.0038 b ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0047 ug/l** | < 3 ug/l | **0.0053 b ug/l** | < 0.0033 ug/l |
| W112 | 10/29/2002 | N | < 0.0034 ug/l | **0.0071 ug/l** | **0.0036 ug/l** | < 0.0034 ug/l | **0.0092 b ug/l** | < 3.0 ug/l | **0.0079 b ug/l** | **0.0041 ug/l** |
| W112 | 9/04/2003 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | **1.3 ug/l** | < 0.051 ug/l | < 0.051 ug/l |
| W112 | 9/15/2003 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | **0.85 ug/l** | < 0.051 ug/l | < 0.051 ug/l |
| W112 | 10/01/2003 | N | -- | -- | -- | -- | -- | < 0.53 ug/l | -- | -- |
| W112 | 10/08/2003 | N | -- | -- | -- | -- | -- | < 0.51 ug/l | -- | -- |
| W113 | 3/28/1985 | N | < 14 ug/l | **280 ug/l** | **330 ug/l** | < 17 ug/l | **8500 ug/l** | **2900 ug/l** | **650 ug/l** | **200 ug/l** |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W113 | 5/22/1985 | N | < 200 ug/l | **8900 ug/l** | **6400 ug/l** | < 200 ug/l | **38000 ug/l** | **12000 ug/l** | **17000 ug/l** | **6400 ug/l** |
| W113 | 6/04/1986 | N | < 1.4 ug/l | < 1.0 ug/l | **2200 ug/l** | < 1.7 ug/l | **17000 ug/l** | **5100 ug/l** | **7300 ug/l** | < 1.0 ug/l |
| W113 | 12/07/1987 | N | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | < 1000 ug/l | **7500 ug/l** | **3000 ug/l** | < 1000 ug/l | < 1000 ug/l |
| W121 | 3/27/1985 | N | < 0.0014 ug/l | **0.0035 ug/l** | **0.010 ug/l** | < 0.0017 ug/l | **0.012 ug/l** | < 5 ug/l | **0.032 ug/l** | **0.0018 ug/l** |
| W121 | 3/28/1985 | N | < 0.0070 ug/l | < 0.0050 ug/l | < 0.0070 ug/l | < 0.0085 ug/l | **0.014 ug/l** | < 5 ug/l | **0.0091 ug/l** | < 0.0050 ug/l |
| W121 | 5/06/1985 | N | < 0.0014 ug/l | **0.0020 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.012 s ug/l** | **1.4 pp ug/l** | **0.0021 ug/l** | **0.0019 ug/l** |
| W121 | 12/13/1985 | N | < 0.0014 ug/l | **0.0014 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0015 ug/l** | < 5 ug/l | **0.0016 ug/l** | **0.0017 ug/l** |
| W121 | 3/18/1986 | N | < 0.0014 ug/l | **0.0028 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0041 ug/l** | < 5 ug/l | **0.0051 ug/l** | **0.0024 ug/l** |
| W121 | 6/02/1986 | N | < 0.0014 ug/l | **0.0012 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.013 s ug/l** | < 5 ug/l | **0.0019 ug/l** | **0.0012 ug/l** |
| W121 | 9/23/1986 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0085 s ug/l** | < 5 ug/l | **0.0011 ug/l** | < 0.0010 ug/l |
| W121 | 12/10/1986 | N | < 0.0014 ug/l | **0.0027 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.033 ug/l** | < 5 ug/l | **0.0037 ug/l** | **0.0024 ug/l** |
| W121 | 3/18/1987 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0058 s ug/l** | < 6 ug/l | **0.0030 ug/l** | < 0.0010 ug/l |
| W121 | 5/05/1987 | N | < 0.0014 ug/l | **0.0011 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.014 ug/l** | < 6 ug/l | **0.0016 ug/l** | < 0.0010 ug/l |
| W121 | 7/28/1987 | N | < 0.0014 ug/l | < 0.001 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0052 ug/l** | **7.7 s ug/l** | **0.0027 ug/l** | < 0.001 ug/l |
| W121 | 11/03/1987 | N | < 0.0014 ug/l | **0.0017 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.010 ug/l** | < 6 ug/l | **0.0024 ug/l** | **0.0019 ug/l** |
| W121 | 2/22/1988 | N | < 0.0014 ug/l | **0.0014 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0074 s ug/l** | < 6 ug/l | **0.0026 s ug/l** | **0.0012 ug/l** |
| W121 | 10/04/1988 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0051 ug/l** | < 6 ug/l | **0.0013 ug/l** | < 0.0010 ug/l |
| W121 | 12/09/1988 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.015 s ug/l** | < 5 ug/l | **0.0068 ug/l** | < 0.0010 ug/l |
| W121 | 8/03/1989 | N | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0014 ug/l<br>< 0.0014 ug/l | **0.0017 ug/l**<br>**< 0.0017 ug/l** | **0.0044 ug/l**<br>**0.0050 ug/l** | < 5 ug/l<br>< 5 ug/l | **0.0030 ug/l**<br>**0.0017 ug/l** | < 0.0010 ug/l<br>< 0.0010 ug/l |
| W121 | 5/01/1990 | N | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0010 ug/l<br>0.0011 ug/l | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0017 ug/l<br>< 0.0017 ug/l | **0.0054 s ug/l**<br>**0.0043 s ug/l** | < 6 ug/l<br>< 6 ug/l | **0.0027 s ug/l**<br>**0.0015 s ug/l** | < 0.0010 ug/l<br>0.0010 ug/l |
| W121 | 10/30/1990 | N | < 0.0014 ug/l | **0.0014 b ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0065 b ug/l** | < 6 ug/l | **0.0032 b ug/l** | **0.0012 ug/l** |
| W121 | 10/17/1991 | N | **0.0093 ug/l** | **0.012 ug/l** | < 0.0030 ug/l | **0.0097 ug/l** | < 0.0040 ug/l | **1 j ug/l** | **0.0072 ug/l** | **0.012 ug/l** |
| W121 | 10/13/1992 | N | < 0.0030 ug/l | **0.0050 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | **0.0043 b ug/l** | < 6 ug/l | < 0.0030 ug/l | **0.0040 ug/l** |
| W121 | 10/19/1993 | N | < 0.00300 ug/l | **0.00835 ug/l** | < 0.00300 ug/l | < 0.00300 ug/l | **0.00894 b ug/l** | < 6 ug/l | **0.00542 ug/l** | **0.00800 ug/l** |
| W121 | 9/29/1994 | N | < 0.003 ug/l | **0.018 ug/l** | < 0.003 ug/l | **0.004 ug/l** | **0.006 b ug/l** | < 3 ug/l | **0.010 ug/l** | **0.012 ug/l** |
| W121 | 10/20/1995 | N | < 0.012 ug/l | **0.016 ug/l** | **0.024 ug/l** | < 0.012 ug/l | **0.29 ug/l** | < 3 ug/l | **0.023 ug/l** | < 0.012 ug/l |
| W121 | 10/03/1996 | N | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | **0.040 b ug/l**<br>**0.044 b ug/l** | < 3 ug/l<br>< 3 ug/l | < 0.006 ug/l<br>< 0.006 ug/l | < 0.006 ug/l<br>< 0.006 ug/l |
| W121 | 10/06/1997 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.012 b ug/l** | < 3 ug/l | **0.006 b ug/l** | < 0.003 ug/l |
| W121 | 11/19/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.006 ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W121 | 11/17/1999 | N | < 0.003 ug/l | **0.012 b ug/l** | **0.004 ug/l** | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | **0.013 b ug/l** | **0.009 b ug/l** |
| W121 | 11/17/1999 | FD | < 0.003 ug/l | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** | < 3 ug/l | **0.004 b ug/l** | < 0.003 ug/l |
| W121 | 9/28/2000 | N | < 0.003 ug/l | **0.010 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.007 b ug/l** | < 3 ug/l | **0.006 b ug/l** | **0.008 b ug/l** |
| W121 | 10/16/2001 | N | < 0.0033 ug/l | **0.0053 b ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0042 b ug/l** | < 3 ug/l | **0.0059 b ug/l** | < 0.0033 ug/l |
| W121 | 5/15/2002 | N | < 0.0034 ug/l | **0.0095 b ug/l** | **0.0067 b ug/l** | < 0.0034 ug/l | **0.0058 ug/l** | < 3.0 ug/l | **0.024 b ug/l** | **0.0067 b ug/l** |
| W122 | 3/26/1985 | N | < 0.035 ug/l | < 0.025 ug/l | < 0.035 ug/l | < 0.043 ug/l | < 0.048 ug/l | **2.5 pp ug/l** | < 0.025 ug/l | < 0.025 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W122 | 5/06/1985 | N | < 0.014 ug/l | **0.23 ug/l** | **0.74 ug/l** | < 0.017 ug/l | **0.048 ug/l** | **1.1 pp ug/l** | **0.140 ug/l** | **0.071 ug/l** |
| W122 | 12/13/1985 | N | < 0.0070 ug/l | < 0.0050 ug/l | < 0.0070 ug/l | < 0.0085 ug/l | **0.041 ug/l** | < 5 ug/l | < 0.0050 ug/l | < 0.0050 ug/l |
| W122 | 3/18/1986 | N | < 0.0028 ug/l | < 0.0020 ug/l | **0.023 ug/l** | < 0.0034 ug/l | **0.011 ug/l** | **1.2 pp ug/l** | **0.024 ug/l** | < 0.0020 ug/l |
| W122 | 6/02/1986 | N | < 0.0014 ug/l | **0.0020 ug/l** | **0.019 ug/l** | < 0.0017 ug/l | **0.0086 s ug/l** | < 5 ug/l | **0.0069 ug/l** | **0.0029 ug/l** |
| W122 | 9/23/1986 | N | < 0.0028 ug/l | < 0.0020 ug/l | **0.0070 ug/l** | < 0.0034 ug/l | **0.0099 s ug/l** | < 5 ug/l | **0.0040 ug/l** | < 0.0020 ug/l |
| W122 | 12/10/1986 | N | < 0.0035 ug/l | < 0.0025 ug/l | **0.014 ug/l** | < 0.0043 ug/l | **0.023 ug/l** | < 5 ug/l | **0.0079 ug/l** | **0.0034 ug/l** |
| W122 | 3/19/1987 | N | < 0.0014 ug/l | **0.0080 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.013 ug/l** | < 6 ug/l | < 0.0010 ug/l | **0.0058 ug/l** |
| W122 | 5/06/1987 | N | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | **412 ug/l** | < 0.5 ug/l | < 0.5 ug/l |
| W122 | 7/29/1987 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **950 ug/l** | < 10 ug/l | < 10 ug/l |
| W122 | 11/04/1987 | N | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | **420 ug/l**<br>**510 ug/l** | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l |
| W122 | 2/25/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 pp ug/l | < 6.0 ug/l | < 6.0 pp ug/l | **690 ug/l** | < 6.0 ug/l | < 6.0 ug/l |
| W122 | 10/06/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 pp ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6 pp ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W122 | 12/12/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 5 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W122 | 2/28/1989 | N | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l | < 5 ug/l<br>< 5 ug/l | < 6 ug/l<br>< 6 ug/l | < 6 ug/l<br>< 6 ug/l |
| W122 | 8/03/1989 | N | < 0.056 ug/l | < 0.040 ug/l | < 0.056 ug/l | < 0.068 ug/l | < 0.076 ug/l | < 5 ug/l | < 0.040 ug/l | < 0.040 ug/l |
| W122 | 5/01/1990 | N | < 0.056 ug/l | < 0.040 ug/l | < 0.056 ug/l | < 0.068 ug/l | < 0.076 ug/l | < 6 ug/l | < 0.040 ug/l | < 0.040 ug/l |
| W122 | 6/22/1990 | N | -- | -- | -- | -- | -- | **6 j ug/l** | -- | -- |
| W122 | 10/31/1990 | N | < 0.073 ug/l | < 0.052 ug/l | **0.20 ug/l** | < 0.088 ug/l | < 0.099 ug/l | **4 j ug/l** | < 0.052 ug/l | < 0.052 ug/l |
| W122 | 10/17/1991 | N | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.040 ug/l | < 6 ug/l | < 0.030 ug/l | < 0.030 ug/l |
| W122 | 10/13/1992 | N | < 0.0030 ug/l | **0.0030 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | **0.0048 b ug/l** | < 6 ug/l | < 0.0030 ug/l | **0.0032 ug/l** |
| W122 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | **0.00917 b ug/l** | < 6 ug/l | < 0.00300 ug/l | < 0.00300 ug/l |
| W122 | 9/29/1994 | N | < 0.003 ug/l | **0.007 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.008 b ug/l** | < 3 * ug/l | **0.006 ug/l** | **0.006 ug/l** |
| W122 | 10/19/1995 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | **0.018 b ug/l** | < 3 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W122 | 10/03/1996 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.005 b ug/l** | < 3 ug/l | < 0.003 ug/l | **0.003 b ug/l** |
| W122 | 10/06/1997 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.014 b ug/l** | < 3 ug/l | **0.004 b ug/l** | < 0.003 ug/l |
| W122 | 11/20/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.007 ug/l** | < 3 ug/l | **0.015 ug/l** | **0.012 ug/l** |
| W122 | 11/17/1999 | N | < 0.003 ug/l | **0.013 b ug/l** | **0.005 ug/l** | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | **0.016 b ug/l** | **0.010 b ug/l** |
| W122 | 9/28/2000 | N | < 0.003 ug/l | **0.007 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | **0.005 b ug/l** | **0.006 b ug/l** |
| W122 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0055 b ug/l** | < 3 ug/l | **0.0036 b ug/l** | < 0.0033 ug/l |
| W122 | 4/08/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 3.0 ug/l | < 0.0034 ug/l | **0.0037 ug/l** |
| W123 | 3/26/1985 | N | < 0.014 ug/l<br>< 0.014 ug/l | < 0.010 ug/l<br>< 0.010 ug/l | < 0.014 ug/l<br>< 0.014 ug/l | < 0.017 ug/l<br>< 0.017 ug/l | **0.061 ug/l**<br>**0.093 ug/l** | **5.8 ug/l**<br>**6.2 ug/l** | < 0.012 ug/l<br>0.018 ug/l | < 0.010 ug/l<br>< 0.010 ug/l |
| W123 | 5/07/1985 | N | < 0.0070 ug/l | **0.078 ug/l** | < 0.0070 ug/l | < 0.0085 ug/l | **0.039 ug/l** | **4.5 pp ug/l** | **0.095 ug/l** | **0.033 ug/l** |
| W123 | 3/18/1986 | N | < 0.0028 ug/l | **0.015 ug/l** | < 0.0028 ug/l | < 0.0034 ug/l | **0.016 ug/l** | **2.3 pp ug/l** | **0.21 ug/l** | **0.0058 ug/l** |
| W123 | 6/03/1986 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.0086 s ug/l** | **2.3 pp ug/l** | < 0.0020 ug/l | < 0.0020 ug/l |
| W123 | 9/24/1986 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.010 s ug/l** | < 5 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W123 | 12/11/1986 | N | < 0.0070 ug/l | **0.020 ug/l** | < 0.0070 ug/l | < 0.0085 ug/l | **0.016 s ug/l** | < 5 ug/l | **0.013 ug/l** | < 0.0050 ug/l |
| W123 | 3/18/1987 | N | < 0.0014 ug/l | **0.0024 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0091 ug/l** | < 6 ug/l | **0.0014 ug/l** | **0.0014 ug/l** |
| W123 | 5/05/1987 | N | < 0.0035 ug/l | < 0.0025 ug/l | < 0.0035 ug/l | < 0.0043 ug/l | **0.019 ug/l** | < 6 ug/l | < 0.0025 ug/l | < 0.0025 ug/l |
| W123 | 7/29/1987 | N | < 0.0014 ug/l<br>< 0.0014 ug/l | **0.0033 ug/l**<br>**0.0011 ug/l** | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0017 ug/l<br>< 0.0017 ug/l | **0.010 ug/l**<br>**0.011 ug/l** | **11 s ug/l**<br>**12 s ug/l** | **0.0059 ug/l**<br>**0.0022 ug/l** | **0.0049 ug/l**<br>**< 0.001 ug/l** |
| W123 | 11/04/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 6 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W123 | 2/23/1988 | N | < 0.0014 ug/l | **0.0023 ug/l** | **0.0021 s ug/l** | < 0.0017 ug/l | **0.021 ug/l** | < 6 ug/l | **0.0032 s ug/l** | **0.0023 ug/l** |
| W123 | 10/05/1988 | N | < 0.0028 ug/l | **0.0021 ug/l** | < 0.0028 ug/l | < 0.0034 ug/l | **0.013 ug/l** | **8 ug/l** | < 0.0020 ug/l | **0.0024 ug/l** |
| W123 | 12/12/1988 | N | < 0.014 ug/l | < 0.010 ug/l | **0.065 ug/l** | < 0.017 ug/l | **1.3 ug/l** | **290 ug/l** | < 0.010 ug/l | < 0.010 ug/l |
| W123 | 2/28/1989 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **1.1 ug/l** | **200 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l |
| W123 | 8/03/1989 | N | < 0.014 ug/l<br>< 0.028 ug/l | < 0.010 ug/l<br>< 0.020 ug/l | < 0.014 ug/l<br>< 0.028 ug/l | < 0.017 ug/l<br>0.038 ug/l | < 0.019 pp ug/l<br>< 0.038 pp ug/l | **40 ug/l**<br>**35 ug/l** | < 0.010 ug/l<br>< 0.020 ug/l | < 0.010 ug/l<br>< 0.020 ug/l |
| W123 | 6/22/1990 | N | < 0.0014 ug/l | < 0.0010 ug/l | **0.0016 ug/l** | < 0.0017 ug/l | **0.0041 s ug/l** | -- | < 0.0010 ug/l | < 0.0010 ug/l |
| W123 | 10/30/1990 | N | < 0.0014 ug/l | **0.0021 b ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0093 b ug/l** | < 6 ug/l | < 0.0010 ug/l | **0.0014 ug/l** |
| W123 | 10/17/1991 | N | < 0.0030 ug/l | **0.0049 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | **0.0056 b ug/l** | < 6 ug/l | < 0.0030 ug/l | **0.0053 ug/l** |
| W123 | 10/13/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0040 ug/l | < 6 ug/l | < 0.0030 ug/l | **0.0061 ug/l** |
| W123 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | **0.00513 b ug/l** | < 6 ug/l | < 0.00300 ug/l | **0.00864 ug/l** |
| W123 | 9/29/1994 | N | < 0.003 ug/l | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.007 b ug/l** | < 3 ug/l | **0.005 ug/l** | < 0.003 ug/l |
| W123 | 10/19/1995 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | **0.009 b ug/l** | < 3 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W123 | 10/03/1996 | N | < 0.003 ug/l | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.005 b ug/l** | **0.004 b ug/l** |
| W123 | 10/06/1997 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.023 ug/l** | < 3 ug/l | **0.005 b ug/l** | < 0.003 ug/l |
| W123 | 11/21/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W123 | 11/17/1999 | N | < 0.003 ug/l | **0.012 b ug/l** | **0.005 ug/l** | < 0.003 ug/l | **0.006 b ug/l** | < 3 ug/l | **0.015 b ug/l** | **0.009 b ug/l** |
| W123 | 9/28/2000 | N | < 0.003 ug/l | **0.006 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.004 b ug/l** | **0.003 b ug/l** |
| W123 | 10/17/2001 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0069 b ug/l** | < 3 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W123 | 10/17/2001 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0093 b ug/l** | < 3 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W123 | 10/29/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0077 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W123 | 6/07/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0061 b ug/l** | < 3.0 ug/l | **0.0066 ug/l** | < 0.0034 ug/l |
| W124 | 3/26/1985 | N | < 0.0014 ug/l | **0.0080 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.043 ug/l** | < 5 ug/l | **0.0090 ug/l** | **0.0073 ug/l** |
| W124 | 5/06/1985 | N | < 0.0014 ug/l | **0.028 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.018 ug/l** | **1.6 pp ug/l** | **0.025 ug/l** | **0.012 ug/l** |
| W124 | 12/13/1985 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.026 ug/l** | < 5 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W124 | 3/18/1986 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0090 ug/l** | < 5 ug/l | **0.0039 ug/l** | < 0.0010 ug/l |
| W124 | 6/02/1986 | N | < 0.0014 ug/l | **0.0014 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.010 s ug/l** | < 5 ug/l | < 0.0010 ug/l | **0.0013 ug/l** |
| W124 | 9/23/1986 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.023 s ug/l** | < 5 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 12/10/1986 | N | < 0.0014 ug/l | **0.0012 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.031 ug/l** | < 5 ug/l | **0.0040 ug/l** | **0.0013 ug/l** |
| W124 | 3/18/1987 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.025 ug/l** | < 6 ug/l | **0.0015 ug/l** | < 0.0010 ug/l |
| W124 | 5/05/1987 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.013 ug/l** | < 6 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W124 | 8/06/1987 | N | < 0.0014 ug/l | < 0.001 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0067 ug/l** | **6.2 s ug/l** | **0.0014 ug/l** | < 0.001 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W124 | 11/03/1987 | N | < 0.0014 ug/l | < 0.001 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.011 ug/l** | < 6 ug/l | **0.002 ug/l** | < 0.001 ug/l |
| W124 | 2/23/1988 | N | < 0.0014 ug/l | < 0.001 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.010 s ug/l** | < 6 ug/l | < 0.001 ug/l | < 0.001 ug/l |
| W124 | 10/04/1988 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0065 ug/l** | < 6 ug/l | **0.0011 ug/l** | < 0.0010 ug/l |
| W124 | 8/03/1989 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0050 ug/l** | < 5 ug/l | **0.0033 ug/l** | < 0.0010 ug/l |
| W124 | 6/22/1990 | N | -- | -- | -- | -- | -- | < 10 ug/l | -- | -- |
| W124 | 10/30/1990 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0060 b ug/l** | < 6 ug/l | **0.0012 b ug/l** | < 0.0010 ug/l |
| W124 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0040 ug/l | < 6 ug/l | < 0.0030 ug/l | < 0.0030 ug/l |
| W124 | 11/08/2005 | N | < 0.0034 ug/l | **0.019 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.011 b ug/l** | < 3.0 ug/l | **0.0098 ug/l** | **0.012 ug/l** |
| W125 | 3/26/1985 | N | < 0.014 ug/l | < 0.010 ug/l | < 0.014 ug/l | < 0.017 ug/l | **0.025 ug/l** | **13 ug/l** | < 0.010 ug/l | < 0.010 ug/l |
| W125 | 5/06/1985 | N | < 0.0014 ug/l | **0.0063 ug/l** | **0.0039 ug/l** | < 0.0017 ug/l | **0.023 s ug/l** | **6.7 ug/l** | **0.015 ug/l** | **0.0030 ug/l** |
| W125 | 12/13/1985 | N | < 0.0014 ug/l | **0.0020 ug/l** | **0.0014 ug/l** | < 0.0017 ug/l | **0.082 ug/l** | **4.6 pp ug/l** | **0.0010 ug/l** | **0.0032 ug/l** |
| W125 | 3/18/1986 | N | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0017 ug/l<br>< 0.0017 ug/l | **0.011 ug/l**<br>**0.035 ug/l** | < 5 ug/l<br>2.4 pp ug/l | **0.0028 ug/l**<br>**< 0.0010 ug/l** | < 0.0010 ug/l<br>< 0.0010 ug/l |
| W125 | 6/02/1986 | N | < 0.0014 ug/l | < 0.0010 ug/l | **0.0027 ug/l** | < 0.0017 ug/l | **0.0058 s ug/l** | < 5 ug/l | **0.0045 ug/l** | < 0.0010 ug/l |
| W125 | 9/24/1986 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.024 s ug/l** | **3.4 pp ug/l** | < 0.0020 ug/l | < 0.0020 ug/l |
| W125 | 12/10/1986 | N | < 0.0035 ug/l | < 0.0025 ug/l | < 0.0035 ug/l | < 0.0043 ug/l | **0.062 ug/l** | < 5 ug/l | **0.0065 ug/l** | < 0.0025 ug/l |
| W125 | 3/18/1987 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0064 ug/l** | < 6 ug/l | **0.0026 ug/l** | < 0.0010 ug/l |
| W125 | 5/05/1987 | N | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 6 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W125 | 7/28/1987 | N | < 0.0014 ug/l | < 0.001 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0056 ug/l** | **10 s ug/l** | < 0.001 ug/l | < 0.001 ug/l |
| W125 | 11/04/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 6 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W125 | 2/25/1988 | N | **0.041 ug/l** | **0.011 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.014 ug/l** | < 6 ug/l | **0.0051 s ug/l** | **0.016 ug/l** |
| W125 | 10/04/1988 | N | < 0.0056 ug/l<br>< 0.0056 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0056 ug/l<br>< 0.0056 ug/l | < 0.0068 ug/l<br>< 0.0068 ug/l | **0.0088 ug/l**<br>**0.0083 ug/l** | **43 ug/l**<br>**58 ug/l** | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l |
| W125 | 12/12/1988 | N | < 0.014 ug/l | < 0.010 ug/l | < 0.014 ug/l | < 0.017 ug/l | **0.030 s ug/l** | **490 ug/l** | < 0.010 ug/l | < 0.010 ug/l |
| W125 | 2/28/1989 | N | < 0.0048 ug/l<br>< 0.0056 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0048 ug/l<br>< 0.0056 ug/l | < 0.0058 ug/l<br>< 0.0068 ug/l | **0.035 ug/l**<br>**< 0.0076 ug/l** | **380 ug/l**<br>**350 ug/l** | < 0.0034 ug/l<br>< 0.0040 ug/l | < 0.0034 ug/l<br>< 0.0040 ug/l |
| W125 | 8/03/1989 | N | < 0.0028 ug/l<br>< 0.0014 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0028 ug/l<br>< 0.0014 ug/l | **0.0048 ug/l**<br>**< 0.0017 ug/l** | **0.012 ug/l**<br>**0.0092 ug/l** | **110 ug/l**<br>**110 ug/l** | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l |
| W125 | 6/22/1990 | N | < 0.0028 ug/l<br>< 0.0028 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0028 ug/l<br>< 0.0028 ug/l | < 0.0034 ug/l<br>< 0.0034 ug/l | **0.0055 s ug/l**<br>**0.0054 s ug/l** | -- | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l |
| W125 | 10/30/1990 | N | < 0.0028 ug/l<br>< 0.0028 ug/l | **0.0044 b ug/l**<br>**< 0.0020 ug/l** | < 0.0028 ug/l<br>< 0.0028 ug/l | < 0.0034 ug/l<br>< 0.0034 ug/l | **0.0082 b ug/l**<br>**0.012 b ug/l** | **16 ug/l**<br>**19 ug/l** | **0.010 b ug/l**<br>**0.013 b ug/l** | **0.0034 ug/l**<br>**0.0023 ug/l** |
| W125 | 10/17/1991 | N | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.016 ug/l | **2 j ug/l** | < 0.012 ug/l | < 0.012 ug/l |
| W125 | 10/13/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0040 ug/l | **4 j ug/l** | < 0.0030 ug/l | < 0.0030 ug/l |
| W125 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | **0.0103 b ug/l** | < 6 ug/l | < 0.00300 ug/l | < 0.00300 ug/l |
| W125 | 9/29/1994 | N | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** | < 3 ug/l | **0.004 ug/l** | **0.003 ug/l** |
| W125 | 10/19/1995 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.003 b ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W125 | 10/03/1996 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | **0.050 b ug/l** | < 3 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W125 | 10/06/1997 | N | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.013 b ug/l** | < 3 ug/l | **0.005 b ug/l** | < 0.003 ug/l |
| W125 | 11/20/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.008 ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W125 | 11/17/1999 | N | < 0.003 ug/l | **0.015 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** | < 3 ug/l | **0.013 b ug/l** | **0.011 b ug/l** |
| W125 | 9/27/2000 | N | < 0.003 ug/l | **0.012 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** | < 3 ug/l | **0.011 b ug/l** | **0.006 b ug/l** |
| W125 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0056 b ug/l** | < 3 ug/l | **0.0038 b ug/l** | < 0.0033 ug/l |
| W125 | 10/30/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0076 b ug/l** | < 3.0 ug/l | **0.0035 ug/l** | < 0.0034 ug/l |
| W126 | 3/27/1985 | N | < 0.0014 ug/l | **0.012 ug/l** | **0.0025 ug/l** | < 0.0017 ug/l | **0.011 ug/l** | < 5 ug/l | **0.064 ug/l** | **0.0067 ug/l** |
| W126 | 3/28/1985 | N | < 0.0028 ug/l | **0.0064 ug/l** | **0.0078 ug/l** | < 0.0034 ug/l | **0.022 ug/l** | < 5 ug/l | **0.030 ug/l** | **0.016 ug/l** |
| W126 | 5/07/1985 | N | < 0.0014 ug/l | < 0.0067 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.037 ug/l** | < 5 ug/l | **0.0066 ug/l** | < 0.0040 ug/l |
| W126 | 12/13/1985 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.045 ug/l** | < 5 ug/l | **0.0021 ug/l** | < 0.0010 ug/l |
| W126 | 3/18/1986 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.011 ug/l** | < 5 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W126 | 6/02/1986 | N | < 0.0014 ug/l | **0.0022 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0044 s ug/l** | < 5 ug/l | < 0.0010 ug/l | **0.0019 ug/l** |
| W126 | 9/23/1986 | N | < 0.0014 ug/l | **0.0031 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0093 s ug/l** | < 5 ug/l | **0.0038 ug/l** | **0.0032 ug/l** |
| W126 | 12/10/1986 | N | < 0.0014 ug/l | **0.0045 ug/l** | < 0.0014 ug/l | **0.0020 ug/l** | **0.022 ug/l** | < 5 ug/l | **0.0036 ug/l** | **0.0042 ug/l** |
| W126 | 3/18/1987 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0056 s ug/l** | < 6 ug/l | **0.0012 ug/l** | < 0.0010 ug/l |
| W126 | 5/05/1987 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.014 ug/l** | < 6 ug/l | **0.0018 ug/l** | < 0.0010 ug/l |
| W126 | 7/28/1987 | N | < 0.0014 ug/l | **0.0012 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0055 ug/l** | **5.6 sp ug/l** | < 0.001 ug/l | **0.0011 ug/l** |
| W126 | 11/03/1987 | N | < 0.0014 ug/l | **0.0075 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.012 ug/l** | < 6 ug/l | **0.0046 ug/l** | **0.0084 ug/l** |
| W126 | 2/22/1988 | N | < 0.0014 ug/l | **0.0048 ug/l** | < 0.0014 ug/l | **0.0023 ug/l** | **0.015 ug/l** | < 6 ug/l | **0.0028 s ug/l** | **0.0051 ug/l** |
| W126 | 10/04/1988 | N | < 0.0014 ug/l | **0.0021 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0065 ug/l** | < 6 ug/l | **0.0018 ug/l** | **0.0018 ug/l** |
| W126 | 12/09/1988 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.022 s ug/l** | < 5 ug/l | **0.0024 ug/l** | < 0.0010 ug/l |
| W126 | 8/04/1989 | N | < 0.0014 ug/l | **0.013 ug/l** | < 0.0014 ug/l | **0.0044 ug/l** | **0.0048 ug/l** | < 5 ug/l | **0.0056 ug/l** | **0.013 ug/l** |
| W126 | 5/01/1990 | N | < 0.0014 ug/l | **0.015 ug/l** | < 0.0014 ug/l | **0.0069 ug/l** | **0.010 s ug/l** | < 6 ug/l | **0.0066 s ug/l** | **0.014 ug/l** |
| W126 | 10/31/1990 | N | **0.0037 ug/l** | **0.19 ug/l** | **0.0040 b ug/l** | **0.010 ug/l** | **0.0055 b ug/l** | < 6 ug/l | < 0.0010 ug/l | **0.13 ug/l** |
| W126 | 10/17/1991 | N | < 0.0030 ug/l | **0.052 ug/l** | < 0.0030 ug/l | **0.053 ug/l** | < 0.0040 ug/l | < 6 ug/l | **0.012 ug/l** | **0.050 ug/l** |
| W126 | 10/13/1992 | N | **0.0043 ug/l** | **0.047 ug/l** | < 0.0030 ug/l | **0.051 ug/l** | < 0.0040 ug/l | < 6 ug/l | **0.012 ug/l** | **0.042 ug/l** |
| W126 | 10/19/1993 | N | **0.0189 ug/l** | **0.0976 ug/l** | < 0.00600 ug/l | **0.0717 ug/l** | **0.0129 b ug/l** | < 6 ug/l | **0.0288 ug/l** | **0.0941 ug/l** |
| W126 | 9/29/1994 | N | **0.005 ug/l** | **0.041 ug/l** | < 0.003 ug/l | **0.012 ug/l** | **0.007 b ug/l** | < 3 ug/l | **0.014 ug/l** | **0.027 ug/l** |
| W126 | 10/20/1995 | N | < 0.024 ug/l<br>< 0.012 ug/l | **0.095 ug/l**<br>**0.073 ug/l** | < 0.024 ug/l<br>< 0.012 ug/l | **0.054 ug/l**<br>**0.041 ug/l** | **0.10 b ug/l**<br>**0.16 b ug/l** | < 3 ug/l<br>< 3 ug/l | **0.026 ug/l**<br>**0.022 ug/l** | **0.067 ug/l**<br>**0.055 ug/l** |
| W126 | 10/03/1996 | N | **0.030 ug/l** | **0.12 ug/l** | < 0.006 ug/l | **0.082 ug/l** | **0.012 b ug/l** | < 3 ug/l | **0.034 b ug/l** | **0.16 ug/l** |
| W126 | 10/06/1997 | N | **0.005 ug/l** | **0.028 ug/l** | **0.003 ug/l** | **0.012 ug/l** | < 0.003 ug/l | < 3 ug/l | **0.014 b ug/l** | **0.021 ug/l** |
| W126 | 11/20/1998 | N | < 0.006 ug/l | **0.034 ug/l** | < 0.006 ug/l | < 0.006 ug/l | **0.008 ug/l** | -- | **0.012 ug/l** | **0.032 ug/l** |
| W126 | 11/17/1999 | N | **0.004 ug/l** | **0.025 b ug/l** | < 0.003 ug/l | **0.022 ug/l** | **0.003 b ug/l** | < 3 ug/l | **0.010 b ug/l** | **0.023 b ug/l** |
| W126 | 9/28/2000 | N | **0.004 ug/l** | **0.039 b ug/l** | **0.005 b ug/l** | **0.021 ug/l** | **0.010 b ug/l** | < 3 ug/l | **0.023 b ug/l** | **0.036 b ug/l** |
| W126 | 10/18/2001 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0047 ug/l** | **0.018 b ug/l** | < 3 ug/l | **0.0036 b ug/l** | < 0.0034 ug/l |
| W126 | 10/31/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.013 b ug/l** | < 3.0 ug/l | **0.0058 ug/l** | < 0.0034 ug/l |
| W126 | 12/18/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.011 b ug/l** | < 3.0 ug/l | **0.0055 b ug/l** | < 0.0034 ug/l |
| W126 | 10/20/2004 | N | < 0.0034 ug/l | **0.0039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0058 b ug/l** | < 2 ug/l | **0.0053 ug/l** | < 0.0034 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W126 | 11/09/2005 | N | < 0.0034 ug/l | **0.0074 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0076 b ug/l** | < 3.0 ug/l | **0.0039 ug/l** | **0.0062 ug/l** |
| W127 | 3/18/1986 | N | < 0.0056 ug/l | **0.014 ug/l** | **0.095 ug/l** | < 0.0068 ug/l | **0.023 ug/l** | **17 ug/l** | **0.28 ug/l** | **0.013 ug/l** |
| W127 | 6/03/1986 | N | < 0.0112 ug/l | < 0.0080 ug/l | < 0.0112 ug/l | < 0.0136 ug/l | **0.070 s ug/l** | **160 ug/l** | **0.020 ug/l** | **0.030 ug/l** |
| W127 | 9/25/1986 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.015 s ug/l** | **31 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l |
| W127 | 12/11/1986 | N | < 0.0035 ug/l<br>< 0.0017 ug/l | < 0.0025 ug/l<br>0.0015 ug/l | **0.0051 ug/l**<br>**0.0033 ug/l** | < 0.0043 ug/l<br>< 0.0017 ug/l | **0.036 ug/l**<br>**0.027 ug/l** | < 5 ug/l<br>11 ug/l | **0.0071 ug/l**<br>**0.0062 ug/l** | < 0.0025 ug/l<br>0.0014 ug/l |
| W127 | 3/19/1987 | N | < 0.0035 ug/l | < 0.0025 ug/l | < 0.0035 ug/l | < 0.0043 ug/l | **0.090 ug/l** | **7 ug/l** | < 0.0025 ug/l | < 0.0025 ug/l |
| W127 | 5/06/1987 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0088 ug/l** | **11 ug/l** | **0.0018 ug/l** | < 0.0010 ug/l |
| W127 | 7/29/1987 | N | < 0.0014 ug/l | **0.0028 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0066 ug/l** | **47 ug/l** | < 0.001 ug/l | **0.0035 ug/l** |
| W127 | 11/04/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 6 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W127 | 2/22/1988 | N | < 0.0014 ug/l | < 0.001 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.021 ug/l** | **28 ug/l** | **0.0038 s ug/l** | < 0.001 ug/l |
| W127 | 10/04/1988 | N | < 0.0028 ug/l<br>< 0.0014 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0028 ug/l<br>< 0.0014 ug/l | < 0.0034 ug/l<br>< 0.0017 ug/l | **0.011 ug/l**<br>**0.008 ug/l** | **60 ug/l**<br>**58 ug/l** | < 0.0020 ug/l<br>< 0.0010 ug/l | < 0.0020 ug/l<br>< 0.0010 ug/l |
| W127 | 12/09/1988 | N | < 0.0056 ug/l | < 0.0040 ug/l | < 0.0056 ug/l | < 0.0068 ug/l | **0.032 s ug/l** | **290 ug/l** | < 0.0040 ug/l | < 0.0040 ug/l |
| W127 | 8/04/1989 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 pp ug/l | **0.0038 ug/l** | **20 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l |
| W127 | 6/22/1990 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0041 s ug/l** | -- | < 0.0010 ug/l | < 0.0010 ug/l |
| W127 | 10/30/1990 | N | < 0.0014 ug/l | **0.0018 b ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0048 b ug/l** | < 6 ug/l | **0.0023 b ug/l** | **0.0022 ug/l** |
| W127 | 10/17/1991 | N | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 6 ug/l<br>< 6 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>0.0030 ug/l |
| W127 | 10/13/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | **0.0079 b ug/l** | < 6 ug/l | **0.0040 ug/l** | < 0.0030 ug/l |
| W127 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | **0.00499 b ug/l** | < 6 ug/l | < 0.00300 ug/l | < 0.00300 ug/l |
| W127 | 9/29/1994 | N | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | **0.006 ug/l** | **0.004 ug/l** |
| W127 | 10/19/1995 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** | < 3 ug/l | **0.007 b ug/l** | < 0.003 ug/l |
| W127 | 10/03/1996 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.007 b ug/l** | < 0.003 ug/l |
| W127 | 10/03/1997 | N | < 0.003 ug/l | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 3 ug/l | **0.009 b ug/l** | < 0.003 ug/l |
| W127 | 11/20/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.008 ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W127 | 11/17/1999 | N | < 0.003 ug/l | **0.003 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** | < 3 ug/l | **0.005 b ug/l** | < 0.003 ug/l |
| W127 | 9/28/2000 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.003 b ug/l** | < 0.003 ug/l |
| W127 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0063 b ug/l** | < 3 ug/l | **0.0043 b ug/l** | < 0.0033 ug/l |
| W127 | 10/29/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.010 b ug/l** | < 3.0 ug/l | **0.0035 b ug/l** | < 0.0034 ug/l |
| W127 | 9/04/2003 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.53 ug/l | < 0.53 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| W127 | 9/15/2003 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.050 ug/l | < 0.50 ug/l | < 0.53 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| W127 | 9/27/2003 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.055 ug/l | < 0.55 ug/l | < 0.55 ug/l | < 0.055 ug/l | < 0.055 ug/l |
| W127 | 10/01/2003 | N | -- | -- | -- | -- | -- | < 0.55 ug/l | -- | -- |
| W127 | 10/08/2003 | N | -- | -- | -- | -- | -- | < 0.50 ug/l | -- | -- |
| W127 | 10/13/2003 | N | -- | -- | -- | -- | -- | < 0.051 ug/l | -- | -- |
| W127 | 11/05/2003 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | < 0.57 ug/l<br>< 10 ug/l | < 0.051 ug/l | < 0.051 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W127 | 11/14/2003 | N | < 0.11 ug/l<br>< 0.11 ug/l | < 0.11 ug/l<br>< 0.11 ug/l | < 0.11 ug/l<br>< 0.11 ug/l | < 0.053 ug/l<br>< 0.053 ug/l | < 0.53 ug/l<br>< 0.53 ug/l | < 0.54 ug/l<br>< 0.54 ug/l | < 0.053 ug/l<br>< 0.053 ug/l | < 0.053 ug/l<br>< 0.053 ug/l |
| W127 | 12/17/2003 | N | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 2 ug/l | < 0.5 ug/l | < 2 ug/l | < 2 ug/l |
| W127N | 12/17/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0064 b ug/l** | < 3.0 ug/l | **0.0049 b ug/l** | < 0.0034 ug/l |
| W127N | 10/19/2004 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0065 b ug/l** | < 2 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 11/08/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.014 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 10/19/2006 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0069 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 8/07/2012 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.030 b ug/l** | < 0.95 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W127N | 8/17/2012 | N | -- | -- | -- | -- | -- | < 1.1 ug/l | -- | -- |
| W127N | 8/24/2012 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0036 ug/l** | < 1.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W127N | 10/09/2013 | N | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | **0.080 ug/l** | < 1.2 ug/l | **0.0045 ug/l** | < 0.0038 ug/l |
| W127N | 10/14/2014 | N | < 0.0034 ug/l | **0.0041 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.034 b ug/l** | < 1.0 ug/l | **0.0056 ug/l** | < 0.0034 ug/l |
| W127N | 10/06/2015 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.97 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W127N | 10/18/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0034 ug/l** | < 0.29 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W128 | 3/21/1986 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.016 ug/l** | < 5 ug/l | **0.0089 ug/l** | < 0.0010 ug/l |
| W128 | 6/02/1986 | N | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0017 ug/l<br>< 0.0017 ug/l | **0.0089 s ug/l**<br>**0.0043 s ug/l** | < 5 ug/l<br>< 5 ug/l | **0.0014 ug/l**<br>**0.0018 ug/l** | < 0.0010 ug/l<br>< 0.0010 ug/l |
| W128 | 9/24/1986 | N | < 0.0014 ug/l | **0.0087 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.018 s ug/l** | < 5 ug/l | **0.020 ug/l** | **0.0056 ug/l** |
| W128 | 12/11/1986 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.063 ug/l** | < 5 ug/l | **0.0031 ug/l** | < 0.0010 ug/l |
| W128 | 3/19/1987 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | < 0.0019 ug/l | < 6 ug/l | **0.0017 ug/l** | < 0.0010 ug/l |
| W128 | 5/06/1987 | N | < 0.0014 ug/l | **0.0018 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0088 ug/l** | **11 ug/l** | **0.0021 ug/l** | **0.0012 ug/l** |
| W128 | 7/29/1987 | N | < 0.0014 ug/l | < 0.001 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0063 ug/l** | **6.8 s ug/l** | **0.0019 ug/l** | < 0.001 ug/l |
| W128 | 11/03/1987 | N | < 0.0014 ug/l | **0.003 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.017 ug/l** | < 6 ug/l | **0.0027 ug/l** | **0.0027 ug/l** |
| W128 | 2/23/1988 | N | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.001 ug/l<br>< 0.001 ug/l | **0.0014 s ug/l**<br>**< 0.0014 ug/l** | < 0.0017 ug/l<br>< 0.0017 ug/l | **0.015 ug/l**<br>**0.016 ug/l** | < 6 ug/l<br>< 6 ug/l | **0.0033 s ug/l**<br>**0.0027 ug/l** | < 0.001 ug/l<br>< 0.001 ug/l |
| W128 | 10/04/1988 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0064 ug/l** | < 6 ug/l | **0.0012 ug/l** | < 0.0010 ug/l |
| W128 | 6/22/1990 | N | -- | -- | -- | -- | -- | < 10 ug/l | -- | -- |
| W128 | 10/18/1995 | N | < 0.003 ug/l | **0.032 ug/l** | **0.005 ug/l** | **0.006 ug/l** | **0.005 b ug/l** | < 3 ug/l | **0.035 ug/l** | **0.023 ug/l** |
| W128 | 10/03/1996 | N | < 0.003 ug/l | **0.018 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.020 b ug/l** | **0.015 b ug/l** |
| W128 | 10/02/1997 | N | < 0.003 ug/l | **0.006 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.010 b ug/l** | < 3 ug/l | **0.009 b ug/l** | **0.005 ug/l** |
| W128 | 11/20/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.008 ug/l** | < 3 ug/l | **0.004 ug/l** | < 0.003 ug/l |
| W128 | 11/17/1999 | N | **0.004 ug/l** | **0.015 b ug/l** | **0.005 ug/l** | **0.013 ug/l** | **0.007 b ug/l** | < 3 ug/l | **0.024 b ug/l** | **0.010 b ug/l** |
| W128 | 9/28/2000 | N | < 0.003 ug/l | **0.011 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.013 b ug/l** | < 3 ug/l | **0.008 b ug/l** | **0.005 b ug/l** |
| W128 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0049 b ug/l** | < 3 ug/l | **0.0044 b ug/l** | < 0.0033 ug/l |
| W128 | 10/29/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0094 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W128 | 12/17/2003 | N | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>0.0081 b ug/l | < 0.5 ug/l<br>< 3.0 ug/l | < 2 ug/l<br>0.0042 b ug/l | < 2 ug/l<br>< 0.0034 ug/l |
| W128 | 10/20/2004 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0048 ug/l | < 0.0034 ug/l | **0.0045 b ug/l** | < 2 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W128 | 10/21/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.017 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W128 | 11/08/2005 | N | < 0.0034 ug/l | **0.0073 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0089 b ug/l** | < 3.0 ug/l | **0.0050 ug/l** | **0.0054 ug/l** |
| W128 | 10/19/2006 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0046 b ug/l** | < 2.9 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W129 | 3/18/1986 | N | < 0.0056 ug/l | **0.018 ug/l** | **0.37 ug/l** | < 0.0068 ug/l | **0.18 ug/l** | **180 ug/l** | **0.16 ug/l** | **0.046 ug/l** |
| W129 | 6/03/1986 | N | < 0.0014 ug/l | **0.0021 ug/l** | **0.014 ug/l** | < 0.0017 ug/l | **0.0075 s ug/l** | **8.8 ug/l** | **0.0035 ug/l** | **0.0013 ug/l** |
| W129 | 9/25/1986 | N | < 0.011 ug/l | < 0.0080 ug/l | **0.14 ug/l** | < 0.013 ug/l | **0.10 ug/l** | **38 ug/l** | **0.031 ug/l** | < 0.0080 ug/l |
| W129 | 12/11/1986 | N | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | **11 ug/l** | **11 ug/l** | < 0.6 ug/l | < 0.6 ug/l |
| W129 | 3/19/1987 | N | < 0.0035 ug/l<br>< 0.0070 ug/l | < 0.0025 ug/l<br>< 0.0050 ug/l | **0.032 ug/l**<br>**< 0.0070 ug/l** | < 0.0043 ug/l<br>< 0.0085 ug/l | **0.130 ug/l**<br>**0.073 ug/l** | **77 ug/l**<br>**65 ug/l** | < 0.0025 ug/l<br>< 0.0050 ug/l | < 0.0025 ug/l<br>< 0.0050 ug/l |
| W129 | 5/06/1987 | N | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | **15 ug/l** | **123 ug/l** | < 0.5 ug/l | < 0.5 ug/l |
| W129 | 7/29/1987 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **66 ug/l** | < 10 ug/l | < 10 ug/l |
| W129 | 11/04/1987 | N | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | **8.2 ug/l** | < 6 ug/l | < 6 ug/l |
| W129 | 2/25/1988 | N | < 0.0028 ug/l | **0.0029 ug/l** | **0.0049 ug/l** | < 0.0034 ug/l | **0.051 ug/l** | **18 ug/l** | **0.013 ug/l** | **0.011 ug/l** |
| W129 | 10/03/1988 | N | < 0.0014 ug/l | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.025 ug/l** | < 6 pp ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W129 | 12/12/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 5 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W129 | 8/04/1989 | N | < 0.0014 ug/l | **0.0037 ug/l** | < 0.0014 ug/l | **0.0022 ug/l** | **0.032 ug/l** | **7 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l |
| W129 | 5/02/1990 | N | < 0.0028 ug/l | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.0046 s ug/l** | **6 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l |
| W129 | 10/30/1990 | N | < 0.0014 ug/l | **0.0029 b ug/l** | **0.017 ug/l** | < 0.0017 ug/l | **0.010 b ug/l** | < 6 ug/l | **0.011 b ug/l** | **0.0048 ug/l** |
| W129 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | **0.013 ug/l** | < 0.0030 ug/l | **0.031 b ug/l** | < 6 ug/l | **0.0035 ug/l** | < 0.0030 ug/l |
| W129 | 10/13/1992 | N | < 0.0030 ug/l | **0.0055 ug/l** | **0.012 ug/l** | < 0.0030 ug/l | **0.064 ug/l** | **5 j ug/l** | **0.0057 ug/l** | **0.0065 ug/l** |
| W129 | 10/19/1993 | N | < 0.0360 ug/l | < 0.0360 ug/l | **0.0370 ug/l** | < 0.0360 ug/l | < 0.0480 ug/l | < 6 ug/l | < 0.0360 ug/l | < 0.0360 ug/l |
| W129 | 9/29/1994 | N | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | **1.2 b ug/l** | < 3 ug/l | < 0.24 ug/l | < 0.24 ug/l |
| W129 | 10/19/1995 | N | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | **0.60 b ug/l** | **2 j ug/l** | < 0.18 ug/l | < 0.18 ug/l |
| W129 | 10/03/1996 | N | < 0.003 ug/l | < 0.003 ug/l | **0.020 ug/l** | < 0.003 ug/l | **0.028 b ug/l** | < 3 ug/l | **0.011 b ug/l** | < 0.003 ug/l |
| W129 | 10/03/1997 | N | < 0.003 ug/l | **0.006 b ug/l** | **0.14 e ug/l** | < 0.003 ug/l | **0.74 ug/l** | < 3 ug/l | **0.036 b ug/l** | **0.005 ug/l** |
| W129 | 11/20/1998 | N | < 0.003 ug/l | < 0.003 ug/l | **0.033 ug/l** | < 0.003 ug/l | **0.11 e ug/l** | < 3 ug/l | **0.009 ug/l** | < 0.003 ug/l |
| W129 | 11/17/1999 | N | < 0.003 ug/l | **0.019 b ug/l** | **0.072 ug/l** | < 0.003 ug/l | **0.084 b ug/l** | < 3 ug/l | **0.017 b ug/l** | **0.010 b ug/l** |
| W129 | 9/27/2000 | N | < 0.003 ug/l | **0.007 b ug/l** | **0.048 ug/l** | < 0.003 ug/l | **0.021 b ug/l** | < 3 ug/l | **0.010 b ug/l** | **0.004 b ug/l** |
| W129 | 10/17/2001 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.13 ug/l** | < 0.0034 ug/l | **0.28 ug/l** | **2 ug/l** | **0.014 b ug/l** | < 0.0034 ug/l |
| W129 | 10/29/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.025 ug/l** | < 0.0034 ug/l | **0.18 ug/l** | < 3.0 ug/l | **0.014 b ug/l** | < 0.0034 ug/l |
| W129 | 12/18/2003 | N | < 0.0034 ug/l | **0.0034 ug/l** | **0.026 ug/l** | < 0.0034 ug/l | **0.026 b ug/l** | < 3.0 ug/l | **0.0096 b ug/l** | **0.0038 ug/l** |
| W129 | 10/20/2004 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.027 ug/l** | < 0.0034 ug/l | **0.039 b ug/l** | < 2 ug/l | **0.0099 ug/l** | < 0.0034 ug/l |
| W129 | 10/21/2005 | N | < 0.0068 * ug/l | < 0.0074 ug/l | < 0.0068 ug/l | < 0.0068 * ug/l | < 0.13 ug/l | **14 ug/l** | < 0.057 ug/l | < 0.0095 ug/l |
| W129 | 11/09/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.084 ug/l** | < 0.0034 ug/l | **0.28 ug/l** | **4.9 ug/l** | **0.014 ug/l** | < 0.0034 ug/l |
| W129 | 10/19/2006 | N | < 0.0071 ug/l | < 0.0071 ug/l | **0.057 ug/l** | < 0.0071 ug/l | **0.69 ug/l** | < 6.2 ug/l | **0.016 ug/l** | **0.0094 ug/l** |
| W130 | 5/01/1990 | N | < 0.0014 ug/l<br>< 0.0014 ug/l | **0.011 ug/l**<br>**0.0056 ug/l** | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0017 ug/l<br>< 0.0017 ug/l | **0.013 s ug/l**<br>**0.0078 s ug/l** | < 6 ug/l<br>< 6 ug/l | **0.0098 ug/l**<br>**0.0081 ug/l** | **0.0083 ug/l**<br>**0.0050 ug/l** |
| W130 | 10/31/1990 | N | < 0.0014 ug/l | **0.0015 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0068 b ug/l** | < 6 ug/l | **0.0023 b ug/l** | **0.0011 ug/l** |
| W130 | 10/17/1991 | N | < 0.0030 ug/l | **0.0032 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0040 ug/l | < 6 ug/l | < 0.0030 ug/l | **0.0032 ug/l** |

# Table A-4
## 1984-2016 Upper Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W130 | 10/13/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0040 ug/l | < 6 ug/l | < 0.0030 ug/l | < 0.0030 ug/l |
| W130 | 10/19/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | **0.00496 b ug/l** | < 6 ug/l | < 0.00300 ug/l | < 0.00300 ug/l |
| W130 | 9/29/1994 | N | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.007 b ug/l** | < 3 ug/l | **0.004 ug/l** | **0.004 ug/l** |
| W130 | 10/19/1995 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W130 | 10/03/1996 | N | < 0.003 ug/l | **0.005 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** | < 3 ug/l | **0.009 b ug/l** | **0.003 b ug/l** |
| W130 | 10/06/1997 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.026 ug/l** | < 3 ug/l | **0.004 b ug/l** | < 0.003 ug/l |
| W130 | 11/20/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.006 ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W130 | 11/17/1999 | N | < 0.003 ug/l | **0.009 b ug/l** | **0.004 ug/l** | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | **0.011 b ug/l** | **0.007 b ug/l** |
| W130 | 9/28/2000 | N | < 0.003 ug/l | **0.006 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.006 b ug/l** | **0.004 b ug/l** |
| W130 | 10/16/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0042 b ug/l** | < 3 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W130 | 10/30/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.013 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 12/17/2003 | N | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>0.0080 b ug/l | < 0.5 ug/l<br>< 3.0 ug/l | < 2 ug/l<br>0.0046 b ug/l | < 2 ug/l<br>< 0.0034 ug/l |
| W130 | 10/19/2004 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0045 b ug/l** | < 2 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 11/09/2005 | N | < 0.0034 ug/l | **0.0085 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0077 b ug/l** | < 3.0 ug/l | **0.0045 ug/l** | **0.0057 ug/l** |
| W130 | 10/19/2006 | N | < 0.0036 * ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 * ug/l | **0.0071 b ug/l** | < 3.1 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| W130 | 11/07/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0059 ug/l** | < 0.98 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 10/09/2008 | N | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>0.0035 ug/l | < 0.96 ug/l<br>< 1.0 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l | < 0.0033 ug/l<br>< 0.0034 ug/l |
| W130 | 9/29/2009 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0035 ug/l** | < 0.0034 ug/l | **0.0040 b ug/l** | < 0.99 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 10/05/2010 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.025 b ug/l** | < 0.97 ug/l | **0.0039 ug/l** | < 0.0033 ug/l |
| W130 | 10/11/2011 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.017 b ug/l** | < 1.1 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| W130 | 10/16/2012 | N | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | **0.030 bh ug/l** | < 1.0 h ug/l | **0.0048 h ug/l** | **0.0035 h ug/l** |
| W130 | 10/09/2013 | N | < 0.0043 ug/l | **0.040 ug/l** | **0.014 ug/l** | **0.010 ug/l** | **0.11 ug/l** | < 1.3 ug/l | **0.020 ug/l** | **0.038 ug/l** |
| W130 | 10/15/2014 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0077 b ug/l** | < 0.95 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W130 | 10/15/2014 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0078 b ug/l** | < 1.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W130 | 10/07/2015 | N | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 1.1 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W130 | 10/14/2016 | N | < 0.0034 ug/l | **0.0038 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0047 ug/l** | < 0.30 ug/l | < 0.0034 ug/l | **0.0038 ug/l** |
| W131 | 5/02/1990 | N | < 0.056 ug/l | **0.52 ug/l** | **1.4 ug/l** | < 0.068 ug/l | < 0.076 ug/l | **77 ug/l** | **0.37 ug/l** | **0.35 ug/l** |
| W131 | 10/31/1990 | N | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | **380 ug/l** | < 6 ug/l | < 6 ug/l |
| W131 | 10/17/1991 | N | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.040 ug/l | **560 ug/l** | < 0.030 ug/l | < 0.030 ug/l |
| W131 | 10/14/1992 | N | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | < 60 ug/l | **1100 ug/l** | < 60 ug/l | < 60 ug/l |
| W131 | 10/19/1993 | N | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.420 ug/l | < 0.560 ug/l | **740 ug/l** | < 0.420 ug/l | < 0.420 ug/l |
| W131 | 11/07/1994 | N | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | < 0.54 ug/l | **1600 ug/l** | < 0.54 ug/l | < 0.54 ug/l |
| W131 | 10/19/1995 | N | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | < 0.60 ug/l | **800 ug/l** | < 0.60 ug/l | < 0.60 ug/l |
| W131 | 10/03/1996 | N | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | **620 ug/l** | < 0.060 ug/l | < 0.060 ug/l |
| W131 | 10/06/1997 | N | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>< 0.003 ug/l | **0.046 ug/l**<br>**0.042 ug/l** | < 0.003 ug/l<br>< 0.003 ug/l | **36 ug/l**<br>**28 ug/l** | **12000 ug/l**<br>**9600 ug/l** | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>0.050 ug/l |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W131 | 11/21/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.031 b ug/l** | **610 ug/l** | < 0.003 ug/l | < 0.003 ug/l |
| W132 | 12/17/2003 | N | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>< 0.0034 ug/l | < 2 ug/l<br>0.0082 b ug/l | < 0.5 ug/l<br>< 3.0 ug/l | < 2 ug/l<br>0.0042 b ug/l | < 2 ug/l<br>< 0.0034 ug/l |
| W132 | 10/19/2004 | N | **0.0034 ug/l** | **0.017 ug/l** | < 0.0034 ug/l | **0.012 ug/l** | **0.0095 b ug/l** | < 2 ug/l | **0.0099 ug/l** | **0.015 ug/l** |
| W132 | 11/08/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0079 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 10/19/2006 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.0071 b ug/l** | < 3.1 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| W132 | 11/07/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.012 ug/l** | < 0.99 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 11/07/2007 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0054 ug/l** | < 0.99 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 10/09/2008 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 1.0 ug/l | **0.0038 ug/l** | < 0.0034 ug/l |
| W132 | 9/29/2009 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.010 b ug/l** | < 0.96 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 10/05/2010 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.012 b ug/l** | < 0.96 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 10/11/2011 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.012 b ug/l** | < 0.96 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 8/07/2012 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.050 b ug/l** | < 0.95 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 8/24/2012 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0038 ug/l** | < 0.96 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 10/16/2012 | N | < 0.0034 h ug/l | **0.0045 h ug/l** | < 0.0034 h ug/l | **0.0041 h ug/l** | **0.050 bh ug/l** | < 1.0 h ug/l | **0.0065 h ug/l** | **0.0047 h ug/l** |
| W132 | 10/10/2013 | N | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | **0.089 ug/l** | < 1.1 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W132 | 10/14/2014 | N | < 0.0034 ug/l | **0.0087 ug/l** | **0.0051 ug/l** | **0.0059 ug/l** | **0.060 b ug/l** | < 1.0 ug/l | **0.011 ug/l** | **0.0074 ug/l** |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| W132 | 10/07/2015 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0059 b ug/l** | < 0.97 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W132 | 10/14/2016 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.33 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l |
| W132 | 10/14/2016 | FD | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.29 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-1 | 7/14/2003 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 24 ug/l | < 10 ug/l | < 10 ug/l |
| S-1 | 8/01/2003 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.53 ug/l | < 1.0 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| S-1 | 9/04/2003 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.054 ug/l | < 0.54 ug/l | < 0.51 ug/l | < 0.054 ug/l | < 0.054 ug/l |
| S-1 | 9/15/2003 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.055 ug/l | < 0.55 ug/l | < 0.053 ug/l | < 0.055 ug/l | < 0.055 ug/l |
| S-1 | 9/22/2003 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.53 ug/l | < 0.60 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| S-1 | 9/27/2003 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | < 0.52 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 10/01/2003 | N | -- | -- | -- | -- | -- | < 0.53 ug/l | -- | -- |
| S-1 | 10/08/2003 | N | -- | -- | -- | -- | -- | < 0.50 ug/l | -- | -- |
| S-1 | 10/13/2003 | N | -- | -- | -- | -- | -- | < 0.52 ug/l | -- | -- |
| S-1 | 10/24/2003 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | < 0.52 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 10/30/2003 | N | < 0.10 ug/l | **0.13 ug/l** | < 0.10 ug/l | < 0.052 ug/l | < 0.52 ug/l | < 0.51 ug/l | < 0.052 ug/l | **0.082 ug/l** |
| S-1 | 11/05/2003 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.050 ug/l | < 0.50 ug/l | < 0.51 ug/l<br>< 10 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| S-1 | 11/14/2003 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.050 ug/l | < 0.50 ug/l | < 0.51 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| S-1 | 12/04/2003 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.054 ug/l | < 0.54 ug/l | < 0.53 ug/l | < 0.054 ug/l | < 0.054 ug/l |
| S-1 | 12/18/2003 | N | < 0.0034 ug/l | **0.010 ug/l** | **0.014 ug/l** | < 0.0034 ug/l | **0.014 b ug/l** | < 3.0 ug/l | **0.011 b ug/l** | **0.0036 ug/l** |
| S-1 | 1/21/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.52 ug/l | < 0.52 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 2/26/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.52 ug/l | < 0.51 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 3/31/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.52 ug/l | < 0.52 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 4/13/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.52 ug/l | < 0.52 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 5/04/2004 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.53 ug/l | < 0.53 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| S-1 | 6/04/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | < 0.51 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 7/19/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | < 0.52 ug/l | **0.19 ug/l** | < 0.051 ug/l |
| S-1 | 8/02/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.050 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.050 ug/l | < 0.050 ug/l |
| S-1 | 9/01/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | < 0.51 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 10/01/2004 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.053 ug/l | < 0.53 ug/l | < 0.52 ug/l | < 0.053 ug/l | < 0.053 ug/l |
| S-1 | 10/19/2004 | N | < 0.0034 ug/l | **0.02 ug/l** | **0.0065 ug/l** | < 0.0034 ug/l | **0.0099 b ug/l** | < 2 ug/l | **0.0092 ug/l** | **0.0092 ug/l** |
| S-1 | 11/05/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.051 ug/l | < 0.51 ug/l | < 0.51 ug/l | < 0.051 ug/l | < 0.051 ug/l |
| S-1 | 12/21/2004 | N | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.052 ug/l | < 0.52 ug/l | < 0.51 ug/l | < 0.052 ug/l | < 0.052 ug/l |
| S-1 | 11/09/2005 | N | < 0.0034 ug/l | **0.015 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.015 b ug/l** | < 3.0 ug/l | **0.0073 ug/l** | **0.0044 ug/l** |
| S-1 | 10/20/2006 | N | < 0.0034 ug/l | **0.014 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.011 b ug/l** | < 3.0 ug/l | **0.0060 ug/l** | **0.0047 ug/l** |
| S-1 | 11/09/2007 | N | < 0.0034 ug/l | **0.0080 ug/l** | < 0.016 ug/l | < 0.0034 ug/l | **0.014 b ug/l** | < 1.0 ug/l | **0.0039 b ug/l** | < 0.0034 ug/l |
| S-1 | 10/14/2008 | N | < 0.0034 ug/l | **0.010 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0080 b ug/l** | < 1.0 ug/l | **0.0068 ug/l** | **0.0041 ug/l** |
| S-1A | 6/04/2010 | N | < 0.0033 ug/l | **0.011 ug/l** | < 0.021 ug/l | < 0.0033 ug/l | **0.015 b ug/l** | < 0.97 ug/l | < 0.0052 ug/l | **0.0054 ug/l** |

# Table A-4
# 1984-2016 Upper Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Dibenz(a,h) anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | |
| S-1A | 10/05/2010 | N | < 0.0034 ug/l | **0.011 ug/l** | < 0.016 ug/l | < 0.0034 ug/l | **0.024 b ug/l** | < 1.0 ug/l | < 0.0053 ug/l | **0.0047 ug/l** |
| S-1A | 10/11/2011 | N | < 0.0036 ug/l | **0.0076 ug/l** | < 0.017 ug/l | < 0.0036 ug/l | **0.060 ug/l** | < 1.1 ug/l | < 0.0043 ug/l | **0.0053 ug/l** |
| S-1A | 10/11/2011 | FD | < 0.0033 ug/l | **0.0078 ug/l** | < 0.014 ug/l | < 0.0033 ug/l | **0.014 b ug/l** | < 0.97 ug/l | < 0.0044 ug/l | **0.0047 ug/l** |
| S-1A | 10/16/2012 | N | < 0.0035 h ug/l | **0.0050 h ug/l** | < 0.017 h ug/l | < 0.0035 h ug/l | **0.020 bh ug/l** | < 1.1 h ug/l | **0.0044 h ug/l** | **0.0054 h ug/l** |
| S-1A | 10/08/2013 | N | < 0.0034 ug/l | **0.0070 ug/l** | < 0.018 ug/l | < 0.0034 ug/l | **0.0098 b ug/l** | < 1.0 ug/l | **0.0064 * ug/l** | **0.0057 ug/l** |
| S-1A | 10/15/2014 | N | < 0.0034 ug/l | **0.0042 ug/l** | < 0.013 ug/l | < 0.0034 ug/l | **0.0074 b ug/l** | < 1.0 ug/l | **0.0038 ug/l** | **0.0052 ug/l** |
| S-1A | 10/06/2015 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.012 * ug/l** | < 0.0033 ug/l | **0.0047 ug/l** | < 0.97 ug/l | < 0.0033 * ug/l | **0.0047 ug/l** |
| S-1A | 10/13/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0091 ug/l** | < 0.29 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-2 | 3/01/2006 | N | < 0.00098 ug/l | **0.023 ug/l** | **0.0075 ug/l** | **0.0025 j ug/l** | **0.018 b ug/l** | < 0.011 ug/l | **0.011 ug/l** | **0.011 ug/l** |
| S-2 | 3/01/2006 | FD | < 0.00098 ug/l | **0.027 ug/l** | **0.0069 ug/l** | **0.0034 ug/l** | **0.019 b ug/l** | < 0.011 ug/l | **0.013 ug/l** | **0.012 ug/l** |
| S-2 | 10/21/2006 | N | < 0.0034 ug/l | **0.018 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.019 b ug/l** | < 3.0 ug/l | **0.0094 ug/l** | **0.0090 ug/l** |
| S-2 | 11/08/2007 | N | < 0.0034 ug/l | **0.0084 ug/l** | < 0.016 ug/l | < 0.0034 ug/l | **0.013 ug/l** | < 0.99 ug/l | **0.0068 b ug/l** | **0.0049 ug/l** |
| S-2 | 10/14/2008 | N | < 0.0033 ug/l | **0.0068 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.014 b ug/l** | < 0.95 ug/l | < 0.0033 ug/l | **0.0034 ug/l** |
| S-2 | 9/30/2009 | N | < 0.0033 ug/l | **0.0068 ug/l** | < 0.019 ug/l | < 0.0033 ug/l | **0.014 b ug/l** | < 0.97 ug/l | **0.0045 ug/l** | **0.0036 ug/l** |
| S-2 | 10/05/2010 | N | < 0.0034 ug/l | **0.0051 ug/l** | < 0.016 ug/l | < 0.0034 ug/l | **0.024 b ug/l** | < 0.98 ug/l | **0.0043 ug/l** | **0.0040 ug/l** |
| S-2 | 10/11/2011 | N | < 0.0033 ug/l | **0.0057 ug/l** | < 0.016 ug/l | < 0.0033 ug/l | **0.039 ug/l** | < 0.96 ug/l | < 0.0041 ug/l | **0.0047 ug/l** |
| S-2 | 10/16/2012 | N | < 0.0042 h ug/l | **0.065 h ug/l** | **0.077 h ug/l** | **0.0082 h ug/l** | **0.39 h ug/l** | < 6.1 h ug/l | **0.060 h ug/l** | **0.050 h ug/l** |
| S-2 | 10/08/2013 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.019 ug/l | < 0.0034 ug/l | **0.045 b ug/l** | < 1.0 ug/l | **0.0054 * ug/l** | **0.0038 ug/l** |
| S-2 | 10/08/2013 | FD | < 0.0035 ug/l | < 0.0035 ug/l | < 0.020 ug/l | < 0.0035 ug/l | **0.015 b ug/l** | < 1.1 ug/l | **0.0061 * ug/l** | **0.0038 ug/l** |
| S-2 | 10/15/2014 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.013 ug/l | < 0.0034 ug/l | **0.014 b ug/l** | < 1.0 ug/l | **0.0043 ug/l** | **0.0045 ug/l** |
| S-2 | 10/06/2015 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.013 * ug/l** | < 0.0033 ug/l | **0.0045 ug/l** | < 0.97 ug/l | **0.0035 ug/l** | **0.0037 ug/l** |
| S-2 | 10/13/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | **0.012 ug/l** | < 0.0033 ug/l | **0.0067 ug/l** | < 0.29 ug/l | **0.0040 ug/l** | < 0.0033 ug/l |

See Table 3-18 for data qualifiers

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| Parameter | | | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W207 | 3/28/1985 | N | **1.4 ug/l** | **15 ug/l** | < 0.050 ug/l | **0.14 ug/l** | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.050 ug/l | < 0.070 ug/l |
| W207 | 5/16/1985 | N | **2.0 ug/l** | **16 ug/l** | < 0.50 ug/l | **1.2 ug/l** | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l |
| W207 | 6/03/1986 | N | **0.018 ug/l**<br>**0.022 ug/l** | **7.4 ug/l**<br>**8.7 ug/l** | **0.033 ug/l**<br>**< 0.0040 ug/l** | **0.150 ug/l**<br>**0.120 ug/l** | **0.0087 ug/l**<br>**< 0.0040 ug/l** | < 0.0020 ug/l<br>< 0.0040 ug/l | < 0.0020 ug/l<br>< 0.0040 ug/l | < 0.0020 ug/l<br>< 0.0040 ug/l | < 0.0020 ug/l<br>< 0.0040 ug/l | **0.022 c ug/l**<br>**< 0.0040 ug/l** | < 0.0028 ug/l<br>< 0.0056 ug/l |
| W207 | 7/29/1987 | N | < 6 ug/l | **11 ug/l** | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l |
| W207 | 11/04/1987 | N | < 0.25 ug/l | **14.0 ug/l** | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W207 | 2/23/1988 | N | < 6.0 ug/l | **14 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W207 | 10/06/1988 | N | < 6.0 ug/l | **12 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W209 | 1/29/1985 | N | **0.035 ug/l** | **0.80 ug/l** | **0.42 ug/l** | **0.020 ug/l** | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0050 ug/l | **0.071 ug/l** | < 0.0050 ug/l | < 0.0050 ug/l | < 0.0070 ug/l |
| W209 | 5/07/1985 | N | **0.0055 ug/l** | **0.13 ug/l** | **0.049 ug/l** | **0.0051 ug/l** | **0.0013 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0013 c ug/l** | < 0.0014 ug/l |
| W209 | 6/04/1986 | N | **0.0034 ug/l** | **0.062 ug/l** | **0.0052 ug/l** | **0.0025 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | **0.012 c ug/l** | < 0.0010 ug/l | ND c ug/l | **0.020 c ug/l** | < 0.0014 ug/l |
| W209 | 7/29/1987 | N | **0.0023 ug/l** | **0.031 ug/l** | **0.0025 ug/l** | **0.0019 ug/l** | **0.0018 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0035 c ug/l** | < 0.0014 ug/l |
| W209 | 11/03/1987 | N | **0.0062 ug/l** | **0.071 ug/l** | **0.0073 ug/l** | **0.0014 ug/l** | **0.0015 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0042 c ug/l** | < 0.0014 ug/l |
| W209 | 2/23/1988 | N | < 0.020 ug/l | **0.020 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.014 ug/l |
| W209 | 10/05/1988 | N | **0.0057 ug/l** | **0.021 ug/l** | **0.0035 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0028 ug/l |
| W223 | 7/22/1986 | N | < 1.0 ug/l | **6.1 ug/l** | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.50 ug/l | < 0.70 ug/l |
| W223 | 9/24/1986 | N | < 0.016 ug/l<br>< 1.0 ug/l | **6.4 ug/l**<br>**5.4 ug/l** | < 0.0080 ug/l<br>< 0.5 ug/l | < 0.0080 ug/l<br>< 0.5 ug/l | < 0.0080 ug/l<br>< 0.5 ug/l | < 0.0080 ug/l<br>< 0.5 ug/l | < 0.0080 ug/l<br>< 0.5 ug/l | < 0.0080 ug/l<br>< 0.5 ug/l | < 0.0080 ug/l<br>< 0.5 ug/l | < 0.0080 ug/l<br>< 0.5 ug/l | < 0.011 ug/l<br>< 0.7 ug/l |
| W223 | 12/11/1986 | N | < 0.6 ug/l | **5.7 ug/l** | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l |
| W223 | 3/19/1987 | N | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l |
| W223 | 5/06/1987 | N | < 0.5 ug/l | **13 ug/l** | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W223 | 7/29/1987 | N | < 10 ug/l | **4.7 pp ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W223 | 11/04/1987 | N | < 6 ug/l | **14 ug/l** | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l |
| W223 | 2/25/1988 | N | < 6.0 ug/l | **39 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W223 | 10/06/1988 | N | < 6.0 ug/l | **72 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W223 | 12/12/1988 | N | < 6.0 ug/l | **20 ug/l** | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W223 | 2/28/1989 | N | < 0.006 ug/l | **0.068 ug/l** | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W223 | 8/04/1989 | N | < 6 ug/l | **13 ug/l** | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l |
| W223 | 5/02/1990 | N | < 6 ug/l | **29 ug/l** | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l |
| W223 | 10/31/1990 | N | < 0.16 ug/l | **4.5 ug/l** | < 0.080 ug/l | < 0.080 ug/l | < 0.080 ug/l | < 0.080 ug/l | < 0.080 ug/l | < 0.080 ug/l | < 0.080 ug/l | < 0.080 ug/l | < 0.11 ug/l |
| W223 | 10/17/1991 | N | **0.0088 ug/l** | **1.1 ug/l** | **0.021 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0060 ug/l | < 0.0030 ug/l |
| W223 | 10/13/1992 | N | < 0.036 ug/l<br>< 0.021 ug/l | **1.0 ug/l**<br>**0.59 ug/l** | < 0.036 ug/l<br>< 0.021 ug/l | < 0.036 ug/l<br>< 0.021 ug/l | < 0.036 ug/l<br>< 0.021 ug/l | < 0.036 ug/l<br>< 0.021 ug/l | < 0.036 ug/l<br>< 0.021 ug/l | < 0.036 ug/l<br>< 0.021 ug/l | < 0.036 ug/l<br>< 0.021 ug/l | < 0.072 ug/l<br>< 0.042 ug/l | < 0.036 ug/l<br>< 0.021 ug/l |
| W223 | 10/20/1993 | N | < 0.0240 ug/l | **0.466 ug/l** | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0480 ug/l | < 0.0240 ug/l |
| W223 | 9/29/1994 | N | < 0.060 ug/l<br>< 0.048 ug/l | **1.3 ug/l**<br>**1.1 ug/l** | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l |
| W223 | 10/19/1995 | N | **0.008 ug/l** | **0.016 ug/l** | < 0.006 ug/l | < 0.006 ug/l | **0.007 ug/l** | **0.010 ug/l** | **0.011 ug/l** | **0.007 ug/l** | **0.008 ug/l** | **0.014 c ug/l** | < 0.006 ug/l |
| W223 | 10/03/1996 | N | < 0.030 ug/l | **0.32 ug/l** | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l | < 0.030 ug/l |

# Table A-5
## 1984-2016 Middle Sand Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W223 | 10/02/1997 | N | **0.014 b ug/l** | **0.098 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 ug/l** | **0.004 ug/l** | **0.005 ug/l** | **0.005 ug/l** | **0.004 ug/l** | **0.005 c ug/l** | < 0.003 ug/l |
| W223 | 11/20/1998 | N | **0.005 ug/l** | **0.22 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W223 | 11/18/1999 | N | **0.010 jb ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 ug/l** | **0.004 ug/l** | **0.005 ug/l** | **0.005 ug/l** | < 0.003 ug/l |
| W223 | 9/28/2000 | N | **0.005 b ug/l** | **0.11 ug/l** | **0.003 ug/l** | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** | < 0.003 ug/l |
| W223 | 10/16/2001 | N | < 0.0033 ug/l | **0.088 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W223 | 11/01/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.0048 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W223 | 6/07/2003 | N | < 0.0034 ug/l | **0.023 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W252 | 5/06/1987 | N | < 0.5 ug/l | **0.7 ug/l** | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W252 | 7/30/1987 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| W252 | 2/25/1988 | N | **0.012 ug/l** | **0.17 ug/l** | **0.0074 ug/l** | **0.0019 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0019 c ug/l** | < 0.0014 ug/l |
| W252 | 10/06/1988 | N | **0.023 ug/l** | **0.26 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.014 ug/l |
| W252 | 12/09/1988 | N | **0.031 ug/l** | **0.33 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0028 ug/l |
| W252 | 2/28/1989 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W252 | 8/04/1989 | N | **0.051 ug/l** | **0.14 ug/l** | < 0.010 ug/l | **1.9 ug/l** | **0.027 ug/l** | **0.013 ug/l** | **0.055 c ug/l** | **0.012 ug/l** | **0.055 c ug/l** | **0.071 c ug/l** | < 0.014 ug/l |
| W252 | 5/02/1990 | N | **0.0029 s ug/l** | **0.043 ug/l** | < 0.0010 ug/l | **0.058 ug/l** | **0.0026 ug/l** | **0.0020 ug/l** | **0.0064 c ug/l** | < 0.0010 ug/l | **0.0064 c ug/l** | **0.011 c ug/l** | < 0.0014 ug/l |
| W252 | 10/31/1990 | N | **0.0098 b ug/l** | **0.043 ug/l** | **0.0019 ug/l** | **0.22 ug/l** | **0.0085 ug/l** | **0.0061 ug/l** | **0.041 c ug/l** | **0.011 ug/l** | **0.041 c ug/l** | **0.10 c ug/l** | **0.0027 ug/l** |
| W252 | 10/17/1991 | N | **0.20 ug/l** | **0.38 ug/l** | < 0.036 ug/l | **0.49 ug/l** | **0.080 ug/l** | < 0.036 ug/l | < 0.072 ug/l | < 0.036 ug/l | < 0.072 ug/l | **0.097 c ug/l** | < 0.036 ug/l |
| W252 | 10/16/1992 | N | **32 ug/l** | **14 ug/l** | < 6 ug/l | **11 ug/l** | **2 j ug/l** | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | **4 jc ug/l** | < 6 ug/l |
| W252 | 10/20/1993 | N | **0.240 b ug/l** | **0.407 ug/l** | < 0.0840 ug/l | **1.430 ug/l** | **0.371 ug/l** | **0.182 ug/l** | < 0.0840 ug/l | < 0.0840 ug/l | < 0.0840 ug/l | **0.502 c ug/l** | < 0.0840 ug/l |
| W252 | 10/10/1994 | N | **0.063 ug/l** | **0.17 ug/l** | < 0.042 ug/l | **0.68 ug/l** | **0.13 ug/l** | **0.041 j ug/l** | **0.043 ug/l** | < 0.042 ug/l | < 0.042 ug/l | **0.50 c ug/l** | < 0.042 ug/l |
| W252 | 10/20/1995 | N | < 0.078 ug/l | **0.15 ug/l** | < 0.078 ug/l | **0.73 ug/l** | **0.13 ug/l** | < 0.078 ug/l | < 0.078 ug/l | < 0.078 ug/l | < 0.078 ug/l | **0.34 c ug/l** | < 0.078 ug/l |
| W252 | 10/02/1996 | N | **0.022 ug/l** | **0.074 ug/l** | **0.007 ug/l** | **0.18 ug/l** | **0.065 ug/l** | **0.057 ug/l** | **0.073 ug/l** | **0.031 ug/l** | **0.057 ug/l** | **0.18 c ug/l** | < 0.003 ug/l |
| W252 | 10/03/1997 | N | **0.006 ug/l** | **0.007 ug/l** | < 0.003 ug/l | **0.063 ug/l** | **0.024 ug/l** | **0.010 ug/l** | **0.025 ug/l** | **0.008 ug/l** | **0.014 ug/l** | **0.12 c ug/l** | < 0.003 ug/l |
| W252 | 11/18/1998 | N | **0.015 ug/l** | **0.002 j ug/l** | < 0.003 ug/l | **0.057 ug/l** | **0.019 ug/l** | **0.010 ug/l** | **0.012 ug/l** | -- | **0.010 ug/l** | **0.085 c ug/l** | < 0.003 ug/l |
| W252N | 12/10/1999 | N | **0.044 ug/l** | **0.066 ug/l** | **0.003 ug/l** | **0.14 ug/l** | **0.015 ug/l** | < 0.003 ug/l | **0.005 ug/l** | **0.005 b ug/l** | **0.003 ug/l** | **0.010 ug/l** | < 0.003 ug/l |
| W252N | 9/27/2000 | N | **0.015 b ug/l** | **0.023 ug/l** | < 0.003 ug/l | **0.11 ug/l** | **0.009 ug/l** | < 0.003 ug/l | **0.005 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.018 b ug/l** | < 0.003 ug/l |
| W252N | 10/18/2001 | N | **0.0075 b ug/l** | **0.0059 ug/l** | < 0.0034 ug/l | **0.012 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0051 ug/l** | < 0.0034 ug/l |
| W252N | 11/01/2002 | N | **0.0046 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.013 ug/l** | **0.0037 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0050 ug/l** | < 0.0034 ug/l |
| W252N | 12/21/2003 | N | **0.044 ug/l** | **0.0093 ug/l** | < 0.0034 ug/l | **0.0038 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0044 ug/l** | < 0.0034 ug/l |
| W252N | 10/20/2004 | N | **0.0077 b ug/l** | **0.0055 ug/l** | < 0.0034 ug/l | **0.015 ug/l** | **0.0061 ug/l** | **0.0039 ug/l** | **0.0061 ug/l** | **0.0048 ug/l** | **0.0057 ug/l** | **0.015 ug/l** | < 0.0034 ug/l |
| W252N | 11/10/2005 | N | **0.0049 ug/l** | **0.0042 ug/l** | **0.0056 ug/l** | **0.011 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0038 ug/l** | < 0.0034 ug/l |
| W252N | 10/21/2006 | N | **0.0084 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.013 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0040 ug/l** | < 0.0034 ug/l |
| W252N | 11/08/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0075 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W252N | 10/10/2008 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0082 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W252N | 9/30/2009 | N | < 0.0035 ug/l | **0.0042 ug/l** | < 0.0035 ug/l | **0.013 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W252N | 10/06/2010 | N | **0.0038 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | **0.0071 ug/l** | **0.0050 ug/l** | < 0.0036 ug/l | **0.0061 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | **0.010 ug/l** | < 0.0036 ug/l |

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W252N | 10/15/2011 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0062 ug/l** | **0.0045 ug/l** | < 0.0034 ug/l | **0.0041 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W252N | 10/19/2012 | N | < 0.0036 h ug/l | < 0.0036 h ug/l | < 0.0036 h ug/l | **0.0048 h ug/l** | **0.0050 h ug/l** | < 0.0036 h ug/l | **0.0081 h ug/l** | **0.0048 h ug/l** | **0.0068 h ug/l** | **0.011 h ug/l** | **0.0042 h ug/l** |
| W252N | 10/09/2013 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.0088 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| W252N | 10/16/2014 | N | **0.0045 ug/l** | **0.010 ug/l** | < 0.0036 ug/l | **0.0078 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| W252N | 10/08/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.011 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W252N | 10/19/2016 | N | **0.0054 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.010 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W253 | 5/06/1987 | N | **68 ug/l**<br>**< 125 ug/l** | **210 ug/l**<br>**190 ug/l** | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l |
| W253 | 11/05/1987 | N | < 150 ug/l | **160 ug/l** | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l | < 150 ug/l |
| W253 | 2/29/1988 | N | < 600.0 ug/l | **240 pp ug/l** | < 600.0 ug/l | < 600.0 ug/l | < 600.0 ug/l | < 600.0 ug/l | < 600.0 ug/l | < 600.0 ug/l | < 600.0 ug/l | < 600.0 ug/l | < 600.0 ug/l |
| W253 | 2/27/1989 | N | < 250 ug/l | < 250 pp ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l | < 250 ug/l |
| W253 | 5/04/1990 | N | **18 j ug/l** | **56 ug/l** | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l | < 30 ug/l |
| W253 | 10/30/1990 | N | **47 j ug/l** | **92 ug/l** | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l | < 80 ug/l |
| W253 | 12/03/1992 | N | < 10 ug/l | **11 * ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W253 | 10/18/1993 | N | < 50 ug/l | **26 j ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| W253 | 9/28/1994 | N | **1 j ug/l** | **16 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W253 | 10/18/1995 | N | < 1.5 ug/l | **16 ug/l** | < 1.5 ug/l | < 1.5 ug/l | < 1.5 ug/l | < 1.5 ug/l | < 1.5 ug/l | < 1.5 ug/l | < 1.5 ug/l | < 1.5 ug/l | < 1.5 ug/l |
| W253 | 10/02/1996 | N | < 10 ug/l | **11 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W253 | 10/01/1997 | N | < 10 ug/l | **14 ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W253 | 9/26/2000 | N | < 9.6 ug/l | **18 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| W253 | 10/16/2001 | N | < 9.6 ug/l | **25 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| W253 | 11/01/2002 | N | < 9.6 ug/l | **19 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| W253 | 12/16/2003 | N | < 9.8 ug/l | **13 ug/l** | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l |
| W253 | 10/29/2004 | N | **0.012 b ug/l** | **12 ug/l** | **0.097 ug/l** | **0.025 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W253 | 11/12/2005 | N | **0.016 ug/l** | **13 ug/l** | **0.11 ug/l** | **0.043 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0036 ug/l** | < 0.0034 ug/l |
| W253 | 10/18/2006 | N | **0.014 ug/l** | **11 ug/l** | **0.081 ug/l** | **0.025 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W253 | 11/13/2007 | N | **0.0060 b ug/l** | **4.8 ug/l** | **0.056 ug/l** | **0.017 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W253 | 10/16/2008 | N | **0.012 ug/l** | **10 ug/l** | **0.061 ug/l** | **0.019 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W253 | 10/02/2009 | N | **0.0083 ug/l** | **9.2 ug/l** | **0.051 ug/l** | < 0.025 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W253 | 10/12/2010 | N | **0.0078 ug/l** | **11 ug/l** | < 0.042 ug/l | < 0.026 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W253 | 10/16/2011 | N | **0.0070 ug/l** | **9.2 ug/l** | **0.037 ug/l** | **0.045 ug/l** | **0.11 ug/l** | **0.060 ug/l** | **0.10 ug/l** | **0.027 ug/l** | **0.037 ug/l** | **0.031 ug/l** | **0.0082 ug/l** |
| W253 | 10/18/2012 | N | < 0.0035 ug/l | **6.2 ug/l** | **0.062 ug/l** | **0.025 ug/l** | **0.0083 ug/l** | **0.0061 ug/l** | **0.0089 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W253 | 10/11/2013 | N | **0.0081 ug/l** | **7.5 ug/l** | **0.047 * ug/l** | **0.034 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W253 | 10/21/2014 | N | **0.28 ug/l** | **20 ug/l** | **0.22 ug/l** | **0.052 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W253 | 10/14/2015 | N | **0.89 ug/l** | **17 ug/l** | **0.53 ug/l** | **0.059 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W253 | 10/11/2016 | N | **0.013 ug/l** | **10 ug/l** | **0.12 ug/l** | **0.049 ug/l** | < 0.0065 ug/l | < 0.0065 ug/l | < 0.0065 c ug/l | < 0.0065 ug/l | < 0.0065 ug/l | < 0.0065 ug/l | < 0.0065 ug/l |
| W254 | 5/06/1987 | N | **0.0049 ug/l** | < 0.0033 ug/l | < 0.0025 ug/l | **0.112 ug/l** | **0.0034 ug/l** | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | < 0.0025 ug/l | **0.024 c ug/l** | < 0.0035 ug/l |

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W254 | 7/28/1987 | N | **0.0021 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0028 c ug/l** | < 0.0014 ug/l |
| W254 | 2/23/1988 | N | **0.033 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0014 c ug/l** | < 0.0014 ug/l |
| W254 | 10/05/1988 | N | **0.0059 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W254 | 8/04/1989 | N | **0.014 ug/l** | **0.036 ug/l** | < 0.0020 ug/l | **0.13 ug/l** | **0.0089 ug/l** | **0.0075 ug/l** | **0.020 c ug/l** | **0.0080 ug/l** | **0.020 c ug/l** | **0.019 c ug/l** | < 0.0028 ug/l |
| W254 | 5/02/1990 | N | < 0.040 ug/l | < 0.026 ug/l | < 0.020 ug/l | **1.1 ug/l** | **0.085 ug/l** | < 0.020 ug/l | **0.10 c ug/l** | < 0.020 ug/l | **0.10 c ug/l** | **0.028 c ug/l** | < 0.028 ug/l |
| W254 | 10/31/1990 | N | **0.020 b ug/l** | **0.013 b ug/l** | < 0.0040 ug/l | **0.50 ug/l** | **0.041 ug/l** | **0.011 ug/l** | **0.056 c ug/l** | **0.0084 ug/l** | **0.056 c ug/l** | **0.10 c ug/l** | < 0.0056 ug/l |
| W254 | 10/17/1991 | N | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | **0.24 ug/l** | < 0.024 ug/l | **0.047 ug/l** | **0.17 c ug/l** | **0.036 ug/l** | **0.17 c ug/l** | < 0.048 ug/l | < 0.024 ug/l |
| W254 | 10/14/1992 | N | **0.010 b ug/l** | **0.016 ug/l** | < 0.0030 ug/l | **0.085 ug/l** | **0.0071 ug/l** | < 0.0030 ug/l | **0.0041 ug/l** | < 0.0030 ug/l | **0.0030 ug/l** | **0.030 c ug/l** | < 0.0030 ug/l |
| W254 | 10/20/1993 | N | **0.0175 b ug/l** | **0.00759 ug/l** | < 0.00600 ug/l | **0.114 ug/l** | **0.0172 ug/l** | **0.00659 ug/l** | **0.0163 ug/l** | **0.00835 ug/l** | **0.0104 ug/l** | **0.0162 c ug/l** | < 0.00600 ug/l |
| W254 | 9/30/1994 | N | **0.015 b ug/l** | **0.018 ug/l** | < 0.003 ug/l | **0.14 ug/l** | **0.016 ug/l** | **0.019 ug/l** | **0.044 ug/l** | **0.020 ug/l** | **0.030 ug/l** | **0.074 c ug/l** | **0.007 ug/l** |
| W254 | 10/20/1995 | N | **0.016 ug/l** | **0.023 ug/l** | < 0.006 ug/l | **0.073 ug/l** | **0.023 ug/l** | **0.009 ug/l** | **0.032 ug/l** | **0.010 ug/l** | < 0.006 ug/l | **0.13 c ug/l** | < 0.006 ug/l |
| W254 | 10/02/1996 | N | **0.010 ug/l** | **0.078 ug/l** | < 0.003 ug/l | **0.025 ug/l** | **0.014 ug/l** | < 0.003 ug/l | **0.006 ug/l** | < 0.003 ug/l | **0.006 ug/l** | **0.021 c ug/l** | < 0.003 ug/l |
| W254 | 10/03/1997 | N | **0.006 ug/l** | **0.025 ug/l** | < 0.003 ug/l | **0.080 ug/l** | **0.035 ug/l** | **0.015 ug/l** | **0.021 ug/l** | **0.010 ug/l** | **0.014 ug/l** | **0.069 c ug/l** | < 0.003 ug/l |
| W254 | 11/19/1998 | N | **0.005 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W254 | 11/18/1999 | N | **0.013 jb ug/l** | **0.005 ug/l** | **0.004 ug/l** | **0.028 b ug/l** | **0.021 ug/l** | **0.019 ug/l** | **0.070 ug/l** | **0.029 ug/l** | **0.045 ug/l** | **0.11 ug/l** | **0.006 ug/l** |
| W254 | 9/27/2000 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.006 b ug/l** | < 0.003 ug/l | **0.003 ug/l** | **0.011 b ug/l** | < 0.003 ug/l |
| W254 | 10/18/2001 | N | **0.0065 b ug/l** | **0.0039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/30/2002 | N | **0.0091 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0053 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0063 ug/l** | < 0.0034 ug/l |
| W254 | 12/21/2003 | N | **0.019 b ug/l** | **0.0042 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/20/2004 | N | **0.012 b ug/l** | **0.0068 ug/l** | < 0.0034 ug/l | **0.0093 ug/l** | **0.0054 ug/l** | **0.0054 ug/l** | **0.020 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.013 ug/l** | < 0.0034 ug/l |
| W254 | 11/10/2005 | N | **0.0072 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0034 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/20/2006 | N | < 0.0038 ug/l | < 0.0038 ug/l | < 0.0038 ug/l | **0.0053 ug/l** | < 0.0038 ug/l | < 0.0038 ug/l | **0.0042 ug/l** | < 0.0038 ug/l | < 0.0038 ug/l | **0.0048 ug/l** | < 0.0038 ug/l |
| W254 | 11/08/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/10/2008 | N | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W254 | 9/29/2009 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0045 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W254 | 9/29/2009 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0055 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/06/2010 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0044 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W254 | 10/14/2011 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0034 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/17/2012 | N | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | **0.0046 h ug/l** | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l |
| W254 | 10/17/2012 | FD | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | **0.0045 h ug/l** | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l |
| W254 | 10/09/2013 | N | **0.0053 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0082 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/16/2014 | N | < 0.0034 ug/l | **0.011 ug/l** | < 0.0034 ug/l | **0.0050 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/08/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0034 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/08/2015 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0054 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/18/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0097 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W255 | 12/29/1988 | N | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l |

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W255 | 2/27/1989 | N | < 500 pp ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l |
| W255 | 8/03/1989 | N | **130 ug/l** | **120 ug/l** | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l |
| W255 | 10/30/1990 | N | **63 ug/l**<br>**69 j ug/l** | **120 ug/l**<br>**130 ug/l** | < 50 ug/l<br>< 100 ug/l | < 50 ug/l<br>< 100 ug/l | < 50 ug/l<br>< 100 ug/l | < 50 ug/l<br>< 100 ug/l | < 50 ug/l<br>< 100 ug/l | < 50 ug/l<br>< 100 ug/l | < 50 ug/l<br>< 100 ug/l | < 50 ug/l<br>< 100 ug/l | < 50 ug/l<br>< 100 ug/l |
| W255 | 10/17/1991 | N | **110 ug/l** | **330 ug/l** | < 50 ug/l | **20 j ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| W255 | 10/18/1993 | N | **58 j ug/l** | **120 ug/l** | < 100 ug/l | **21 j ug/l** | **71 j ug/l** | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l | < 100 ug/l |
| W255 | 9/28/1994 | N | **300 j ug/l** | **1100 ug/l** | < 350 ug/l | **460 ug/l** | **1300 ug/l** | **720 ug/l** | **820 ug/l** | **240 j ug/l** | **690 ug/l** | **610 c ug/l** | **92 j ug/l** |
| W255 | 10/24/1995 | N | **110 ug/l** | **170 ug/l** | **4.4 ug/l** | **13 ug/l** | **4.6 ug/l** | < 3.6 ug/l | < 3.6 ug/l | < 3.6 ug/l | < 3.6 ug/l | **3.7 c ug/l** | < 3.6 ug/l |
| W255 | 10/02/1996 | N | **85 j ug/l** | **130 j ug/l** | < 500 ug/l | **120 j ug/l** | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l | < 500 ug/l |
| W255 | 10/01/1997 | N | **81 j ug/l** | **140 j ug/l** | **5 j ug/l** | **4 j ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W255 | 11/18/1998 | N | **61 j ug/l** | **140 j ug/l** | < 200 ug/l | < 200 ug/l | < 200 ug/l | < 200 ug/l | < 200 ug/l | -- | < 200 ug/l | < 200 ug/l | < 200 ug/l |
| W255 | 1/14/2000 | N | **55 ug/l** | **210 ug/l** | **6 j ug/l** | **4 j ug/l** | **1 j ug/l** | **0.7 j ug/l** | **0.7 j ug/l** | < 10 ug/l | **0.6 j ug/l** | **0.8 j ug/l** | < 10 ug/l |
| W255 | 9/26/2000 | N | **180 e ug/l** | **260 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| W255 | 10/16/2001 | N | **98 ug/l** | **190 ug/l** | < 9.8 ug/l | **14 ug/l** | **10 ug/l** | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l |
| W255 | 11/01/2002 | N | **140 ug/l** | **290 ug/l** | < 9.6 ug/l | **31 ug/l** | **53 ug/l** | **28 ug/l** | **32 ug/l** | **9.8 ug/l** | **22 ug/l** | **25 ug/l** | < 9.6 ug/l |
| W255 | 12/16/2003 | N | **92 ug/l** | **170 ug/l** | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| W255 | 10/29/2004 | N | **79 ug/l** | **190 ug/l** | **4.5 ug/l** | **7.0 ug/l** | **1.7 ug/l** | **0.5 ug/l** | **0.98 ug/l** | < 0.17 ug/l | **0.28 ug/l** | **0.45 ug/l** | < 0.17 ug/l |
| W255 | 11/12/2005 | N | **45 ug/l** | **130 ug/l** | **5.2 ug/l** | **9.5 ug/l** | **4.7 ug/l** | **2.1 ug/l** | **1.6 ug/l** | **0.53 ug/l** | **3.6 ug/l** | **2.7 ug/l** | < 0.17 ug/l |
| W255 | 10/18/2006 | N | **80 ug/l** | **220 ug/l** | **5.7 ug/l** | **11 ug/l** | **16 ug/l** | **9.0 ug/l** | **11 ug/l** | **3.2 ug/l** | **8.2 ug/l** | **8.0 ug/l** | **1.0 ug/l** |
| W255 | 11/13/2007 | N | **180 ug/l** | **710 ug/l** | **28 ug/l** | **210 ug/l** | **730 ug/l** | **440 ug/l** | **700 ug/l** | **160 ug/l** | **230 ug/l** | **200 ug/l** | **51 ug/l** |
| W255 | 10/16/2008 | N | **63 ug/l** | **150 ug/l** | **4.3 ug/l** | **4.2 ug/l** | **3.2 ug/l** | **1.5 ug/l** | **2.4 ug/l** | **0.51 ug/l** | **0.77 ug/l** | **1.6 ug/l** | **0.17 ug/l** |
| W255 | 10/02/2009 | N | **89 ug/l** | **260 ug/l** | **6.4 ug/l** | **16 ug/l** | **34 ug/l** | **21 ug/l** | **34 ug/l** | **7.6 ug/l** | **11 ug/l** | **11 ug/l** | **2.4 ug/l** |
| W255 | 10/12/2010 | N | **83 ug/l** | **210 ug/l** | **5.7 ug/l** | **7.9 ug/l** | **9.9 ug/l** | **6.3 ug/l** | **7.8 ug/l** | **1.6 ug/l** | **4.3 ug/l** | **4.1 ug/l** | **0.58 ug/l** |
| W255 | 10/16/2011 | N | **68 ug/l** | **230 ug/l** | **4.8 ug/l** | **11 ug/l** | **16 ug/l** | **7.8 ug/l** | **13 ug/l** | **2.9 ug/l** | **4.2 ug/l** | **10 ug/l** | **1.0 ug/l** |
| W255 | 10/18/2012 | N | **71 ug/l** | **250 ug/l** | **5.0 ug/l** | **8.7 ug/l** | **12 ug/l** | **7.4 ug/l** | **10 ug/l** | **2.0 ug/l** | **3.3 ug/l** | **3.5 ug/l** | **0.72 ug/l** |
| W255 | 10/11/2013 | N | **93 ug/l** | **240 ug/l** | **4.6 ug/l** | **5.1 ug/l** | **1.2 ug/l** | **0.31 ug/l** | **0.51 ug/l** | **0.093 ug/l** | **0.15 ug/l** | **0.48 ug/l** | < 0.034 ug/l |
| W255 | 10/21/2014 | N | **100 ug/l** | **200 ug/l** | **6.3 ug/l** | **6.9 ug/l** | **8.9 ug/l** | **4.6 ug/l** | **6.7 ug/l** | **1.6 ug/l** | **2.3 ug/l** | **3.5 ug/l** | **0.55 ug/l** |
| W255 | 10/14/2015 | N | **110 ug/l** | **260 ug/l** | **6.2 ug/l** | **8.0 ug/l** | **6.8 ug/l** | **3.1 ug/l** | **5.4 c ug/l** | **1.2 ug/l** | **2.5 ug/l** | **4.7 ug/l** | **0.35 ug/l** |
| W255 | 10/11/2016 | N | **110 ug/l** | **210 ug/l** | **5.0 ug/l** | **10 ug/l** | **17 ug/l** | **9.2 ug/l** | **14 c ug/l** | **3.3 ug/l** | **4.7 ug/l** | **9.6 ug/l** | **1.2 ug/l** |

See Table 3-18 for data qualifiers and footnotes.

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W207 | 3/28/1985 | N | **0.38 ug/l** | **0.85 ug/l** | < 0.085 ug/l | **0.48 ug/l** | **15 ug/l** | **2.0 ug/l** | **0.29 ug/l** |
| W207 | 5/16/1985 | N | < 0.50 ug/l | **7.3 ug/l** | < 0.50 ug/l | < 0.50 ug/l | **15 ug/l** | **1.2 ug/l** | < 0.50 ug/l |
| W207 | 6/03/1986 | N | **0.250 ug/l**<br>**0.240 ug/l** | **0.270 ug/l**<br>**0.310 ug/l** | < 0.0034 ug/l<br>< 0.0068 ug/l | **0.028 s ug/l**<br>**0.049 s ug/l** | **5.5 ug/l**<br>**< 5 ug/l** | **0.030 ug/l**<br>**0.150 ug/l** | **0.190 ug/l**<br>**0.150 ug/l** |
| W207 | 7/29/1987 | N | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | **12 s ug/l** | < 6 ug/l | < 6 ug/l |
| W207 | 11/04/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 6 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W207 | 2/23/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W207 | 10/06/1988 | N | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6.0 ug/l | < 6 ug/l | < 6.0 ug/l | < 6.0 ug/l |
| W209 | 1/29/1985 | N | **0.022 ug/l** | **0.20 ug/l** | < 0.0085 ug/l | **1.3 ug/l** | **16 ug/l** | **0.25 ug/l** | **0.027 ug/l** |
| W209 | 5/07/1985 | N | **0.039 ug/l** | **0.034 ug/l** | < 0.0017 ug/l | **0.17 ug/l** | < 5 ug/l | **0.10 ug/l** | **0.028 ug/l** |
| W209 | 6/04/1986 | N | **0.057 ug/l** | **0.0039 ug/l** | < 0.0017 ug/l | **0.029 s ug/l** | < 5 ug/l | **0.0098 ug/l** | **0.041 ug/l** |
| W209 | 7/29/1987 | N | **0.0078 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.005 ug/l** | **6.2 s ug/l** | **0.0042 ug/l** | **0.010 ug/l** |
| W209 | 11/03/1987 | N | **0.0069 ug/l** | **0.0083 ug/l** | < 0.0017 ug/l | **0.033 ug/l** | < 6 ug/l | **0.0064 ug/l** | **0.0082 ug/l** |
| W209 | 2/23/1988 | N | < 0.010 ug/l | < 0.014 ug/l | < 0.017 ug/l | **0.045 ug/l** | < 6 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W209 | 10/05/1988 | N | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.019 ug/l** | < 6 ug/l | < 0.0020 ug/l | **0.0024 ug/l** |
| W223 | 7/22/1986 | N | < 0.50 ug/l | **1.7 ug/l** | < 0.90 ug/l | **0.70 ug/l** | < 5 ug/l | < 0.50 ug/l | < 0.50 ug/l |
| W223 | 9/24/1986 | N | < 0.0080 ug/l<br>< 0.5 ug/l | **1.4 ug/l**<br>**1.1 ug/l** | < 0.013 ug/l<br>< 0.9 ug/l | **0.74 ug/l**<br>**0.6 ug/l** | < 5 ug/l<br>< 5 ug/l | **0.19 ug/l**<br>**< 0.5 ug/l** | < 0.0080 ug/l<br>< 0.5 ug/l |
| W223 | 12/11/1986 | N | < 0.6 ug/l | **1.4 ug/l** | < 0.6 ug/l | **0.8 ug/l** | < 5 ug/l | < 0.6 ug/l | < 0.6 ug/l |
| W223 | 3/19/1987 | N | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | < 0.6 ug/l | **490 ug/l** | < 0.6 ug/l | < 0.6 ug/l |
| W223 | 5/06/1987 | N | < 0.5 ug/l | **2.1 ug/l** | < 0.5 ug/l | **1.2 ug/l** | < 24 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W223 | 7/29/1987 | N | < 10 ug/l | < 10 ug/l | < 10 ug/l | < 10 ug/l | **280 ug/l** | < 10 ug/l | < 10 ug/l |
| W223 | 11/04/1987 | N | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | **110 ug/l** | < 6 ug/l | < 6 ug/l |
| W223 | 2/25/1988 | N | < 6.0 ug/l | **10 ug/l** | < 6.0 ug/l | < 6.0 pp ug/l | **640 ug/l** | < 6.0 ug/l | < 6.0 ug/l |
| W223 | 10/06/1988 | N | < 6.0 ug/l | **26 ug/l** | < 6.0 ug/l | **6.4 ug/l** | **300 ug/l** | **6.0 ug/l** | < 6.0 ug/l |
| W223 | 12/12/1988 | N | < 6.0 ug/l | **12 ug/l** | < 6.0 ug/l | < 6.0 pp ug/l | **580 ug/l** | < 6.0 pp ug/l | < 6.0 ug/l |
| W223 | 2/28/1989 | N | < 0.006 ug/l | **0.016 ug/l** | < 0.006 ug/l | **0.012 ug/l** | **1200 ug/l** | < 0.006 pp ug/l | < 0.006 ug/l |
| W223 | 8/04/1989 | N | < 6 ug/l | < 6 pp ug/l | < 6 ug/l | < 6 ug/l | < 5 ug/l | < 6 ug/l | < 6 ug/l |
| W223 | 5/02/1990 | N | < 6 ug/l | **11 ug/l** | < 6 ug/l | **2 j ug/l** | **32 ug/l** | **2 j ug/l** | < 6 ug/l |
| W223 | 10/31/1990 | N | < 0.080 ug/l | **1.3 ug/l** | < 0.14 ug/l | **0.27 ug/l** | < 6 ug/l | **0.38 ug/l** | < 0.080 ug/l |
| W223 | 10/17/1991 | N | **0.0033 ug/l** | **0.33 ug/l** | < 0.0030 ug/l | **0.012 b ug/l** | < 6 ug/l | **0.0088 ug/l** | **0.0032 ug/l** |
| W223 | 10/13/1992 | N | < 0.036 ug/l<br>< 0.021 ug/l | **0.44 ug/l**<br>**0.23 ug/l** | < 0.036 ug/l<br>< 0.021 ug/l | < 0.048 ug/l<br>< 0.028 ug/l | < 6 ug/l<br>< 6 ug/l | < 0.036 ug/l<br>< 0.021 ug/l | < 0.036 ug/l<br>< 0.021 ug/l |
| W223 | 10/20/1993 | N | < 0.0240 ug/l | **0.203 ug/l** | < 0.0240 ug/l | < 0.0320 ug/l | < 6 ug/l | < 0.0240 ug/l | < 0.0240 ug/l |
| W223 | 9/29/1994 | N | < 0.060 ug/l<br>< 0.048 ug/l | **0.26 ug/l**<br>**0.22 ug/l** | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 3 * ug/l<br>< 3 ug/l | < 0.060 ug/l<br>< 0.048 ug/l | < 0.060 ug/l<br>< 0.048 ug/l |
| W223 | 10/19/1995 | N | **0.031 ug/l** | < 0.006 ug/l | < 0.006 ug/l | **0.016 b ug/l** | **2 j ug/l** | **0.008 b ug/l** | **0.034 ug/l** |
| W223 | 10/03/1996 | N | < 0.030 ug/l | **0.089 ug/l** | < 0.030 ug/l | **0.26 b ug/l** | < 3 ug/l | < 0.030 ug/l | < 0.030 ug/l |

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W223 | 10/02/1997 | N | **0.015 b ug/l** | **0.008 b ug/l** | **0.004 ug/l** | **0.022 b ug/l** | < 3 ug/l | **0.017 b ug/l** | **0.014 ug/l** |
| W223 | 11/20/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.013 ug/l** | < 3 ug/l | **0.005 ug/l** | **0.005 ug/l** |
| W223 | 11/18/1999 | N | **0.011 ug/l** | < 0.003 ug/l | **0.003 ug/l** | **0.006 jb ug/l** | < 3 ug/l | **0.008 b ug/l** | **0.006 ug/l** |
| W223 | 9/28/2000 | N | **0.012 b ug/l** | **0.004 b ug/l** | < 0.003 ug/l | **0.013 b ug/l** | < 3 ug/l | **0.007 b ug/l** | **0.008 b ug/l** |
| W223 | 10/16/2001 | N | **0.0058 b ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0081 b ug/l** | < 3 ug/l | **0.0073 b ug/l** | < 0.0033 ug/l |
| W223 | 11/01/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.015 b* ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W223 | 6/07/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0042 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W252 | 5/06/1987 | N | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | **16 ug/l** | < 0.5 ug/l | < 0.5 ug/l |
| W252 | 7/30/1987 | N | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l | **29 ug/l**<br>**19 ug/l** | < 10 ug/l<br>< 10 ug/l | < 10 ug/l<br>< 10 ug/l |
| W252 | 2/25/1988 | N | **0.023 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.019 ug/l** | **22 ug/l** | **0.011 ug/l** | **0.020 ug/l** |
| W252 | 10/06/1988 | N | **0.015 ug/l** | < 0.014 ug/l | < 0.017 ug/l | **0.82 ug/l** | **12 ug/l** | < 0.010 ug/l | **0.013 ug/l** |
| W252 | 12/09/1988 | N | **0.013 ug/l** | < 0.0028 ug/l | < 0.0034 ug/l | **0.062 ug/l** | **24 ug/l** | **0.014 ug/l** | **0.012 ug/l** |
| W252 | 2/28/1989 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | < 0.0019 ug/l | -- | < 0.0010 ug/l | < 0.0010 ug/l |
| W252 | 8/04/1989 | N | **0.15 ug/l** | **0.18 ug/l** | **0.017 ug/l** | **0.036 ug/l** | < 5 ug/l | **0.25 ug/l** | **0.15 ug/l** |
| W252 | 5/02/1990 | N | **0.032 ug/l** | **0.0061 ug/l** | < 0.0017 ug/l | **0.0063 s ug/l** | -- | **0.020 ug/l** | **0.028 ug/l** |
| W252 | 10/31/1990 | N | **0.099 ug/l** | **0.028 ug/l** | **0.010 ug/l** | **0.011 b ug/l** | < 6 ug/l | < 0.0010 ug/l | **0.071 ug/l** |
| W252 | 10/17/1991 | N | **0.82 ug/l** | **0.39 ug/l** | < 0.036 ug/l | **0.12 b ug/l** | **2 j ug/l** | **1.0 ug/l** | **0.46 ug/l** |
| W252 | 10/16/1992 | N | **10 ug/l** | **12 ug/l** | < 6 ug/l | **39 ug/l** | **320 ug/l** | **20 ug/l** | **6 ug/l** |
| W252 | 10/20/1993 | N | **1.560 ug/l** | **0.694 ug/l** | < 0.0840 ug/l | < 0.112 ug/l | < 6 ug/l | **1.650 ug/l** | **1.310 ug/l** |
| W252 | 10/10/1994 | N | **0.97 ug/l** | **0.27 ug/l** | < 0.042 ug/l | < 0.042 ug/l | **2 j ug/l** | **1.1 ug/l** | **0.56 ug/l** |
| W252 | 10/20/1995 | N | **1.1 ug/l** | **0.26 ug/l** | < 0.078 ug/l | **0.15 b ug/l** | **2 j ug/l** | **1.3 ug/l** | **0.77 ug/l** |
| W252 | 10/02/1996 | N | **0.39 ug/l** | **0.068 ug/l** | **0.026 ug/l** | **0.033 b ug/l** | **2 j ug/l** | **0.30 ug/l** | **0.47 ug/l** |
| W252 | 10/03/1997 | N | **0.068 ug/l** | **0.008 b ug/l** | **0.007 ug/l** | **0.008 ug/l** | < 3 ug/l | **0.030 b ug/l** | **0.058 ug/l** |
| W252 | 11/18/1998 | N | **0.12 ug/l** | **0.026 ug/l** | < 0.003 ug/l | **0.024 ug/l** | < 3 ug/l | **0.038 ug/l** | **0.13 ug/l** |
| W252N | 12/10/1999 | N | **0.13 ug/l** | **0.065 ug/l** | **0.004 b ug/l** | **0.038 b ug/l** | **9.6 ug/l** | **0.17 ug/l** | **0.094 ug/l** |
| W252N | 9/27/2000 | N | **0.13 b ug/l** | **0.028 ug/l** | < 0.003 ug/l | **0.014 b ug/l** | **15 ug/l** | **0.12 b ug/l** | **0.087 b ug/l** |
| W252N | 10/18/2001 | N | **0.02 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.015 b ug/l** | **8.3 ug/l** | **0.0049 b ug/l** | **0.017 ug/l** |
| W252N | 11/01/2002 | N | **0.049 ug/l** | **0.0039 ug/l** | < 0.0034 ug/l | **0.0063 b* ug/l** | **5.2 ug/l** | **0.022 b ug/l** | **0.034 ug/l** |
| W252N | 12/21/2003 | N | **0.010 ug/l** | **0.0067 ug/l** | < 0.0034 ug/l | **0.052 b ug/l** | **12 ug/l** | **0.010 ug/l** | **0.011 ug/l** |
| W252N | 10/20/2004 | N | **0.015 ug/l** | **0.0094 ug/l** | **0.0043 ug/l** | **0.044 b ug/l** | **5.6 ug/l** | **0.015 ug/l** | **0.022 ug/l** |
| W252N | 11/10/2005 | N | **0.019 ug/l** | **0.0038 ug/l** | < 0.0034 ug/l | **0.0088 b ug/l** | **2.3 ug/l** | **0.013 ug/l** | **0.015 ug/l** |
| W252N | 10/21/2006 | N | **0.019 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.018 b ug/l** | < 3.0 ug/l | **0.0087 ug/l** | **0.017 ug/l** |
| W252N | 11/08/2007 | N | **0.015 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0075 ug/l** | < 1.0 ug/l | **0.0061 b ug/l** | **0.016 ug/l** |
| W252N | 10/10/2008 | N | **0.010 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0076 ug/l** | < 1.0 ug/l | **0.0054 ug/l** | **0.010 ug/l** |
| W252N | 9/30/2009 | N | **0.021 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | **0.012 b ug/l** | < 1.1 ug/l | **0.0086 ug/l** | **0.018 ug/l** |
| W252N | 10/06/2010 | N | **0.012 ug/l** | **0.0079 ug/l** | < 0.0036 ug/l | **0.11 ug/l** | < 1.1 ug/l | **0.019 ug/l** | **0.012 ug/l** |

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W252N | 10/15/2011 | N | **0.018 ug/l** | **0.0035 ug/l** | < 0.0034 ug/l | **0.071 b ug/l** | < 1.0 ug/l | **0.0095 b ug/l** | **0.014 ug/l** |
| W252N | 10/19/2012 | N | **0.012 h ug/l** | < 0.0036 h ug/l | **0.0054 h ug/l** | **0.032 h ug/l** | < 1.1 h ug/l | **0.0053 h ug/l** | **0.011 h ug/l** |
| W252N | 10/09/2013 | N | **0.0096 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | **0.071 ug/l** | < 1.1 ug/l | **0.0072 ug/l** | **0.011 ug/l** |
| W252N | 10/16/2014 | N | **0.0063 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | **0.031 ug/l** | < 1.1 ug/l | **0.0065 ug/l** | **0.011 ug/l** |
| W252N | 10/08/2015 | N | **0.016 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0039 b ug/l** | < 0.98 ug/l | **0.0057 b ug/l** | **0.017 ug/l** |
| W252N | 10/19/2016 | N | **0.0074 ug/l** | **0.0066 ug/l** | < 0.0033 ug/l | **0.058 ug/l** | < 0.29 ug/l | **0.012 ug/l** | **0.0083 ug/l** |
| W253 | 5/06/1987 | N | < 10 ug/l<br>< 125 ug/l | **42 ug/l**<br>**< 125 ug/l** | < 10 ug/l<br>< 125 ug/l | **3600 ug/l**<br>**4000 ug/l** | < 120 ug/l<br>< 120 ug/l | < 10 ug/l<br>< 125 ug/l | < 10 ug/l<br>< 125 ug/l |
| W253 | 11/05/1987 | N | < 150 ug/l | < 150 ug/l | < 150 ug/l | **1900 ug/l** | < 150 ug/l | < 150 ug/l | < 150 ug/l |
| W253 | 2/29/1988 | N | < 600.0 ug/l | < 600.0 ug/l | < 600.0 ug/l | **2200 ug/l** | **6 ug/l** | < 600.0 ug/l | < 600.0 ug/l |
| W253 | 2/27/1989 | N | < 250 ug/l | < 250 ug/l | < 250 ug/l | **1700 ug/l** | -- | < 250 ug/l | < 250 ug/l |
| W253 | 5/04/1990 | N | < 30 ug/l | **13 j ug/l** | < 30 ug/l | **720 ug/l** | -- | **3 j ug/l** | < 30 ug/l |
| W253 | 10/30/1990 | N | < 80 ug/l | **25 j ug/l** | < 80 ug/l | **1600 ug/l** | < 10 ug/l | < 80 ug/l | < 80 ug/l |
| W253 | 12/03/1992 | N | < 10 ug/l | **3 j* ug/l** | < 10 ug/l | **81 * ug/l** | < 10 ug/l | < 10 ug/l | < 10 ug/l |
| W253 | 10/18/1993 | N | < 50 ug/l | < 50 ug/l | < 50 ug/l | **300 ug/l** | < 50 ug/l | < 50 ug/l | < 50 ug/l |
| W253 | 9/28/1994 | N | < 10 ug/l | **3 j ug/l** | < 10 ug/l | **76 ug/l** | < 10 ug/l | **1 j ug/l** | < 10 ug/l |
| W253 | 10/18/1995 | N | < 1.5 ug/l | **3.4 ug/l** | < 1.5 ug/l | **18 b ug/l** | < 3 ug/l | < 1.5 ug/l | < 1.5 ug/l |
| W253 | 10/02/1996 | N | < 10 ug/l | **3 j ug/l** | < 10 ug/l | **25 ug/l** | < 10 ug/l | **1 j ug/l** | < 10 ug/l |
| W253 | 10/01/1997 | N | **1 j ug/l** | **3 j ug/l** | < 10 ug/l | **62 ug/l** | < 50 ug/l | **1 j ug/l** | < 10 ug/l |
| W253 | 9/26/2000 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | **67 ug/l** | < 48 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| W253 | 10/16/2001 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | **78 ug/l** | < 48 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| W253 | 11/01/2002 | N | < 9.6 ug/l | < 9.6 ug/l | < 9.6 ug/l | **21 * ug/l** | < 48 ug/l | < 9.6 ug/l | < 9.6 ug/l |
| W253 | 12/16/2003 | N | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 9.8 ug/l | < 49 ug/l | < 9.8 ug/l | < 9.8 ug/l |
| W253 | 10/29/2004 | N | < 0.0035 ug/l | **2.4 ug/l** | < 0.0035 ug/l | **1.7 ug/l** | < 2 * ug/l | **0.15 ug/l** | < 0.0035 ug/l |
| W253 | 11/12/2005 | N | < 0.0034 ug/l | **2.1 ug/l** | < 0.0034 ug/l | **3.3 ug/l** | < 3.0 ug/l | **0.088 ug/l** | < 0.0034 ug/l |
| W253 | 10/18/2006 | N | **0.0037 ug/l** | **1.8 ug/l** | < 0.0034 ug/l | **3.7 ug/l** | < 3.0 ug/l | **0.054 ug/l** | < 0.0034 ug/l |
| W253 | 11/13/2007 | N | < 0.0034 ug/l | **0.91 ug/l** | < 0.0034 ug/l | **0.42 b ug/l** | < 0.98 ug/l | **0.022 ug/l** | < 0.0034 ug/l |
| W253 | 10/16/2008 | N | < 0.0034 ug/l | **0.63 ug/l** | < 0.0034 ug/l | **1.6 ug/l** | < 1.0 ug/l | **0.016 ug/l** | < 0.0034 ug/l |
| W253 | 10/02/2009 | N | < 0.0034 ug/l | **1.3 ug/l** | < 0.0034 ug/l | **1.1 ug/l** | < 1.0 ug/l | **0.024 ug/l** | < 0.0034 ug/l |
| W253 | 10/12/2010 | N | < 0.0033 ug/l | **0.53 ug/l** | < 0.0033 ug/l | **0.37 ug/l** | < 0.96 ug/l | < 0.018 ug/l | < 0.0033 ug/l |
| W253 | 10/16/2011 | N | **0.34 ug/l** | **0.42 ug/l** | **0.027 ug/l** | **0.91 b ug/l** | < 0.96 ug/l | **0.19 ug/l** | **0.24 ug/l** |
| W253 | 10/18/2012 | N | **0.024 ug/l** | **0.24 ug/l** | < 0.0035 ug/l | **0.16 ug/l** | < 1.1 ug/l | **0.011 ug/l** | **0.020 ug/l** |
| W253 | 10/11/2013 | N | **0.0066 ug/l** | **0.19 ug/l** | < 0.0035 ug/l | **0.91 ug/l** | < 1.1 ug/l | **0.018 ug/l** | **0.0062 ug/l** |
| W253 | 10/21/2014 | N | **0.013 ug/l** | **2.8 ug/l** | < 0.0034 ug/l | **0.11 ug/l** | < 1.0 ug/l | **0.17 ug/l** | < 0.0034 ug/l |
| W253 | 10/14/2015 | N | **0.019 ug/l** | **2.6 ug/l** | < 0.0033 ug/l | **83 ug/l** | < 0.97 ug/l | **0.27 ug/l** | **0.012 ug/l** |
| W253 | 10/11/2016 | N | **0.023 ug/l** | **1.4 ug/l** | < 0.0065 ug/l | **0.028 ug/l** | < 0.57 ug/l | **0.14 ug/l** | **0.012 ug/l** |
| W254 | 5/06/1987 | N | **0.013 ug/l** | < 0.0035 ug/l | < 0.0043 ug/l | **0.017 ug/l** | < 6 ug/l | < 0.0025 ug/l | **0.010 ug/l** |

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W254 | 7/28/1987 | N | **0.0059 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0042 ug/l** | **7.6 s ug/l** | **0.0017 ug/l** | **0.0042 ug/l** |
| W254 | 2/23/1988 | N | **0.0038 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.030 ug/l** | < 6 ug/l | **0.0027 s ug/l** | **0.0032 ug/l** |
| W254 | 10/05/1988 | N | **0.0015 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0086 ug/l** | < 6 ug/l | **0.0017 ug/l** | **0.0013 ug/l** |
| W254 | 8/04/1989 | N | **0.11 ug/l** | **0.038 ug/l** | **0.0089 ug/l** | **0.026 ug/l** | < 5 ug/l | **0.041 ug/l** | **0.037 ug/l** |
| W254 | 5/02/1990 | N | **0.47 ug/l** | **0.17 ug/l** | < 0.034 ug/l | < 0.038 ug/l | -- | **0.41 ug/l** | **0.42 ug/l** |
| W254 | 10/31/1990 | N | **0.44 ug/l** | **0.11 ug/l** | **0.011 ug/l** | **0.020 b ug/l** | **2 j ug/l** | **0.25 ug/l** | **0.31 ug/l** |
| W254 | 10/17/1991 | N | **0.36 ug/l** | **0.048 ug/l** | **0.053 ug/l** | **0.034 b ug/l** | **2 j ug/l** | **0.11 ug/l** | **0.34 ug/l** |
| W254 | 10/14/1992 | N | **0.026 ug/l** | **0.020 ug/l** | < 0.0030 ug/l | **0.011 b ug/l** | < 6 ug/l | **0.031 ug/l** | **0.020 ug/l** |
| W254 | 10/20/1993 | N | **0.118 ug/l** | **0.0216 ug/l** | **0.00829 ug/l** | **0.0447 b ug/l** | < 6 ug/l | **0.0542 ug/l** | **0.101 ug/l** |
| W254 | 9/30/1994 | N | **0.076 ug/l** | **0.024 ug/l** | **0.020 ug/l** | **0.016 b ug/l** | < 3 ug/l | **0.076 ug/l** | **0.053 ug/l** |
| W254 | 10/20/1995 | N | **0.15 ug/l** | **0.022 ug/l** | **0.008 ug/l** | **0.10 b ug/l** | < 3 ug/l | **0.068 ug/l** | **0.10 ug/l** |
| W254 | 10/02/1996 | N | **0.083 ug/l** | **0.040 ug/l** | < 0.003 ug/l | **0.020 b ug/l** | < 3 ug/l | **0.060 ug/l** | **0.071 ug/l** |
| W254 | 10/03/1997 | N | **0.17 ug/l** | **0.031 ug/l** | **0.008 ug/l** | **0.010 ug/l** | < 3 ug/l | **0.054 b ug/l** | **0.15 ug/l** |
| W254 | 11/19/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 3 ug/l | **0.004 ug/l** | < 0.003 ug/l |
| W254 | 11/18/1999 | N | **0.078 ug/l** | **0.009 ug/l** | **0.022 ug/l** | **0.012 jb ug/l** | < 3 ug/l | **0.047 b ug/l** | **0.056 ug/l** |
| W254 | 9/27/2000 | N | **0.023 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.007 b ug/l** | < 3 ug/l | **0.011 b ug/l** | **0.013 b ug/l** |
| W254 | 10/18/2001 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.012 b ug/l** | < 3 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/30/2002 | N | **0.012 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.012 b ug/l** | < 3.0 ug/l | **0.0080 ug/l** | **0.0071 ug/l** |
| W254 | 12/21/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.024 b ug/l** | < 3.0 ug/l | **0.0047 ug/l** | < 0.0034 ug/l |
| W254 | 10/20/2004 | N | **0.014 ug/l** | **0.0071 ug/l** | < 0.0034 ug/l | **0.017 b ug/l** | < 2 ug/l | **0.015 ug/l** | **0.012 ug/l** |
| W254 | 11/10/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.014 b ug/l** | < 3.0 ug/l | **0.0044 ug/l** | < 0.0034 ug/l |
| W254 | 10/20/2006 | N | **0.0056 ug/l** | **0.0050 ug/l** | < 0.0038 ug/l | **0.068 b ug/l** | < 3.4 ug/l | **0.012 ug/l** | **0.0043 ug/l** |
| W254 | 11/08/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.99 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/10/2008 | N | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | **0.0043 ug/l** | < 1.1 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W254 | 9/29/2009 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0068 b ug/l** | < 0.96 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W254 | 9/29/2009 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0061 b ug/l** | < 0.98 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/06/2010 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.022 ug/l** | < 0.96 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W254 | 10/14/2011 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.021 ug/l** | < 0.99 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/17/2012 | N | < 0.0034 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l | **0.013 bh ug/l** | < 1.0 h ug/l | < 0.0034 h ug/l | < 0.0034 h ug/l |
| W254 | 10/17/2012 | FD | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | **0.016 bh ug/l** | < 0.97 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l |
| W254 | 10/09/2013 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.089 ug/l** | < 0.99 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/16/2014 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0077 ug/l** | < 1.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/08/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.98 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/08/2015 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0051 b ug/l** | < 0.98 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W254 | 10/18/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0046 ug/l** | < 0.29 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W255 | 12/29/1988 | N | < 2000 ug/l | < 2000 ug/l | < 2000 ug/l | **5600 ug/l** | < 50 ug/l | < 2000 ug/l | < 2000 ug/l |

# Table A-5
# 1984-2016 Middle Sand Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W255 | 2/27/1989 | N | < 500 ug/l | < 500 ug/l | < 500 ug/l | **2700 ug/l** | -- | < 500 ug/l | < 500 ug/l |
| W255 | 8/03/1989 | N | < 100 pp ug/l | < 100 pp ug/l | < 100 ug/l | **1600 ug/l** | < 5 ug/l | **110 ug/l** | < 100 pp ug/l |
| W255 | 10/30/1990 | N | **24 j ug/l**<br>**< 100 ug/l** | **63 ug/l**<br>**69 j ug/l** | < 50 ug/l<br>< 100 ug/l | **1200 ug/l**<br>**1300 ug/l** | < 10 ug/l<br>< 10 ug/l | **220 ug/l**<br>**120 ug/l** | **18 j ug/l**<br>**< 100 ug/l** |
| W255 | 10/17/1991 | N | **91 ug/l** | **170 ug/l** | < 50 ug/l | **2600 ug/l** | < 50 ug/l | **300 ug/l** | **58 ug/l** |
| W255 | 10/18/1993 | N | **230 ug/l** | **63 j ug/l** | < 100 ug/l | **1400 ug/l** | < 100 ug/l | **240 ug/l** | **130 ug/l** |
| W255 | 9/28/1994 | N | **4800 ug/l** | **1100 ug/l** | **220 j ug/l** | **2700 ug/l** | < 350 ug/l | **5700 ug/l** | **3800 ug/l** |
| W255 | 10/24/1995 | N | **46 ug/l** | **93 ug/l** | < 3.6 ug/l | **2200 ug/l** | < 29 ug/l | **130 ug/l** | **22 ug/l** |
| W255 | 10/02/1996 | N | < 500 ug/l | **66 j ug/l** | < 500 ug/l | **1700 ug/l** | < 500 ug/l | **130 j ug/l** | < 500 ug/l |
| W255 | 10/01/1997 | N | **9 j ug/l** | **63 ug/l** | < 10 ug/l | **1500 ug/l** | **5 j ug/l** | **58 ug/l** | **5 j ug/l** |
| W255 | 11/18/1998 | N | < 200 ug/l | **64 j ug/l** | < 200 ug/l | **1400 ug/l** | < 200 ug/l | **82 j ug/l** | < 200 ug/l |
| W255 | 1/14/2000 | N | **12 ug/l** | **81 ug/l** | **0.3 j ug/l** | **1900 ug/l** | < 50 ug/l | **92 ug/l** | **7 j ug/l** |
| W255 | 9/26/2000 | N | **24 ug/l** | **92 ug/l** | < 9.6 ug/l | **3600 ug/l** | < 48 ug/l | **95 ug/l** | **19 ug/l** |
| W255 | 10/16/2001 | N | **57 ug/l** | **110 ug/l** | < 9.8 ug/l | **1600 ug/l** | < 49 ug/l | **150 ug/l** | **36 ug/l** |
| W255 | 11/01/2002 | N | **220 ug/l** | **150 ug/l** | **11 ug/l** | **2700 * ug/l** | < 48 ug/l | **380 ug/l** | **150 ug/l** |
| W255 | 12/16/2003 | N | **21 ug/l** | **75 ug/l** | < 9.6 ug/l | **1800 ug/l** | < 48 ug/l | **95 ug/l** | **14 ug/l** |
| W255 | 10/29/2004 | N | **27 ug/l** | **85 ug/l** | < 0.17 ug/l | **2000 ug/l** | < 10 * ug/l | **120 ug/l** | **19 ug/l** |
| W255 | 11/12/2005 | N | **48 ug/l** | **74 ug/l** | **0.53 ug/l** | **2000 ug/l** | < 150 ug/l | **98 ug/l** | **39 ug/l** |
| W255 | 10/18/2006 | N | **70 ug/l** | **110 ug/l** | **3.4 ug/l** | **2700 ug/l** | < 150 ug/l | **150 ug/l** | **50 ug/l** |
| W255 | 11/13/2007 | N | **2300 ug/l** | **550 ug/l** | **180 ug/l** | **3200 ug/l** | < 55 ug/l | **1900 ug/l** | **1700 ug/l** |
| W255 | 10/16/2008 | N | **21 ug/l** | **74 ug/l** | **0.56 ug/l** | **1800 ug/l** | **6.8 ug/l** | **88 ug/l** | **15 ug/l** |
| W255 | 10/02/2009 | N | **150 ug/l** | **160 ug/l** | **8.5 ug/l** | **2500 ug/l** | < 48 ug/l | **230 ug/l** | **74 ug/l** |
| W255 | 10/12/2010 | N | **41 ug/l** | **90 ug/l** | **1.9 ug/l** | **2700 ug/l** | < 48 ug/l | **110 ug/l** | **32 ug/l** |
| W255 | 10/16/2011 | N | **46 ug/l** | **73 ug/l** | **1.8 ug/l** | **1400 ug/l** | **11 ug/l** | **91 ug/l** | **28 ug/l** |
| W255 | 10/18/2012 | N | **45 ug/l** | **88 ug/l** | **2.6 ug/l** | **1700 ug/l** | < 48 ug/l | **160 ug/l** | **38 ug/l** |
| W255 | 10/11/2013 | N | **17 ug/l** | **120 ug/l** | **0.11 ug/l** | **270 ug/l** | **10 ug/l** | **130 ug/l** | **12 ug/l** |
| W255 | 10/21/2014 | N | **37 ug/l** | **100 ug/l** | **2.0 ug/l** | **1500 ug/l** | **9.2 ug/l** | **110 ug/l** | **31 ug/l** |
| W255 | 10/14/2015 | N | **42 ug/l** | **110 ug/l** | **1.2 ug/l** | **1900 ug/l** | **13 ug/l** | **150 ug/l** | **30 ug/l** |
| W255 | 10/11/2016 | N | **85 ug/l** | **110 ug/l** | **4.1 ug/l** | **2800 ug/l** | **14 ug/l** | **170 ug/l** | **48 ug/l** |

See Table 3-18 for data qualifiers

# Table A-6
# 1984-2016 Lower Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W300 | 12/11/1984 | N | **0.0076 ug/l** | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0028 ug/l |
| W300 | 3/28/1985 | N | **0.0025 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W300 | 12/13/1985 | N | **0.0037 ug/l** | < 0.0013 ug/l | **0.0014 ug/l** | < 0.0010 ug/l | **0.0036 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0033 c ug/l** | < 0.0014 ug/l |
| W300 | 3/20/1986 | N | **0.0040 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W300 | 6/04/1986 | N | **0.0088 ug/l** | **0.0096 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W300 | 9/23/1986 | N | **0.0047 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0043 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0011 c ug/l** | < 0.0014 ug/l |
| W300 | 12/10/1986 | N | **0.0048 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W300 | 3/19/1987 | N | **0.0042 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W300SP | 5/08/1987 | N | **0.0071 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W300SP | 7/28/1987 | N | < 0.002 ug/l | **0.0014 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.0014 ug/l |
| W300SP | 11/03/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W300SP | 2/23/1988 | N | < 0.016 ug/l | < 0.010 ug/l | < 0.008 ug/l | < 0.008 ug/l | < 0.008 ug/l | < 0.008 ug/l | < 0.008 ug/l | < 0.008 ug/l | < 0.008 ug/l | < 0.008 ug/l | < 0.011 ug/l |
| W300SP | 10/07/1988 | N | < 0.016 ug/l<br>0.0042 ug/l | < 0.010 ug/l<br>< 0.0013 ug/l | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.011 ug/l<br>< 0.0014 ug/l |
| W300SP | 12/20/1988 | N | **0.027 ug/l** | **0.0042 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W300SP | 8/07/1989 | N | **0.0090 ug/l** | **0.016 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W300SP | 5/02/1990 | N | **0.0029 s ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0019 c ug/l** | < 0.0014 ug/l |
| W300SP | 10/30/1990 | N | **0.014 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0016 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | **0.0021 c ug/l** | < 0.0010 ug/l | **0.0021 c ug/l** | **0.0067 c ug/l** | < 0.0014 ug/l |
| W300SP | 10/17/1991 | N | < 0.0060 ug/l | < 0.0060 ug/l | < 0.0060 ug/l | < 0.0060 ug/l | < 0.0060 ug/l | < 0.0060 ug/l | **0.012 c ug/l** | < 0.0060 ug/l | **0.012 c ug/l** | **0.014 c ug/l** | < 0.0060 ug/l |
| W300SP | 10/14/1992 | N | **0.010 b ug/l** | **0.0046 ug/l** | < 0.0030 ug/l | **0.0058 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | **0.0036 ug/l** | < 0.0030 ug/l | **0.011 c ug/l** | < 0.0030 ug/l |
| W300SP | 10/20/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l | < 0.00300 ug/l |
| W300SP | 9/30/1994 | N | **0.008 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.003 ug/l** | **0.005 ug/l** | < 0.003 ug/l | **0.004 ug/l** | **0.011 c ug/l** | < 0.003 ug/l |
| W300SP | 10/19/1995 | N | **0.007 ug/l**<br>**0.007 ug/l** | **0.004 ug/l**<br>**< 0.006 ug/l** | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l |
| W300SP | 10/02/1996 | N | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l |
| W300SP | 10/02/1997 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.030 c ug/l** | < 0.003 ug/l |
| W300SP | 11/19/1998 | N | **0.008 ug/l** | **0.005 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W300SP | 11/18/1999 | N | **0.005 jb ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.007 ug/l** | < 0.003 ug/l |
| W300SP | 11/18/1999 | FD | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.005 ug/l** | < 0.003 ug/l |
| W300SP | 9/27/2000 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.005 ug/l** | **0.005 ug/l** | **0.003 ug/l** | **0.009 b ug/l** | **0.006 b ug/l** | **0.005 ug/l** | **0.013 b ug/l** | < 0.003 ug/l |
| W300SP | 10/18/2001 | N | **0.0069 b ug/l** | **0.0037 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SP | 5/15/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/31/2002 | N | **0.021 b ug/l** | **0.0097 ug/l** | **0.0049 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 12/21/2003 | N | **0.029 b ug/l** | **0.0094 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/20/2004 | N | **0.0058 b ug/l** | **0.01 ug/l** | < 0.0034 ug/l | **0.0073 ug/l** | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | < 0.034 ug/l | **0.041 ug/l** | < 0.034 ug/l |
| W300SPN | 11/10/2005 | N | **0.013 ug/l** | **0.0049 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/20/2006 | N | **0.017 b ug/l** | **0.015 ug/l** | < 0.0038 ug/l | **0.010 ug/l** | < 0.0038 ug/l | < 0.0038 ug/l | **0.0076 ug/l** | < 0.0038 ug/l | < 0.0038 ug/l | **0.0073 ug/l** | < 0.0038 ug/l |

# Table A-6
## 1984-2016 Lower Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W300SPN | 11/08/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/09/2008 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.030 ug/l | < 0.0033 ug/l |
| W300SPN | 9/29/2009 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W300SPN | 10/06/2010 | N | **0.0062 ug/l** | < 0.0040 ug/l | < 0.0040 ug/l | **0.025 ug/l** | **0.062 ug/l** | **0.031 ug/l** | **0.048 ug/l** | **0.016 ug/l** | **0.030 ug/l** | **0.11 ug/l** | **0.0063 ug/l** |
| W300SPN | 11/12/2010 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/11/2011 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| W300SPN | 10/16/2012 | N | < 0.0036 h ug/l | < 0.0036 h ug/l | < 0.0036 h ug/l | **0.013 h ug/l** | **0.059 h ug/l** | **0.043 h ug/l** | **0.069 h ug/l** | **0.020 h ug/l** | **0.024 h ug/l** | **0.074 h ug/l** | **0.0069 h ug/l** |
| W300SPN | 10/08/2013 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0041 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/15/2014 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/06/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 c ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/18/2016 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0049 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 c ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 3/28/1985 | N | **0.0091 ug/l** | **0.0026 ug/l** | < 0.0010 ug/l | **0.0024 ug/l** | **0.0045 ug/l** | **0.0017 ug/l** | **0.014 c ug/l** | < 0.0010 ug/l | ND c ug/l | **0.011 c ug/l** | < 0.0014 ug/l |
| W301 | 5/06/1985 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 12/13/1985 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 3/20/1986 | N | **0.0021 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 6/03/1986 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 9/23/1986 | N | **0.0024 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 12/10/1986 | N | **0.0031 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 3/19/1987 | N | **0.0054 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0022 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0014 c ug/l** | < 0.0014 ug/l |
| W301 | 5/06/1987 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 8/06/1987 | N | **0.0042 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.0014 ug/l |
| W301 | 11/03/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W301 | 2/25/1988 | N | < 0.004 ug/l | < 0.0026 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.0028 ug/l |
| W301 | 10/05/1988 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 12/09/1988 | N | **0.0052 ug/l** | < 0.0013 ug/l | **0.0016 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 8/07/1989 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W301 | 5/03/1990 | N | < 0.0080 ug/l | < 0.0052 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0040 ug/l | < 0.0056 ug/l |
| W301 | 10/30/1990 | N | **0.0049 ug/l**<br>**0.0025 ug/l** | **0.0026 ug/l**<br>**< 0.0013 ug/l** | **0.0021 ug/l**<br>**< 0.0010 ug/l** | **0.0018 ug/l**<br>**< 0.0010 ug/l** | **0.0017 ug/l**<br>**< 0.0010 ug/l** | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | **0.0013 c ug/l**<br>**< 0.0010 ug/l** | < 0.0014 ug/l<br>< 0.0014 ug/l |
| W301 | 10/16/1991 | N | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0060 ug/l<br>< 0.0060 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0060 ug/l<br>< 0.0060 ug/l | < 0.0060 ug/l<br>< 0.0060 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l |
| W301 | 10/14/1992 | N | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>0.016 ug/l | < 0.0030 ug/l<br>0.014 ug/l | < 0.0030 ug/l<br>0.0041 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0060 ug/l<br>< 0.0060 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l |
| W301 | 10/20/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00600 ug/l | < 0.00300 ug/l |
| W301 | 9/29/1994 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W301 | 10/20/1995 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W301 | 10/02/1996 | N | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W301 | 10/02/1997 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |

# Table A-6
# 1984-2016 Lower Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W301 | 11/19/1998 | N | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W301 | 1/14/2000 | N | **0.013 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.003 ug/l** | **0.004 ug/l** | < 0.003 ug/l | **0.007 ug/l** | < 0.003 ug/l |
| W301 | 9/28/2000 | N | **0.010 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.005 b ug/l** | < 0.003 ug/l |
| W301 | 10/19/2001 | N | **0.0072 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W301 | 11/01/2002 | N | **0.010 b ug/l** | **0.0034 ug/l** | **0.0037 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 12/23/2003 | N | **0.0072 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 10/21/2004 | N | **0.028 ug/l** | **0.005 ug/l** | < 0.0034 ug/l | **0.005 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 11/10/2005 | N | **0.0086 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 10/21/2006 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0048 ug/l** | **0.0035 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 11/09/2007 | N | **0.0063 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 10/16/2008 | N | **0.0035 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W301 | 10/08/2009 | N | **0.0036 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W301 | 10/13/2010 | N | < 0.0034 ug/l | < 0.0034 ug/l | **0.012 ug/l** | **0.0043 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 10/16/2011 | N | **0.0044 b ug/l** | **0.0049 ug/l** | < 0.0038 ug/l | **0.0074 ug/l** | **0.0070 ug/l** | **0.0057 ug/l** | **0.013 ug/l** | **0.0060 ug/l** | **0.0043 ug/l** | **0.016 ug/l** | < 0.0038 ug/l |
| W301 | 11/01/2012 | N | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l |
| W301 | 10/17/2013 | N | **0.015 b* ug/l** | **0.0057 * ug/l** | **0.0034 * ug/l** | **0.011 ug/l** | **0.0094 ug/l** | **0.0062 ug/l** | **0.0099 ug/l** | **0.0050 ug/l** | **0.0052 ug/l** | **0.015 ug/l** | < 0.0034 ug/l |
| W301 | 10/22/2014 | N | **0.0095 ug/l** | < 0.017 ug/l | < 0.017 ug/l | **0.0092 ug/l** | **0.010 ug/l** | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | < 0.017 ug/l | **0.016 ug/l** | < 0.017 ug/l |
| W301 | 10/12/2015 | N | **0.0056 ug/l** | **0.0038 ug/l** | < 0.0034 ug/l | **0.0045 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W301 | 10/20/2016 | N | **0.0083 ug/l** | **0.0075 ug/l** | < 0.0033 ug/l | **0.018 ug/l** | **0.0065 ug/l** | **0.0084 ug/l** | **0.0057 c ug/l** | **0.0034 ug/l** | < 0.0033 ug/l | **0.025 ug/l** | < 0.0033 ug/l |
| W307 | 3/27/1985 | N | **0.0059 ug/l** | **0.069 ug/l** | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | **0.0035 c ug/l** | < 0.0028 ug/l |
| W307 | 5/07/1985 | N | **0.0067 ug/l** | **0.011 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | **0.0013 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 c ug/l | < 0.0014 ug/l |
| W307 | 12/13/1985 | N | **0.0040 ug/l** | **0.0056 ug/l** | **0.0014 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W307 | 3/20/1986 | N | **0.0026 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0011 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W307 | 6/03/1986 | N | **0.0026 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W307 | 9/23/1986 | N | **0.0022 ug/l** | **0.0020 ug/l** | **0.0011 ug/l** | **0.0010 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W307 | 12/10/1986 | N | **0.0036 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0011 ug/l** | **0.0014 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0027 c ug/l** | < 0.0014 ug/l |
| W307 | 3/19/1987 | N | < 0.050 ug/l | **1.3 ug/l** | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.035 ug/l |
| W307 | 5/05/1987 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0020 c ug/l** | < 0.0014 ug/l |
| W307 | 7/28/1987 | N | < 0.002 ug/l | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0012 ug/l** | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.0015 c ug/l** | < 0.0014 ug/l |
| W307 | 11/03/1987 | N | < 0.008 ug/l | < 0.0052 ug/l | < 0.004 ug/l | < 0.004 ug/l | < 0.004 ug/l | < 0.004 ug/l | < 0.004 ug/l | < 0.004 ug/l | < 0.004 ug/l | < 0.004 ug/l | < 0.0056 ug/l |
| W307 | 2/25/1988 | N | < 0.004 ug/l | < 0.0026 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.002 ug/l | < 0.0028 ug/l |
| W307 | 10/07/1988 | N | < 0.0040 ug/l | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0028 ug/l |
| W307 | 12/09/1988 | N | < 0.0040 ug/l<br>< 0.0040 ug/l | < 0.0026 ug/l<br>< 0.0026 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0028 ug/l<br>< 0.0028 ug/l |
| W307 | 8/07/1989 | N | **0.0032 ug/l** | **0.0029 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0010 c ug/l** | < 0.0014 ug/l |
| W307 | 5/03/1990 | N | < 0.0040 ug/l | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0028 ug/l |
| W307 | 10/30/1990 | N | **0.0065 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | **0.0048 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | **0.0018 c ug/l** | < 0.0014 ug/l |

# Table A-6
# 1984-2016 Lower Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W307 | 10/17/1991 | N | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0060 ug/l<br>< 0.0060 ug/l | **0.0065 ug/l**<br>**< 0.0030 ug/l** | < 0.0060 ug/l<br>< 0.0060 ug/l | **0.0061 c ug/l**<br>**< 0.0060 ug/l** | < 0.0030 ug/l<br>< 0.0030 ug/l |
| W307 | 10/14/1992 | N | **0.0052 b ug/l** | **0.0089 ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0030 ug/l |
| W307 | 10/20/1993 | N | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0480 ug/l | < 0.0240 ug/l |
| W307 | 9/30/1994 | N | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l |
| W307 | 10/20/1995 | N | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l |
| W307 | 10/02/1996 | N | **0.004 ug/l** | **0.020 ug/l** | < 0.003 ug/l | **0.006 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W307 | 10/02/1997 | N | **0.004 b ug/l** | **0.006 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W307 | 11/18/1998 | N | < 0.003 ug/l | **0.012 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W307 | 11/18/1998 | FD | **0.003 ug/l** | **0.013 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W323 | 3/19/1987 | N | **0.0030 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W323 | 5/05/1987 | N | < 0.5 ug/l | **2.4 ug/l** | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W323 | 7/07/1987 | N | < 0.050 ug/l | **3.7 ug/l** | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.025 ug/l | < 0.035 ug/l |
| W323 | 7/28/1987 | N | **0.18 ug/l**<br>**< 10 ug/l** | **1.7 ug/l**<br>**3.2 pp ug/l** | **0.012 ug/l**<br>**< 10 ug/l** | < 0.010 ug/l<br>< 10 ug/l | < 0.010 ug/l<br>< 10 ug/l | < 0.010 ug/l<br>< 10 ug/l | < 0.010 ug/l<br>< 10 ug/l | < 0.010 ug/l<br>< 10 ug/l | < 0.010 ug/l<br>< 10 ug/l | < 0.010 ug/l<br>< 10 ug/l | < 0.014 ug/l<br>< 10 ug/l |
| W323 | 11/03/1987 | N | **0.020 ug/l** | **2.5 ug/l** | **0.022 ug/l** | **0.015 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.014 ug/l |
| W323 | 2/25/1988 | N | < 0.040 ug/l | **0.92 ug/l** | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.020 ug/l | < 0.028 ug/l |
| W323 | 10/06/1988 | N | < 0.020 ug/l | **1.2 ug/l** | **0.013 ug/l** | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.010 ug/l | < 0.014 ug/l |
| W323 | 10/20/1995 | N | < 0.11 ug/l | **1.1 ug/l** | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l |
| W323 | 10/02/1996 | N | < 0.048 ug/l | **1.1 ug/l** | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l |
| W323 | 10/02/1997 | N | **0.004 b ug/l** | **0.63 ug/l** | < 0.003 ug/l | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W323 | 11/19/1998 | N | < 0.003 ug/l | **0.57 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W323 | 11/18/1999 | N | **0.007 jb ug/l** | **0.59 ug/l** | **0.004 ug/l** | **0.011 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W323 | 9/28/2000 | N | **0.005 b ug/l** | **0.55 ug/l** | **0.004 ug/l** | **0.010 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W323 | 9/28/2000 | FD | **0.004 b ug/l** | **0.54 ug/l** | **0.006 ug/l** | **0.009 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W323 | 10/19/2001 | N | **0.0035 ug/l** | **0.39 ug/l** | **0.0043 ug/l** | **0.0090 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W323 | 10/19/2001 | FD | < 0.0033 ug/l | **0.44 ug/l** | **0.0052 ug/l** | **0.0089 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W323 | 10/31/2002 | N | **0.0044 b ug/l** | **0.36 ug/l** | < 0.0034 ug/l | **0.0040 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W323 | 6/07/2003 | N | < 0.0034 ug/l | **0.46 ug/l** | **0.0049 ug/l** | **0.0089 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 3/20/1986 | N | **0.0043 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 6/03/1986 | N | < 0.0040 ug/l | < 0.0026 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0020 ug/l | < 0.0028 ug/l |
| W328 | 9/23/1986 | N | **0.0063 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 12/10/1986 | N | **0.0041 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 3/19/1987 | N | **0.0023 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 5/05/1987 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 8/06/1987 | N | **0.0038 ug/l** | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.0014 ug/l |
| W328 | 11/03/1987 | N | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l |

# Table A-6
# 1984-2016 Lower Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W328 | 2/25/1988 | N | < 0.002 ug/l | < 0.0013 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | < 0.001 ug/l | **0.002 ug/l** |
| W328 | 10/07/1988 | N | < 0.0020 ug/l<br>< 0.0020 ug/l | < 0.0013 ug/l<br>< 0.0013 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0010 ug/l<br>< 0.0010 ug/l | < 0.0014 ug/l<br>< 0.0014 ug/l |
| W328 | 12/09/1988 | N | **0.0034 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 8/04/1989 | N | < 0.0020 ug/l | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 5/03/1990 | N | **0.0040 s ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 10/30/1990 | N | **0.0032 ug/l** | < 0.0013 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0010 ug/l | < 0.0014 ug/l |
| W328 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0060 ug/l | < 0.0030 ug/l |
| W328 | 10/14/1992 | N | **0.0038 b ug/l** | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0060 ug/l | < 0.0030 ug/l |
| W328 | 10/20/1993 | N | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00600 ug/l<br>< 0.0120 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l |
| W328 | 10/10/1994 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W328 | 1/09/1996 | N | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l |
| W328 | 10/02/1996 | N | **0.007 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W328 | 10/02/1997 | N | **0.003 b ug/l**<br>**< 0.003 ug/l** | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>0.007 ug/l | < 0.003 ug/l<br>0.007 ug/l | < 0.003 ug/l<br>0.007 ug/l | < 0.003 ug/l<br>0.009 ug/l | < 0.003 ug/l<br>0.006 ug/l | < 0.003 ug/l<br>0.008 c ug/l | < 0.003 ug/l<br>0.004 ug/l |
| W328 | 11/19/1998 | N | **0.005 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | -- | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W328 | 11/18/1999 | N | **0.007 jb ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.005 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W328 | 9/28/2000 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W328 | 10/19/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W328 | 10/31/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/31/2002 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 12/22/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/21/2004 | N | **0.039 ug/l** | **0.0039 ug/l** | < 0.0034 ug/l | **0.0039 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/21/2004 | FD | **0.031 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0044 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 11/10/2005 | N | **0.010 ug/l** | < 0.0034 ug/l | **0.0039 ug/l** | **0.0056 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 11/10/2005 | FD | **0.0084 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0035 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/21/2006 | N | **0.0057 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0056 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 11/09/2007 | N | **0.0037 b ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W328 | 10/16/2008 | N | **0.0067 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/08/2009 | N | **0.0069 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W328 | 10/13/2010 | N | **0.0091 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0046 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W328 | 10/16/2011 | N | < 0.0039 ug/l | < 0.0039 ug/l | < 0.0039 ug/l | **0.0056 ug/l** | **0.0079 ug/l** | **0.0084 ug/l** | **0.016 ug/l** | **0.0078 ug/l** | **0.0062 ug/l** | **0.0096 ug/l** | < 0.0039 ug/l |
| W328 | 11/01/2012 | N | **0.0048 b ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0075 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W328 | 11/01/2012 | FD | **0.0044 b ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0082 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W328 | 10/17/2013 | N | **0.0034 b ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0096 ug/l** | **0.0096 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0035 ug/l** | **0.014 ug/l** | < 0.0033 ug/l |
| W328 | 10/17/2013 | FD | **0.0037 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0073 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/22/2014 | N | **0.0037 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0048 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |

# Table A-6
# 1984-2016 Lower Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | 2-Methylnaphthalene | Acenaphthene | Acenaphthylene | Anthracene | Benz(a) anthracene | Benzo(a) pyrene | Benzo(b) fluoranthene | Benzo(g,h,i) perylene | Benzo(k) fluoranthene | Chrysene | Dibenz(a,h) anthracene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | | | | | |
| W328 | 10/12/2015 | N | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | **0.0042 ug/l** | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W328 | 10/20/2016 | N | **0.0061 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.013 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-3 | 3/01/2006 | N | **0.086 ug/l** | **0.0079 ug/l** | **0.0041 ug/l** | **0.014 ug/l** | **0.00056 j ug/l** | < 0.00055 ug/l | **0.00076 j ug/l** | **0.00053 j ug/l** | < 0.00061 ug/l | **0.00099 j ug/l** | < 0.00098 ug/l |
| S-3 | 10/21/2006 | N | **0.14 ug/l** | **0.012 ug/l** | **0.0050 ug/l** | **0.024 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-3 | 11/08/2007 | N | **0.0040 ug/l** | < 0.0032 ug/l | < 0.0032 ug/l | **0.0092 ug/l** | < 0.0032 ug/l | < 0.0032 ug/l | < 0.0032 ug/l | < 0.0032 ug/l | < 0.0032 ug/l | < 0.0032 ug/l | < 0.0032 ug/l |
| S-3 | 10/14/2008 | N | **0.013 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | **0.011 ug/l** | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l |
| S-3 | 9/30/2009 | N | **0.012 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.016 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-3 | 10/05/2010 | N | **0.0073 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.013 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-3 | 10/05/2010 | FD | **0.0074 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.013 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| S-3 | 10/11/2011 | N | **0.018 ug/l** | **0.0067 ug/l** | < 0.0051 ug/l | **0.0092 ug/l** | **0.0080 ug/l** | < 0.0039 ug/l | **0.0066 ug/l** | < 0.0039 ug/l | < 0.0039 ug/l | **0.0074 ug/l** | < 0.0039 ug/l |
| S-3 | 10/16/2012 | N | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | **0.012 h ug/l** | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l |
| S-3 | 10/08/2013 | N | **0.0045 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.017 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-3 | 10/15/2014 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0089 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-3 | 10/06/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.010 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 c ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| S-3 | 10/13/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.016 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 c ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |

See Table 3-18 for data qualifiers and footnotes.

# Table A-6
## 1984-2016 Lower Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W300 | 12/11/1984 | N | < 0.0020 ug/l | < 0.0028 ug/l | < 0.0034 ug/l | **0.022 ug/l** | < 5 ug/l | < 0.0020 ug/l | < 0.0020 ug/l |
| W300 | 3/28/1985 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.015 ug/l** | < 5 ug/l | **0.0025 ug/l** | **0.0028 ug/l** |
| W300 | 12/13/1985 | N | **0.044 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0047 ug/l** | < 5 ug/l | **0.0086 ug/l** | **0.038 ug/l** |
| W300 | 3/20/1986 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0071 ug/l** | < 5 ug/l | **0.0029 ug/l** | < 0.0010 ug/l |
| W300 | 6/04/1986 | N | **0.0010 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.250 ug/l** | < 5 ug/l | **0.0079 ug/l** | **0.0027 ug/l** |
| W300 | 9/23/1986 | N | **0.010 ug/l** | **0.0019 ug/l** | < 0.0017 ug/l | **0.0075 s ug/l** | < 5 ug/l | **0.0083 ug/l** | **0.0079 ug/l** |
| W300 | 12/10/1986 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0072 s ug/l** | < 5 ug/l | **0.0029 ug/l** | < 0.0010 ug/l |
| W300 | 3/19/1987 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0093 ug/l** | < 6 ug/l | **0.0012 ug/l** | < 0.0010 ug/l |
| W300SP | 5/08/1987 | N | **0.0014 ug/l** | **0.0012 ug/l** | < 0.0017 ug/l | **0.024 ug/l** | < 6 ug/l | **0.0052 ug/l** | **0.0014 ug/l** |
| W300SP | 7/28/1987 | N | < 0.001 ug/l | **0.0016 ug/l** | < 0.0017 ug/l | **0.0047 ug/l** | **6.0 s ug/l** | **0.0024 ug/l** | < 0.001 ug/l |
| W300SP | 11/03/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 6 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W300SP | 2/23/1988 | N | < 0.008 ug/l | < 0.011 ug/l | < 0.014 ug/l | < 0.015 ug/l | < 6 ug/l | < 0.008 ug/l | < 0.008 ug/l |
| W300SP | 10/07/1988 | N | < 0.0080 ug/l<br>< 0.0010 ug/l | < 0.011 ug/l<br>< 0.0014 ug/l | < 0.014 ug/l<br>< 0.0017 ug/l | < 0.015 ug/l<br>0.0075 ug/l | < 6 ug/l<br>< 6 ug/l | < 0.0080 ug/l<br>0.0015 ug/l | < 0.0080 ug/l<br>0.0011 ug/l |
| W300SP | 12/20/1988 | N | **0.016 ug/l** | **0.0026 ug/l** | < 0.0017 ug/l | **0.064 ug/l** | < 5 ug/l | **0.0053 ug/l** | **0.0026 ug/l** |
| W300SP | 8/07/1989 | N | **0.0034 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.12 ug/l** | < 5 ug/l | **0.0094 ug/l** | **0.0029 ug/l** |
| W300SP | 5/02/1990 | N | **0.0020 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0064 s ug/l** | < 6 ug/l | **0.0053 s ug/l** | **0.0029 ug/l** |
| W300SP | 10/30/1990 | N | **0.0055 b ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.016 b ug/l** | < 6 ug/l | **0.0068 b ug/l** | **0.0059 ug/l** |
| W300SP | 10/17/1991 | N | **0.014 ug/l** | < 0.0060 ug/l | < 0.0060 ug/l | < 0.0080 ug/l | < 6 ug/l | < 0.0060 ug/l | **0.020 ug/l** |
| W300SP | 10/14/1992 | N | **0.016 ug/l** | **0.0074 ug/l** | **0.0038 ug/l** | **0.013 b ug/l** | < 6 ug/l | **0.020 ug/l** | **0.014 ug/l** |
| W300SP | 10/20/1993 | N | **0.00460 ug/l** | < 0.00300 ug/l | < 0.00300 ug/l | **0.00894 b ug/l** | < 6 ug/l | **0.00453 ug/l** | **0.00688 ug/l** |
| W300SP | 9/30/1994 | N | **0.006 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.012 b ug/l** | < 3 ug/l | **0.009 ug/l** | **0.007 ug/l** |
| W300SP | 10/19/1995 | N | **0.004 ug/l**<br>**< 0.006 ug/l** | < 0.003 ug/l<br>< 0.006 ug/l | < 0.003 ug/l<br>< 0.006 ug/l | **0.042 b ug/l**<br>**0.032 b ug/l** | < 3 ug/l<br>< 3 ug/l | **0.008 b ug/l**<br>**0.006 b ug/l** | **0.006 ug/l**<br>**< 0.006 ug/l** |
| W300SP | 10/02/1996 | N | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l | < 0.060 ug/l |
| W300SP | 10/02/1997 | N | **0.006 b ug/l** | **0.003 b ug/l** | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.009 b ug/l** | **0.007 ug/l** |
| W300SP | 11/19/1998 | N | **0.004 ug/l** | **0.010 ug/l** | < 0.003 ug/l | **0.018 ug/l** | < 3 ug/l | **0.019 ug/l** | **0.005 ug/l** |
| W300SP | 11/18/1999 | N | **0.010 ug/l** | **0.004 ug/l** | < 0.003 ug/l | **0.007 jb ug/l** | < 3 ug/l | **0.016 b ug/l** | **0.007 ug/l** |
| W300SP | 11/18/1999 | FD | **0.006 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.005 jb ug/l** | < 3 ug/l | **0.007 b ug/l** | **0.004 ug/l** |
| W300SP | 9/27/2000 | N | **0.016 b ug/l** | < 0.003 ug/l | **0.005 b ug/l** | **0.010 b ug/l** | < 3 ug/l | **0.013 b ug/l** | **0.012 b ug/l** |
| W300SP | 10/18/2001 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.013 b ug/l** | < 3 ug/l | **0.0044 b ug/l** | < 0.0034 ug/l |
| W300SP | 5/15/2002 | N | **0.0054 b ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0043 b ug/l** | < 3 ug/l | **0.0077 b ug/l** | **0.0046 b ug/l** |
| W300SPN | 10/31/2002 | N | **0.0065 ug/l** | **0.011 ug/l** | < 0.0034 ug/l | **0.035 b ug/l** | < 3.0 ug/l | **0.016 ug/l** | **0.0042 ug/l** |
| W300SPN | 12/21/2003 | N | < 0.0034 ug/l | **0.0072 ug/l** | < 0.0034 ug/l | **0.032 b ug/l** | < 3.0 ug/l | **0.0087 ug/l** | < 0.0034 ug/l |
| W300SPN | 10/20/2004 | N | **0.038 ug/l** | **0.012 ug/l** | < 0.034 ug/l | **0.0045 b ug/l** | < 2 ug/l | **0.017 ug/l** | **0.063 ug/l** |
| W300SPN | 11/10/2005 | N | **0.0041 ug/l** | **0.0071 ug/l** | < 0.0034 ug/l | **0.020 b ug/l** | < 3.0 ug/l | **0.0085 ug/l** | **0.0039 ug/l** |
| W300SPN | 10/20/2006 | N | **0.026 ug/l** | **0.028 ug/l** | < 0.0038 ug/l | **0.20 ug/l** | < 3.4 ug/l | **0.065 ug/l** | **0.021 ug/l** |

# Table A-6
# 1984-2016 Lower Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W300SPN | 11/08/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0041 ug/l** | < 1.0 ug/l | **0.012 b ug/l** | < 0.0034 ug/l |
| W300SPN | 10/09/2008 | N | **0.0073 ug/l** | **0.0047 ug/l** | < 0.0033 ug/l | **0.072 ug/l** | < 0.95 ug/l | **0.012 ug/l** | **0.0052 ug/l** |
| W300SPN | 9/29/2009 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0094 b ug/l** | < 0.97 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W300SPN | 10/06/2010 | N | **0.043 ug/l** | **0.019 ug/l** | **0.017 ug/l** | **0.17 ug/l** | < 1.2 ug/l | **0.068 ug/l** | **0.031 ug/l** |
| W300SPN | 11/12/2010 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.021 b ug/l** | < 1.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/11/2011 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | **0.023 ug/l** | < 1.1 ug/l | **0.0054 b ug/l** | < 0.0036 ug/l |
| W300SPN | 10/16/2012 | N | **0.048 h ug/l** | **0.0077 h ug/l** | **0.023 h ug/l** | **0.044 bh ug/l** | < 1.1 h ug/l | **0.027 h ug/l** | **0.041 h ug/l** |
| W300SPN | 10/08/2013 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.044 b ug/l** | < 0.99 ug/l | **0.0036 ug/l** | < 0.0034 ug/l |
| W300SPN | 10/15/2014 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0034 b ug/l** | < 1.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/06/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 1.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W300SPN | 10/18/2016 | N | **0.0036 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.011 ug/l** | < 0.30 ug/l | **0.0035 ug/l** | < 0.0034 ug/l |
| W301 | 3/28/1985 | N | **0.031 ug/l** | **0.0048 ug/l** | < 0.0017 ug/l | **0.011 ug/l** | < 5 ug/l | **0.043 ug/l** | **0.024 ug/l** |
| W301 | 5/06/1985 | N | **0.0029 ug/l** | **0.0024 ug/l** | < 0.0017 ug/l | **0.0063 s ug/l** | < 5 ug/l | **0.036 ug/l** | **0.0039 ug/l** |
| W301 | 12/13/1985 | N | **0.0014 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | < 0.0019 ug/l | < 5 ug/l | **0.0034 ug/l** | **0.0019 ug/l** |
| W301 | 3/20/1986 | N | **0.0015 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0064 ug/l** | < 5 ug/l | **0.0042 ug/l** | **0.0021 ug/l** |
| W301 | 6/03/1986 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.022 s ug/l** | < 5 ug/l | **0.0037 ug/l** | < 0.0010 ug/l |
| W301 | 9/23/1986 | N | **0.0035 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0067 s ug/l** | < 5 ug/l | **0.0033 ug/l** | **0.0016 ug/l** |
| W301 | 12/10/1986 | N | **0.0014 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0071 s ug/l** | < 5 ug/l | **0.0026 ug/l** | **0.0015 ug/l** |
| W301 | 3/19/1987 | N | **0.0094 ug/l** | **0.0044 ug/l** | < 0.0017 ug/l | **0.032 ug/l** | < 6 ug/l | **0.0061 ug/l** | **0.011 ug/l** |
| W301 | 5/06/1987 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.012 ug/l** | < 6 ug/l | < 0.0010 ug/l | **0.0011 ug/l** |
| W301 | 8/06/1987 | N | < 0.001 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0064 ug/l** | **8.9 s ug/l** | **0.0016 ug/l** | < 0.001 ug/l |
| W301 | 11/03/1987 | N | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 6 ug/l | < 0.25 ug/l | < 0.25 ug/l |
| W301 | 2/25/1988 | N | **0.013 ug/l** | < 0.0028 ug/l | < 0.0034 ug/l | **0.0065 s ug/l** | < 6 ug/l | **0.017 ug/l** | **0.013 ug/l** |
| W301 | 10/05/1988 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0033 s ug/l** | < 6 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W301 | 12/09/1988 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.006 s ug/l** | < 5 ug/l | **0.002 ug/l** | < 0.0010 ug/l |
| W301 | 8/07/1989 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0039 ug/l** | < 5 ug/l | **0.0015 ug/l** | < 0.0010 ug/l |
| W301 | 5/03/1990 | N | < 0.0040 ug/l | < 0.0056 ug/l | < 0.0068 ug/l | < 0.0076 ug/l | < 6 ug/l | < 0.0040 ug/l | < 0.0040 ug/l |
| W301 | 10/30/1990 | N | **0.0029 b ug/l**<br>**< 0.0010 ug/l** | **0.0023 ug/l**<br>**< 0.0014 ug/l** | < 0.0017 ug/l<br>< 0.0017 ug/l | **0.017 b ug/l**<br>**0.0067 b ug/l** | < 6 ug/l<br>< 6 ug/l | **0.0066 b ug/l**<br>**0.0031 b ug/l** | **0.0023 ug/l**<br>**< 0.0010 ug/l** |
| W301 | 10/16/1991 | N | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 6 ug/l<br>< 6 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l |
| W301 | 10/14/1992 | N | < 0.0030 ug/l<br>0.0048 ug/l | < 0.0030 ug/l<br>0.011 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | **0.0041 b ug/l**<br>**0.0055 b ug/l** | < 6 ug/l<br>< 6 ug/l | **0.0042 ug/l**<br>**0.0097 ug/l** | < 0.0030 ug/l<br>0.0038 ug/l |
| W301 | 10/20/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00400 ug/l | < 6 ug/l | **0.00358 ug/l** | < 0.00300 ug/l |
| W301 | 9/29/1994 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** | < 3 ug/l | < 0.003 ug/l | < 0.003 ug/l |
| W301 | 10/20/1995 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | < 3 ug/l | < 0.006 ug/l | < 0.006 ug/l |
| W301 | 10/02/1996 | N | **0.004 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.005 b ug/l** | < 3 ug/l | < 0.003 ug/l | **0.004 ug/l** |
| W301 | 10/02/1997 | N | **0.008 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.007 b ug/l** | < 3 ug/l | **0.013 b ug/l** | **0.020 ug/l** |

# Table A-6
# 1984-2016 Lower Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W301 | 11/19/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.006 ug/l** | < 3 ug/l | **0.003 ug/l** | < 0.003 ug/l |
| W301 | 1/14/2000 | N | **0.017 ug/l** | **0.003 ug/l** | < 0.003 ug/l | **0.024 b ug/l** | < 3 ug/l | **0.015 b ug/l** | **0.008 ug/l** |
| W301 | 9/28/2000 | N | **0.010 b ug/l** | **0.004 b ug/l** | < 0.003 ug/l | **0.014 b ug/l** | < 3 ug/l | **0.021 b ug/l** | **0.009 ug/l** |
| W301 | 10/19/2001 | N | **0.0048 b ug/l** | **0.0033 ug/l** | < 0.0033 ug/l | **0.0096 ug/l** | < 3 ug/l | **0.012 b ug/l** | **0.0047 ug/l** |
| W301 | 11/01/2002 | N | **0.0062 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.015 b* ug/l** | < 3.0 ug/l | **0.013 ug/l** | **0.0044 ug/l** |
| W301 | 12/23/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.010 b ug/l** | < 3.0 ug/l | **0.0054 ug/l** | < 0.0034 ug/l |
| W301 | 10/21/2004 | N | **0.0039 ug/l** | **0.0058 ug/l** | < 0.0034 ug/l | **0.028 b ug/l** | < 2 * ug/l | **0.02 ug/l** | **0.0043 ug/l** |
| W301 | 11/10/2005 | N | **0.0036 ug/l** | **0.0064 ug/l** | < 0.0034 ug/l | **0.017 b ug/l** | < 3.0 ug/l | **0.011 ug/l** | < 0.0034 ug/l |
| W301 | 10/21/2006 | N | **0.0096 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0095 b ug/l** | < 3.0 ug/l | **0.0082 ug/l** | **0.0082 ug/l** |
| W301 | 11/09/2007 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.026 b ug/l** | < 1.0 ug/l | **0.0086 b ug/l** | < 0.0034 ug/l |
| W301 | 10/16/2008 | N | < 0.0033 ug/l | < 0.0033 * ug/l | < 0.0033 ug/l | **0.012 ug/l** | < 0.97 ug/l | **0.0053 ug/l** | < 0.0033 ug/l |
| W301 | 10/08/2009 | N | **0.0044 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0090 ug/l** | < 0.96 ug/l | **0.0081 ug/l** | < 0.0033 ug/l |
| W301 | 10/13/2010 | N | < 0.0034 ug/l | **0.0046 ug/l** | < 0.0034 ug/l | **0.025 b ug/l** | < 0.98 ug/l | **0.0065 ug/l** | < 0.0034 ug/l |
| W301 | 10/16/2011 | N | **0.057 ug/l** | **0.0076 b ug/l** | **0.0048 ug/l** | **0.018 b ug/l** | < 1.1 ug/l | **0.058 ug/l** | **0.039 ug/l** |
| W301 | 11/01/2012 | N | **0.098 ug/l** | < 0.065 ug/l | < 0.065 ug/l | < 0.065 ug/l | < 19 ug/l | < 0.065 ug/l | < 0.27 ug/l |
| W301 | 10/17/2013 | N | **0.035 ug/l** | **0.0056 * ug/l** | **0.0051 ug/l** | **0.11 b ug/l** | < 0.98 ug/l | **0.033 ug/l** | **0.028 ug/l** |
| W301 | 10/22/2014 | N | **0.018 ug/l** | < 0.017 ug/l | < 0.017 ug/l | **0.048 ug/l** | < 5.0 ug/l | **0.027 ug/l** | **0.014 ug/l** |
| W301 | 10/12/2015 | N | **0.0057 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.011 ug/l** | < 1.0 ug/l | **0.0088 ug/l** | **0.0051 ug/l** |
| W301 | 10/20/2016 | N | **0.012 ug/l** | **0.0073 ug/l** | < 0.0033 ug/l | **0.018 ug/l** | < 0.29 ug/l | **0.041 ug/l** | **0.017 ug/l** |
| W307 | 3/27/1985 | N | **0.0083 ug/l** | **0.0073 ug/l** | < 0.0034 ug/l | **0.081 ug/l** | < 5 ug/l | **0.013 ug/l** | **0.0085 ug/l** |
| W307 | 5/07/1985 | N | **0.013 ug/l** | **0.0033 ug/l** | < 0.0017 ug/l | **0.016 s ug/l** | < 5 ug/l | < 0.024 ug/l | **0.013 ug/l** |
| W307 | 12/13/1985 | N | **0.0078 ug/l** | **0.0046 ug/l** | < 0.0017 ug/l | **0.0078 ug/l** | < 5 ug/l | **0.0087 ug/l** | **0.0088 ug/l** |
| W307 | 3/20/1986 | N | **0.0067 ug/l** | **0.0062 ug/l** | < 0.0017 ug/l | **0.0082 ug/l** | < 5 ug/l | **0.0081 ug/l** | **0.0083 ug/l** |
| W307 | 6/03/1986 | N | **0.0078 ug/l** | **0.0055 ug/l** | < 0.0017 ug/l | **0.0071 s ug/l** | < 5 ug/l | **0.0083 ug/l** | **0.0095 ug/l** |
| W307 | 9/23/1986 | N | **0.0083 ug/l** | **0.0042 ug/l** | < 0.0017 ug/l | **0.0065 s ug/l** | < 5 ug/l | **0.0063 ug/l** | **0.011 ug/l** |
| W307 | 12/10/1986 | N | **0.0093 ug/l** | **0.0054 ug/l** | < 0.0017 ug/l | **0.0084 s ug/l** | < 5 ug/l | **0.011 ug/l** | **0.011 ug/l** |
| W307 | 3/19/1987 | N | < 0.025 ug/l | **0.067 ug/l** | < 0.0425 ug/l | < 0.047 ug/l | < 6 ug/l | < 0.025 ug/l | < 0.025 ug/l |
| W307 | 5/05/1987 | N | **0.0054 ug/l** | **0.0035 ug/l** | < 0.0017 ug/l | **0.014 ug/l** | < 6 ug/l | **0.0038 ug/l** | **0.0071 ug/l** |
| W307 | 7/28/1987 | N | **0.0076 ug/l** | **0.0035 ug/l** | < 0.0017 ug/l | **0.0062 ug/l** | **21 s ug/l** | **0.0052 ug/l** | **0.010 ug/l** |
| W307 | 11/03/1987 | N | **0.0065 ug/l** | **0.0082 ug/l** | < 0.0068 ug/l | **0.013 ug/l** | < 6 ug/l | **0.005 ug/l** | **0.0096 ug/l** |
| W307 | 2/25/1988 | N | **0.0086 ug/l** | **0.0035 ug/l** | < 0.0034 ug/l | **0.017 ug/l** | < 6 ug/l | **0.0075 ug/l** | **0.011 ug/l** |
| W307 | 10/07/1988 | N | **0.0034 ug/l** | **0.005 ug/l** | < 0.0034 ug/l | **0.0074 ug/l** | < 6 ug/l | **0.0027 ug/l** | **0.0058 ug/l** |
| W307 | 12/09/1988 | N | < 0.0020 ug/l<br>0.0023 ug/l | **0.0032 ug/l**<br>**0.0059 ug/l** | < 0.0034 ug/l<br>< 0.0034 ug/l | **0.0083 s ug/l**<br>**0.0089 s ug/l** | < 5 ug/l<br>< 5 ug/l | **0.003 ug/l**<br>**0.004 ug/l** | **0.0052 ug/l**<br>**0.0055 ug/l** |
| W307 | 8/07/1989 | N | **0.0037 ug/l** | **0.0058 ug/l** | < 0.0017 ug/l | **0.0072 ug/l** | < 5 ug/l | **0.0034 ug/l** | **0.0051 ug/l** |
| W307 | 5/03/1990 | N | **0.0071 ug/l** | **0.0051 ug/l** | < 0.0034 ug/l | **0.0075 s ug/l** | < 6 ug/l | **0.0065 s ug/l** | **0.0083 ug/l** |
| W307 | 10/30/1990 | N | **0.011 ug/l** | **0.0062 ug/l** | < 0.0017 ug/l | **0.010 b ug/l** | < 6 ug/l | **0.016 b ug/l** | **0.0096 ug/l** |

# Table A-6
## 1984-2016 Lower Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W307 | 10/17/1991 | N | **0.018 ug/l**<br>**0.0095 ug/l** | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0030 ug/l<br>< 0.0030 ug/l | < 0.0040 ug/l<br>< 0.0040 ug/l | < 6 ug/l<br>< 6 ug/l | **0.014 ug/l**<br>**0.0057 ug/l** | **0.051 ug/l**<br>**0.012 ug/l** |
| W307 | 10/14/1992 | N | **0.0036 ug/l** | **0.012 ug/l** | < 0.0030 ug/l | **0.0081 b ug/l** | < 6 ug/l | **0.0044 ug/l** | **0.0058 ug/l** |
| W307 | 10/20/1993 | N | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0240 ug/l | < 0.0320 ug/l | < 6 ug/l | < 0.0240 ug/l | < 0.0240 ug/l |
| W307 | 9/30/1994 | N | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 3 ug/l | < 0.024 ug/l | < 0.024 ug/l |
| W307 | 10/20/1995 | N | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 0.024 ug/l | < 3 ug/l | < 0.024 ug/l | < 0.024 ug/l |
| W307 | 10/02/1996 | N | **0.003 ug/l** | **0.035 ug/l** | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.004 ug/l** | **0.005 ug/l** |
| W307 | 10/02/1997 | N | **0.007 b ug/l** | **0.029 ug/l** | < 0.003 ug/l | **0.007 b ug/l** | < 3 ug/l | **0.008 b ug/l** | **0.007 ug/l** |
| W307 | 11/18/1998 | N | < 0.003 ug/l | **0.030 ug/l** | < 0.003 ug/l | **0.006 ug/l** | < 3 ug/l | < 0.003 ug/l | **0.004 ug/l** |
| W307 | 11/18/1998 | FD | < 0.003 ug/l | **0.029 ug/l** | < 0.003 ug/l | **0.006 ug/l** | < 3 ug/l | < 0.003 ug/l | **0.004 ug/l** |
| W323 | 3/19/1987 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0071 ug/l** | < 6 ug/l | < 0.0010 ug/l | < 0.0010 ug/l |
| W323 | 5/05/1987 | N | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 0.5 ug/l | < 6 ug/l | < 0.5 ug/l | < 0.5 ug/l |
| W323 | 7/07/1987 | N | < 0.025 ug/l | < 0.035 ug/l | < 0.043 ug/l | < 0.048 ug/l | < 10 ug/l | < 0.025 ug/l | < 0.025 ug/l |
| W323 | 7/28/1987 | N | < 0.010 ug/l<br>< 10 ug/l | **0.083 ug/l**<br>**< 10 ug/l** | < 0.017 ug/l<br>< 10 ug/l | **0.25 ug/l**<br>**< 10 ug/l** | **7.7 s ug/l**<br>**< 10 ug/l** | < 0.010 ug/l<br>< 10 ug/l | < 0.010 ug/l<br>< 10 ug/l |
| W323 | 11/03/1987 | N | < 0.010 ug/l | **0.19 ug/l** | < 0.017 ug/l | **0.048 ug/l** | < 6 ug/l | **0.037 ug/l** | **0.016 ug/l** |
| W323 | 2/25/1988 | N | < 0.020 ug/l | **0.068 ug/l** | < 0.034 ug/l | < 0.038 ug/l | < 6 ug/l | < 0.020 ug/l | < 0.020 ug/l |
| W323 | 10/06/1988 | N | < 0.010 ug/l | **0.11 ug/l** | < 0.017 ug/l | **0.019 ug/l** | < 6 ug/l | < 0.010 ug/l | < 0.010 ug/l |
| W323 | 10/20/1995 | N | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 3 ug/l | < 0.11 ug/l | < 0.11 ug/l |
| W323 | 10/02/1996 | N | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | < 3 ug/l | < 0.048 ug/l | < 0.048 ug/l |
| W323 | 10/02/1997 | N | **0.006 b ug/l** | **0.021 ug/l** | < 0.003 ug/l | < 0.003 ug/l | < 3 ug/l | **0.011 b ug/l** | **0.017 ug/l** |
| W323 | 11/19/1998 | N | < 0.003 ug/l | **0.016 ug/l** | < 0.003 ug/l | **0.012 ug/l** | < 3 ug/l | < 0.003 ug/l | **0.013 ug/l** |
| W323 | 11/18/1999 | N | **0.005 ug/l** | **0.008 ug/l** | < 0.003 ug/l | **0.007 jb ug/l** | < 3 ug/l | **0.006 b ug/l** | **0.013 ug/l** |
| W323 | 9/28/2000 | N | **0.006 b ug/l** | **0.007 b ug/l** | < 0.003 ug/l | **0.009 b ug/l** | < 3 ug/l | **0.006 b ug/l** | **0.012 b ug/l** |
| W323 | 9/28/2000 | FD | **0.005 b ug/l** | **0.007 b ug/l** | < 0.003 ug/l | **0.023 b ug/l** | < 3 ug/l | **0.005 b ug/l** | **0.010 b ug/l** |
| W323 | 10/19/2001 | N | **0.0072 b ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.0075 ug/l** | < 3 ug/l | **0.0066 b ug/l** | **0.011 ug/l** |
| W323 | 10/19/2001 | FD | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0068 ug/l** | < 3 ug/l | **0.0043 b ug/l** | **0.011 ug/l** |
| W323 | 10/31/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0076 b ug/l** | < 3.0 ug/l | **0.0039 ug/l** | **0.0081 ug/l** |
| W323 | 6/07/2003 | N | **0.0043 ug/l** | < 0.0034 ug/l | < 0.0034 ug/l | **0.0062 b ug/l** | < 3.0 ug/l | **0.0036 ug/l** | **0.010 ug/l** |
| W328 | 3/20/1986 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.011 ug/l** | < 5 ug/l | **0.012 ug/l** | < 0.0010 ug/l |
| W328 | 6/03/1986 | N | **0.0031 ug/l** | < 0.0028 ug/l | < 0.0034 ug/l | **0.0068 s ug/l** | < 5 ug/l | **0.0055 ug/l** | **0.0018 ug/l** |
| W328 | 9/23/1986 | N | **0.0054 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.034 s ug/l** | < 5 ug/l | **0.0085 ug/l** | **0.0036 ug/l** |
| W328 | 12/10/1986 | N | **0.0030 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0074 s ug/l** | < 5 ug/l | **0.0059 ug/l** | **0.0022 ug/l** |
| W328 | 3/19/1987 | N | **0.0029 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0082 ug/l** | < 6 ug/l | **0.0024 ug/l** | **0.0013 ug/l** |
| W328 | 5/05/1987 | N | **0.0018 ug/l** | **0.0035 ug/l** | < 0.0017 ug/l | **0.0055 s ug/l** | < 6 ug/l | **0.0030 ug/l** | **0.0015 ug/l** |
| W328 | 8/06/1987 | N | **0.0023 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0066 ug/l** | **8.5 s ug/l** | **0.0037 ug/l** | **0.0014 ug/l** |
| W328 | 11/03/1987 | N | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 6 ug/l<br>< 6 ug/l | < 0.25 ug/l<br>< 0.25 ug/l | < 0.25 ug/l<br>< 0.25 ug/l |

# Table A-6
## 1984-2016 Lower Aquifer Wells
## Historical Water Quality Data
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W328 | 2/25/1988 | N | **0.0015 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | < 0.0019 ug/l | < 6 ug/l | < 0.001 ug/l | **0.0011 ug/l** |
| W328 | 10/07/1988 | N | **0.0012 ug/l**<br>**0.001 ug/l** | < 0.0014 ug/l<br>< 0.0014 ug/l | < 0.0017 ug/l<br>< 0.0017 ug/l | **0.0048 ug/l**<br>**0.0044 ug/l** | < 6 ug/l<br>< 6 ug/l | **0.0013 ug/l**<br>**0.0012 ug/l** | < 0.0010 ug/l<br>0.001 ug/l |
| W328 | 12/09/1988 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0076 s ug/l** | < 5 ug/l | **0.0024 ug/l** | < 0.0010 ug/l |
| W328 | 8/04/1989 | N | < 0.0010 ug/l | < 0.0014 ug/l | < 0.0017 ug/l | **0.0047 ug/l** | < 5 ug/l | **0.0023 ug/l** | < 0.0010 ug/l |
| W328 | 5/03/1990 | N | **0.0016 ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0096 s ug/l** | < 6 ug/l | **0.0021 s ug/l** | **0.0013 ug/l** |
| W328 | 10/30/1990 | N | **0.0021 b ug/l** | < 0.0014 ug/l | < 0.0017 ug/l | **0.0088 b ug/l** | < 6 ug/l | **0.0076 b ug/l** | **0.0024 ug/l** |
| W328 | 10/17/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0040 ug/l | < 6 ug/l | < 0.0030 ug/l | < 0.0030 ug/l |
| W328 | 10/14/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | **0.0074 b ug/l** | < 6 ug/l | **0.0038 ug/l** | < 0.0030 ug/l |
| W328 | 10/20/1993 | N | **0.00338 ug/l**<br>**< 0.00600 ug/l** | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00300 ug/l<br>< 0.00600 ug/l | < 0.00400 ug/l<br>0.00888 b ug/l | < 6 ug/l<br>< 6 ug/l | **0.00369 ug/l**<br>**< 0.00600 ug/l** | < 0.00300 ug/l<br>< 0.00600 ug/l |
| W328 | 10/10/1994 | N | **0.003 ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.004 b ug/l** | < 3 ug/l | **0.003 ug/l** | < 0.003 ug/l |
| W328 | 1/09/1996 | N | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | < 3 ug/l | < 0.009 ug/l | < 0.009 ug/l |
| W328 | 10/02/1996 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.008 b ug/l** | < 3 ug/l | **0.003 ug/l** | < 0.003 ug/l |
| W328 | 10/02/1997 | N | **0.004 b ug/l**<br>**0.017 ug/l** | < 0.003 ug/l<br>< 0.003 ug/l | < 0.003 ug/l<br>0.009 ug/l | **0.007 b ug/l**<br>**0.006 b ug/l** | < 3 ug/l<br>< 3 ug/l | **0.007 b ug/l**<br>**0.013 b ug/l** | **0.003 ug/l**<br>**0.014 ug/l** |
| W328 | 11/19/1998 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | **0.009 ug/l** | < 3 ug/l | **0.004 ug/l** | < 0.003 ug/l |
| W328 | 11/18/1999 | N | **0.004 ug/l** | **0.003 ug/l** | < 0.003 ug/l | **0.009 jb ug/l** | < 3 ug/l | **0.008 b ug/l** | **0.003 ug/l** |
| W328 | 9/28/2000 | N | **0.004 b ug/l** | < 0.003 ug/l | < 0.003 ug/l | **0.013 b ug/l** | < 3 ug/l | **0.004 b ug/l** | < 0.003 ug/l |
| W328 | 10/19/2001 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0044 ug/l** | < 3 ug/l | **0.0045 b ug/l** | < 0.0033 ug/l |
| W328 | 10/31/2002 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0055 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/31/2002 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0055 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 12/22/2003 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.0053 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/21/2004 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.027 b ug/l** | < 2 * ug/l | **0.004 ug/l** | < 0.0034 ug/l |
| W328 | 10/21/2004 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.020 b ug/l** | < 2 * ug/l | **0.0037 ug/l** | < 0.0034 ug/l |
| W328 | 11/10/2005 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.015 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 11/10/2005 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.014 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/21/2006 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.012 b ug/l** | < 3.0 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 11/09/2007 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0083 b ug/l** | < 0.96 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W328 | 10/16/2008 | N | < 0.0034 ug/l | < 0.0034 * ug/l | < 0.0034 ug/l | **0.010 ug/l** | < 0.98 ug/l | **0.0053 ug/l** | < 0.0034 ug/l |
| W328 | 10/08/2009 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.022 ug/l** | < 0.96 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |
| W328 | 10/13/2010 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.048 b ug/l** | < 0.96 ug/l | **0.0063 ug/l** | < 0.0033 ug/l |
| W328 | 10/16/2011 | N | **0.017 ug/l** | < 0.0039 ug/l | **0.0082 ug/l** | **0.029 b ug/l** | < 1.2 ug/l | **0.012 b ug/l** | **0.013 ug/l** |
| W328 | 11/01/2012 | N | **0.0074 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.037 b ug/l** | < 0.95 ug/l | **0.0083 b ug/l** | **0.0066 ug/l** |
| W328 | 11/01/2012 | FD | **0.0073 ug/l** | < 0.0033 ug/l | < 0.0033 ug/l | **0.054 b ug/l** | < 0.95 ug/l | **0.0072 b ug/l** | **0.0065 ug/l** |
| W328 | 10/17/2013 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.021 b ug/l** | < 0.96 ug/l | **0.0048 ug/l** | < 0.0033 ug/l |
| W328 | 10/17/2013 | FD | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.11 b ug/l** | < 0.99 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| W328 | 10/22/2014 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0088 ug/l** | < 0.95 ug/l | **0.0043 ug/l** | < 0.0033 ug/l |

# Table A-6
# 1984-2016 Lower Aquifer Wells
# Historical Water Quality Data
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Parameter | Fluoranthene | Fluorene | Indeno(1,2,3-cd) pyrene | Naphthalene | Pentachlorophenol | Phenanthrene | Pyrene |
|---|---|---|---|---|---|---|---|---|---|
| Location | Date | Sample Type | | | | | | | |
| W328 | 10/12/2015 | N | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | < 1.1 ug/l | < 0.0035 ug/l | < 0.0035 ug/l |
| W328 | 10/20/2016 | N | **0.0050 ug/l** | **0.0037 ug/l** | < 0.0033 ug/l | **0.013 ug/l** | < 0.29 ug/l | **0.0083 ug/l** | **0.0041 ug/l** |
| S-3 | 3/01/2006 | N | **0.0032 j ug/l** | **0.0083 ug/l** | < 0.0016 ug/l | **0.056 b ug/l** | < 0.011 ug/l | **0.0084 ug/l** | **0.0020 j ug/l** |
| S-3 | 10/21/2006 | N | **0.0050 ug/l** | **0.0096 ug/l** | < 0.0034 ug/l | **0.094 b ug/l** | < 3.0 ug/l | **0.015 ug/l** | **0.0037 ug/l** |
| S-3 | 11/08/2007 | N | < 0.0032 ug/l | < 0.0032 ug/l | < 0.0032 ug/l | **0.0064 ug/l** | < 0.94 ug/l | **0.0033 b ug/l** | < 0.0032 ug/l |
| S-3 | 10/14/2008 | N | < 0.0036 ug/l | **0.0046 ug/l** | < 0.0036 ug/l | **0.014 b ug/l** | < 1.1 ug/l | **0.0079 ug/l** | < 0.0036 ug/l |
| S-3 | 9/30/2009 | N | < 0.0033 ug/l | **0.0036 ug/l** | < 0.0033 ug/l | **0.011 b ug/l** | < 0.95 ug/l | **0.0068 ug/l** | < 0.0033 ug/l |
| S-3 | 10/05/2010 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.024 b ug/l** | < 0.96 ug/l | **0.0069 ug/l** | < 0.0033 ug/l |
| S-3 | 10/05/2010 | FD | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.026 b ug/l** | < 0.96 ug/l | **0.0062 ug/l** | < 0.0033 ug/l |
| S-3 | 10/11/2011 | N | **0.019 ug/l** | **0.013 ug/l** | < 0.0039 ug/l | **0.11 ug/l** | < 1.2 ug/l | **0.022 b ug/l** | **0.014 ug/l** |
| S-3 | 10/16/2012 | N | < 0.0033 h ug/l | < 0.0033 h ug/l | < 0.0033 h ug/l | **0.020 bh ug/l** | < 0.95 h ug/l | < 0.0033 h ug/l | **0.0078 h ug/l** |
| S-3 | 10/08/2013 | N | < 0.0034 ug/l | **0.0046 ug/l** | < 0.0034 ug/l | **0.060 b ug/l** | < 1.0 ug/l | **0.0082 ug/l** | **0.0068 ug/l** |
| S-3 | 10/15/2014 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | **0.012 b ug/l** | < 1.0 ug/l | < 0.0034 ug/l | **0.0081 ug/l** |
| S-3 | 10/06/2015 | N | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | < 1.0 ug/l | < 0.0034 ug/l | **0.0078 ug/l** |
| S-3 | 10/13/2016 | N | < 0.0033 ug/l | < 0.0033 ug/l | < 0.0033 ug/l | **0.0044 ug/l** | < 0.29 ug/l | < 0.0033 ug/l | < 0.0033 ug/l |

See Table 3-18 for data qualifiers a

# Table A-7
## Water Quality Data
## Pentachlorophenol - Tank Effluent
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | **Chemical Name** | **Pentachlorophenol** |
|---|---|---|
| Location | Sample Date | |
| EFF | 02/27/1989 | **1900 ug/l** |
| EFF | 03/31/1989 | **1700 ug/l** |
| EFF | 04/14/1989 | **620 ug/l** |
| EFF | 05/12/1989 | **2600 ug/l** |
| EFF | 06/06/1989 | **1300 ug/l** |
| EFF | 07/18/1989 | **110 ug/l** |
| EFF | 08/07/1989 | **510 ug/l** |
| EFF | 09/05/1989 | **770 ug/l** |
| EFF | 09/29/1989 | **370 ug/l** |
| EFF | 11/03/1989 | **1500 ug/l**<br>**890 ug/l** |
| EFF | 12/01/1989 | **480 ug/l** |
| EFF | 01/05/1990 | **760 ug/l** |
| EFF | 03/09/1990 | **1700 ug/l** |
| EFF | 04/02/1990 | < 14 ug/l |
| EFF | 05/04/1990 | **460 ug/l** |
| EFF | 06/04/1990 | **750 ug/l** |
| EFF | 07/02/1990 | **670 ug/l** |
| EFF | 08/09/1990 | **670 ug/l** |
| EFF | 09/04/1990 | **1700 ug/l** |
| EFF | 10/01/1990 | **450 ug/l** |
| EFF | 11/09/1990 | **1000 ug/l** |
| EFF | 12/06/1990 | **650 ug/l** |
| EFF | 01/10/1991 | < 700 ug/l |
| EFF | 02/07/1991 | **1000 ug/l** |
| EFF | 03/11/1991 | **280 ug/l** |
| EFF | 04/10/1991 | **3200 ug/l** |
| EFF | 05/14/1991 | **760 ug/l** |
| EFF | 07/12/1991 | **1600 ug/l** |
| EFF | 08/20/1991 | **1200 ug/l** |
| EFF | 09/16/1991 | **1200 ug/l** |
| EFF | 10/17/1991 | **670 ug/l** |
| EFF | 11/19/1991 | **980 ug/l** |
| EFF | 12/12/1991 | **1300 ug/l** |
| EFF | 01/06/1992 | < 16 ug/l |
| EFF | 02/04/1992 | **1200 ug/l** |
| EFF | 03/30/1992 | **1100 ug/l** |
| EFF | 04/24/1992 | **500 ug/l** |
| EFF | 05/22/1992 | **1000 ug/l** |
| EFF | 06/08/1992 | **1000 ug/l** |
| EFF | 07/22/1992 | **1300 ug/l** |
| EFF | 08/13/1992 | **1200 ug/l** |
| EFF | 09/03/1992 | **1100 ug/l** |
| EFF | 10/13/1992 | **690 ug/l** |
| EFF | 11/11/1992 | **1900 ug/l** |
| EFF | 12/03/1992 | **2200 ug/l** |
| EFF | 01/13/1993 | **1200 ug/l** |
| EFF | 02/12/1993 | **770 ug/l** |
| EFF | 03/11/1993 | **1200 ug/l** |
| EFF | 04/13/1993 | **1000 ug/l** |
| EFF | 05/10/1993 | **1500 ug/l** |
| EFF | 06/09/1993 | **1300 ug/l** |
| EFF | 07/19/1993 | **1800 ug/l** |
| EFF | 08/17/1993 | **1100 ug/l** |
| EFF | 09/24/1993 | **1100 ug/l** |
| EFF | 10/18/1993 | **850 ug/l** |
| EFF | 11/09/1993 | **630 ug/l** |
| EFF | 12/21/1993 | **1200 ug/l** |
| EFF | 01/06/1994 | **1300 ug/l** |
| EFF | 02/04/1994 | **1400 ug/l** |
| EFF | 03/03/1994 | **2800 ug/l** |
| EFF | 04/01/1994 | **2900 ug/l** |
| EFF | 05/03/1994 | < 59 ug/l |
| EFF | 05/31/1994 | **1300 ug/l** |
| EFF | 07/01/1994 | **1300 ug/l** |
| EFF | 08/02/1994 | **1900 j ug/l** |
| EFF | 08/31/1994 | **1300 ug/l** |
| EFF | 09/28/1994 | **1200 ug/l** |
| EFF | 11/01/1994 | **1100 ug/l** |
| EFF | 11/29/1994 | **1100 ug/l** |
| EFF | 12/29/1994 | **670 j ug/l** |
| EFF | 02/01/1995 | **740 ug/l** |
| EFF | 03/01/1995 | **860 ug/l** |
| EFF | 04/03/1995 | **1200 ug/l** |
| EFF | 05/01/1995 | **1000 ug/l** |
| EFF | 06/01/1995 | < 50 ug/l |
| EFF | 07/06/1995 | **720 ug/l** |
| EFF | 07/27/1995 | **1340 ug/l** |
| EFF | 08/30/1995 | **570 ug/l** |
| EFF | 10/18/1995 | **1400 ug/l**<br>**1200 ug/l** |
| EFF | 11/02/1995 | **140 ug/l** |
| EFF | 12/05/1995 | **1020 ug/l** |
| EFF | 12/28/1995 | **780 ug/l** |
| EFF | 02/08/1996 | **610 ug/l** |
| EFF | 03/06/1996 | **740 BQA ug/l** |
| EFF | 03/29/1996 | **4100 ug/l** |
| EFF | 04/24/1996 | **2000 ug/l** |
| EFF | 06/05/1996 | **780 ug/l** |
| EFF | 07/09/1996 | **1400 ug/l** |
| EFF | 09/06/1996 | **1800 ug/l** |
| EFF | 10/02/1996 | **1100 ug/l** |
| EFF | 11/06/1996 | **1600 ug/l** |
| EFF | 12/02/1996 | **1900 ug/l** |
| EFF | 01/02/1997 | **770 ug/l** |
| EFF | 02/04/1997 | **860 ug/l** |
| EFF | 02/28/1997 | **980 ug/l** |
| EFF | 03/26/1997 | **690 ug/l** |
| EFF | 03/31/1997 | **2800 ug/l** |
| EFF | 05/01/1997 | **1900 j ug/l** |
| EFF | 06/17/1997 | **1300 ug/l** |
| EFF | 07/01/1997 | **780 j ug/l** |
| EFF | 08/07/1997 | **460 j ug/l** |
| EFF | 08/26/1997 | **480 j ug/l** |
| EFF | 09/12/1997 | **490 j ug/l** |
| EFF | 10/01/1997 | **1000 j ug/l** |
| EFF | 11/06/1997 | **600 ug/l** |
| EFF | 12/04/1997 | **780 ug/l** |
| EFF | 01/07/1998 | **830 ug/l** |
| EFF | 02/04/1998 | **480 ug/l** |
| EFF | 03/03/1998 | **390 ug/l** |
| EFF | 04/01/1998 | **590 ug/l** |
| EFF | 04/30/1998 | **600 ug/l** |
| EFF | 06/02/1998 | **530 ug/l** |
| EFF | 07/01/1998 | **470 ug/l** |
| EFF | 08/04/1998 | **750 ug/l** |
| EFF | 09/09/1998 | **850 ug/l** |
| EFF | 10/01/1998 | **510 ug/l** |
| EFF | 11/02/1998 | **810 ug/l** |
| EFF | 12/11/1998 | **770 BQU ug/l** |
| EFF | 01/05/1999 | **1100 ug/l** |
| EFF | 01/29/1999 | **950 ug/l** |
| EFF | 02/25/1999 | **780 ug/l** |
| EFF | 03/31/1999 | **790 ug/l** |
| EFF | 05/03/1999 | **760 ug/l** |
| EFF | 05/31/1999 | **430 ug/l** |
| EFF | 06/30/1999 | **1100 ug/l** |
| EFF | 08/02/1999 | **530 ug/l** |
| EFF | 09/03/1999 | **510 ug/l** |
| EFF | 10/01/1999 | **440 ug/l** |
| EFF | 11/01/1999 | **480 ug/l** |

# Table A-7
# Water Quality Data
# Pentachlorophenol - Tank Effluent
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | Chemical Name | Pentachlorophenol |
|---|---|---|
| Location | Sample Date | |
| EFF | 11/19/1999 | **630 ug/l** |
| EFF | 01/04/2000 | **500 ug/l** |
| EFF | 02/02/2000 | **620 ug/l** |
| EFF | 03/01/2000 | **680 ug/l** |
| EFF | 03/31/2000 | **690 ug/l** |
| EFF | 05/02/2000 | **730 ug/l** |
| EFF | 06/02/2000 | **650 ug/l** |
| EFF | 06/30/2000 | **650 ug/l** |
| EFF | 08/04/2000 | **570 ug/l** |
| EFF | 09/06/2000 | **590 ug/l** |
| EFF | 09/26/2000 | **650 ug/l** |
| EFF | 10/31/2000 | **560 ug/l** |
| EFF | 12/07/2000 | **470 ug/l** |
| EFF | 01/03/2001 | **560 ug/l** |
| EFF | 02/01/2001 | **590 ug/l** |
| EFF | 03/06/2001 | **620 ug/l** |
| EFF | 04/02/2001 | **360 ug/l** |
| EFF | 04/27/2001 | **470 ug/l** |
| EFF | 05/30/2001 | **590 ug/l** |
| EFF | 07/03/2001 | **800 ug/l** |
| EFF | 07/31/2001 | **1000 ug/l** |
| EFF | 09/04/2001 | **610 ug/l** |
| EFF | 10/02/2001 | **540 ug/l** |
| EFF | 11/01/2001 | **600 ug/l** |
| EFF | 12/04/2001 | **510 ug/l** |
| EFF | 12/31/2001 | **850 ug/l** |
| EFF | 01/31/2002 | **660 ug/l** |
| EFF | 02/28/2002 | **650 ug/l** |
| EFF | 03/27/2002 | **640 ug/l** |
| EFF | 04/29/2002 | **540 ug/l** |
| EFF | 05/30/2002 | **560 ug/l** |
| EFF | 06/30/2002 | **960 ug/l** |
| EFF | 08/02/2002 | **800 ug/l** |
| EFF | 08/30/2002 | **770 ug/l** |
| EFF | 09/30/2002 | **760 ug/l** |
| EFF | 11/01/2002 | **610 ug/l** |
| EFF | 12/03/2002 | **560 ug/l** |
| EFF | 12/30/2002 | **450 ug/l** |
| EFF | 02/04/2003 | **590 ug/l** |
| EFF | 03/03/2003 | **580 ug/l** |
| EFF | 04/01/2003 | **540 ug/l** |
| EFF | 05/02/2003 | **550 ug/l** |
| EFF | 06/07/2003 | **620 ug/l** |
| EFF | 07/02/2003 | **610 ug/l** |
| EFF | 08/04/2003 | **500 ug/l** |
| EFF | 09/03/2003 | **490 ug/l** |
| EFF | 10/13/2003 | **790 ug/l** |
| EFF | 11/03/2003 | **780 ug/l** |
| EFF | 03/09/2004 | **510 ug/l** |
| EFF | 05/10/2004 | **410 ug/l** |
| EFF | 08/02/2004 | **310 ug/l** |
| EFF | 10/29/2004 | **360 ug/l** |
| EFF | 02/02/2005 | **270 ug/l** |
| EFF | 05/04/2005 | **310 ug/l** |
| EFF | 08/05/2005 | **290 ug/l** |
| EFF | 11/12/2005 | **340 ug/l** |
| EFF | 03/19/2006 | **400 ug/l** |
| EFF | 05/09/2006 | **380 ug/l** |
| EFF | 08/15/2006 | < 50 ug/l |
| EFF | 10/18/2006 | **360 ug/l** |
| EFF | 11/29/2006 | **400 ug/l** |
| EFF | 02/12/2007 | **350 ug/l** |
| EFF | 06/08/2007 | **530 ug/l** |
| EFF | 09/12/2007 | **380 * ug/l** |
| EFF | 11/13/2007 | **390 ug/l** |
| EFF | 03/19/2008 | **500 ug/l** |
| EFF | 06/14/2008 | **370 ug/l** |
| EFF | 09/04/2008 | **380 ug/l** |
| EFF | 10/16/2008 | **420 ug/l** |
| EFF | 02/25/2009 | **380 ug/l** |
| EFF | 06/10/2009 | **330 ug/l** |
| EFF | 09/09/2009 | **340 ug/l** |
| EFF | 10/08/2009 | **430 ug/l** |
| EFF | 03/09/2010 | **400 ug/l** |
| EFF | 06/04/2010 | **300 ug/l** |
| EFF | 08/09/2010 | **360 ug/l** |
| EFF | 10/07/2010 | **310 ug/l** |
| EFF | 03/22/2011 | **290 ug/l** |
| EFF | 06/06/2011 | **300 ug/l** |
| EFF | 09/11/2011 | **240 ug/l** |
| EFF | 10/16/2011 | **290 ug/l** |
| EFF | 03/16/2012 | **280 ug/l** |
| EFF | 06/09/2012 | **430 ug/l** |
| EFF | 09/27/2012 | **210 ug/l** |
| EFF | 10/18/2012 | **180 ug/l** |
| EFF | 3/7/2013 | **270 ug/l** |
| EFF | 5/30/2013 | **270 ug/l** |
| EFF | 8/14/2013 | **280 ug/l** |
| EFF | 10/11/2013 | **320 ug/l** |
| EFF | 3/27/2014 | **280 ug/l** |
| EFF | 6/30/2014 | **280 ug/l** |
| EFF | 9/30/2014 | **290 ug/l** |
| EFF | 10/21/2014 | **260 ug/l** |
| EFF | 3/20/2015 | **270 ug/l** |
| EFF | 6/30/2015 | **150 h ug/l** |
| EFF | 9/01/2015 | **330 ug/l** |
| EFF | 10/14/2015 | **210 ug/l** |
| EFF | 2/04/2016 | **250 ug/l** |
| EFF | 6/30/2016 | **310 ug/l** |
| EFF | 9/12/2016 | **260 ug/l** |
| EFF | 10/11/2016 | **330 ug/l** |

See Table 3-18 for data qualifiers and footnotes.

# Table A-8
## Historical Surface Water Quality Data
## Comparison to ARARs and TBCs
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| | | Chemical Name | Acenaphthene | Anthracene | Benzo(a) pyrene | Fluoranthene | Naphthalene | Pentachlorophenol | Phenanthrene |
|---|---|---|---|---|---|---|---|---|---|
| Joslyn SW ARARs **(Bold)** | | | **12 (2) ug/l** | **0.029 (2) ug/l** | **0.00051 (1) ug/l** | 20 (2) ug/l | 81 (2) ug/l | **5.5 (2,3) ug/l** | **2.1 (2) ug/l** |
| Location | Sample Date | Sample Type | | | | | | | |
| NE Drain | 11/04/1987 | N | **15.0 ug/l** | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | < 0.25 ug/l | **570 ug/l** | < 0.25 ug/l |
| NE Drain | 08/20/1990 | N | 7.3 ug/l | < 0.080 ug/l | < 0.080 ug/l | < 0.080 ug/l | 0.16 ug/l | **29 ug/l** | 0.088 ug/l |
| NE Drain | 09/05/1990 | N | 5.4 ug/l | < 0.20 ug/l | < 0.20 ug/l | < 0.20 ug/l | < 0.38 ug/l | **49 ug/l** | < 0.20 ug/l |
| NE Drain | 10/01/1990 | N | **15 ug/l** | < 6 ug/l | < 6 ug/l | < 6 ug/l | < 6 ug/l | **64 ug/l** | < 6 ug/l |
| NE Drain | 11/09/1990 | N | 6.3 ug/l | **0.089 ug/l** | < 0.0010 ug/l | < 0.0010 ug/l | 0.11 ug/l | **11 ug/l** | 0.13 ug/l |
| NE Drain | 05/14/1991 | N | 0.79 ug/l | < 0.020 ug/l | < 0.020 ug/l | 0.052 ug/l | < 0.038 ug/l | < 6 ug/l | 0.031 ug/l |
| NE Drain | 06/12/1991 | N | 2.5 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | 0.11 ug/l | 3 bj ug/l | < 0.060 ug/l |
| NE Drain | 07/12/1991 | N | 1.6 ug/l | 0.026 ug/l | < 0.0030 ug/l | 0.0062 ug/l | 0.033 b ug/l | < 6 ug/l | 0.019 ug/l |
| NE Drain | 08/20/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | **0.0092 ug/l** | 0.041 ug/l | 0.013 b ug/l | < 6 ug/l | 0.026 ug/l |
| NE Drain | 09/16/1991 | N | 1.7 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.14 ug/l | < 10 ug/l | < 0.11 ug/l |
| NE Drain | 10/16/1991 | N | 0.051 ug/l | 0.015 ug/l | **0.0035 ug/l** | 0.011 ug/l | < 0.0040 ug/l | 2 j ug/l | < 0.0030 ug/l |
| NE Drain | 11/19/1991 | N | 2.4 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.080 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 12/12/1991 | N | 1.9 ug/l | < 0.060 ug/l | **0.084 ug/l** | 0.38 ug/l | < 0.080 ug/l | < 6 ug/l | 0.38 ug/l |
| NE Drain | 01/06/1992 | N | 3.2 ug/l | < 0.072 ug/l | < 0.072 ug/l | < 0.072 ug/l | < 0.096 ug/l | < 6 ug/l | 0.11 b ug/l |
| NE Drain | 02/04/1992 | N | 2.9 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.18 ug/l | < 0.24 ug/l | < 6 ug/l | < 0.18 ug/l |
| NE Drain | 03/30/1992 | N | 1.5 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.11 ug/l | < 0.14 ug/l | < 6 ug/l | < 0.11 ug/l |
| NE Drain | 04/24/1992 | N | 1.8 ug/l | < 0.15 ug/l | < 0.15 ug/l | < 0.15 ug/l | < 0.20 ug/l | < 6 ug/l | < 0.15 ug/l |
| NE Drain | 05/22/1992 | N | 1.9 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.10 ug/l | < 0.14 ug/l | < 6 ug/l | < 0.10 ug/l |
| NE Drain | 06/08/1992 | N | 1.3 ug/l | < 0.14 ug/l | < 0.14 ug/l | < 0.14 ug/l | < 0.19 ug/l | < 6 ug/l | < 0.14 ug/l |
| NE Drain | 07/14/1992 | N | 1.4 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.16 ug/l | < 6 ug/l | < 0.12 ug/l |
| NE Drain | 08/13/1992 | N | 0.76 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.080 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 09/03/1992 | N | 0.70 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.080 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 10/13/1992 | N | 2.2 ug/l | **0.042 ug/l** | < 0.036 ug/l | < 0.036 ug/l | < 0.048 ug/l | < 6 ug/l | < 0.036 ug/l |
| NE Drain | 12/03/1992 | N | 1.2 ug/l | < 0.13 ug/l | < 0.13 ug/l | < 0.13 ug/l | < 0.18 ug/l | < 6 ug/l | < 0.13 ug/l |
| NE Drain | 12/22/1992 | N | 0.46 ug/l | 0.022 ug/l | < 0.0030 ug/l | 0.0073 ug/l | 0.0064 ug/l | < 6 ug/l | 0.016 ug/l |
| NE Drain | 01/13/1993 | N | 1.130 ug/l | **0.0340 ug/l** | < 0.00300 ug/l | 0.0248 ug/l | 0.0118 ug/l | < 6 ug/l | 0.0283 ug/l |
| NE Drain | 02/12/1993 | N | 1.94 ug/l | < 0.102 ug/l | < 0.102 ug/l | < 0.102 ug/l | < 0.136 ug/l | < 6 ug/l | < 0.102 ug/l |
| NE Drain | 03/11/1993 | N | 2.2 ug/l | < 0.120 ug/l | < 0.120 ug/l | < 0.120 ug/l | < 0.0160 ug/l | < 6 ug/l | < 0.230 ug/l |
| NE Drain | 04/14/1993 | N | 1.110 ug/l | **0.0817 ug/l** | **0.185 ug/l** | 0.348 ug/l | < 0.0720 ug/l | < 60 ug/l | 0.266 ug/l |
| NE Drain | 05/10/1993 | N | 0.122 ug/l | **0.0453 ug/l** | **0.140 ug/l** | 0.429 ug/l | < 0.0320 ug/l | < 6 ug/l | 0.177 ug/l |
| NE Drain | 06/09/1993 | N | 2.74 ug/l | < 0.192 ug/l | < 0.192 ug/l | < 0.192 ug/l | < 0.256 ug/l | < 6 ug/l | < 0.192 ug/l |
| NE Drain | 07/19/1993 | N | 1.79 ug/l | < 0.0600 ug/l | < 0.0600 ug/l | < 0.0600 ug/l | 0.0811 b ug/l | < 6 ug/l | < 0.0600 ug/l |
| NE Drain | 08/17/1993 | N | 0.641 ug/l | < 0.0900 ug/l | < 0.0900 ug/l | < 0.0900 ug/l | < 0.120 ug/l | < 6 ug/l | < 0.0900 ug/l |
| NE Drain | 09/24/1993 | N | 2.50 ug/l | < 0.0900 ug/l | < 0.0900 ug/l | < 0.0900 ug/l | < 0.120 ug/l | < 6 ug/l | < 0.0900 ug/l |
| NE Drain | 10/18/1993 | N | 1.21 ug/l | 0.0617 ug/l | < 0.0600 ug/l | < 0.0600 ug/l | < 0.0800 ug/l | < 6 ug/l | < 0.0600 ug/l |
| NE Drain | 11/09/1993 | N | 1.38 ug/l | **0.0776 ug/l** | < 0.0720 ug/l | < 0.0720 ug/l | < 0.0960 ug/l | < 6 ug/l | < 0.0720 ug/l |
| NE Drain | 12/21/1993 | N | 0.588 ug/l | 0.0202 ug/l | < 0.00300 ug/l | 0.00723 ug/l | 0.0107 b ug/l | < 12 ug/l | 0.00594 ug/l |
| NE Drain | 01/06/1994 | N | 1.92 ug/l | < 0.138 ug/l | < 0.138 ug/l | < 0.138 ug/l | < 0.184 ug/l | < 6 ug/l | < 0.138 ug/l |
| NE Drain | 02/03/1994 | N | 1.88 ug/l | < 0.0900 ug/l | < 0.0900 ug/l | < 0.0900 ug/l | < 0.120 ug/l | < 6 ug/l | < 0.0900 ug/l |
| NE Drain | 03/03/1994 | N | 0.906 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.080 ug/l | < 6 * ug/l | < 0.060 ug/l |
| NE Drain | 04/01/1994 | N | 1.71 ug/l | < 0.156 ug/l | < 0.156 ug/l | < 0.156 ug/l | < 0.208 ug/l | < 12 ug/l | < 0.156 ug/l |
| NE Drain | 05/03/1994 | N | **50.6 ug/l** | < 0.072 ug/l | < 0.072 ug/l | < 0.072 ug/l | 2.44 ug/l | < 6 ug/l | < 0.072 ug/l |
| NE Drain | 05/31/1994 | N | 1.61 ug/l | < 0.06 ug/l | < 0.06 ug/l | < 0.06 ug/l | < 0.06 ug/l | < 3 ug/l | < 0.06 ug/l |
| NE Drain | 07/01/1994 | N | 1.730 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 08/02/1994 | N | 1.62 ug/l | < 0.072 ug/l | < 0.072 ug/l | < 0.072 ug/l | < 0.072 ug/l | < 3 ug/l | < 0.072 ug/l |
| NE Drain | 08/31/1994 | N | 2.7 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 3 ug/l | < 0.24 ug/l |
| NE Drain | 09/28/1994 | N | 1.9 ug/l | < 0.072 ug/l | < 0.072 ug/l | < 0.072 ug/l | < 0.072 ug/l | < 3 ug/l | < 0.072 ug/l |
| NE Drain | 11/01/1994 | N | 2.2 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 11/29/1994 | N | 2.2 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 3 ug/l | < 0.12 ug/l |
| NE Drain | 12/29/1994 | N | 2.60 ug/l | < 0.120 ug/l | < 0.120 ug/l | < 0.120 ug/l | < 0.120 ug/l | < 3 ug/l | < 0.120 ug/l |
| NE Drain | 02/01/1995 | N | 2.70 ug/l | < 0.120 ug/l | < 0.120 ug/l | < 0.120 ug/l | < 0.120 ug/l | < 3 ug/l | < 0.120 ug/l |
| NE Drain | 03/01/1995 | N | 1.8 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 3 ug/l | < 0.12 ug/l |
| NE Drain | 04/03/1995 | N | 3.2 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 3 ug/l | < 0.12 ug/l |
| NE Drain | 05/01/1995 | N | 3.4 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 3 ug/l | < 0.12 ug/l |
| NE Drain | 06/01/1995 | N | 2.1 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 3 ug/l | < 0.12 ug/l |
| NE Drain | 07/06/1995 | N | 2.3 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 0.12 ug/l | < 3 ug/l | < 0.12 ug/l |
| NE Drain | 07/27/1995 | N | 1.3 ug/l | < 0.060 ug/l | < 0.060 ug/l | 0.064 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 08/30/1995 | N | 1.3 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 10/18/1995 | N | 1.2 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 11/02/1995 | N | 0.74 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 12/05/1995 | N | 1.0 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 12/28/1995 | N | 0.75 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |

# Table A-8
# Historical Surface Water Quality Data
# Comparison to ARARs and TBCs
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | Chemical Name | Acenaphthene | Anthracene | Benzo(a)pyrene | Fluoranthene | Naphthalene | Pentachlorophenol | Phenanthrene |
|---|---|---|---|---|---|---|---|---|---|
| Joslyn SW ARARs **(Bold)** | | | **12 (2) ug/l** | **0.029 (2) ug/l** | **0.00051 (1) ug/l** | 20 (2) ug/l | 81 (2) ug/l | **5.5 (2,3) ug/l** | **2.1 (2) ug/l** |
| Location | Sample Date | Sample Type | | | | | | | |
| NE Drain | 04/24/1996 | N | 2.0 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 09/06/1996 | N | 1.4 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 10/03/1996 | N | 1.0 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 02/05/1997 | N | 2.9 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 03/31/1997 | N | 3.3 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 07/09/1997 | N | 2.9 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 09/12/1997 | N | 1.3 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 6 ug/l | < 0.060 ug/l |
| NE Drain | 10/01/1997 | N | 1.6 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 01/07/1998 | N | 1.0 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 5 ug/l | < 0.060 ug/l |
| NE Drain | 04/01/1998 | N | 1.3 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 0.060 ug/l | < 3 ug/l | < 0.060 ug/l |
| NE Drain | 07/01/1998 | N | 1.0 ug/l | < 0.15 ug/l | < 0.15 ug/l | < 0.15 ug/l | < 0.15 ug/l | < 3 ug/l | < 0.15 ug/l |
| NE Drain | 11/19/1998 | N | 0.19 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | < 3 ug/l | < 0.012 ug/l |
| NE Drain | 02/25/1999 | N | 0.87 ug/l | **0.038 ug/l** | **0.029 ug/l** | 0.088 ug/l | 0.025 b ug/l | < 0.5 ug/l | 0.036 ug/l |
| NE Drain | 05/31/1999 | N | 0.70 ug/l | 0.019 ug/l | < 0.003 ug/l | 0.007 ug/l | 0.008 ug/l | 0.3 ug/l | 0.005 ug/l |
| NE Drain | 09/03/1999 | N | 0.56 ug/l | 0.024 ug/l | < 0.003 ug/l | 0.007 b ug/l | 0.010 b ug/l | < 0.2 ug/l | 0.006 b ug/l |
| NE Drain | 11/19/1999 | N | 0.36 ug/l | 0.025 ug/l | **0.010 b ug/l** | 0.025 b ug/l | 0.015 b ug/l | < 3 ug/l | 0.014 b ug/l |
| NE Drain | 11/19/1999 | FD | 0.37 ug/l | 0.026 ug/l | **0.010 b ug/l** | 0.022 b ug/l | 0.014 b ug/l | < 3 ug/l | 0.014 b ug/l |
| NE Drain | 03/30/2001 | N | 0.63 ug/l | 0.019 ug/l | **0.0053 ug/l** | 0.037 ug/l | 0.012 ug/l | < 0.50 ug/l | 0.018 ug/l |
| NE Drain | 07/03/2001 | N | 0.26 ug/l | 0.014 ug/l | < 0.0033 ug/l | 0.0080 b ug/l | 0.0084 ug/l | < 2.0 ug/l | 0.0051 b ug/l |
| NE Drain | 10/02/2001 | N | 0.32 ug/l | 0.017 ug/l | < 0.0033 ug/l | 0.0056 ug/l | 0.0090 ug/l | < 3 ug/l | 0.0040 b ug/l |
| NE Drain | 10/16/2001 | N | 0.29 ug/l | 0.019 ug/l | < 0.0033 ug/l | 0.0060 b ug/l | 0.012 b ug/l | < 3 ug/l | 0.0056 b ug/l |
| NE Drain | 02/28/2002 | N | 0.29 ug/l | 0.02 ug/l | < 0.0034 ug/l | 0.0071 b ug/l | 0.011 b* ug/l | < 3.0 ug/l | 0.0076 b ug/l |
| NE Drain | 06/30/2002 | N | 0.1 ug/l | 0.017 ug/l | < 0.0034 ug/l | 0.018 ug/l | 0.025 ug/l | < 3.0 ug/l | 0.016 ug/l |
| NE Drain | 07/30/2002 | N | 0.065 ug/l | 0.012 ug/l | < 0.0034 ug/l | 0.015 ug/l | 0.013 ug/l | < 3.0 ug/l | 0.020 ug/l |
| NE Drain | 10/31/2002 | N | 0.055 ug/l | 0.014 ug/l | < 0.0034 ug/l | 0.010 ug/l | 0.032 b ug/l | < 3.0 ug/l | 0.015 ug/l |
| NE Drain | 03/03/2003 | N | 0.078 ug/l | 0.012 ug/l | < 0.0034 ug/l | 0.014 ug/l | 0.013 ug/l | < 3.0 ug/l | 0.013 ug/l |
| NE Drain | 06/07/2003 | N | 0.043 ug/l | 0.012 ug/l | < 0.0034 ug/l | 0.011 ug/l | 0.028 b ug/l | < 3.0 ug/l | 0.017 ug/l |
| NE Drain | 08/03/2004 | N | 0.020 ug/l | **0.038 ug/l** | **0.10 ug/l** | 0.15 ug/l | 0.026 ug/l | < 0.50 * ug/l | 0.052 ug/l |
| NE Drain | 10/19/2004 | N | < 0.0034 ug/l | 0.014 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | 0.0048 b ug/l | < 2 ug/l | < 0.0034 ug/l |
| NE Drain | 02/02/2005 | N | 0.0080 ug/l | **0.085 ug/l** | **0.060 ug/l** | 0.21 ug/l | 0.086 ug/l | < 3.0 ug/l | 0.15 ug/l |
| NE Drain | 05/04/2005 | N | < 0.0035 ug/l | 0.0067 ug/l | < 0.0035 ug/l | < 0.0035 ug/l | 0.017 ug/l | < 3.0 ug/l | < 0.0035 ug/l |
| NE Drain | 08/05/2005 | N | < 0.0034 ug/l | 0.010 ug/l | < 0.0034 ug/l | 0.0071 ug/l | 0.018 b ug/l | < 3.0 * ug/l | 0.0039 b ug/l |
| NE Drain | 11/08/2005 | N | < 0.0034 ug/l | 0.0088 ug/l | < 0.0034 ug/l | 0.0054 ug/l | 0.011 b ug/l | < 3.0 ug/l | < 0.0034 ug/l |
| NE Drain | 03/19/2006 | N | < 0.0034 ug/l | 0.013 ug/l | **0.0041 ug/l** | 0.020 ug/l | 0.0070 b ug/l | < 3.0 ug/l | 0.012 ug/l |
| NE Drain | 05/09/2006 | N | < 0.0034 ug/l | 0.0091 ug/l | < 0.0034 ug/l | 0.0067 ug/l | 0.0078 b ug/l | < 3.0 ug/l | 0.0050 ug/l |
| NE Drain | 08/15/2006 | N | < 0.0034 ug/l | 0.021 ug/l | < 0.0034 ug/l | 0.0044 ug/l | 0.014 b ug/l | < 3.0 ug/l | < 0.0034 ug/l |
| NE Drain | 10/21/2006 | N | < 0.0034 ug/l | 0.015 ug/l | < 0.0034 ug/l | 0.0040 ug/l | 0.011 b ug/l | < 3.0 ug/l | < 0.0034 ug/l |
| NE Drain | 03/15/2007 | N | < 0.0033 ug/l | 0.013 ug/l | < 0.0033 ug/l | 0.016 ug/l | 0.013 b ug/l | < 2.9 ug/l | 0.012 ug/l |
| Storm Sewer | 11/09/1990 | N | 0.12 ug/l | 0.0037 ug/l | **0.0017 ug/l** | 0.032 ug/l | 0.015 ug/l | < 6 ug/l | 0.012 ug/l |
| Storm Sewer | 05/14/1991 | N | 0.064 ug/l | **0.12 ug/l** | **0.31 ug/l** | 1.9 ug/l | 0.035 bj ug/l | < 6 ug/l | 0.93 ug/l |
| Storm Sewer | 06/12/1991 | N | < 0.13 ug/l | < 0.10 ug/l | < 0.10 ug/l | 0.96 ug/l | < 0.19 ug/l | < 6 ug/l | 0.29 ug/l |
| Storm Sewer | 07/12/1991 | N | 0.32 ug/l | **0.049 ug/l** | **0.029 ug/l** | 0.16 ug/l | 0.18 b ug/l | < 6 ug/l | 0.35 ug/l |
| Storm Sewer | 08/20/1991 | N | 4.5 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.24 ug/l | < 0.32 ug/l | < 6 ug/l | < 0.24 ug/l |
| Storm Sewer | 09/16/1991 | N | < 0.0060 ug/l | < 0.0060 ug/l | **0.013 ug/l** | 0.10 ug/l | < 0.0080 ug/l | < 10 ug/l | 0.036 ug/l |
| Storm Sewer | 10/16/1991 | N | < 0.0030 ug/l | 0.0038 ug/l | **0.017 ug/l** | 0.084 ug/l | < 0.0040 ug/l | < 6 ug/l | 0.028 ug/l |
| Storm Sewer | 11/19/1991 | N | < 0.018 ug/l | < 0.018 ug/l | < 0.018 ug/l | 0.021 ug/l | < 0.024 ug/l | < 6 ug/l | < 0.018 ug/l |
| Storm Sewer | 12/12/1991 | N | < 6 ug/l | < 6 ug/l | **4 j ug/l** | 15 ug/l | < 6 ug/l | < 6 ug/l | **11 ug/l** |
| Storm Sewer | 01/06/1992 | N | < 0.24 ug/l | < 0.24 ug/l | **0.56 ug/l** | 2.4 ug/l | < 0.32 ug/l | < 6 ug/l | 1.4 b ug/l |
| Storm Sewer | 02/04/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | **0.0069 ug/l** | 0.082 ug/l | 0.010 b ug/l | < 6 ug/l | 0.030 ug/l |
| Storm Sewer | 03/30/1992 | N | < 0.0060 ug/l | < 0.0060 ug/l | **0.0064 ug/l** | 0.066 ug/l | < 0.0080 ug/l | < 6 ug/l | 0.017 ug/l |
| Storm Sewer | 04/24/1992 | N | 0.14 ug/l | < 0.018 ug/l | **0.037 ug/l** | 0.18 ug/l | < 0.024 ug/l | < 6 ug/l | 0.078 ug/l |
| Storm Sewer | 05/22/1992 | N | < 0.0030 ug/l | 0.0056 ug/l | **0.0041 ug/l** | 0.059 ug/l | 0.0060 b ug/l | < 6 ug/l | 0.016 ug/l |
| Storm Sewer | 06/08/1992 | N | < 0.0030 ug/l | 0.0037 ug/l | **0.034 ug/l** | 0.10 ug/l | < 0.0040 ug/l | < 6 ug/l | 0.028 ug/l |
| Storm Sewer | 07/14/1992 | N | 0.043 ug/l | < 0.0060 ug/l | < 0.0060 ug/l | 0.023 ug/l | < 0.0080 ug/l | < 6 ug/l | 0.0092 ug/l |
| Storm Sewer | 08/13/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | **0.0080 ug/l** | 0.032 ug/l | 0.0047 b ug/l | < 6 ug/l | 0.011 b ug/l |
| Storm Sewer | 09/03/1992 | N | 0.012 ug/l | 0.0052 ug/l | **0.014 ug/l** | 0.11 ug/l | 0.018 b ug/l | < 6 ug/l | 0.034 ug/l |
| Storm Sewer | 10/13/1992 | N | < 0.0030 ug/l | 0.0040 ug/l | **0.0097 ug/l** | 0.033 ug/l | 0.0047 b ug/l | < 6 ug/l | 0.013 ug/l |
| Storm Sewer | 12/03/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | 0.0033 ug/l | < 0.0040 ug/l | < 6 ug/l | < 0.0030 ug/l |
| Storm Sewer | 12/22/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | **0.0051 ug/l** | 0.036 ug/l | 0.0051 ug/l | < 6 ug/l | 0.015 ug/l |
| Storm Sewer | 01/13/1993 | N | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | 0.0138 ug/l | 0.00580 ug/l | < 6 ug/l | 0.0112 ug/l |
| Storm Sewer | 04/14/1993 | N | < 0.0120 ug/l | 0.0259 ug/l | **0.0472 ug/l** | 0.288 ug/l | 0.0311 b ug/l | < 60 ug/l | 0.154 ug/l |
| Storm Sewer | 05/10/1993 | N | < 0.108 ug/l | **0.115 ug/l** | **0.404 ug/l** | 1.71 ug/l | < 0.144 ug/l | < 6 ug/l | 0.756 ug/l |

# Table A-8
## Historical Surface Water Quality Data
## Comparison to ARARs and TBCs
## Joslyn Manufacturing and Supply Company
## Brooklyn Center, MN

| **Chemical Name** | | | **Acenaphthene** | **Anthracene** | **Benzo(a) pyrene** | **Fluoranthene** | **Naphthalene** | **Pentachlorophenol** | **Phenanthrene** |
|---|---|---|---|---|---|---|---|---|---|
| Joslyn SW ARARs **(Bold)** | | | **12 (2) ug/l** | **0.029 (2) ug/l** | **0.00051 (1) ug/l** | 20 (2) ug/l | 81 (2) ug/l | **5.5 (2,3) ug/l** | **2.1 (2) ug/l** |
| Location | Sample Date | Sample Type | | | | | | | |
| Storm Sewer | 06/09/1993 | N | 0.103 ug/l | 0.0133 ug/l | **0.0246 ug/l** | 0.113 ug/l | < 0.00800 ug/l | < 6 ug/l | 0.0617 ug/l |
| Storm Sewer | 07/19/1993 | N | 0.318 ug/l | 0.0128 ug/l | **0.0139 ug/l** | 0.0659 ug/l | 0.0490 b ug/l | < 6 ug/l | 0.0311 ug/l |
| Storm Sewer | 08/17/1993 | N | 0.123 ug/l | 0.0129 ug/l | **0.0312 ug/l** | 0.108 ug/l | 0.0155 b ug/l | < 6 ug/l | 0.0574 ug/l |
| Storm Sewer | 10/18/1993 | N | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | 0.0403 ug/l | 0.00929 b ug/l | < 6 ug/l | 0.0239 ug/l |
| Storm Sewer | 02/03/1994 | N | < 0.00600 ug/l | < 0.00600 ug/l | **0.00653 ug/l** | 0.0198 ug/l | < 0.00800 ug/l | < 6 ug/l | 0.0148 ug/l |
| Storm Sewer | 06/02/1994 | N | < 0.024 ug/l | < 0.024 ug/l | **0.073 ug/l** | 0.411 ug/l | < 0.024 ug/l | < 3 ug/l | 0.167 ug/l |
| Storm Sewer | 08/02/1994 | N | < 0.006 ug/l | < 0.006 ug/l | **0.022 ug/l** | 0.098 ug/l | < 0.006 ug/l | < 3 ug/l | 0.028 ug/l |
| Storm Sewer | 09/28/1994 | N | 0.43 ug/l | < 0.018 ug/l | < 0.018 ug/l | 0.025 ug/l | < 0.018 ug/l | < 3 ug/l | < 0.018 ug/l |
| Storm Sewer | 10/18/1995 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | 0.008 ug/l | 0.005 b ug/l | < 3 ug/l | 0.006 ug/l |
| Storm Sewer | 10/03/1996 | N | < 0.006 ug/l | < 0.006 ug/l | < 0.006 ug/l | 0.018 b ug/l | 0.012 b ug/l | < 6 ug/l | 0.007 b ug/l |
| Storm Sewer | 10/01/1997 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | 0.010 ug/l | 0.006 b ug/l | < 3 ug/l | 0.008 b ug/l |
| Storm Sewer | 11/19/1998 | N | < 0.009 ug/l | < 0.009 ug/l | < 0.009 ug/l | 0.027 ug/l | < 0.009 ug/l | < 3 ug/l | < 0.009 ug/l |
| Storm Sewer | 11/19/1999 | N | < 0.003 ug/l | 0.003 ug/l | < 0.003 ug/l | 0.009 b ug/l | 0.004 b ug/l | < 3 ug/l | 0.010 b ug/l |
| Storm Sewer | 09/27/2000 | N | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | 0.016 b ug/l | 0.006 b ug/l | < 3 ug/l | 0.009 b ug/l |
| Storm Sewer | 09/27/2000 | FD | < 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | 0.008 b ug/l | 0.005 b ug/l | < 3 ug/l | 0.005 b ug/l |
| Storm Sewer | 10/16/2001 | N | 0.016 ug/l | 0.0041 ug/l | **0.0089 ug/l** | 0.049 b ug/l | 0.0050 b ug/l | < 3 ug/l | 0.02 b ug/l |
| Storm Sewer | 10/31/2002 | N | 0.0087 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | 0.0051 ug/l | 0.0085 b ug/l | < 3.0 ug/l | 0.0060 ug/l |
| Storm Sewer | 06/07/2003 | N | 0.0059 ug/l | 0.012 ug/l | **0.049 ug/l** | 0.26 ug/l | 0.0097 b ug/l | < 3.0 ug/l | 0.064 ug/l |
| Storm Sewer | 12/18/2003 | N | 0.071 ug/l | 0.0035 ug/l | < 0.0034 ug/l | 0.020 ug/l | 0.013 b ug/l | < 3.0 ug/l | 0.010 b ug/l |
| Storm Sewer | 10/19/2004 | N | 0.029 ug/l | 0.013 ug/l | < 0.0034 ug/l | 0.009 ug/l | 0.0041 b ug/l | < 2 ug/l | 0.0038 ug/l |
| Storm Sewer | 11/10/2005 | N | 0.016 ug/l | 0.0049 ug/l | < 0.0034 ug/l | 0.0059 ug/l | 0.0077 b ug/l | < 3.0 ug/l | < 0.0034 ug/l |
| Storm Sewer | 10/19/2006 | N | 0.022 ug/l | 0.012 ug/l | **0.029 ug/l** | 0.090 ug/l | 0.0049 b ug/l | < 3.2 ug/l | 0.035 ug/l |
| Storm Sewer | 11/07/2007 | N | 0.0077 ug/l | 0.0072 ug/l | < 0.0032 ug/l | 0.011 ug/l | 0.0035 ug/l | < 0.94 ug/l | 0.0055 b ug/l |
| Storm Sewer | 10/17/2008 | N | 0.030 ug/l | 0.0052 ug/l | < 0.0037 ug/l | 0.0089 ug/l | 0.0054 b ug/l | < 1.1 ug/l | < 0.0037 ug/l |
| Storm Sewer | 10/05/2009 | N | 0.038 ug/l | 0.0094 ug/l | **0.035 ug/l** | 0.14 ug/l | 0.0070 b ug/l | < 1.0 ug/l | 0.042 ug/l |
| Storm Sewer | 10/07/2010 | N | 0.017 ug/l | 0.0084 ug/l | < 0.0039 ug/l | < 0.0039 ug/l | 0.071 ug/l | < 1.2 ug/l | < 0.0039 ug/l |
| Shingle Creek | 11/09/1990 | N | 0.0059 ug/l | 0.0018 ug/l | **0.030 ug/l** | 0.086 ug/l | 0.010 ug/l | < 6 ug/l | 0.033 ug/l |
| Shingle Creek | 05/14/1991 | N | 0.014 ug/l | 0.0056 ug/l | **0.027 ug/l** | 0.25 ug/l | 0.011 b ug/l | < 6 ug/l | 0.096 ug/l |
| Shingle Creek | 06/12/1991 | N | 0.012 ug/l | 0.011 ug/l | **0.064 ug/l** | 0.46 ug/l | 0.0066 b ug/l | < 6 ug/l | 0.16 ug/l |
| Shingle Creek | 07/12/1991 | N | 0.043 ug/l | 0.0051 ug/l | **0.0038 ug/l** | 0.055 ug/l | 0.0049 b ug/l | < 6 ug/l | 0.0091 ug/l |
| Shingle Creek | 08/20/1991 | N | < 0.048 ug/l | < 0.048 ug/l | < 0.048 ug/l | 1.2 ug/l | < 0.064 ug/l | < 6 ug/l | 0.22 ug/l |
| Shingle Creek | 09/16/1991 | N | 0.043 ug/l | < 0.018 ug/l | **0.12 ug/l** | 0.51 ug/l | < 0.024 ug/l | < 10 ug/l | 0.21 ug/l |
| Shingle Creek | 10/16/1991 | N | < 0.0030 ug/l | < 0.0030 ug/l | **0.0099 ug/l** | 0.042 ug/l | 0.0064 b ug/l | < 6 ug/l | 0.0042 ug/l |
| Shingle Creek | 11/19/1991 | N | 0.0086 ug/l | < 0.0030 ug/l | **0.026 ug/l** | 0.16 ug/l | 0.013 b ug/l | < 6 ug/l | 0.044 ug/l |
| Shingle Creek | 12/12/1991 | N | 0.065 ug/l | **0.035 ug/l** | **0.20 ug/l** | 1.3 ug/l | 0.087 ug/l | < 6 ug/l | 0.92 ug/l |
| Shingle Creek | 01/06/1992 | N | < 0.030 ug/l | < 0.030 ug/l | **0.14 ug/l** | 0.85 ug/l | < 0.040 ug/l | < 6 ug/l | 0.45 ug/l |
| Shingle Creek | 02/04/1992 | N | 0.013 ug/l | < 0.012 ug/l | **0.014 ug/l** | 0.18 ug/l | 0.044 b ug/l | < 6 ug/l | 0.14 ug/l |
| Shingle Creek | 03/30/1992 | N | 0.092 ug/l | **0.036 ug/l** | < 0.018 ug/l | 0.27 ug/l | 0.055 b ug/l | < 6 ug/l | 0.30 ug/l |
| Shingle Creek | 04/24/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | **0.0036 ug/l** | 0.031 ug/l | 0.0052 b ug/l | < 6 ug/l | 0.011 ug/l |
| Shingle Creek | 05/22/1992 | N | < 0.012 ug/l | 0.017 ug/l | **0.044 ug/l** | 0.27 ug/l | < 0.016 ug/l | < 6 ug/l | 0.12 ug/l |
| Shingle Creek | 06/08/1992 | N | 0.11 ug/l | < 0.0060 ug/l | **0.014 ug/l** | 0.26 ug/l | 0.40 ug/l | < 6 ug/l | 0.29 ug/l |
| Shingle Creek | 07/14/1992 | N | < 0.0060 ug/l | < 0.0060 ug/l | **0.024 ug/l** | 0.084 ug/l | 0.0089 b ug/l | < 6 ug/l | 0.044 ug/l |
| Shingle Creek | 08/13/1992 | N | 0.0084 ug/l | 0.0046 ug/l | **0.0056 ug/l** | 0.066 ug/l | 0.018 b ug/l | < 6 ug/l | 0.029 b ug/l |
| Shingle Creek | 09/03/1992 | N | < 0.0060 ug/l | < 0.0060 ug/l | < 0.0060 ug/l | 0.012 ug/l | < 0.0080 ug/l | < 6 ug/l | < 0.0060 ug/l |
| Shingle Creek | 10/13/1992 | N | 0.0030 ug/l | < 0.0030 ug/l | **0.0052 ug/l** | 0.033 ug/l | 0.0082 b ug/l | < 6 ug/l | 0.015 ug/l |
| Shingle Creek | 12/03/1992 | N | < 0.0030 ug/l | < 0.0030 ug/l | < 0.0030 ug/l | 0.011 ug/l | 0.0079 ug/l | < 6 ug/l | 0.0045 ug/l |
| Shingle Creek | 12/22/1992 | N | < 0.015 ug/l | **0.032 ug/l** | **0.43 ug/l** | 0.75 ug/l | < 0.020 ug/l | < 6 ug/l | 0.30 ug/l |
| Shingle Creek | 01/13/1993 | N | 0.00396 ug/l | < 0.00300 ug/l | < 0.00300 ug/l | 0.00970 ug/l | 0.00723 ug/l | < 30 ug/l | 0.00548 ug/l |
| Shingle Creek | 04/14/1993 | N | 0.0606 ug/l | **0.0911 ug/l** | **0.253 ug/l** | 1.080 ug/l | 0.185 b ug/l | < 60 ug/l | 0.612 ug/l |
| Shingle Creek | 05/10/1993 | N | 0.125 ug/l | **0.0380 j ug/l** | **0.213 ug/l** | 0.392 ug/l | < 0.0800 ug/l | < 6 ug/l | 0.174 ug/l |
| Shingle Creek | 06/09/1993 | N | < 0.00600 ug/l | 0.00806 ug/l | **0.0502 ug/l** | 0.185 ug/l | < 0.00800 ug/l | < 6 ug/l | 0.0794 ug/l |
| Shingle Creek | 07/19/1993 | N | 0.00411 ug/l | < 0.00300 ug/l | **0.00635 ug/l** | 0.0436 ug/l | 0.0287 b ug/l | < 6 ug/l | 0.0219 ug/l |
| Shingle Creek | 08/17/1993 | N | 0.0127 ug/l | < 0.0120 ug/l | **0.115 ug/l** | 0.329 ug/l | 0.0186 b ug/l | < 6 ug/l | 0.123 ug/l |
| Shingle Creek | 10/18/1993 | N | < 0.0120 ug/l | < 0.0120 ug/l | < 0.0120 ug/l | 0.0346 ug/l | 0.0247 b ug/l | < 6 ug/l | 0.0212 ug/l |
| Shingle Creek | 02/03/1994 | N | < 0.00600 ug/l | < 0.00600 ug/l | < 0.00600 ug/l | 0.0200 ug/l | 0.0176 b ug/l | < 6 ug/l | 0.0110 ug/l |
| Shingle Creek | 05/31/1994 | N | < 0.024 ug/l | 0.024 ug/l | **0.025 ug/l** | 0.18 ug/l | < 0.024 ug/l | < 3 ug/l | 0.099 ug/l |
| Shingle Creek | 08/02/1994 | N | 0.014 ug/l | 0.019 ug/l | **0.181 ug/l** | 0.59 ug/l | 0.029 ug/l | < 3 ug/l | 0.185 ug/l |
| Shingle Creek | 09/28/1994 | N | 0.019 ug/l | < 0.018 ug/l | **0.047 ug/l** | 0.16 ug/l | < 0.018 ug/l | < 3 ug/l | 0.071 ug/l |
| Shingle Creek | 10/18/1995 | N | < 0.012 ug/l | < 0.012 ug/l | < 0.012 ug/l | 0.069 ug/l | 0.011 b ug/l | < 3 ug/l | 0.028 ug/l |
| Shingle Creek | 10/03/1996 | N | 0.014 ug/l | 0.006 ug/l | **< 0.003 ug/l** | 0.048 ug/l | 0.032 ug/l | < 6 ug/l | 0.019 ug/l |
| Shingle Creek | 10/01/1997 | N | 0.022 ug/l | 0.007 ug/l | **0.010 ug/l** | 0.088 ug/l | < 0.003 ug/l | < 3 ug/l | 0.052 ug/l |
| Shingle Creek | 11/19/1998 | N | 0.003 ug/l | < 0.003 ug/l | < 0.003 ug/l | 0.050 ug/l | 0.068 ug/l | < 3 ug/l | 0.021 ug/l |

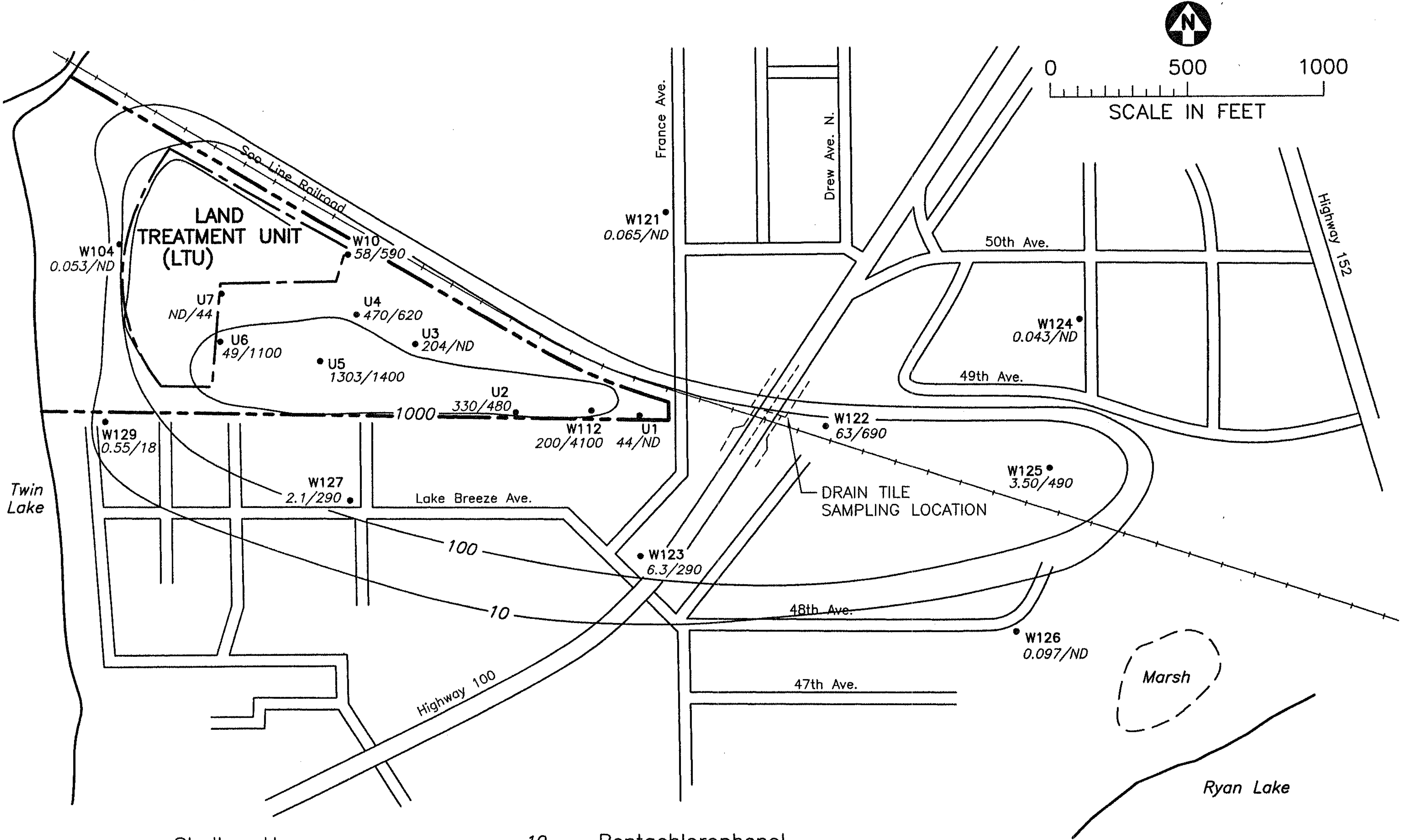
# Table A-8
# Historical Surface Water Quality Data
# Comparison to ARARs and TBCs
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | | **Chemical Name** | **Acenaphthene** | **Anthracene** | **Benzo(a) pyrene** | **Fluoranthene** | **Naphthalene** | **Pentachlorophenol** | **Phenanthrene** |
|---|---|---|---|---|---|---|---|---|---|
| Joslyn SW ARARs **(Bold)** | | | **12 (2) ug/l** | **0.029 (2) ug/l** | **0.00051 (1) ug/l** | 20 (2) ug/l | 81 (2) ug/l | **5.5 (2,3) ug/l** | **2.1 (2) ug/l** |
| Location | Sample Date | Sample Type | | | | | | | |
| Shingle Creek | 11/19/1999 | N | 0.004 ug/l | 0.004 ug/l | **0.020 b ug/l** | 0.059 b ug/l | 0.013 b ug/l | < 3 ug/l | 0.022 b ug/l |
| Shingle Creek | 09/27/2000 | N | 0.009 ug/l | 0.003 ug/l | **0.003 ug/l** | 0.040 b ug/l | 0.015 b ug/l | < 3 ug/l | 0.018 ug/l |
| Shingle Creek | 10/16/2001 | N | 0.0099 ug/l | 0.0066 ug/l | **0.014 ug/l** | 0.074 ug/l | 0.013 b ug/l | < 3 ug/l | 0.027 b ug/l |
| Shingle Creek | 08/30/2002 | N | 0.0053 ug/l | 0.0061 ug/l | **0.033 ug/l** | 0.15 ug/l | 0.0048 ug/l | < 3.0 ug/l | 0.044 ug/l |
| Shingle Creek | 10/31/2002 | N | 0.0039 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | 0.018 ug/l | 0.0088 b ug/l | < 3.0 ug/l | 0.0097 ug/l |
| Shingle Creek | 06/07/2003 | N | 0.0050 ug/l | 0.0065 ug/l | < 0.0034 ug/l | 0.056 ug/l | 0.0067 b ug/l | < 3.0 ug/l | 0.022 ug/l |
| Shingle Creek | 12/18/2003 | N | 0.0050 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | 0.013 ug/l | 0.013 b ug/l | < 3.0 ug/l | 0.0078 b ug/l |
| Shingle Creek | 12/18/2003 | FD | 0.0056 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | 0.015 ug/l | 0.014 b ug/l | < 3.0 ug/l | 0.0097 b ug/l |
| Shingle Creek | 10/19/2004 | N | 0.0066 ug/l | 0.0063 ug/l | **0.0042 ug/l** | 0.029 ug/l | 0.011 b ug/l | < 2 ug/l | 0.016 ug/l |
| Shingle Creek | 11/10/2005 | N | 0.0049 ug/l | < 0.0034 ug/l | < 0.0034 ug/l | 0.037 ug/l | 0.014 b ug/l | < 3.0 ug/l | 0.019 ug/l |
| Shingle Creek | 10/19/2006 | N | 0.0036 ug/l | 0.011 ug/l | **0.043 ug/l** | 0.15 ug/l | 0.0082 b ug/l | < 3.1 ug/l | 0.076 ug/l |
| Shingle Creek | 11/07/2007 | N | 0.0042 ug/l | < 0.0036 ug/l | **0.021 ug/l** | 0.077 ug/l | 0.010 ug/l | < 1.1 ug/l | 0.029 b ug/l |
| Shingle Creek | 10/17/2008 | N | 0.0050 ug/l | 0.0069 ug/l | **0.0087 ug/l** | 0.057 ug/l | 0.011 b ug/l | < 1.1 ug/l | 0.026 ug/l |
| Shingle Creek | 10/05/2009 | N | < 0.0036 ug/l | < 0.0036 ug/l | < 0.0036 ug/l | 0.039 ug/l | 0.011 b ug/l | < 1.1 ug/l | 0.012 b ug/l |
| Shingle Creek | 10/07/2010 | N | 0.0057 ug/l | < 0.0041 ug/l | < 0.0041 ug/l | 0.039 ug/l | 0.034 ug/l | < 1.2 ug/l | 0.016 ug/l |

These locations have not sampled since 2010.
See Table 3-18 for data qualifiers and footnotes.

# Appendix A

## Figures



• Shallow Upper Aquifer Well

0.55/18

Total PAH/Heterocycles (ug/L)

Pentachlorophenol (ug/L)

—10— Pentachlorophenol Concentration Contour

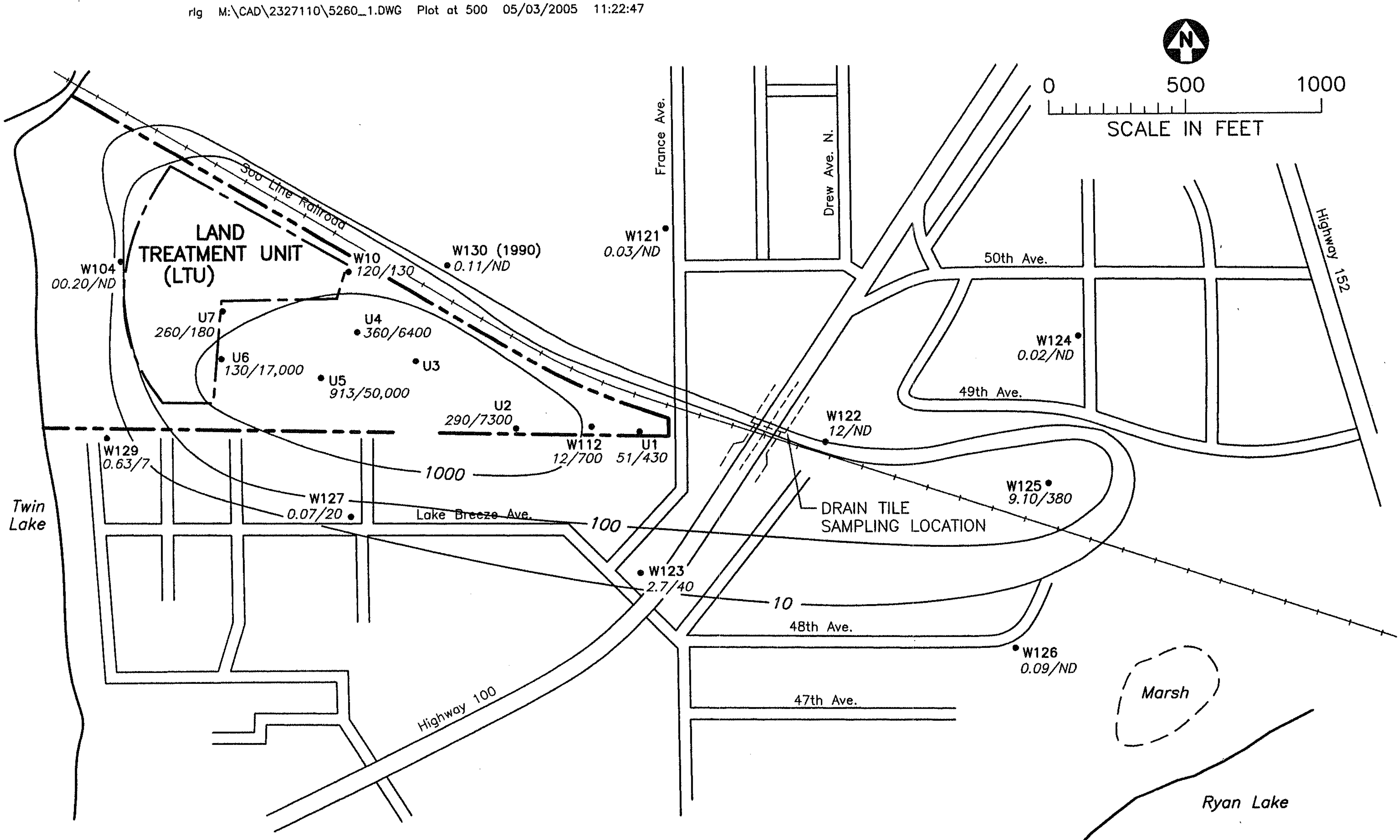
*ND* Not Detected

Note: Originally Figure 8, 1990 Monitoring Report (Barr, 1991)

Figure A-1

1988 MAXIMUM PAH/HETEROCYCLE AND PENTACHLOROPHENOL CONCENTRATION Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\5260_1.DWG Plot at 500 05/03/2005 11:22:47



• Shallow Upper Aquifer Well

Total PAH/Heterocycles (ug/L)

0.63/7

Pentachlorophenol (ug/L)

—10— Pentachlorophenol Concentration Contour

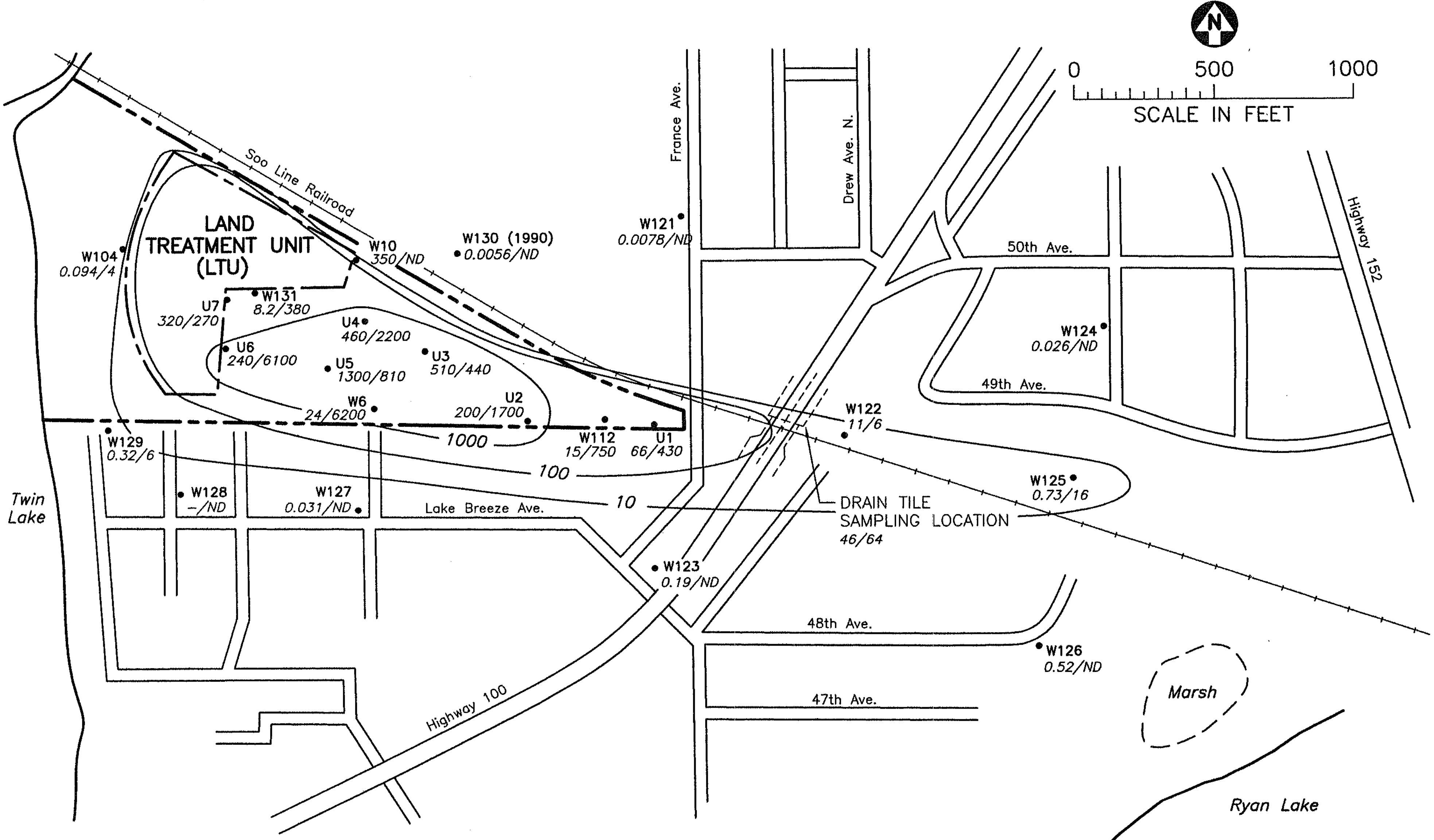
ND Not Detected

Note: Originally Figure 7, 1990 Monitoring Report (Barr, 1991)

Figure A–2

1989 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\5259_1.DWG Plot at 500 05/03/2005 11:23:25



• Shallow Upper Aquifer Well

—10— Pentachlorophenol Concentration Contour

0.32/6
Total PAH/Heterocycles (ug/L)
Pentachlorophenol (ug/L)

*ND* Not Detected

Note: Originally Figure 6, 1990 Monitoring Report (Barr, 1991)

Figure A–3

1990 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\5258_1.DWG Plot at 500 05/03/2005 11:23:56

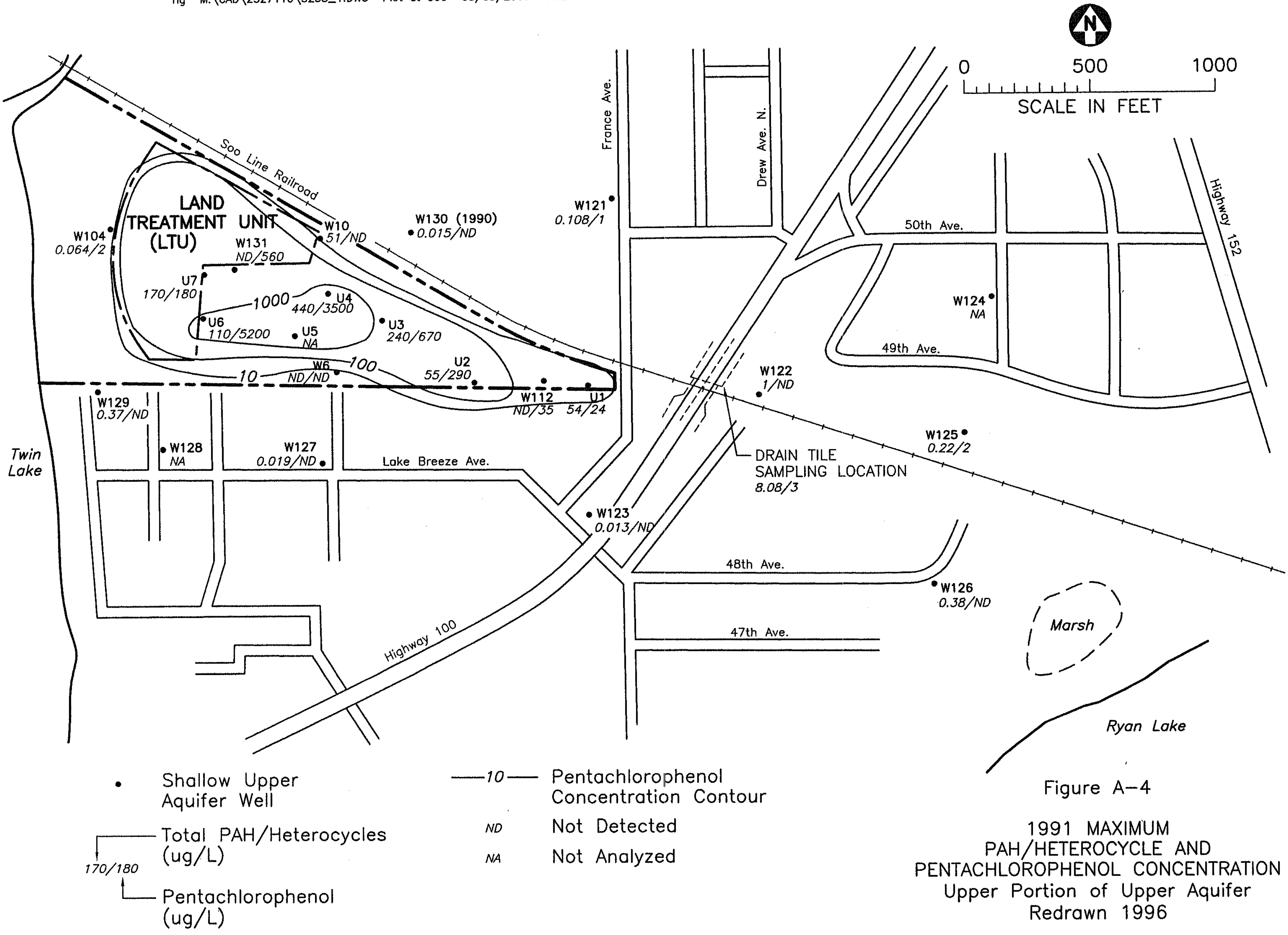
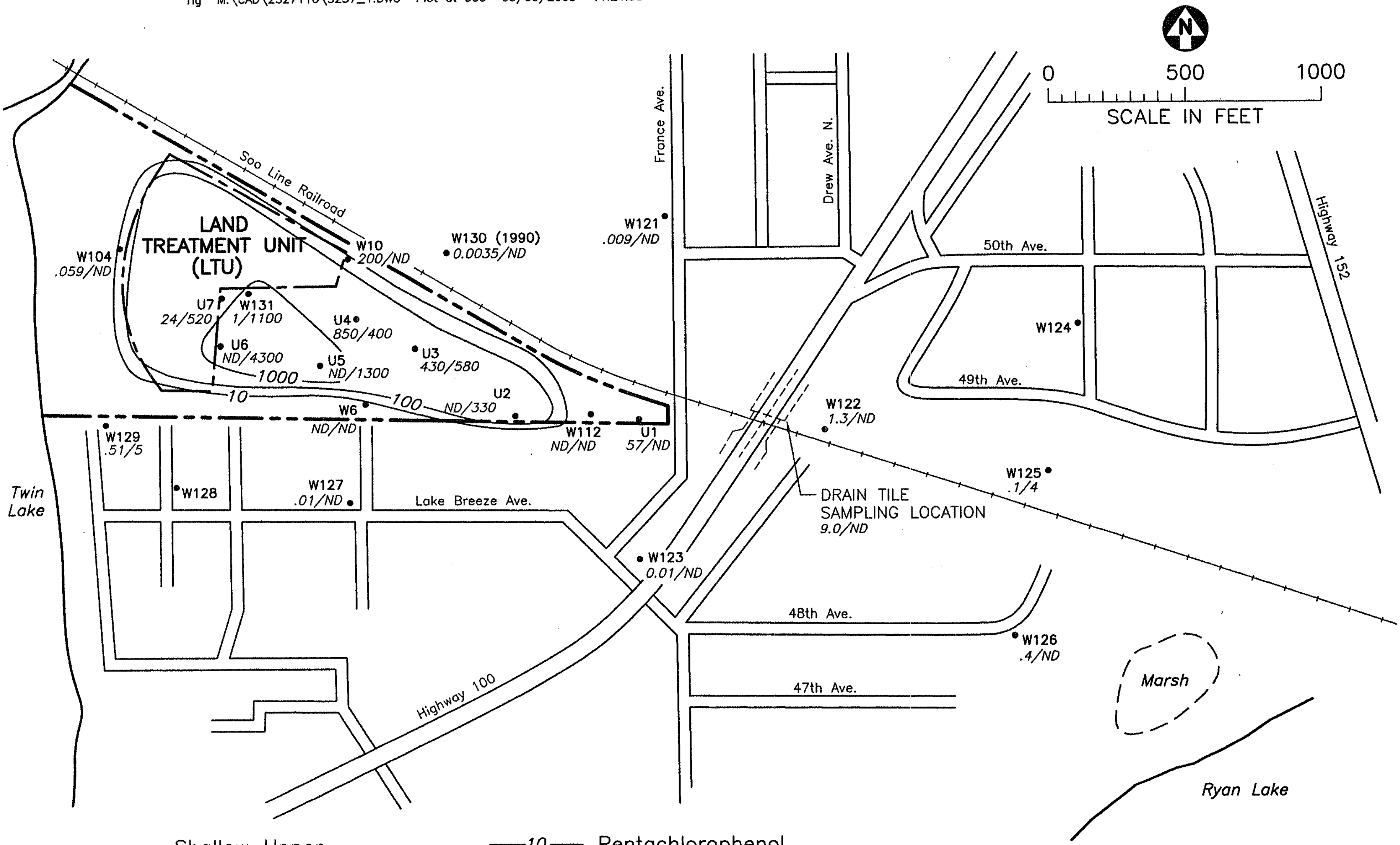


Figure A–4

1991 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer
Redrawn 1996

rlg M:\CAD\2327110\5257_1.DWG Plot at 500 05/03/2005 11:24:38



● Shallow Upper Aquifer Well

24/520
Total PAH/Heterocycles (ug/L)
Pentachlorophenol (ug/L)

—10— Pentachlorophenol Concentration Contour

ND Not Detected

NA Not Analyzed

Figure A–5

1992 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer
Redrawn 1996

rlg M:\CAD\2327110\5256_1.DWG Plot at 500 05/03/2005 11:25:10

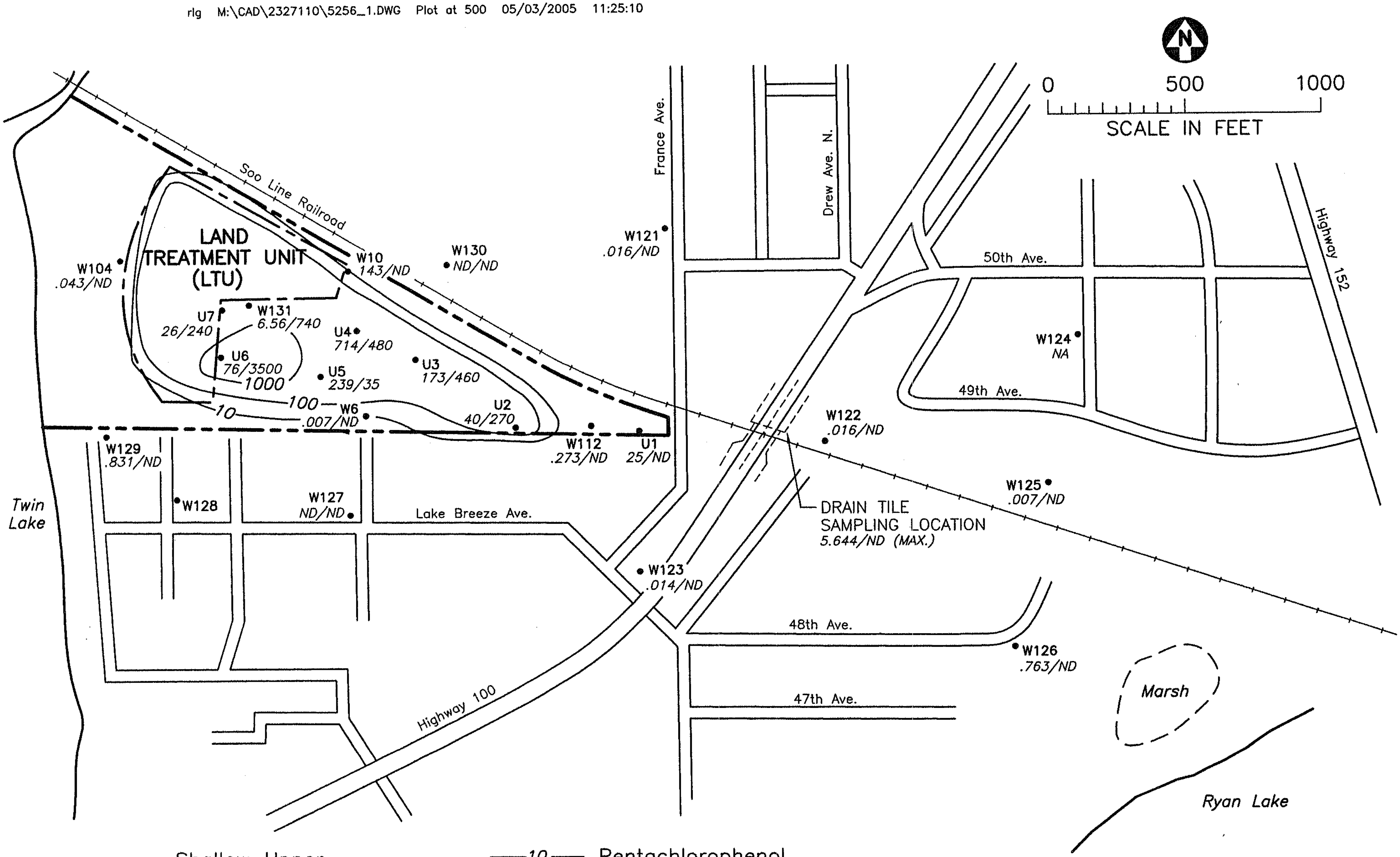
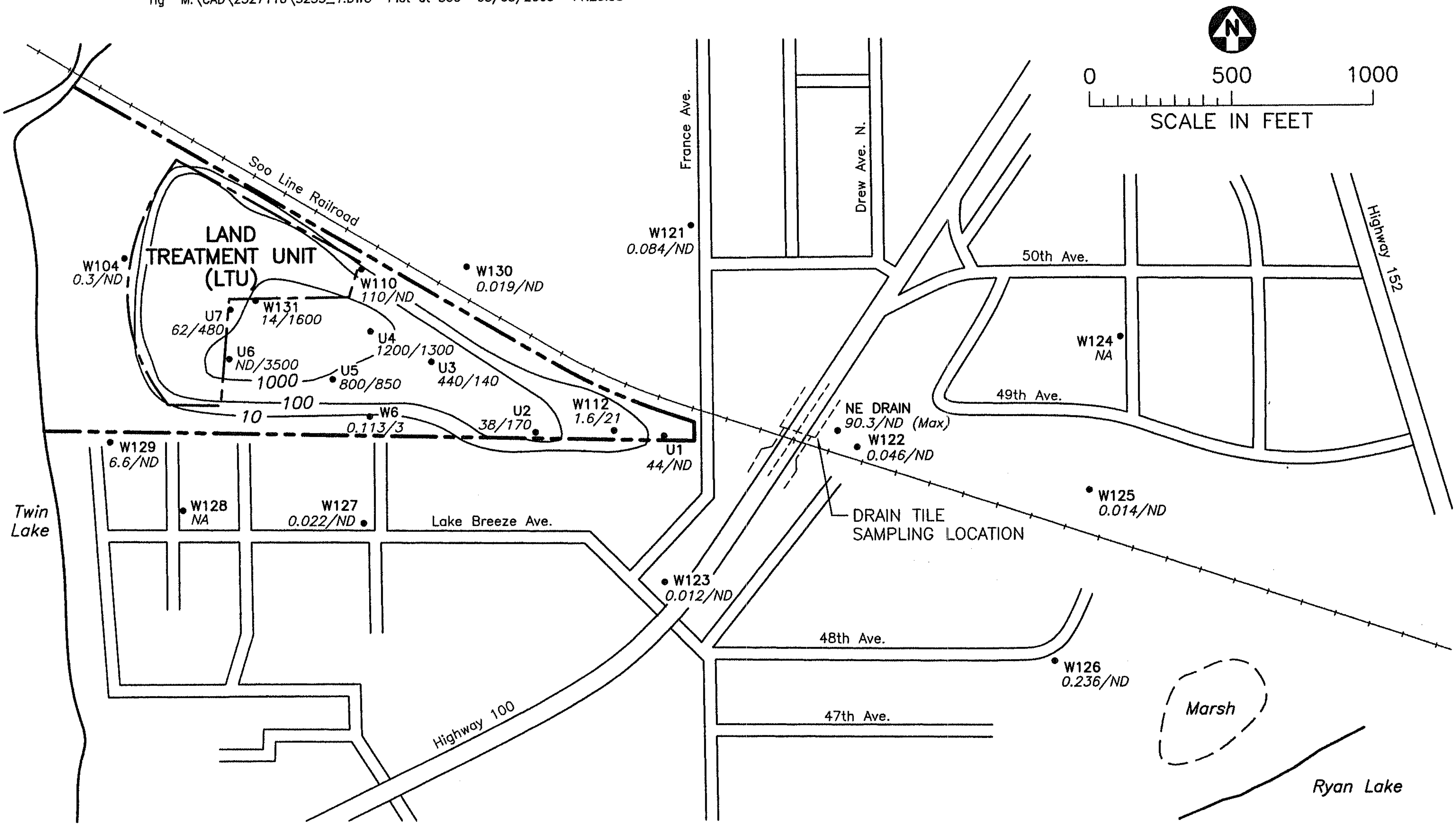


Figure A–6

1993 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer
Redrawn 1996

rlg M:\CAD\2327110\5255_1.DWG Plot at 500 05/03/2005 11:25:58



- Shallow Upper Aquifer Well

0.019/ND

Total PAH/Heterocycles (ug/L)

Pentachlorophenol (ug/L)

—10— Pentachlorophenol Concentration Contour

*ND* Not Detected

*NA* Not Analyzed

Figure A-7

1994 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer
Redrawn 1996

rlg M:\CAD\2327110\5254_1.DWG Plot at 500 05/03/2005 11:28:37

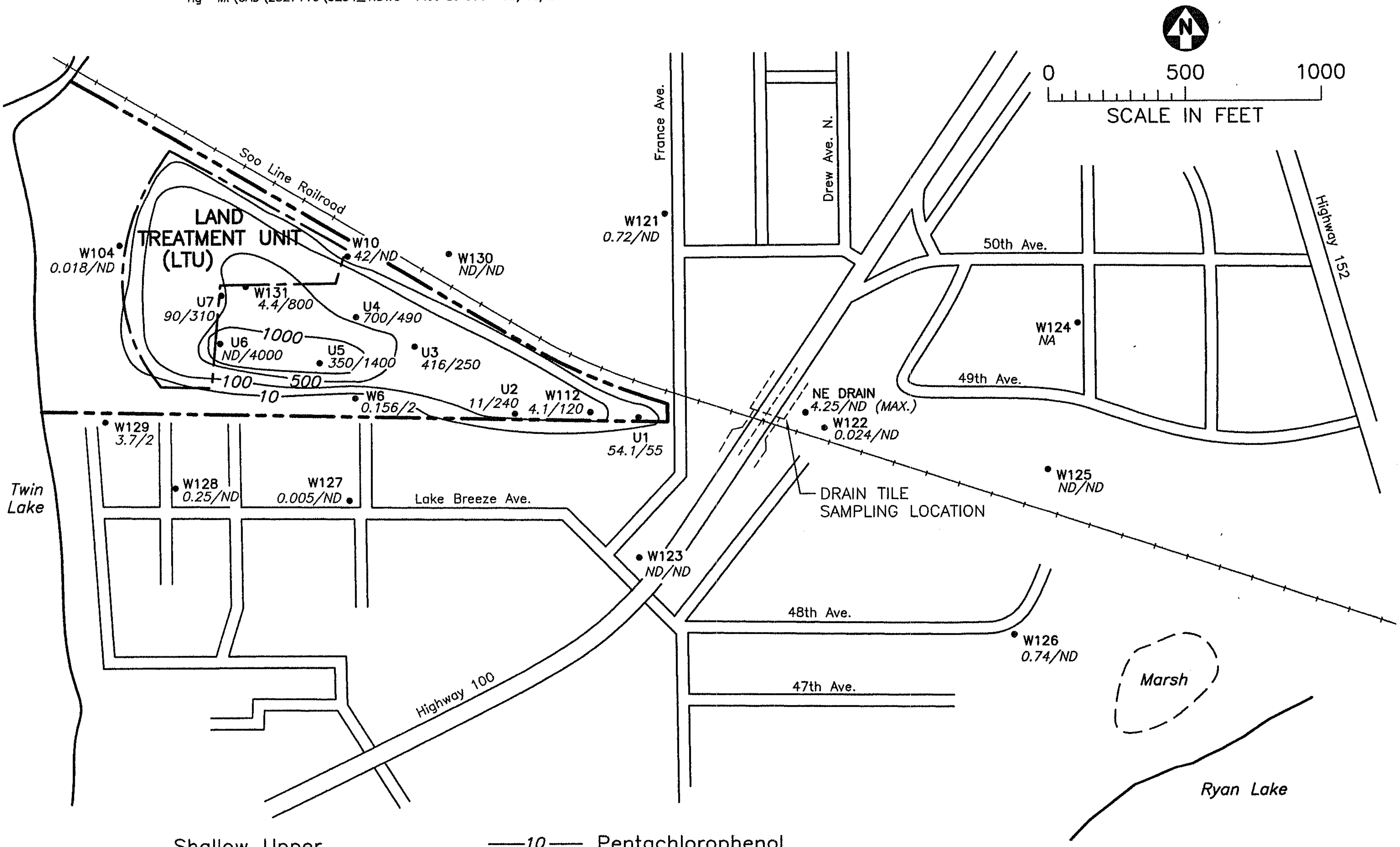


Figure A–8

1995 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\5253_1.DWG Plot at 500 05/03/2005 11:29:24

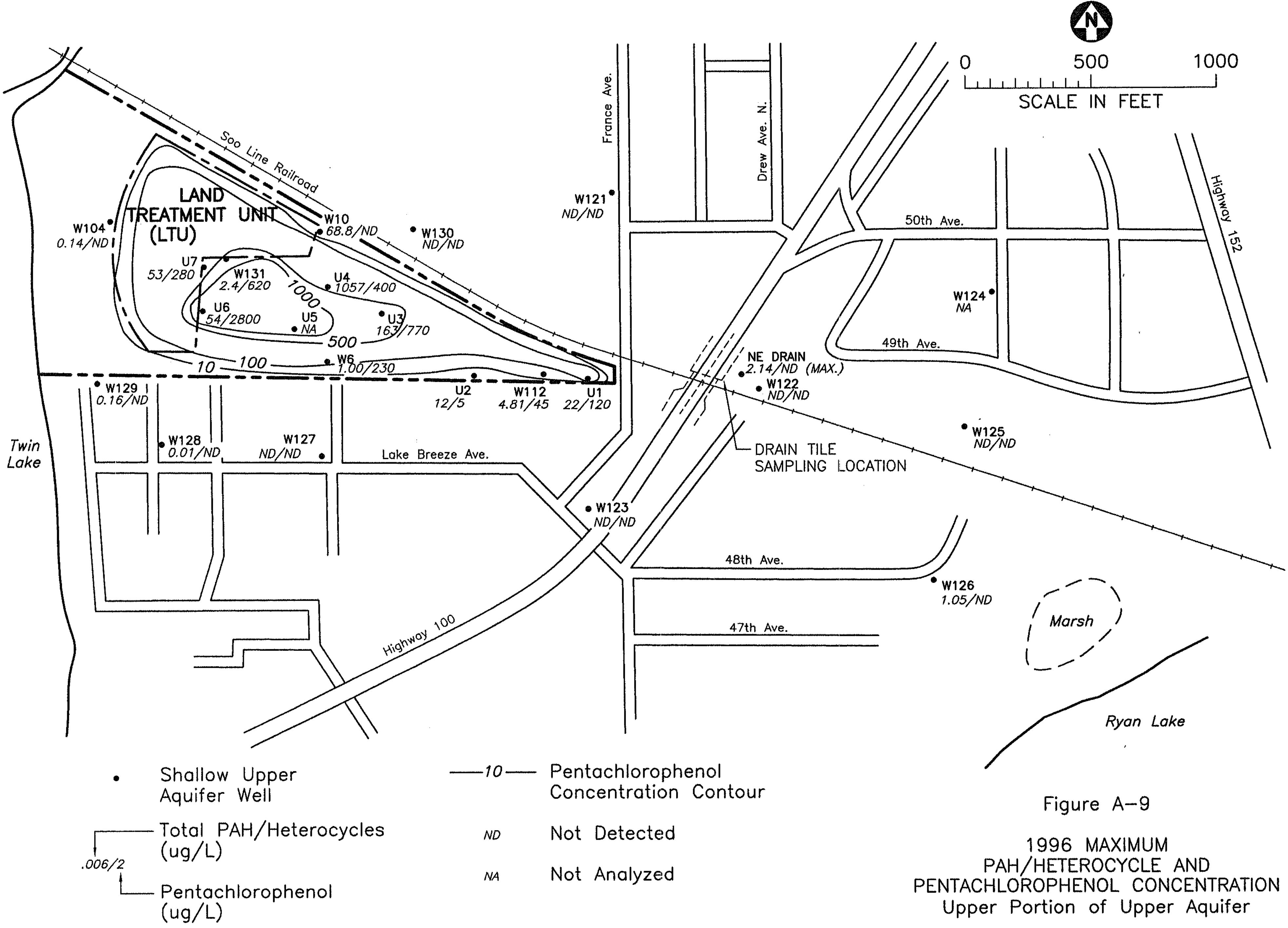


Figure A-9

1996 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\7795_2.DWG Plot at 500 05/03/2005 11:30:08

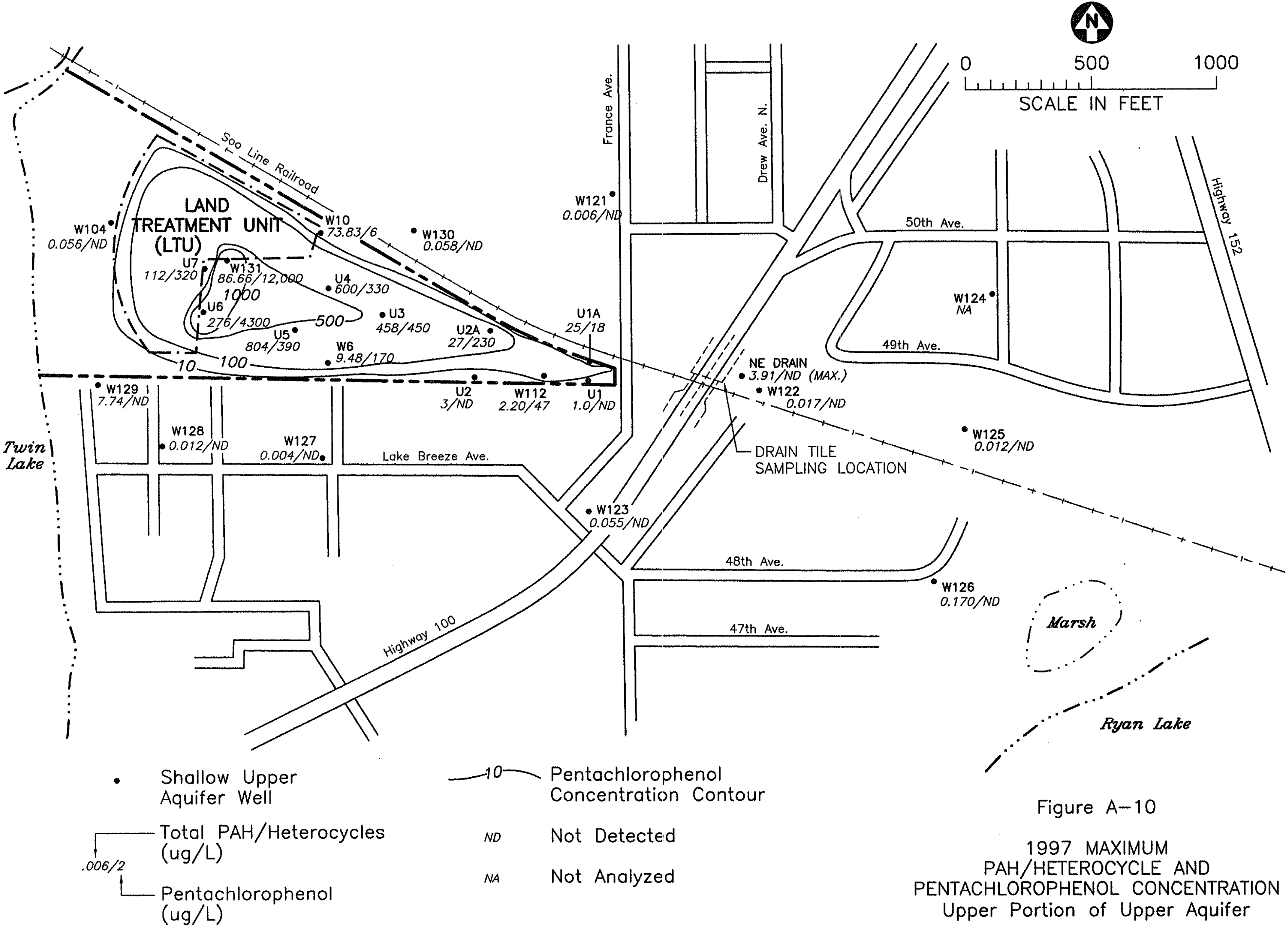
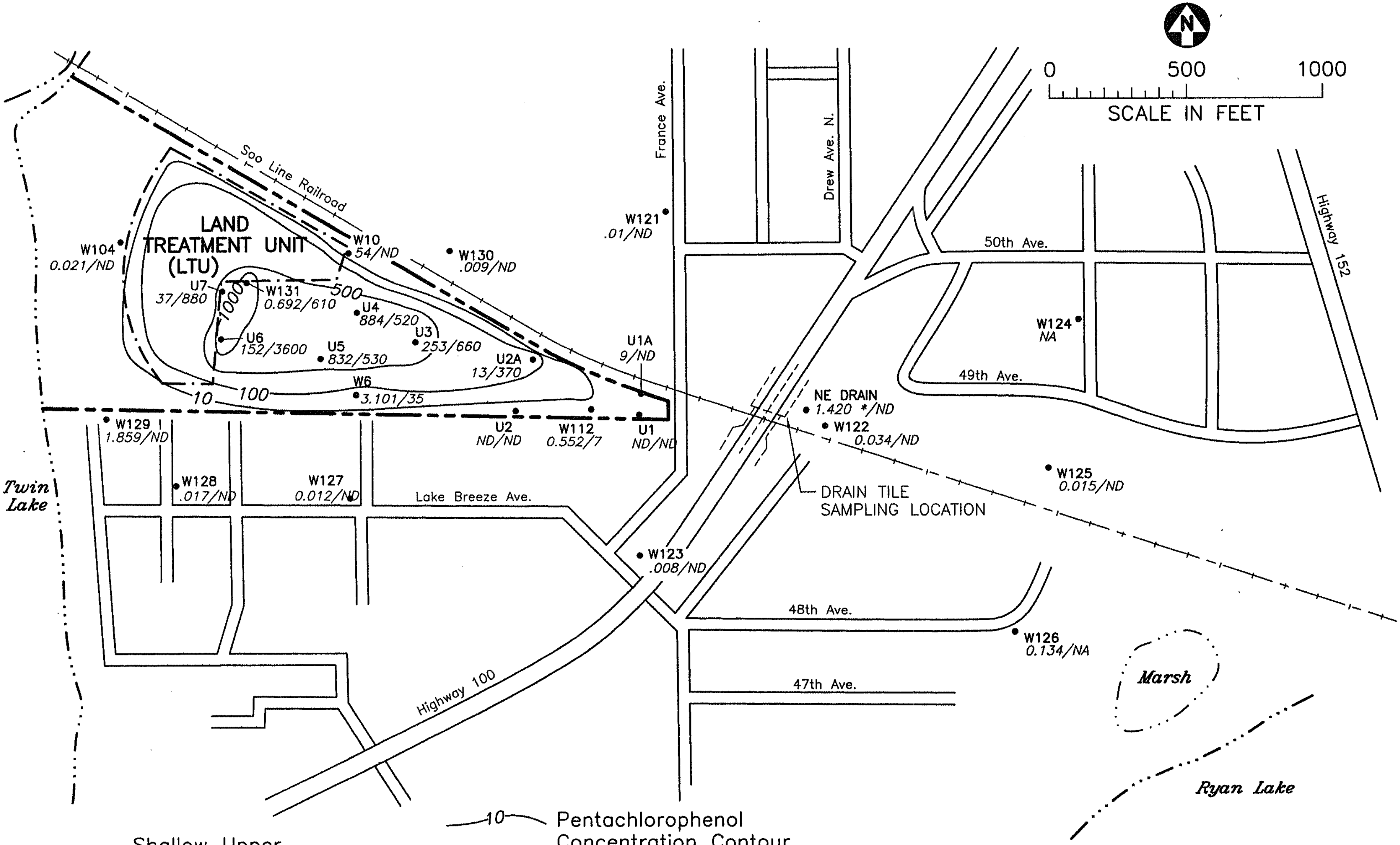


Figure A-10

1997 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\10110_4.DWG Plot at 500 05/03/2005 11:30:53



● Shallow Upper Aquifer Well

.006/2 — Total PAH/Heterocycles (ug/L) / Pentachlorophenol (ug/L)

—10— Pentachlorophenol Concentration Contour

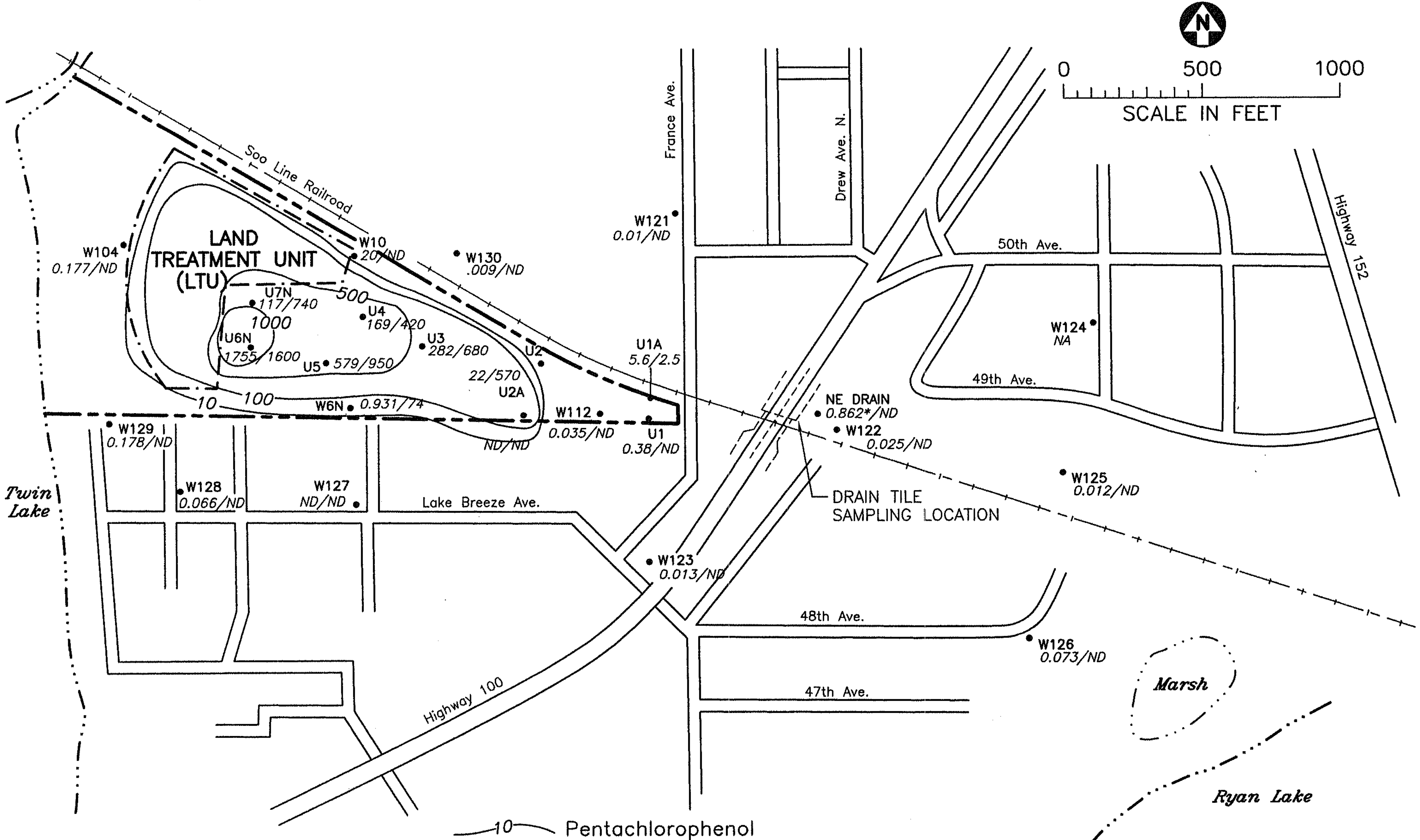
*ND* Not Detected

*NA* Not Analyzed

* Greatest concentration occured on April 1, 1998

Figure A–11

1998 MAXIMUM PAH/HETEROCYCLE AND PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer



● Shallow Upper Aquifer Well

.006/2 — Total PAH/Heterocycles (ug/L) / Pentachlorophenol (ug/L)

—10— Pentachlorophenol Concentration Contour

*ND* Not Detected

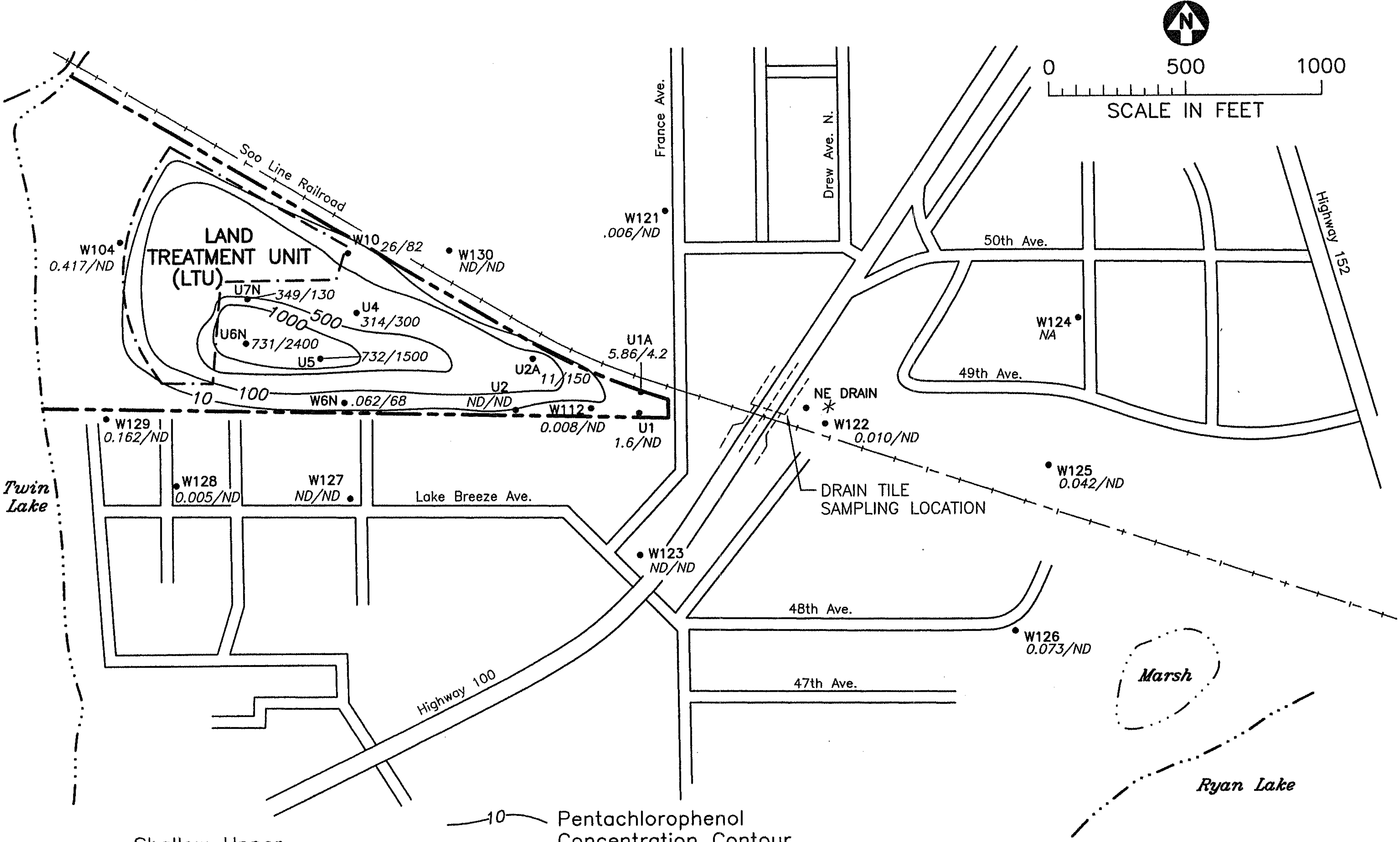
*NA* Not Analyzed

* No Observable Flow for Collection was Present in 2000.

Figure A–12

1999 MAXIMUM
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\21497_1.DWG Plot at 500 05/03/2005 11:37:31



● Shallow Upper Aquifer Well

.006/2
Total PAH/Heterocycles (ug/L)
Pentachlorophenol (ug/L)

—10— Pentachlorophenol Concentration Contour

ND Not Detected

NA Not Analyzed

* No Observable Flow for Collection was Present in 2000.

Figure A–13

2000
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\21498_1.DWG Plot at 500 05/03/2005 11:47:27

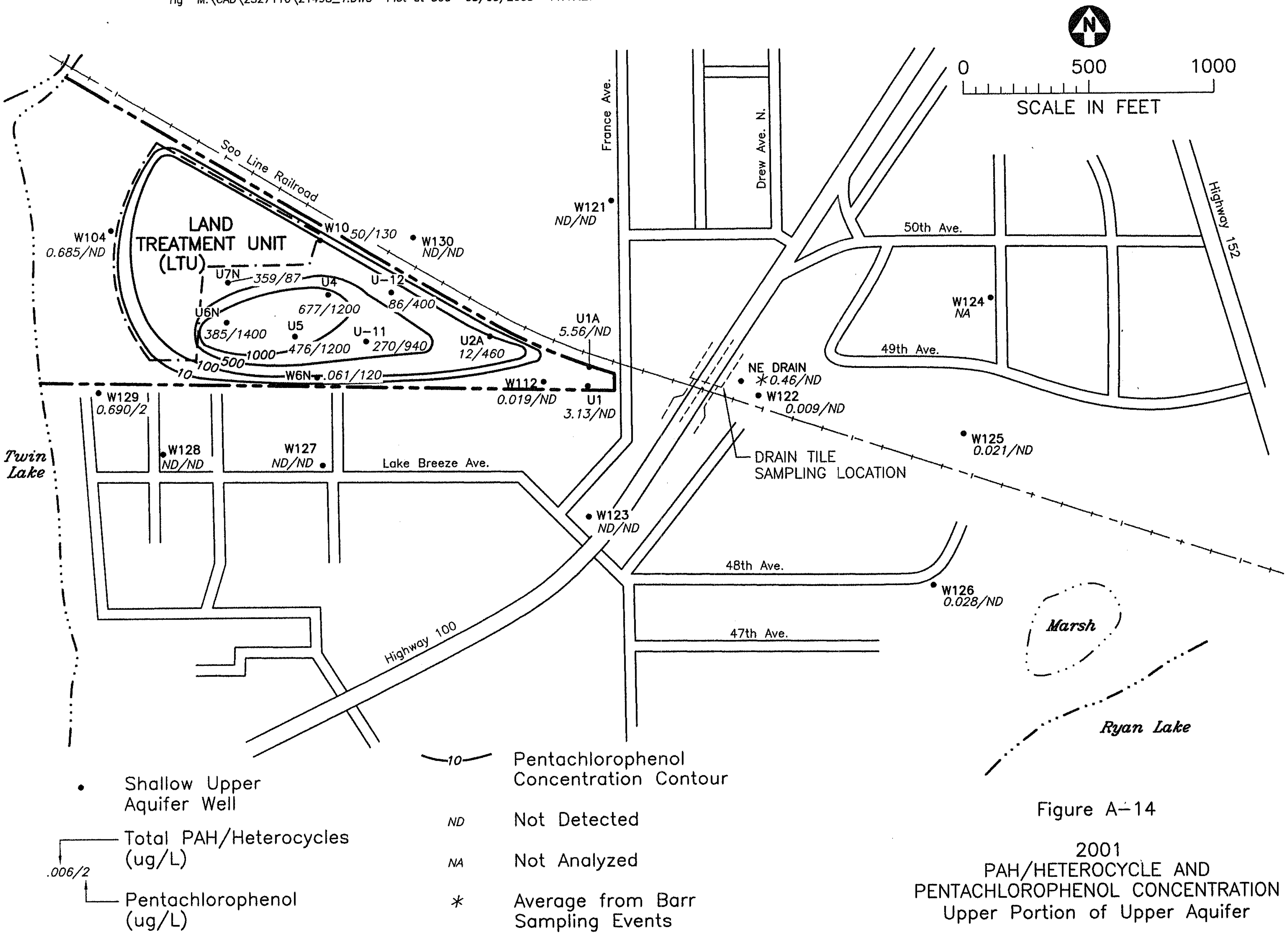
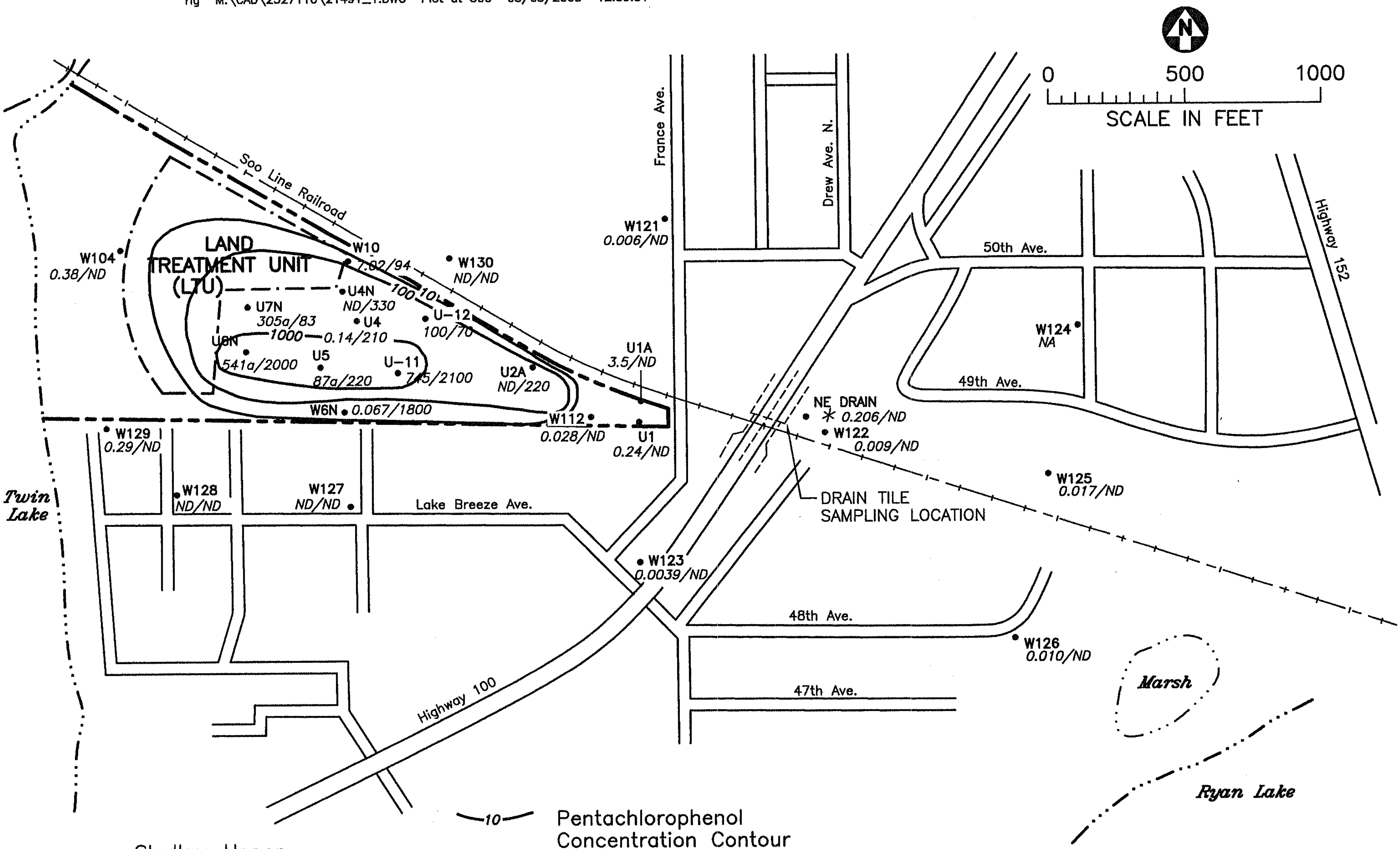


Figure A-14

2001
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATION
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\21491_1.DWG Plot at 500 05/03/2005 12:39:31



- Shallow Upper Aquifer Well

.006/2
Total PAH/Heterocycles (ug/L)
Pentachlorophenol (ug/L)

10 Pentachlorophenol Concentration Contour

ND Not Detected

NA Not Analyzed

* Average from Barr Sampling Events

Figure A-15

2002
PAH/HETEROCYCLE AND
PENTACHLOROPHENOL CONCENTRATIONS
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\19552_1.DWG Plot at 300 05/02/2005 13:44:55

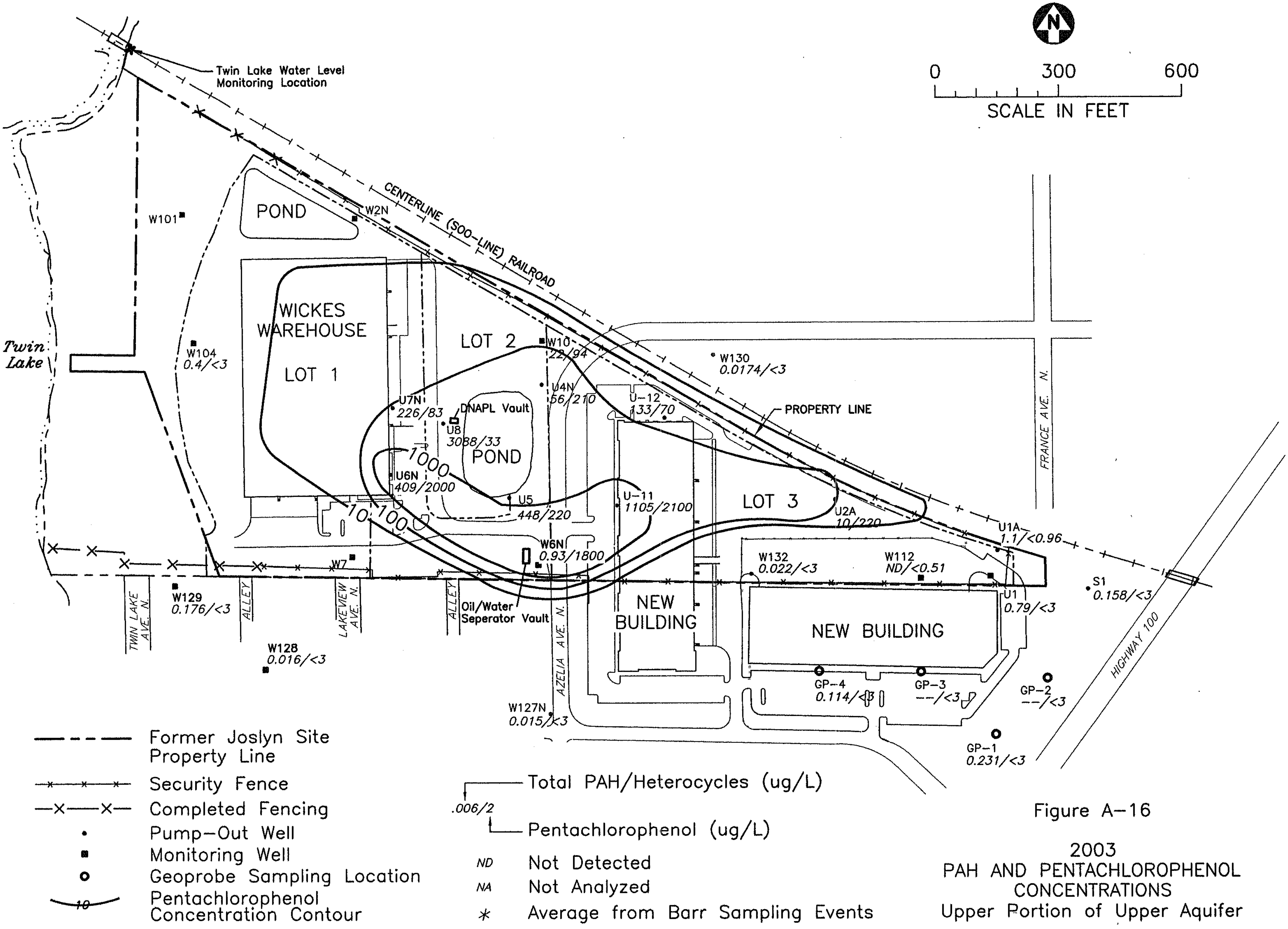
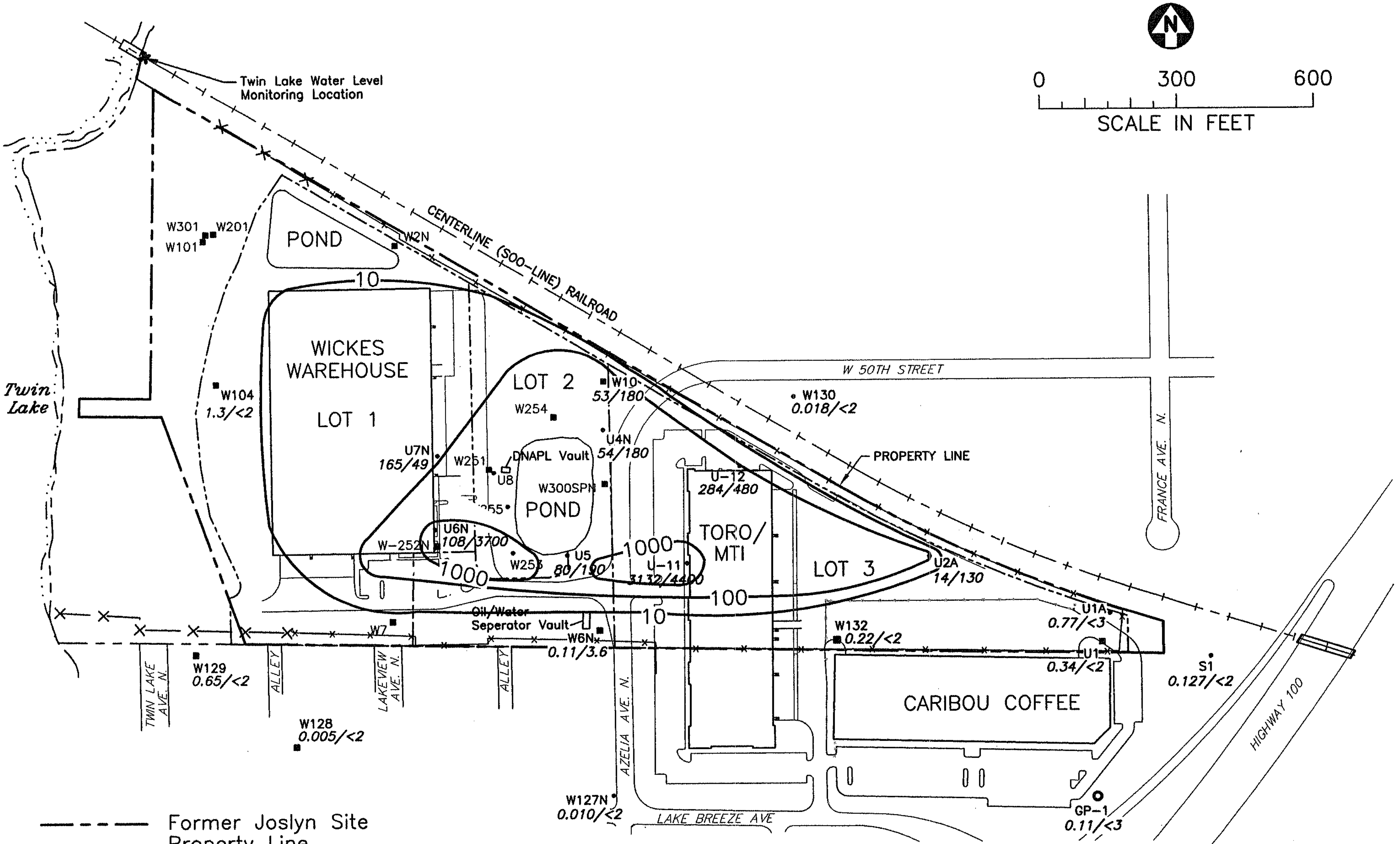


Figure A-16

2003
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer

rlg M:\CAD\2327110\21495_1.DWG Plot at 300 05/03/2005 11:06:10



Former Joslyn Site Property Line

Security Fence

Completed Fencing

• Pump-Out Well

■ Monitoring Well

○ Geoprobe Sampling Location

Pentachlorophenol Concentration Contour

.006/2 Total PAH/Heterocycles (ug/L) / Pentachlorophenol (ug/L)

ND Not Detected

NA Not Analyzed

* Average from Barr Sampling Events

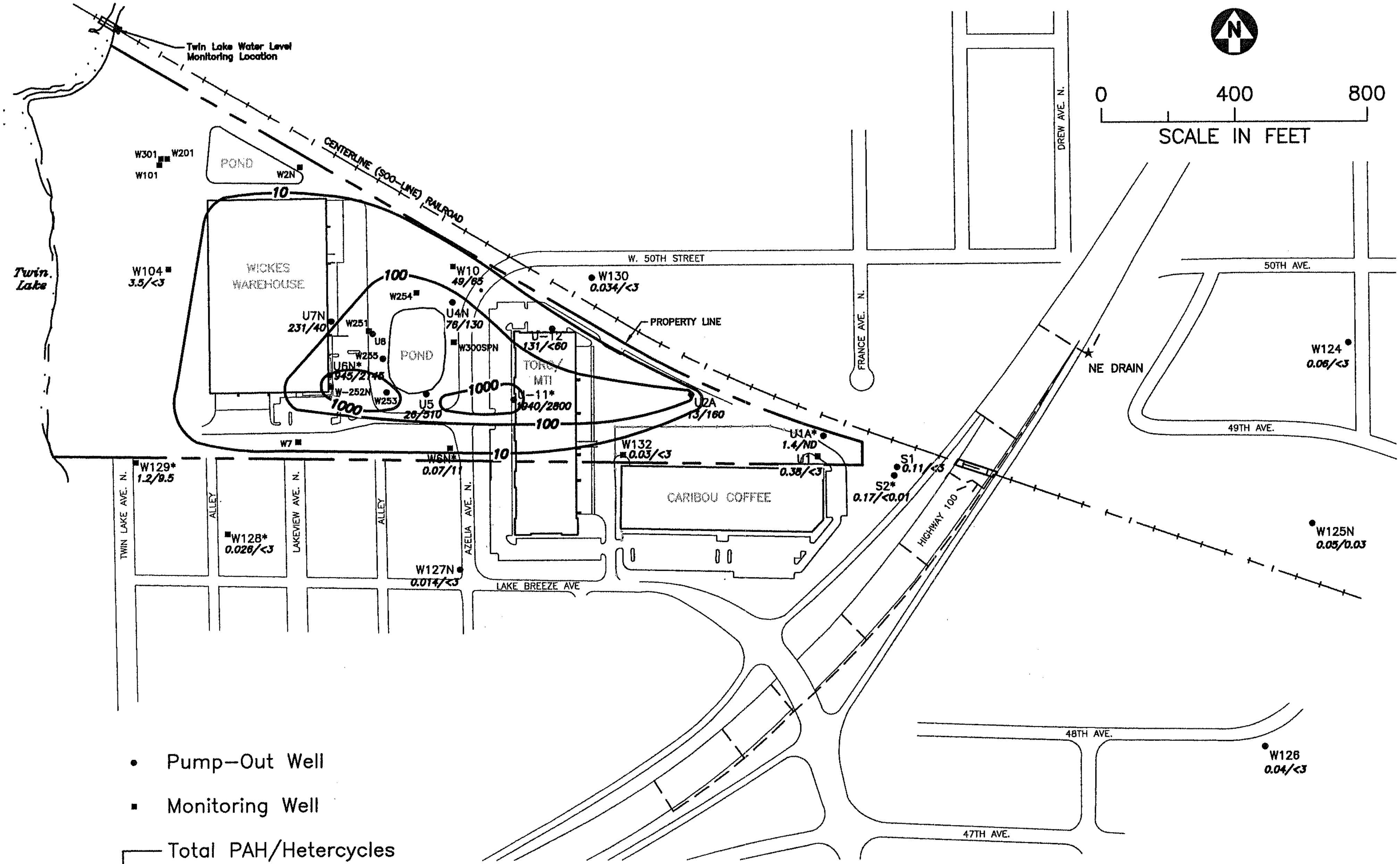
Figure A-17

2004

PAH AND PENTACHLOROPHENOL CONCENTRATIONS

Upper Portion of Upper Aquifer

RLG M:\CAD\2327110\24146_1.DWG Plot at 0 01/25/2007 11:29:46



● Pump–Out Well

■ Monitoring Well

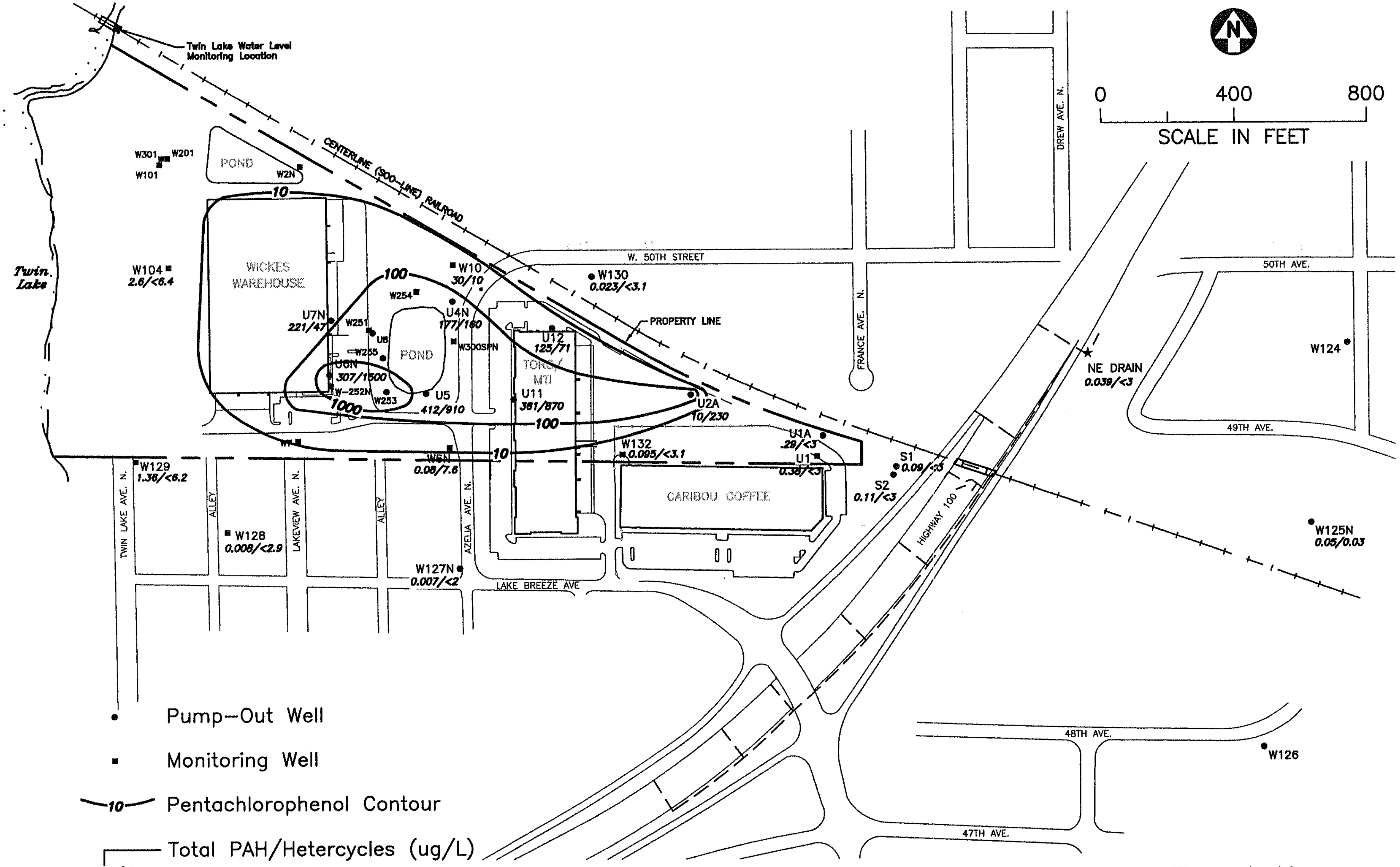
0.15/11 ┌ Total PAH/Hetercycles └ Pentachlorophenol

ND Not Detected

* Average from Barr Sampling Events

Figure A–18

2005
PAH AND PENTACHLOROPHENOL CONCENTRATIONS
Upper Portion of Upper Aquifer



● Pump–Out Well

■ Monitoring Well

—10— Pentachlorophenol Contour

0.15/11 — Total PAH/Hetercycles (ug/L)

— Pentachlorophenol (ug/L)

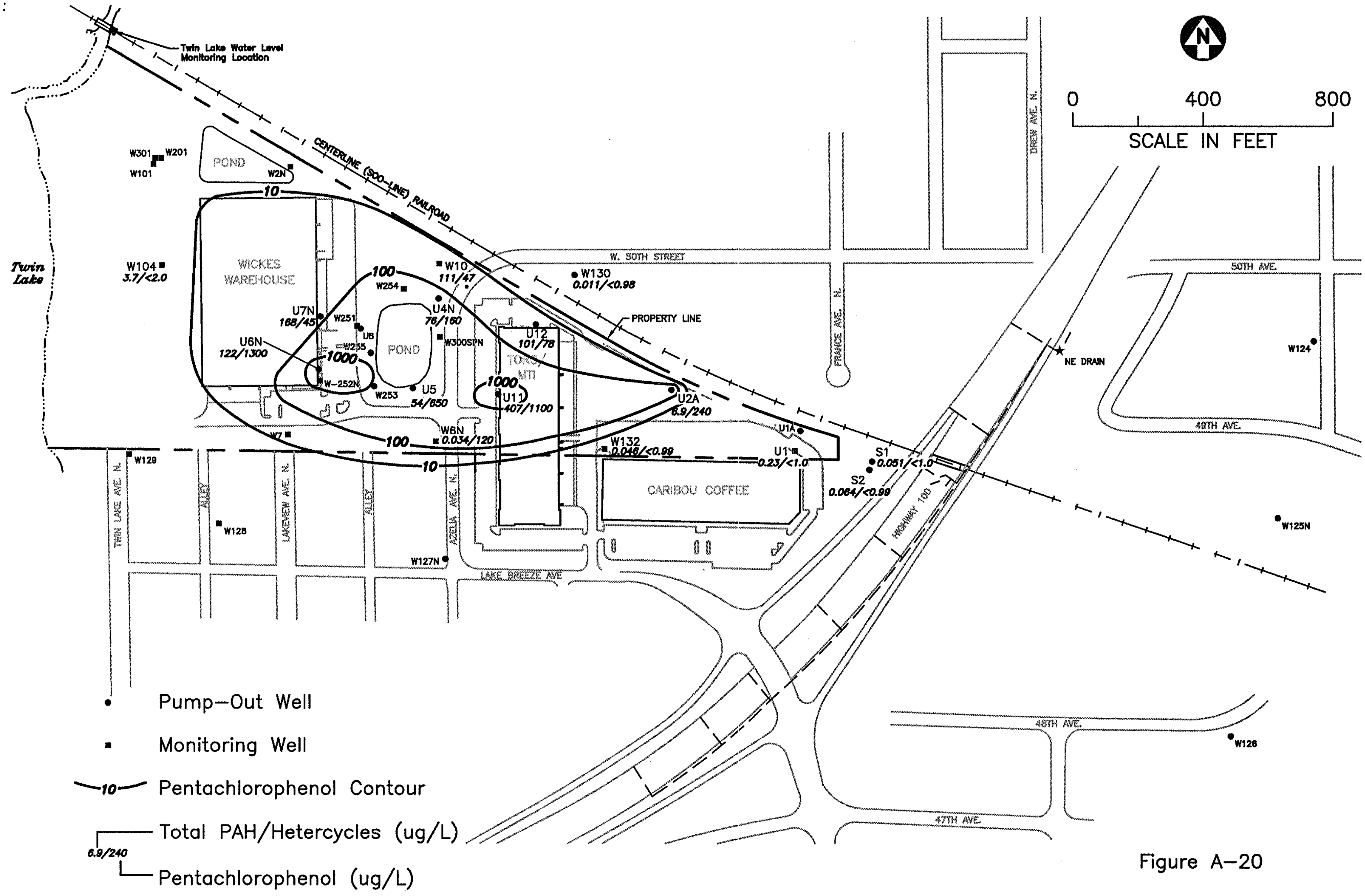
ND Not Detected

All Results from October 2006 Sampling Event

Figure A–19

2006
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer

RLG M:\CAD\2327110\29015_1.DWG Plot at 0 03/21/2008 15:40:37

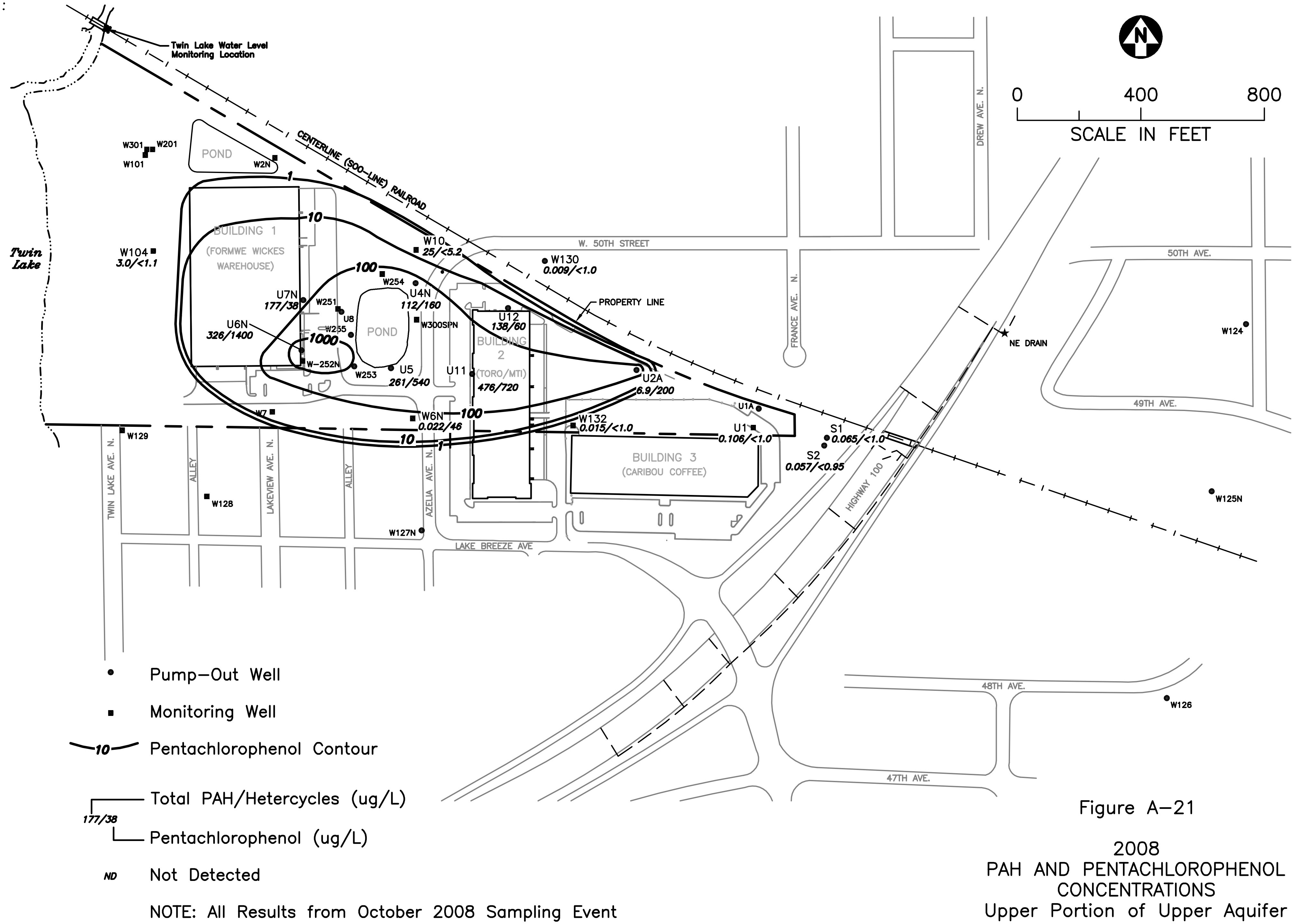


All Results from November 2007 Sampling Event

Figure A-20

2007
PAH AND PENTACHLOROPHENOL CONCENTRATIONS
Upper Portion of Upper Aquifer

RLG M:\CAD\2327110\29011_2.DWG Plot at 0 03/06/2009 10:36:31

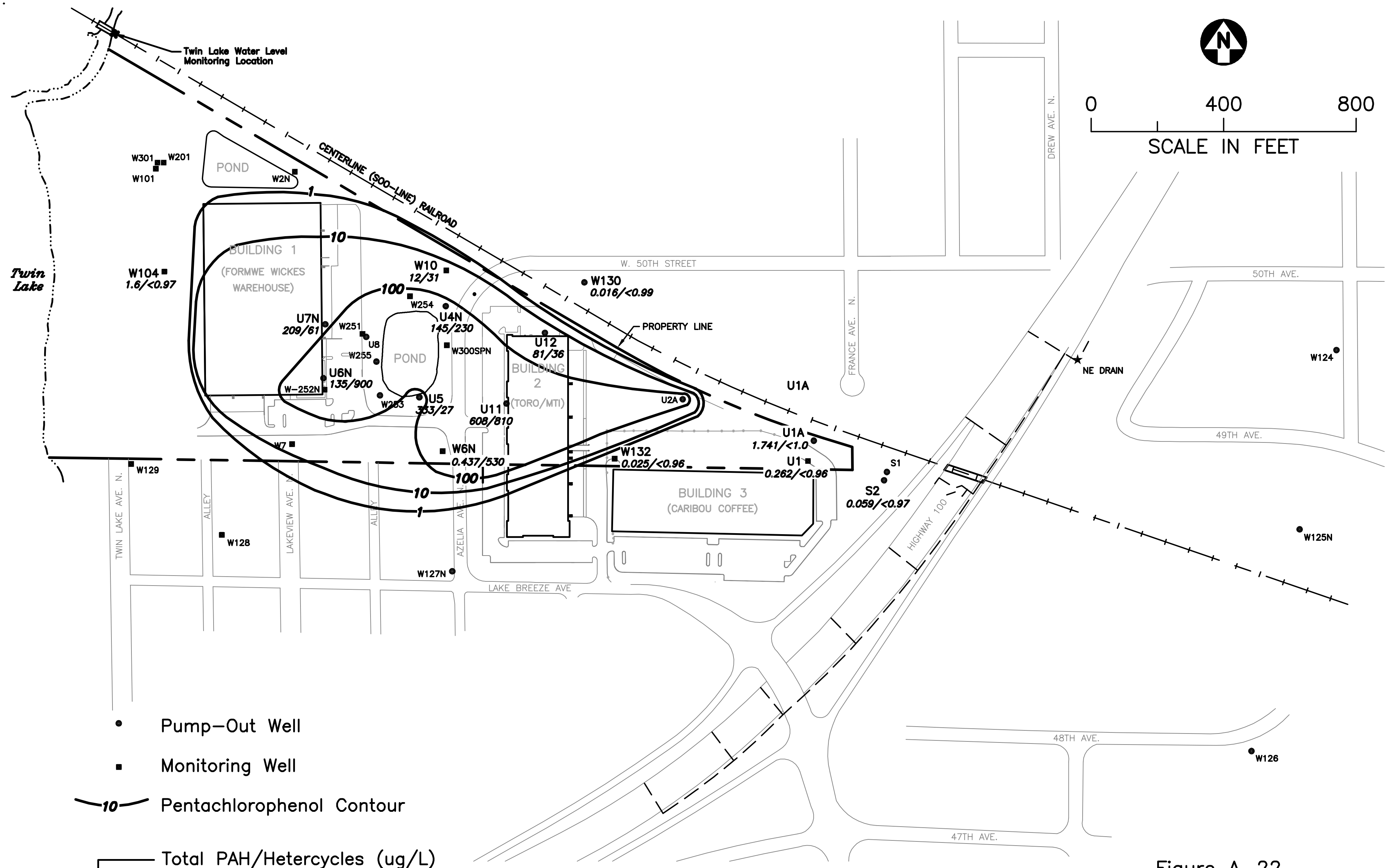


NOTE: All Results from October 2008 Sampling Event

Figure A-21

2008
PAH AND PENTACHLOROPHENOL CONCENTRATIONS
Upper Portion of Upper Aquifer

RLG M:\cad\2327110\29011_3.DWG Plot at 0 04/13/2010 09:26:24



● Pump-Out Well

■ Monitoring Well

—*10*— Pentachlorophenol Contour

*145/230* Total PAH/Hetercycles (ug/L)

Pentachlorophenol (ug/L)

*ND* Not Detected

NOTE: All Results from September/October 2009

Figure A-22

2009
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer

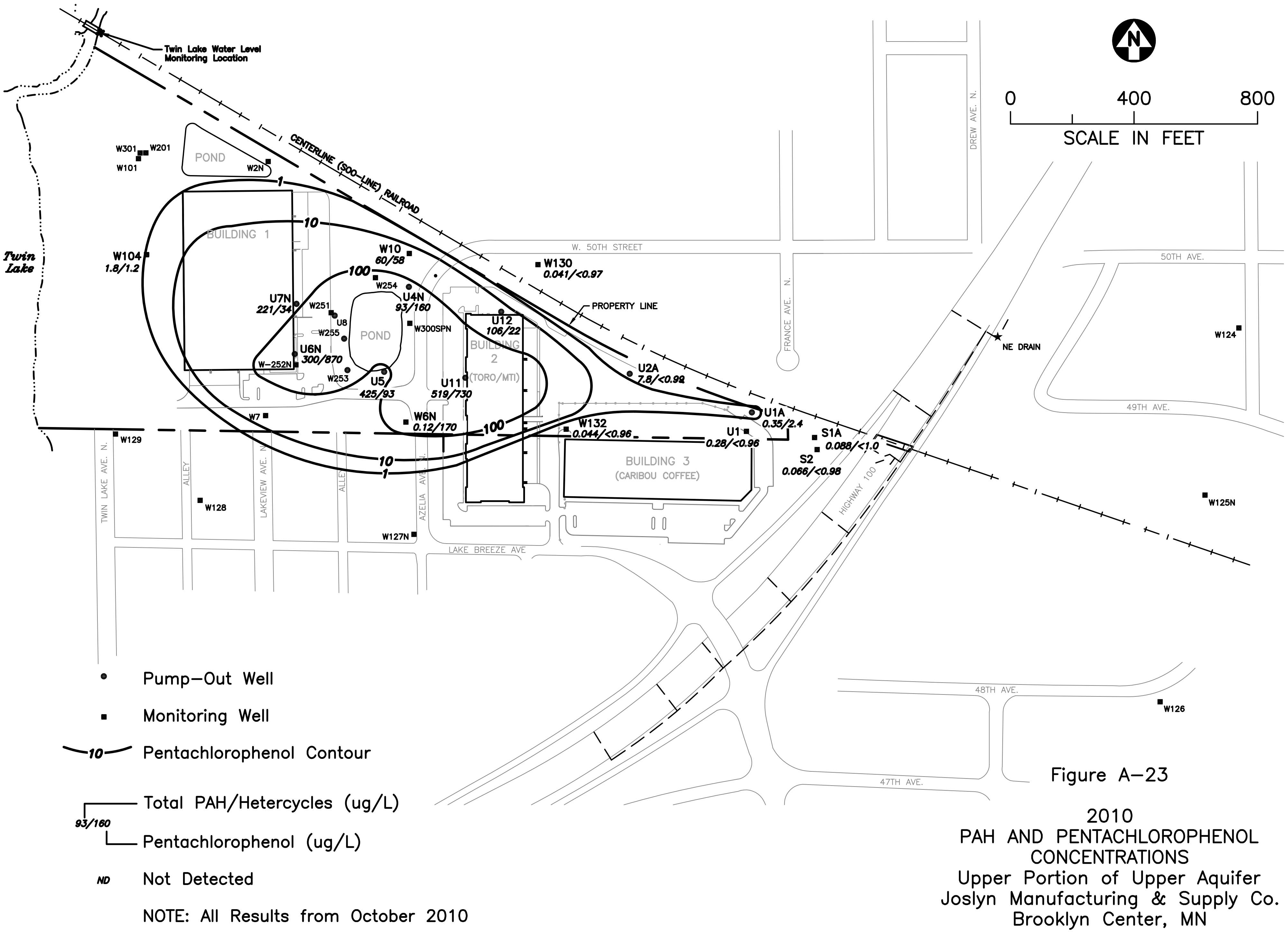


Figure A–23

2010
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

RLG M:\AdeptWork\RLG\2327011000_2011 AR Figure 4-2.dwg Plot at 0 03/12/2012 14:20:26

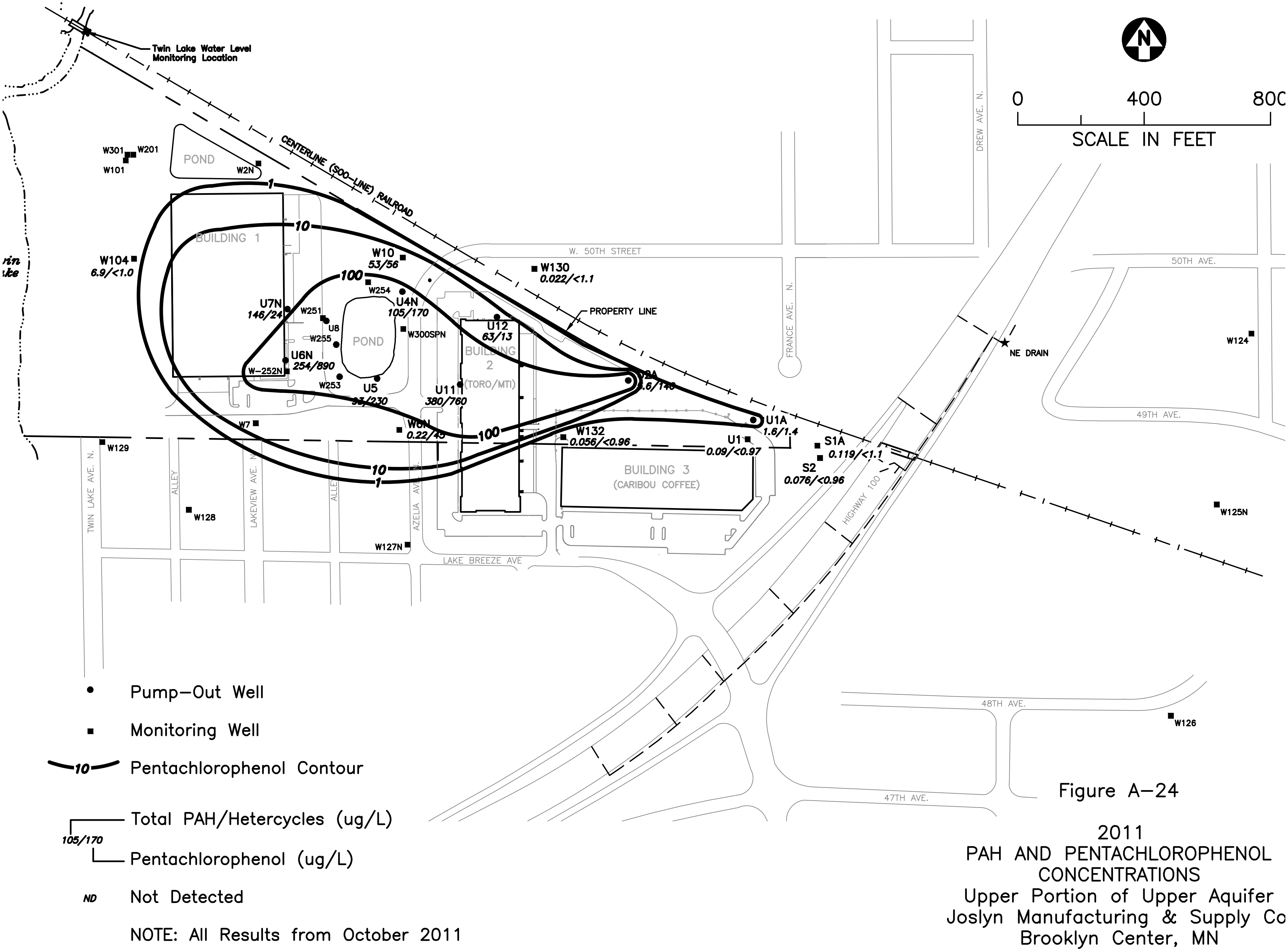


Figure A–24

2011
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co
Brooklyn Center, MN

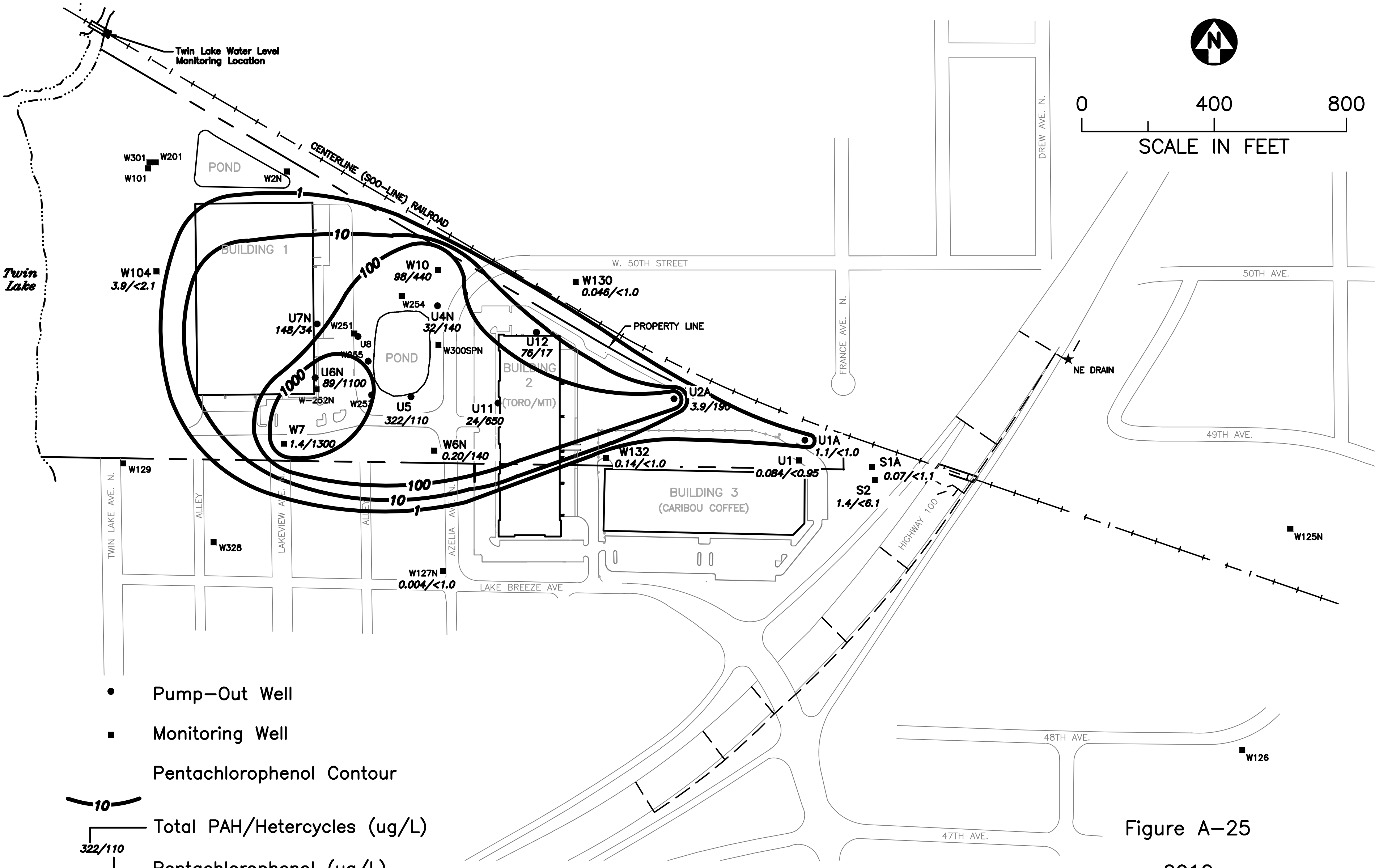
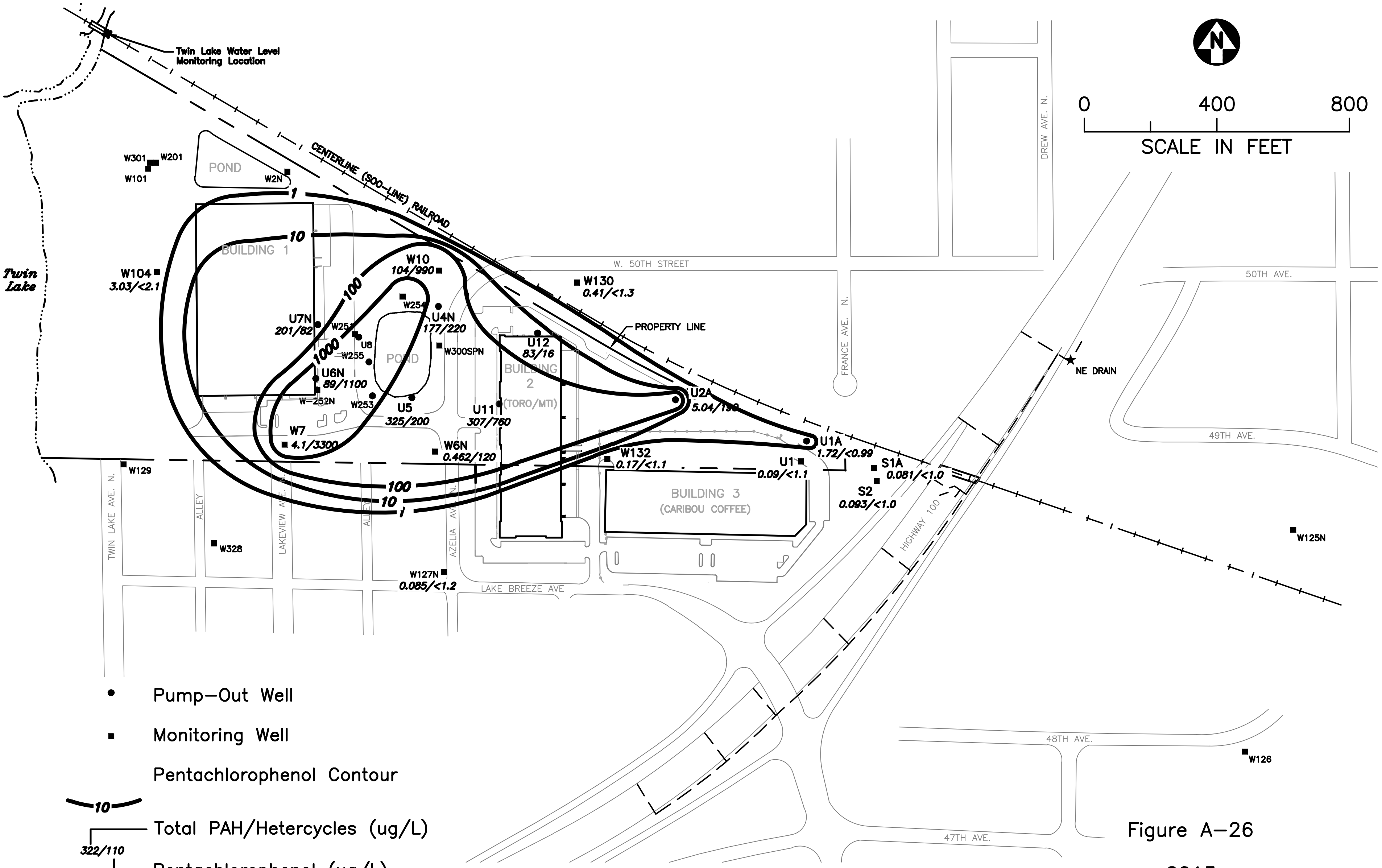


Figure A-25

2012
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

rlg M:\AdeptWork\RLG\2327011000_2013 AR Figure 4-2.dwg Plot at 0 03/13/2014 09:52:54



● Pump–Out Well

■ Monitoring Well

Pentachlorophenol Contour

10

Total PAH/Hetercycles (ug/L)

322/110

Pentachlorophenol (ug/L)

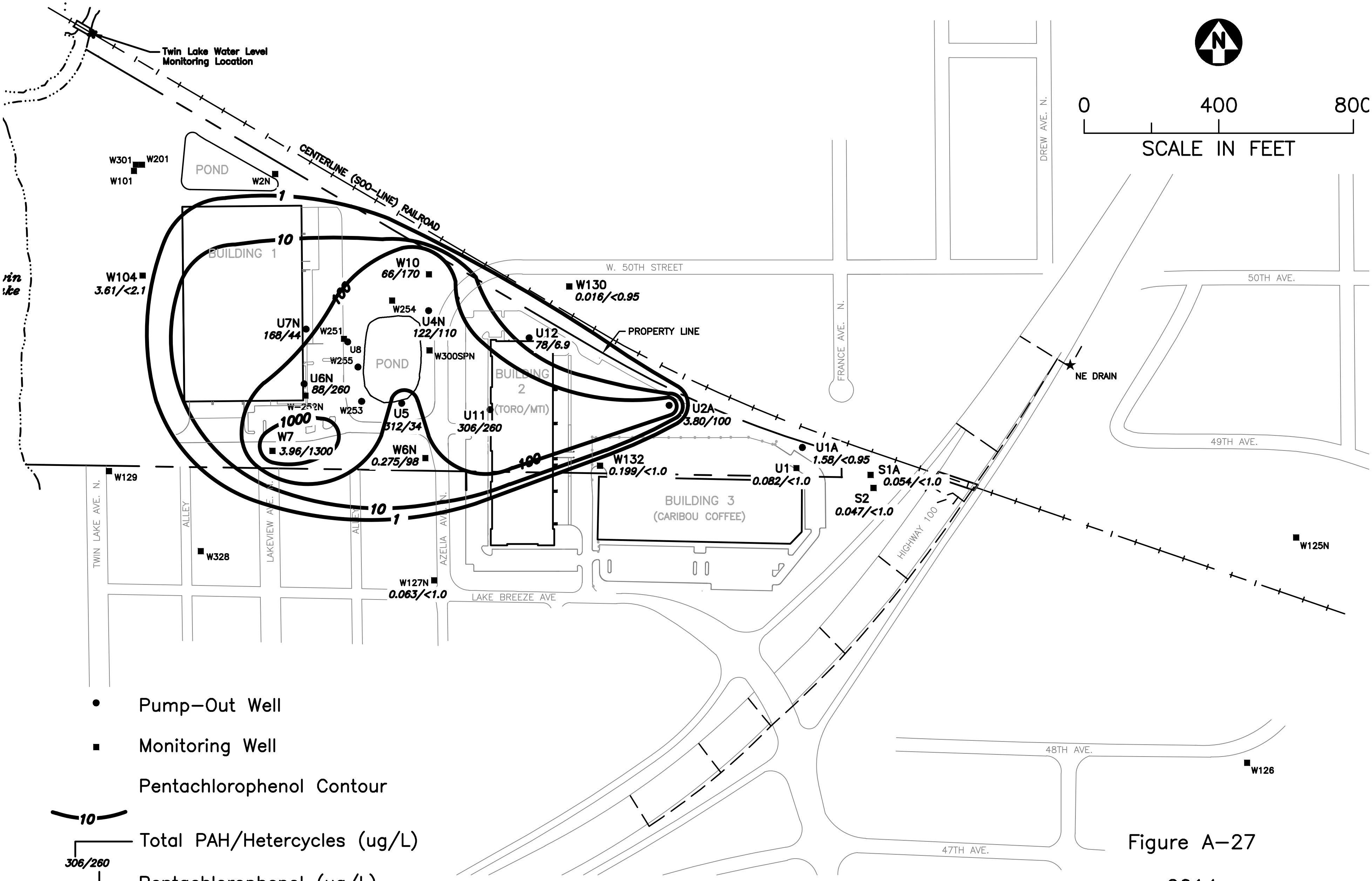
ND Not Detected

NOTE: Results from October 2013
(W127N Results from August 2013)

Figure A–26

2013
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

rlg M:\AdeptWork\RLG\2327011000_2014 AR Figure 4-2.dwg Plot at 0 02/26/2015 14:22:03



● Pump–Out Well

■ Monitoring Well

Pentachlorophenol Contour

10

Total PAH/Hetercycles (ug/L)

306/260

Pentachlorophenol (ug/L)

*ND* Not Detected

NOTE: Results from October 2014

Figure A–27

2014
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co
Brooklyn Center, MN

rlg M:\AdeptWork\RLG\2327011000_2015 AR Figure 4-2.dwg Plot at 0 03/08/2016 13:50:37

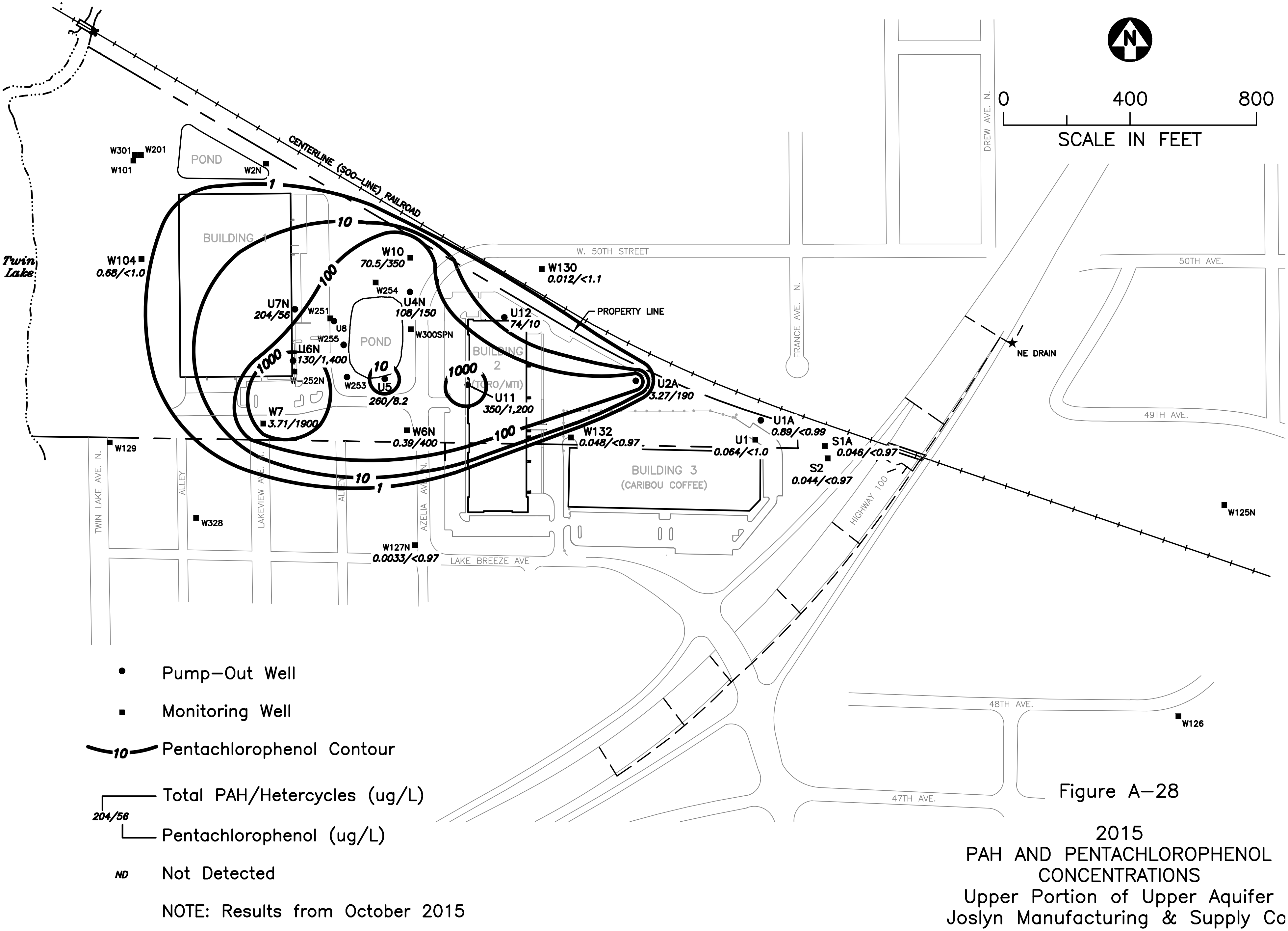


Figure A–28

2015
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co
Brooklyn Center, MN

rlg M:\AdeptWork\RLG\2327011000_AR Figure 4-2.dwg Plot at 0 02/27/2017 12:56:56

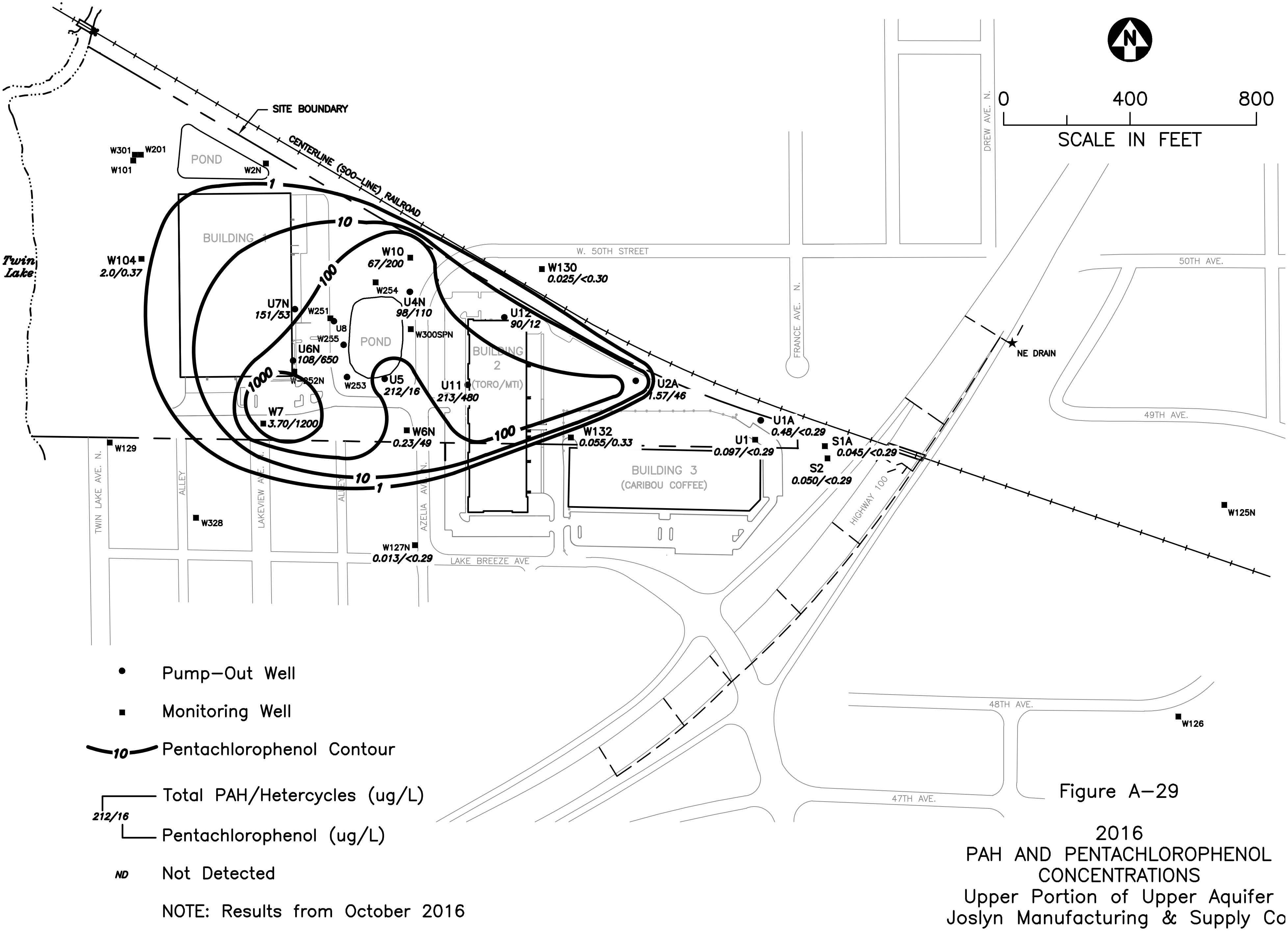


Figure A-29

2016
PAH AND PENTACHLOROPHENOL
CONCENTRATIONS
Upper Portion of Upper Aquifer
Joslyn Manufacturing & Supply Co
Brooklyn Center, MN

# Appendix B

## Description of Hydrogeologic Setting and Historical Monitoring Locations

# Appendix B

## Description of Hydrogeologic Setting and Historical Monitoring Locations

Two aquifers have been identified at the site. The upper aquifer is a surficial sand that extends from the ground surface to depths of 30 to 80 feet and is comprised of Operable Units 1 and 2 (the shallow and middle sand units). The lower aquifer consists of St. Peter Sandstone, the Prairie du Chien, and a buried sand and gravel unit overlying these bedrock units. A sequence of stratified silt, clay, and sand (the middle confining unit) separates the upper and lower aquifers below approximately the eastern two-thirds of the site. A buried bedrock valley is located below the western one-third of the site. The bedrock valley is filled with sand. The middle confining unit is not present in the bedrock valley. Figure B-1 shows the cross section locations through the site that are shown on Figures B-2 and B-3. A west to east geologic cross-section (A-A') is shown on Figure B-2. A north to south cross section (B-B') is shown on Figure B-3.

### Upper Aquifer

Groundwater in the upper aquifer moves generally to the east, eventually discharging to the Mississippi River. Seepage from Twin Lakes recharges the upper aquifer upgradient of the site. The phreatic surface is 10 to 15 feet below the ground surface over most of the site. The saturated portion of the upper aquifer ranges from about 20 to 45 feet in thickness. The average rate of lateral groundwater movement in the upper aquifer is in the range of 250 to 1,000 feet per year.

### Middle Confining Unit

As described previously, the upper and lower aquifers are separated by a middle confining unit below the eastern two-thirds of the site. This unit consists of fine-grained (clay and silt) units and discontinuous sand units referred to as the middle sands. The thickness of the middle confining unit varies from 10 to 60 feet beneath the site. The middle confining unit has been identified in borings placed at another site (Howe Chemical) located approximately 2,000 feet east of the Joslyn site. Vertical movement of water downward through the confining unit is estimated to be relatively slow (2.6 to 0.4 feet per year) due to the small pressure difference across the unit (approximately 2.5 feet) and the low permeability of the unit (approximately 1 x 10-5 cm/sec) (Barr, 1987). This unit was defined in more detail in the area of W251 (Barr, 1990).

### Lower Aquifer

The lower aquifer beneath the eastern portion of the site consists of the St. Peter Sandstone and the Prairie du Chien along with an overlying thin stratum of sand and gravel. The groundwater elevations in the lower aquifer are generally 2 to 3 feet lower than the elevations in the upper aquifer beneath the eastern portion of the site.

The direction of groundwater flow in the lower aquifer is also towards the east to the Mississippi River, which is the discharge zone for water in the St. Peter and Prairie du Chien aquifers. The horizontal groundwater velocity in the St. Peter is estimated to be in the range of 50 to 200 feet per year (Barr, 1987).

The middle confining unit and the St. Peter Sandstone are not present below the western one-third of the site. These units have been removed by glacial action, creating a north-south trending buried bedrock valley cutting into the Prairie du Chien. The middle confining unit and the St. Peter Sandstone have been replaced in this valley by an outwash deposit of sand and gravel. The vertical rate of groundwater movement through the outwash is likely greater than the vertical rate of movement through the middle confining unit, although only a small downward vertical gradient can be measured in the valley.

### Monitoring Wells

The historical locations of monitoring wells are shown on Figure B-1. Information on these wells is provided in Table B-1.

### Surface Water Quality Monitoring

Highway 100 is protected in times of high rainfall and high groundwater levels by a system of catch basins and drain tile. The drain tile system intercepts groundwater during times of high groundwater and is downgradient of the site, so it could potentially capture site chemicals not captured by the site pumpout system. For this reason, the drain tile system was historically part of the monitoring program.

Water captured by the drain tile system and catch basins is conveyed via a storm sewer to a pond at the Brooklyn Center Golf Course, which discharges through a channel to Shingle Creek (Figure B-5). The pond also receives water from a separate storm sewer, which serves residential areas, Highway 100, and commercial areas south of the former Brookdale Shopping Center.

Surface water has historically been monitored at three points:

- *At the outlet of the storm sewer where it discharges to the golf course pond.* This sampling location is referred to as the "storm sewer outlet" (Figure B-5).
- *At Shingle Creek, at a location upstream of the outlet from the golf course pond.* This sampling location is referred to as "Upstream Shingle Creek" (Figure B-5).
- *In the drain system.* This sampling location is referred to as the "NE Drain" (Figure B-5). In the past, samples were collected from the catch basin on the side of the highway, but after the Highway 100 reconstruction in 2003-04, the new catch basin most analogous to the former NE Drain sampling location was difficult and dangerous to access, so the sample collection point was changed to the first manhole downstream of the on-ramp (Figure B-7).

Monitoring of the NE Drain location was conducted from May 1991 through March 2007, and was discontinued in accordance with the approved 2007 monitoring plan (MPCA, 2007). In addition, in 2011, the MPCA approved the recommendation to discontinue all surface water monitoring at the Joslyn site (MPCA, 2011a). The potential for migration of PCP and PAHs to the underdrain system is better monitored with the existing shallow monitoring well network for reasons described below.

Wells near the highway underdrain give some indication of the groundwater that is captured by the underdrain. The four wells that were part of the surface water monitoring program (W112, W122, W123, and W223) were abandoned due to the Highway 100 reconstruction project and site redevelopment. Other historical monitoring points include the geoprobes completed during site redevelopment prior to 2007 in the area of former wells W123 and W223. Recent monitoring points have included wells located between the site and the drain system; well S1 was installed in 2003, but inadvertently sealed by MNDOT in 2009, and existing well S2 was installed in 2005. Well S1 was replaced with well S1A in 2010. These wells are in better locations than the previous four wells to monitor the quality of the groundwater downgradient of the site that may eventually reach the drain system. Other existing monitoring points between the plume and the drain include former pumping well U1 and monitoring well W132. Neither benzo(a)pyrene nor PCP were detected in any of the groundwater monitoring points between the site and the drain system in 2011.

Historically, PAHs were occasionally detected at the NE Drain location, which also collects runoff from Highway 100. Benzo(a)pyrene has historically been detected in about 10 percent of the NE Drain samples, at concentrations ranging from 0.0035 to 0.185 µg/L. Benzo(a)pyrene was not detected in the most recent sample collected in March 2007 (Table B-2). Although benzo(a)pyrene has been detected on occasion in groundwater samples from wells near the NE drain, the concentrations detected in the groundwater are significantly lower than concentrations in the NE drain samples (Table B-2), indicating that groundwater was not the source of benzo(a)pyrene in the NE drain.

In contrast, benzo(a)pyrene has historically been detected in more than 70 percent of the samples from Shingle Creek, upstream of any possible influence from the Joslyn site (Table B-2). There have been exceedances of the site-specific water quality criterion for benzo(a)pyrene in almost 75 percent of the samples from the upstream location in Shingle Creek. The average concentration of benzo(a)pyrene in upstream surface water samples from Shingle Creek is about 0.06 μg/L, more than 100 times higher than the site-specific surface water benzo(a)pyrene criterion of 0.00051 μg/L. During all historical sampling periods, the concentrations detected in the upstream creek samples have been higher than the concentration detected in the NE Drain sample.

Figure B-8 shows graphically the detections of benzo(a)pyrene in the samples from the NE Drain, storm sewer outlet, and upstream Shingle Creek locations. The occurrences and the range of values of these detections at the three monitoring points are similar. Historically, the highest detected concentrations have been in the samples from the Shingle Creek location, upstream of any influence from the Joslyn site, and the storm sewer outlet samples. Benzo(a)pyrene is a naturally occurring compound, with numerous potential sources in an urban area (runoff, air pollution, spills, etc.). Because of these factors, benzo(a)pyrene is not a good indicator of the influence of the site on surface water.

In contrast, PCP is more soluble than benzo(a)pyrene, and therefore has a greater potential for migration in groundwater. In addition, PCP is man-made, whereas benzo(a)pyrene is naturally occurring in the environment. Therefore, PCP is considered to be a better indicator of potential migration from the Joslyn site than benzo(a)pyrene.

Figure B-9 shows the historical PCP concentrations in samples from the NE Drain. PCP was detected in the initial sample from the NE Drain in 1985 at 570 μg/L. By early 1991, PCP was below detection limits (typically <3μg/L but sometimes as low as <0.5μg/L), where it has remained. PCP has also remained undetectable in samples from the currently monitored wells S1A, S2, U1 and W132. In addition, PCP has never been detected in samples from the storm sewer outlet or upstream in Shingle Creek.

In conclusion, some PAHs have at times been present in the samples from the NE drain and Shingle Creek, but the groundwater monitoring and the lack of PCP suggests that the Joslyn site is not the source of these PAHs.

Therefore, sampling at all surface water monitoring points was discontinued in 2011, with approval from the MPCA (MPCA, 2012).

## References

Barr, 1987: Detailed Analysis Report, Brooklyn Center Wood Treating Site-Part One-RAP Investigation.

Barr, 1990. March 1990; 1989 Annual Monitoring Report, Brooklyn Center Wood Treating Site.

MPCA, 2012. Letter from MPCA to Carl Grabinski of Joslyn approving the 2010 Annual Report with modifications. February 8, 2012.

# Appendix B

## Tables

# Table B-1
## Monitoring and Recovery Well History
## Updated Through 2015*

| Well Name | Date Installed | Mn Unique Number | Well Diameter inches | Original Elevation MSL | Total Well Depth | Bottom Elevation | Current Riser Elevation | Screen Length Feet | Screened Interval Elevation | Date Abandoned | Abandon Record | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | Jul-03 | 698450 | 2 | NA | 30.0 | | 870.27 | 10 | | Sep-09 | NA | Installed by MnDOT. Sealed by MnDOT. |
| S1A | May-10 | 767742 | 2 | 870.33 | 30.0 | 837.35 | 870.33 | 15 | 852.9 - 837.9 | NA | NA | |
| S2 | Nov-05 | 715647 | 2 | NA | 35.0 | 834.92 | 869.92 | 10 | 842.2 - 832.2 | NA | NA | Nested with S1 and S3 |
| S3 | Jan-06 | 715648 | 2 | NA | 149.0 | 721.43 | 870.43 | 5 | 726.0 - 721.0 | NA | NA | Nested with S1 and S2 |
| P-1 | Jul-88 | 447013 | 2 | 863.30 | 33.0 | 830.30 | 863.30 | 5 | 835.3 - 830.3 | Apr-01 | 179118 | Abandoned during site development |
| P-2 | Jul-88 | 447014 | 2 | 868.55 | 33.0 | 835.55 | 868.55 | 5 | 840.6 - 835.6 | Apr-01 | 179119 | Abandoned during site development |
| P-3 | Jul-88 | 447015 | 2 | 867.61 | 33.0 | 834.61 | 867.61 | 5 | 839.6 - 834.6 | Sep-00 | 172799 | Abandoned during site development |
| P-4 | Jul-88 | 447016 | 2 | 867.60 | 33.0 | 834.60 | 867.60 | 5 | 839.6 - 834.6 | Sep-00 | 172800 | Abandoned during site development |
| P-5 | Jul-88 | 447017 | 2 | 867.36 | 33.0 | 834.36 | 867.36 | 5 | 839.4 - 834.4 | Sep-00 | 175863 | Abandoned during site development |
| P-6 | Jul-88 | 447018 | 2 | | 28.0 | | | 5 | | Jun-91 | ? | Abandoned during soil excavation |
| U-1 | Jun-88 | 442429 | 8 | 868.45 | 36.0 | 832.45 | 864.89 | 20 | 852.8 - 832.8 | NA | NA | Re-surveyed on 5-14-2010. |
| U1A | Oct-96 | 537393 | 8 | 870.07 | 35.0 | 835.07 | 869.43 | 20 | 852.7 - 832.7 | NA | NA | Recovery Well. Resurveyed on 5-14-2010. |
| U2 | Jun-88 | 442444 | 8 | 867.61 | 40.0 | 827.61 | 867.61 | 25 | 853.0 - 828.0 | Apr-01 | 179120 | Abandoned during site development |
| U2A | Nov-96 | 537394 | 8 | 867.87 | 40.5 | 827.37 | 867.87 | 20 | 845.0 - 825.0 | NA | NA | Recovery Well |
| U3 | Jun-88 | 442445 | 8 | 867.69 | 41.0 | 826.69 | 867.69 | 24 | 851.2 - 827.2 | Nov-00 | 172798 | Abandoned during site development |
| U4 | Jun-88 | 442446 | 8 | 867.88 | 27.0 | 840.88 | 867.88 | 10 | 850.9 - 840.9 | Sep-02 | 198114 | Abandoned during Azalea Av rebuild |
| U4N | Sep-02 | 681792 | 8 | 867.20 | 32.4 | 836.20 | 868.35 | 18 | 854.2 - 836.2 | NA | NA | Recovery Well. Replaces U4 |
| U-5 | Jun-88 | 442447 | 8 | 865.86 | 36.0 | 829.86 | 866.51 | 10 | 840.5 - 830.5 | NA | NA | Recovery Well |
| U-6 | Jun-88 | 442448 | 8 | 864.07 | 42.0 | 822.07 | 864.07 | 15 | 840.1 - 825.1 | Nov-99 | 155773 | Abandoned during site development |
| U6N | Nov-99 | 636482 | 8 | 865.57 | 42.0 | 823.57 | 865.57 | 15 | 838.6 - 825.6 | NA | NA | Recovery Well |
| U7 | Jun-88 | 442449 | 8 | 866.59 | 39.5 | 827.09 | 866.59 | 15 | 842.1 - 827.1 | Nov-99 | 155774 | Abandoned during site development |
| U7N | Nov-99 | 636483 | 8 | 860.07 | 39.5 | 820.57 | 860.07 | 15 | 835.6 - 820.6 | NA | NA | Recovery Well |
| U8 | Oct-88 | 448742 | 4 | 865.25 | 69.0 | 796.25 | 865.25 | 15 | 811.5 - 796.5 | NA | NA | Recovery Well - Inactive |
| U11 | Nov-00 | 655460 | 8 | 869.42 | 31.0 | 838.42 | 31.00 | 12 | 850.4 - 838.4 | NA | NA | Recovery Well to Replace U-3 |
| U12 | Nov-00 | 655461 | 8 | 868.62 | 40.0 | 828.62 | 40.00 | 18 | 846.6 - 828.6 | NA | NA | Recovery well to Replace U-4 |
| W2 | Jun-78 | None | 2 | 858.72 | 13.6 | 845.10 | 861.78 | 3 | 849.8 - 846.8 | Feb-99 | ? | Abandoned because damaged |
| W2N | Nov-99 | 636488 | 2 | 862.19 | 15.0 | 847.19 | 862.19 | 5 | 852.2 - 847.2 | NA | NA | Replacement for W2 |
| W5 | Jun-78 | None | 2 | 860.96 | 16.0 | 845.00 | 860.96 | 3 | 848.0 - 845.0 | May-75 | NA | |
| W6 | Jun-78 | None | 2 | 863.67 | 19.5 | 844.20 | 865.82 | 3 | 847.2 - 844.2 | Jun-99 | 155770 | Abandoned during site development |
| W6N | Nov-99 | 636485 | 2 | 866.70 | 18.0 | 848.70 | 866.70 | 5 | 853.7 - 848.7 | NA | NA | Replacement for W6 |
| W7 | Feb-81 | None | 2 | 864.00 | 25.2 | 838.80 | 864.21 | 10 | 848.8 - 838.8 | NA | NA | |
| W9 | Jun-81 | None | 4 | 867.85 | 24.0 | 843.90 | 867.94 | 10 | 853.9 - 843.9 | Sep-00 | 172797 | Abandoned during site development |
| W10 | Jun-81 | None | 4 | 862.07 | 14.9 | 847.20 | 876.62 | 10 | 857.2 - 847.2 | NA | NA | |
| W101 | Jan-85 | None | 2 | 865.05 | 23.7 | 841.40 | 856.22 | 10 | 851.8 - 841.6 | NA | NA | |
| W104 | Jan-85 | None | 2 | 857.14 | 13.5 | 843.60 | 861.13 | 10 | 851.6 - 841.4 | NA | NA | |
| W111 | Jan-85 | None | 2 | 860.98 | 18.7 | 842.30 | 860.98 | 10 | 852.3 - 842.3 | Jun-92 | ? | Abandoned for LTU |
| W112 | Jan-85 | None | 2 | 867.77 | 26.4 | 841.40 | 867.80 | 10 | 851.6 - 841.4 | Oct-03 | 214896 | Abandoned for Lot 3 bldg Caribou Coffee |
| W113 | Mar-85 | None | 2 | 865.54 | 20.5 | 845.00 | 865.54 | 10 | 855.0 - 845.0 | Jun-91 | ? | Abandoned during soil excavation |
| W121 | Mar-85 | None | 2 | 866.96 | 25.7 | 841.30 | 867.20 | 10 | 851.3 - 841.3 | Jul-02 | 196319 | Abandoned during Azalea Av rebuild |
| W122 | Mar-85 | None | 2 | 865.73 | 25.6 | 840.10 | 865.96 | 10 | 850.3 - 840.1 | Apr-02 | 202964 | Abandoned during CP Rail bridge rebuild |
| W123 | Mar-85 | None | 2 | 859.36 | 18.6 | 840.80 | 859.44 | 10 | 850.8 - 840.8 | Jul-03 | 181889 | Hwy 100 reconstruction |
| W124 | Mar-85 | None | 2 | 867.60 | 29.1 | 838.50 | 867.84 | 10 | 848.5 - 838.5 | Oct-12 | 303317 | Not used -sealed with MPCA approval. |

\\barr.com\projects\Mpls\23 MN\27\2327110\WorkFiles\annual reports\2016 Annual Report\Appendices\Appendix B-Hydrogeologic Setting\Table B-1 Well history thru 2015.xls

# Table B-1
## Monitoring and Recovery Well History
## Updated Through 2015*

| Well Name | Date Installed | Mn Unique Number | Well Diameter inches | Original Elevation MSL | Total Well Depth | Bottom Elevation | Current Riser Elevation | Screen Length Feet | Screened Interval Elevation | Date Abandoned | Abandon Record | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W125 | Mar-85 | None | 2 | 866.15 | 29.1 | 837.10 | 866.37 | 10 | 849.0 - 839.0 | Nov-05 | 236375 | Vandalized in 2004 |
| W125N | Nov-05 | 715649 | 2 | 866.18 | 25.0 | 841.18 | 866.18 | 10 | 850.3 - 840.3 | NA | NA | Replaces W125 |
| W126 | Mar-85 | None | 2 | 859.21 | 20.5 | 838.70 | 859.21 | 10 | 848.9 - 838.7 | NA | NA | |
| W127 | Feb-86 | None | 2 | 865.07 | 23.4 | 841.70 | 865.22 | 10 | 851.9 - 841.7 | Apr-03 | 202960 | Interfered with new City sidewalk |
| W127N | Apr-03 | 668297 | 2 | 866.27 | 22.0 | 844.27 | 866.27 | 10 | 853.6-843.6 | NA | NA | |
| W128 | Feb-86 | None | 2 | 862.83 | 21.6 | 841.20 | 863.03 | 10 | 852.3 - 842.1 | Oct-12 | 303318 | Not used -sealed with MPCA approval. |
| W129 | Feb-86 | None | 2 | 856.31 | 16.3 | 840.00 | 856.36 | 10 | 851.4 - 841.2 | NA | NA | |
| W130 | Apr-90 | 461024 | 2 | 868.38 | 26.1 | 842.30 | 868.41 | 11 | 853.3 - 842.3 | NA | NA | |
| W131 | Apr-90 | 461023 | 2 | 862.48 | 19.8 | 842.70 | 866.96 | 11 | 842.7 - 853.2 | Jun-99 | 155769 | Abandoned during site development |
| W132 | Dec-03 | 702820 | 2 | 867.52 | 27.2 | 840.32 | 867.52 | 10 | 850.3 - 841.3 | NA | NA | |
| No Well | -- | 461022 | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| W201 | Feb-85 | None | 4 | 856.36 | 69.4 | 787.00 | 856.41 | 10 | 797.0 - 787.0 | NA | NA | |
| W206 | Jan-85 | None | 2 | 865.45 | 53.4 | 812.10 | 865.55 | 5 | 817.3 - 812.1 | Jun-99 | 155771 | Abandoned during site development |
| W207 | Mar-85 | None | 2 | 865.81 | 55.9 | 809.90 | 865.90 | 5 | 818.0 - 713.0 | Jun-99 | 155768 | Abandoned during site development |
| W209 | Jan-85 | None | 2 | 867.25 | 61.2 | 806.10 | 867.23 | 5 | 811.3 - 806.1 | Sep-00 | 172796 | Abandoned during site development |
| W223 | Jul-86 | None | 2 | 862.58 | 36.5 | 826.10 | 862.75 | 5 | 832.6 - 827.6 | Jul-03 | 181888 | Hwy 100 reconstruction |
| W251 | Apr-87 | 431562 | 8 | 865.00 | 83.9 | 781.10 | 865.04 | 5 | 788.1 - 783.1 | NA | NA | DNAPL Recovery Well |
| W252 | Apr-87 | 431563 | 4 | 864.73 | 83.7 | 781.00 | 864.52 | 10 | 791.0 - 781.0 | Jun-99 | 155772 | Abandoned during site development |
| W252N | Nov-99 | 636484 | 4 | 865.47 | 82.0 | 783.47 | 865.47 | 10 | 793.5 - 783.5 | NA | NA | Replacement for W252 |
| W253 | Apr-87 | 431564 | 4 | 864.65 | 82.6 | 782.10 | 865.18 | 10 | 793.9 - 783.0 | NA | NA | Recovery Well |
| W254 | Apr-87 | 431565 | 4 | 861.50 | 84.0 | 777.50 | 869.67 | 10 | 787.5 - 777.5 | NA | NA | |
| W255 | Jul-88 | 442450 | 4 | 865.49 | 81.0 | 784.49 | 865.49 | 20 | 806.6 - 786.6 | NA | NA | Recovery Well |
| W300 | Mar-85 | None | 4 | 866.10 | 192.0 | 674.10 | 866.12 | 66 | 738.1 - 672.1 | Sep-02 | 198115 | Abandoned during Azalea Av rebuild |
| W300SPN | Sep-02 | 681791 | 2 | 867.31 | 133.1 | 734.47 | 867.31 | 5 | 739.5 - 734.5 | NA | NA | Replaces 300SP |
| W301 | Feb-85 | None | 4 | 856.28 | 139.5 | 716.80 | 856.33 | 20 | 736.8 - 716.8 | NA | NA | |
| W307 | Mar-85 | None | 4 | 863.46 | 134.6 | 728.90 | 867.44 | 5 | 733.7 - 728.9 | Jun-99 | 155778 | Abandoned during site development |
| W323 | Mar-87 | 416090 | 4 | 862.00 | 132.2 | 729.80 | 862.19 | 10 | 739.8 - 729.8 | Jul-03 | 181886 | Hwy 100 reconstruction |
| W328 | Feb-86 | None | 4 | 862.66 | 125.0 | 733.80 | 862.85 | 10 | 745.3 - 735.3 | NA | NA | |

*No Changes since 2012.

# Table B-2
# Historical Benzo(a)pyrene Concentrations
# at Surface Water Monitoring Locations
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| Sys Loc Code | NE Drain | Storm Sewer | Upstream in Shingle Creek |
|---|---|---|---|
| Sample Date | | | |
| 11/04/1987 | < 0.25 ug/l | -- | -- |
| 08/20/1990 | < 0.080 ug/l | -- | -- |
| 09/05/1990 | < 0.20 ug/l | -- | -- |
| 10/01/1990 | < 6 ug/l | -- | -- |
| 11/09/1990 | < 0.0010 ug/l | **0.0017 ug/l** | **0.030 ug/l** |
| 05/14/1991 | < 0.020 ug/l | **0.31 ug/l** | **0.027 ug/l** |
| 06/12/1991 | < 0.060 ug/l | < 0.10 ug/l | **0.064 ug/l** |
| 07/12/1991 | < 0.0030 ug/l | **0.029 ug/l** | **0.0038 ug/l** |
| 08/20/1991 | **0.0092 ug/l** | < 0.24 ug/l | < 0.048 ug/l |
| 09/16/1991 | < 0.11 ug/l | **0.013 ug/l** | **0.12 ug/l** |
| 10/16/1991 | **0.0035 ug/l** | **0.017 ug/l** | **0.0099 ug/l** |
| 11/19/1991 | < 0.060 ug/l | < 0.018 ug/l | **0.026 ug/l** |
| 12/12/1991 | **0.084 ug/l** | **4 j ug/l** | **0.20 ug/l** |
| 01/06/1992 | < 0.072 ug/l | **0.56 ug/l** | **0.14 ug/l** |
| 02/04/1992 | < 0.18 ug/l | **0.0069 ug/l** | **0.014 ug/l** |
| 03/30/1992 | < 0.11 ug/l | **0.0064 ug/l** | < 0.018 ug/l |
| 04/24/1992 | < 0.15 ug/l | **0.037 ug/l** | **0.0036 ug/l** |
| 05/22/1992 | < 0.10 ug/l | **0.0041 ug/l** | **0.044 ug/l** |
| 06/08/1992 | < 0.14 ug/l | **0.034 ug/l** | **0.014 ug/l** |
| 07/14/1992 | < 0.12 ug/l | < 0.0060 ug/l | **0.024 ug/l** |
| 08/13/1992 | < 0.060 ug/l | **0.0080 ug/l** | **0.0056 ug/l** |
| 09/03/1992 | < 0.060 ug/l | **0.014 ug/l** | < 0.0060 ug/l |
| 10/13/1992 | < 0.036 ug/l | **0.0097 ug/l** | **0.0052 ug/l** |
| 12/03/1992 | < 0.13 ug/l | < 0.0030 ug/l | < 0.0030 ug/l |
| 12/22/1992 | < 0.0030 ug/l | **0.0051 ug/l** | **0.43 ug/l** |
| 01/13/1993 | < 0.00300 ug/l | < 0.00300 ug/l | < 0.00300 ug/l |
| 02/12/1993 | < 0.102 ug/l | -- | -- |
| 03/11/1993 | < 0.120 ug/l | -- | -- |
| 04/14/1993 | **0.185 ug/l** | **0.0472 ug/l** | **0.253 ug/l** |
| 05/10/1993 | **0.140 ug/l** | **0.404 ug/l** | **0.213 ug/l** |
| 06/09/1993 | < 0.192 ug/l | **0.0246 ug/l** | **0.0502 ug/l** |
| 07/19/1993 | < 0.0600 ug/l | **0.0139 ug/l** | **0.00635 ug/l** |
| 08/17/1993 | < 0.0900 ug/l | **0.0312 ug/l** | **0.115 ug/l** |
| 09/24/1993 | < 0.0900 ug/l | -- | -- |
| 10/18/1993 | < 0.0600 ug/l | < 0.00600 ug/l | < 0.0120 ug/l |
| 11/09/1993 | < 0.0720 ug/l | -- | -- |
| 12/21/1993 | < 0.00300 ug/l | -- | -- |
| 01/06/1994 | < 0.138 ug/l | -- | -- |
| 02/03/1994 | < 0.0900 ug/l | **0.00653 ug/l** | < 0.00600 ug/l |
| 03/03/1994 | < 0.060 ug/l | -- | -- |
| 04/01/1994 | < 0.156 ug/l | -- | -- |
| 05/03/1994 | < 0.072 ug/l | -- | -- |
| 05/31/1994 | < 0.06 ug/l | -- | **0.025 ug/l** |
| 06/02/1994 | -- | **0.073 ug/l** | -- |
| 07/01/1994 | < 0.060 ug/l | -- | -- |
| 08/02/1994 | < 0.072 ug/l | **0.022 ug/l** | **0.181 ug/l** |
| 08/31/1994 | < 0.24 ug/l | -- | -- |
| 09/28/1994 | < 0.072 ug/l | < 0.018 ug/l | **0.047 ug/l** |
| 11/01/1994 | < 0.060 ug/l | -- | -- |
| 11/29/1994 | < 0.12 ug/l | -- | -- |
| 12/29/1994 | < 0.120 ug/l | -- | -- |
| 02/01/1995 | < 0.120 ug/l | -- | -- |
| 03/01/1995 | < 0.12 ug/l | -- | -- |
| 04/03/1995 | < 0.12 ug/l | -- | -- |
| 05/01/1995 | < 0.12 ug/l | -- | -- |
| 06/01/1995 | < 0.12 ug/l | -- | -- |
| 07/06/1995 | < 0.12 ug/l | -- | -- |
| 07/27/1995 | < 0.060 ug/l | -- | -- |
| 08/30/1995 | < 0.060 ug/l | -- | -- |
| 10/18/1995 | < 0.060 ug/l | < 0.003 ug/l | < 0.012 ug/l |
| 11/02/1995 | < 0.060 ug/l | -- | -- |
| 12/05/1995 | < 0.060 ug/l | -- | -- |
| 12/28/1995 | < 0.060 ug/l | -- | -- |
| 04/24/1996 | < 0.060 ug/l | -- | -- |
| 09/06/1996 | < 0.060 ug/l | -- | -- |
| 10/03/1996 | < 0.060 ug/l | < 0.006 ug/l | **0.020 ug/l** |
| 02/05/1997 | < 0.060 ug/l | -- | -- |
| 03/31/1997 | < 0.060 ug/l | -- | -- |
| 07/09/1997 | < 0.060 ug/l | -- | -- |
| 09/12/1997 | < 0.060 ug/l | -- | -- |
| 10/01/1997 | < 0.060 ug/l | < 0.003 ug/l | **0.008 ug/l** |
| 01/07/1998 | < 0.060 ug/l | -- | -- |
| 04/01/1998 | < 0.060 ug/l | -- | -- |
| 07/01/1998 | < 0.15 ug/l | -- | -- |
| 11/19/1998 | < 0.012 ug/l | < 0.009 ug/l | < 0.003 ug/l |
| 02/25/1999 | **0.029 ug/l** | -- | -- |
| 05/31/1999 | < 0.003 ug/l | -- | -- |
| 09/03/1999 | < 0.003 ug/l | -- | -- |
| 11/19/1999 | **0.010 b ug/l** | < 0.003 ug/l | **0.020 b ug/l** |
| 09/27/2000 | -- | < 0.003 ug/l | **0.003 ug/l** |
| 03/30/2001 | **0.0053 ug/l** | -- | -- |
| 07/03/2001 | < 0.0033 ug/l | -- | -- |
| 10/02/2001 | < 0.0033 ug/l | -- | -- |
| 10/16/2001 | < 0.0033 ug/l | **0.0089 ug/l** | **0.014 ug/l** |
| 02/28/2002 | < 0.0034 ug/l | -- | -- |
| 06/30/2002 | < 0.0034 ug/l | -- | -- |
| 07/30/2002 | < 0.0034 ug/l | -- | -- |
| 08/30/2002 | -- | -- | **0.033 ug/l** |
| 10/31/2002 | < 0.0034 ug/l | < 0.0034 ug/l | < 0.0034 ug/l |
| 03/03/2003 | < 0.0034 ug/l | -- | -- |
| 06/07/2003 | < 0.0034 ug/l | **0.049 ug/l** | < 0.0034 ug/l |
| 12/18/2003 | -- | < 0.0034 ug/l | < 0.0034 ug/l |
| 08/03/2004 | **0.10 ug/l** | -- | -- |
| 10/19/2004 | < 0.0034 ug/l | < 0.0034 ug/l | **0.0042 ug/l** |
| 02/02/2005 | **0.060 ug/l** | -- | -- |
| 05/04/2005 | < 0.0035 ug/l | -- | -- |
| 08/05/2005 | < 0.0034 ug/l | -- | -- |
| 11/08/2005 | < 0.0034 ug/l | -- | -- |
| 11/10/2005 | -- | < 0.0034 ug/l | < 0.0034 ug/l |
| 03/19/2006 | **0.0041 ug/l** | -- | -- |
| 05/09/2006 | < 0.0034 ug/l | -- | -- |
| 08/15/2006 | < 0.0034 ug/l | -- | -- |
| 10/19/2006 | -- | **0.029 ug/l** | **0.043 ug/l** |
| 10/21/2006 | < 0.0034 ug/l | -- | -- |
| 03/15/2007 | < 0.0033 ug/l | -- | -- |
| 11/07/2007 | -- | < 0.0032 ug/l | **0.021 ug/l** |
| 10/17/2008 | -- | < 0.0037 ug/l | **0.0087 ug/l** |
| 10/05/2009 | -- | **0.035 ug/l** | < 0.0036 ug/l |
| 10/07/2010 | -- | < 0.0039 ug/l | < 0.0041 ug/l |

See Table 3-18 for data qualifiers and footnotes.

# Appendix B

## Figures

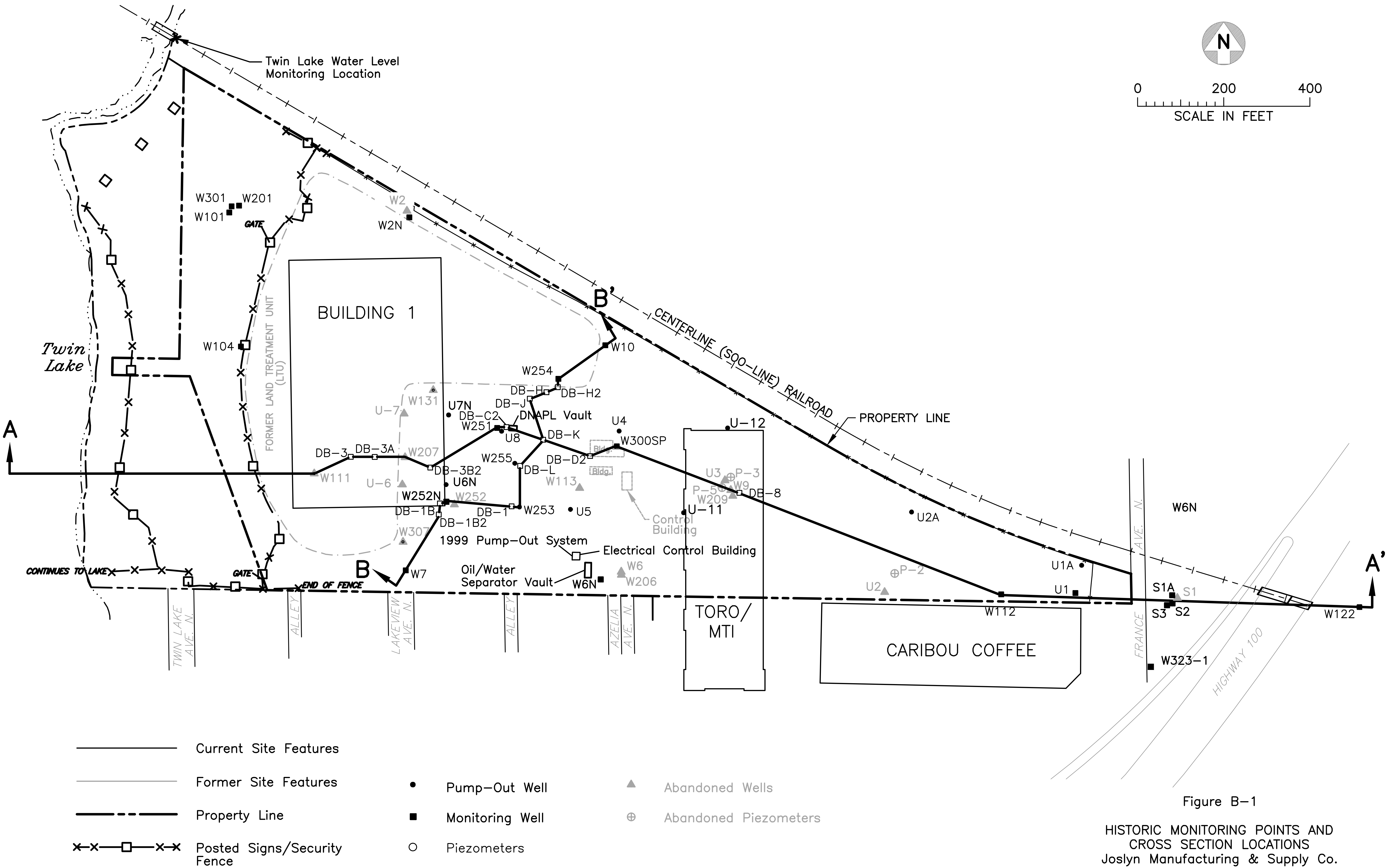
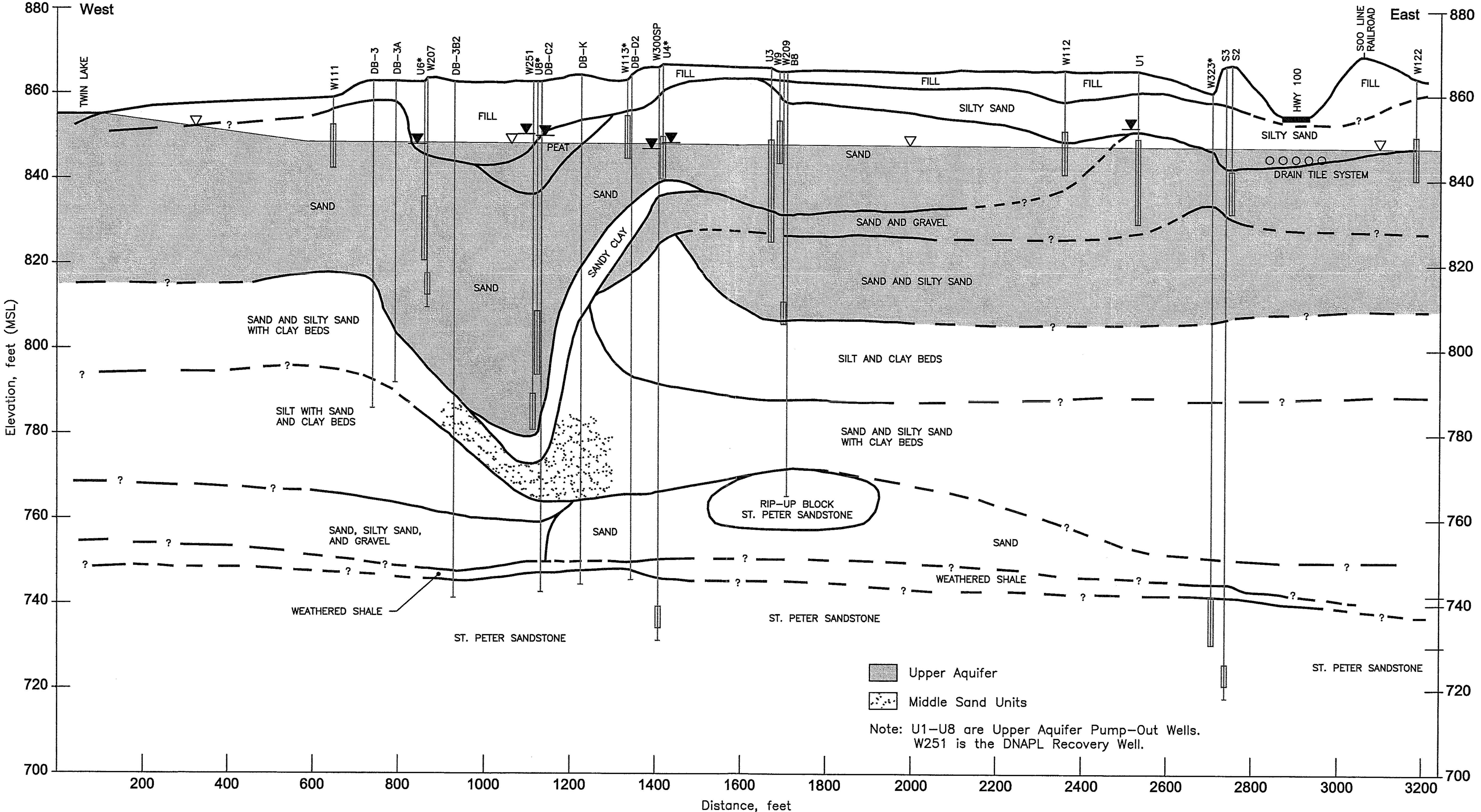


Figure B-1

HISTORIC MONITORING POINTS AND CROSS SECTION LOCATIONS
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

RLG M:\AdeptWork\RLG\2327011000_2010 AR Figure B-1.dwg Plot at 200 03/16/2011 11:23:39



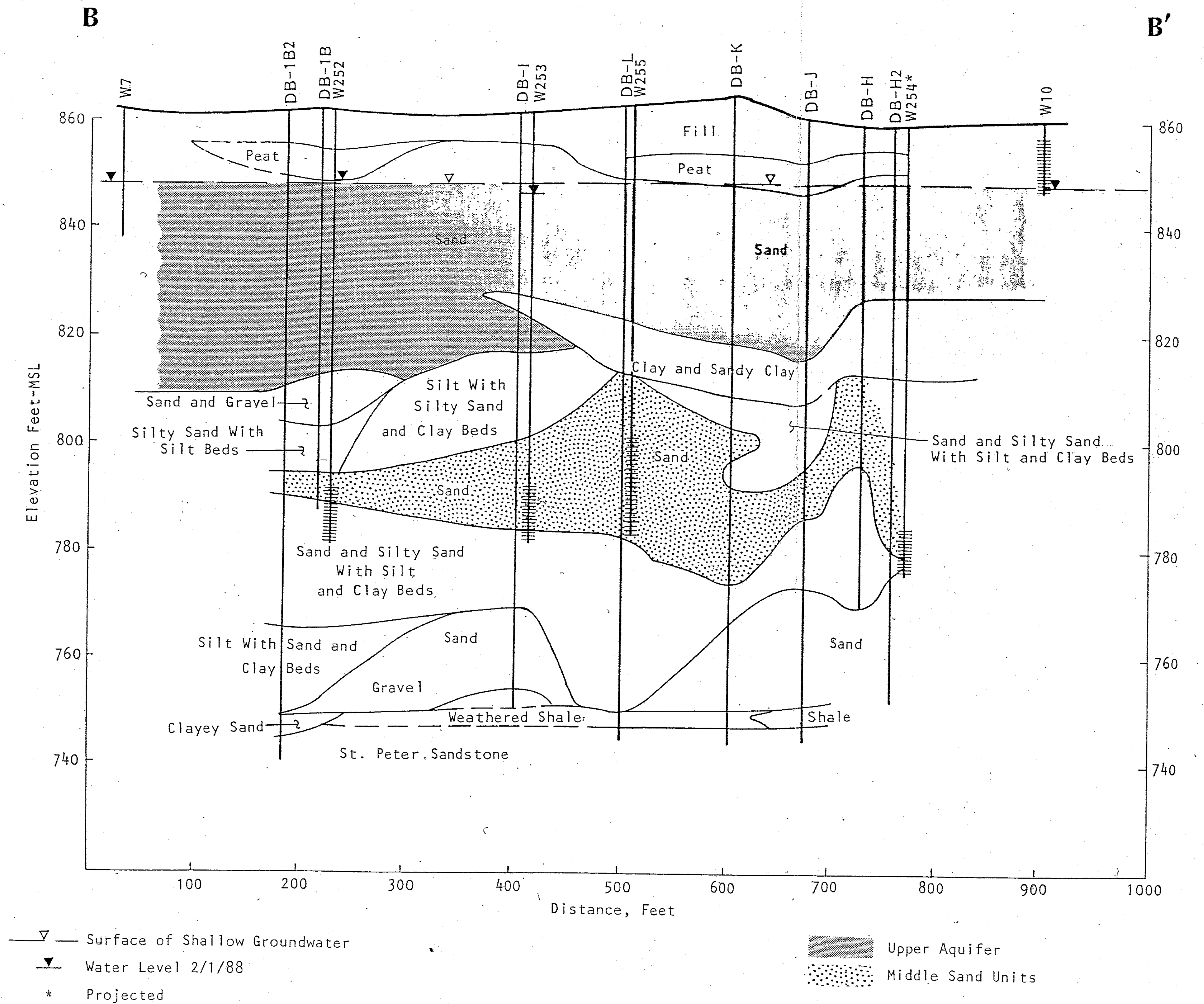
Note: U1–U8 are Upper Aquifer Pump-Out Wells.
W251 is the DNAPL Recovery Well.

▼ Average Water Level 2005
▽ Surface of Average Shallow Groundwater Level 2005
* Projected

Originally Published: Pump–Out System Verification Plans. Brooklyn Center Wood Treating Site. Shallow Groundwater, Middle Sand Groundwater, and Desnse Non–Aqueous Phase Liquid Operatble Units: November 1988, Figure 9 Groundwater Pump–Out Well Configuration Cross Section A–A'

Figure B–2
GEOLOGIC CROSS–SECTION A–A'

mpm M:\cad\2327110\Xsection 18 June 2006\XsectionAA.DWG Plot at 200 7/14/06



Note: W252 & W254 Are Middle Sand Monitoring Wells
W253 & W255 Are Middle Sand Pump-out/Monitoring Wells

Originally Published: Pump-Out System Verification Plans. Brooklyn Center Wood Treatment Site. Shallow Groundwater, Middle Sand Ground Water and Dense Non Aqueous Phase Liquid Operable Units: November 1988 Figure 10 Groundwater Pump-Out Well Configuration Cross Section B-B'

Figure B-3

GEOLOGIC CROSS SECTION B-B'

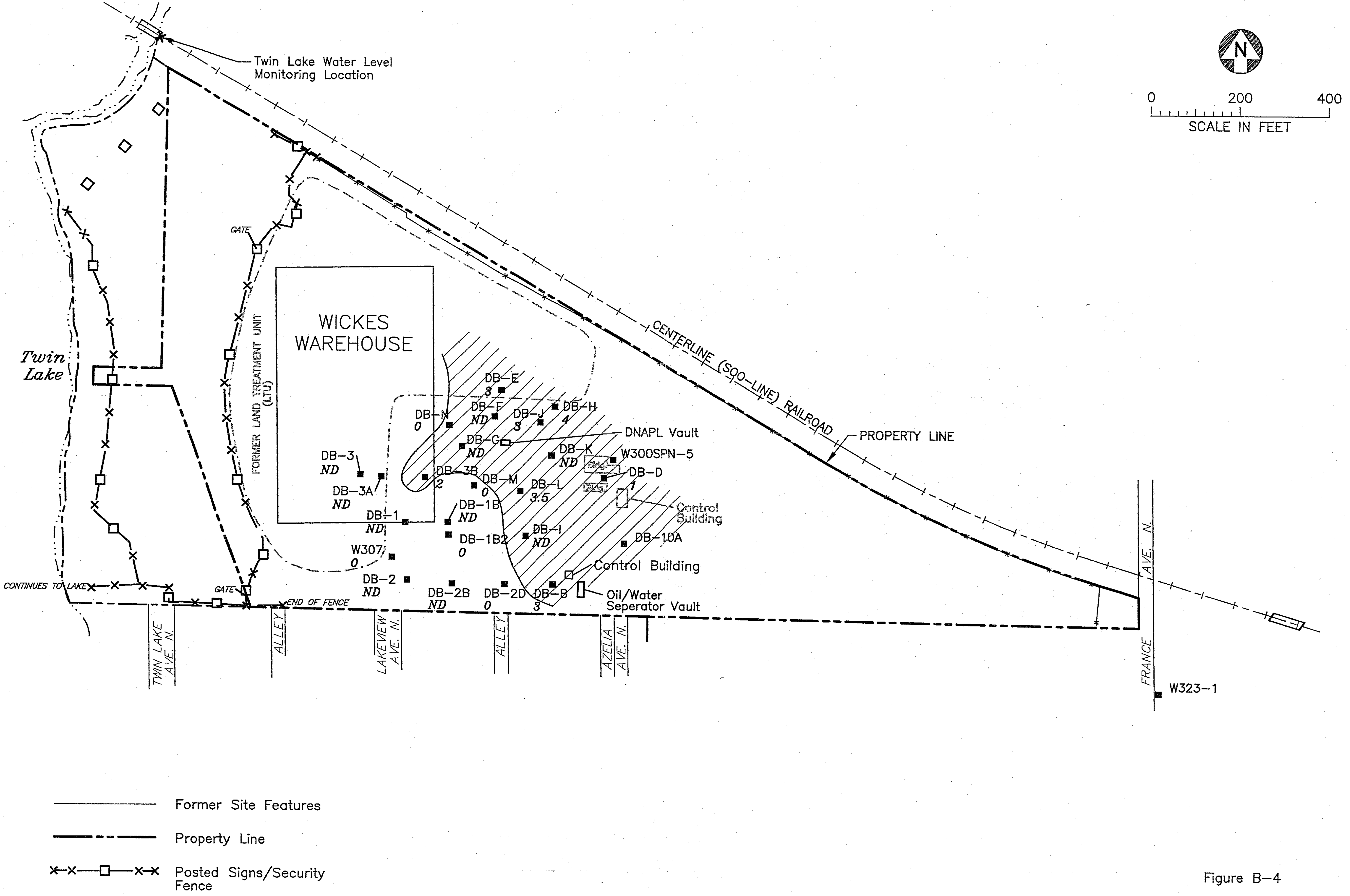
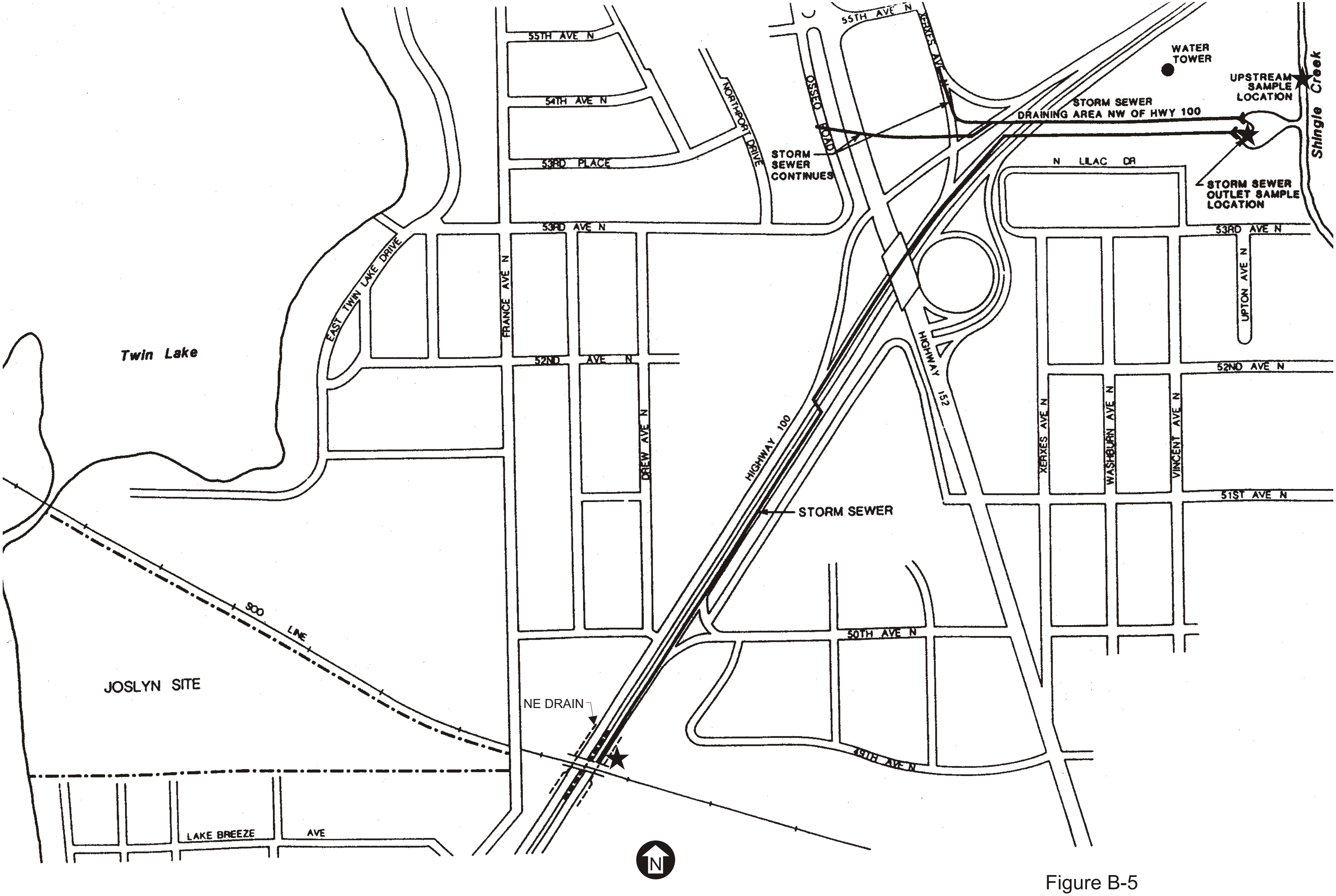


Figure B-4

EXTENT OF WEATHERD SHALE

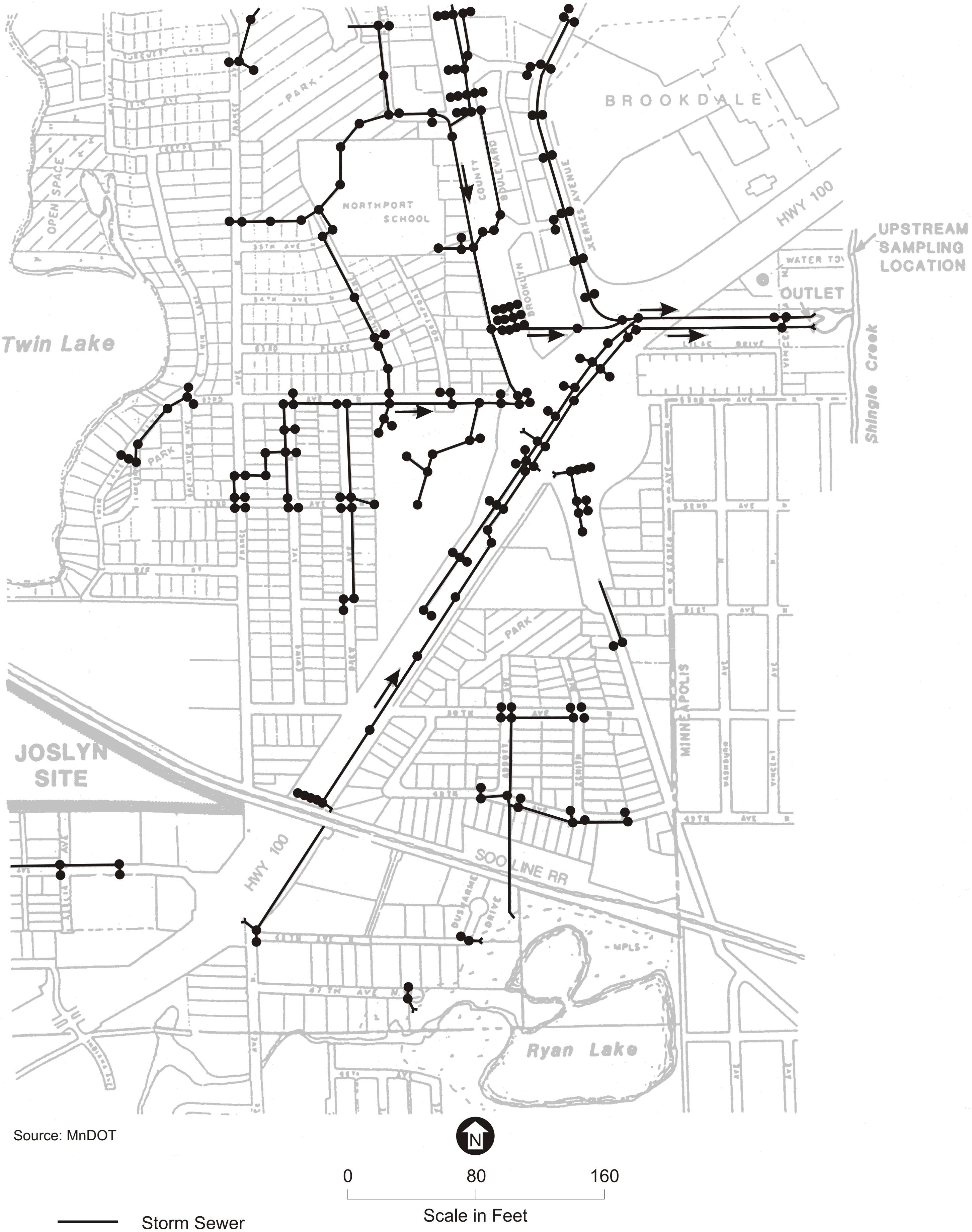
jmw M:\CAD\2327110\18131_1.DWG Plot at 200 04/18/2003 16:05:13



★ Surface Water Sampling Points

Figure B-5

LOCATION OF STORM SEWER FROM NE DRAIN TO THE OUTLET AT SHINGLE CREEK



Source: MnDOT

P:\Mpls\23 MN\27\2327110\MovedFromMpls_P\Graphics\STORM SEWER SERVICE AREA 2.CDR RLG 03-12-12

Figure B-6

STORM SEWER SERVICE AREAS

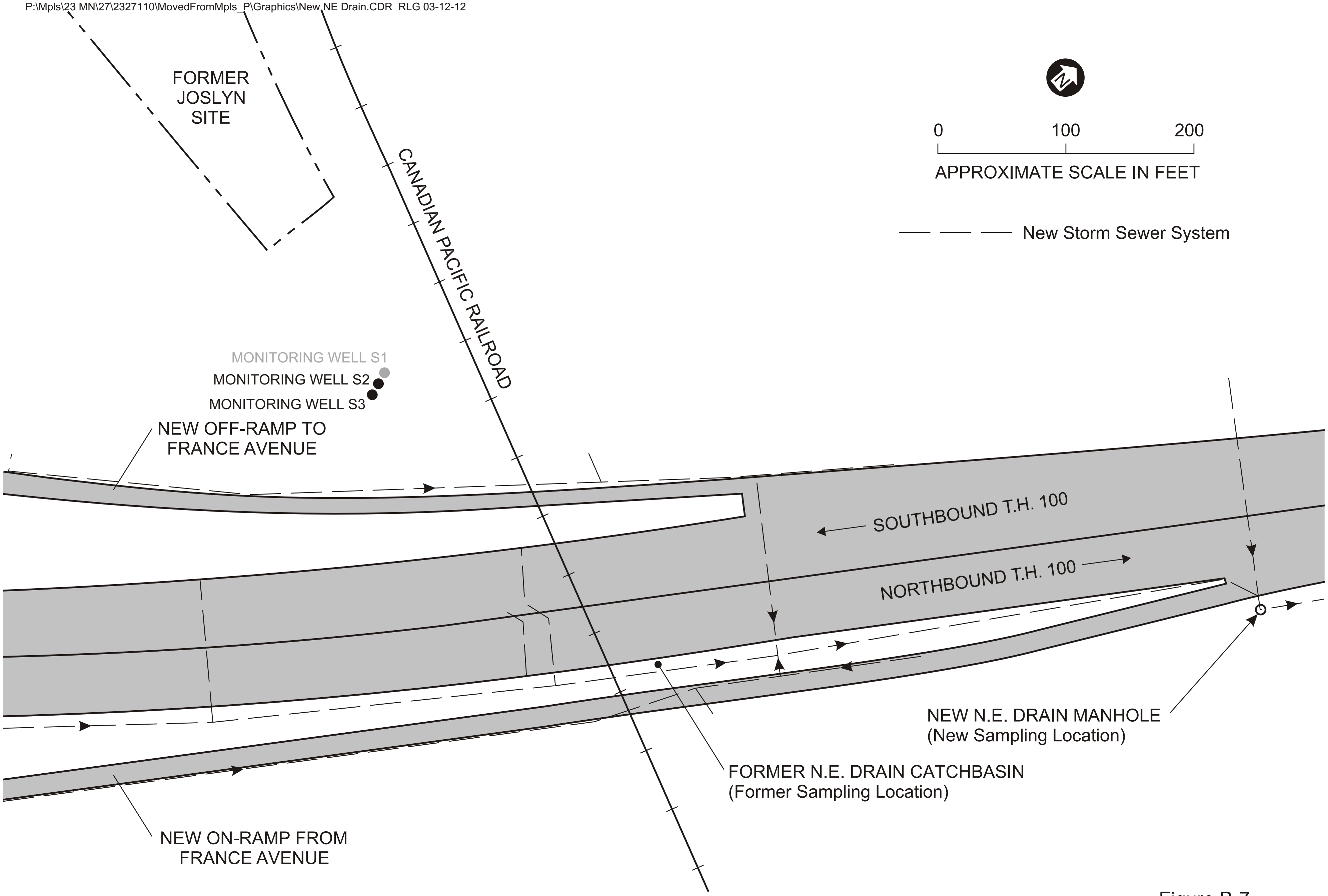


Figure B-7

NEW N.E. DRAIN SAMPLING LOCATION

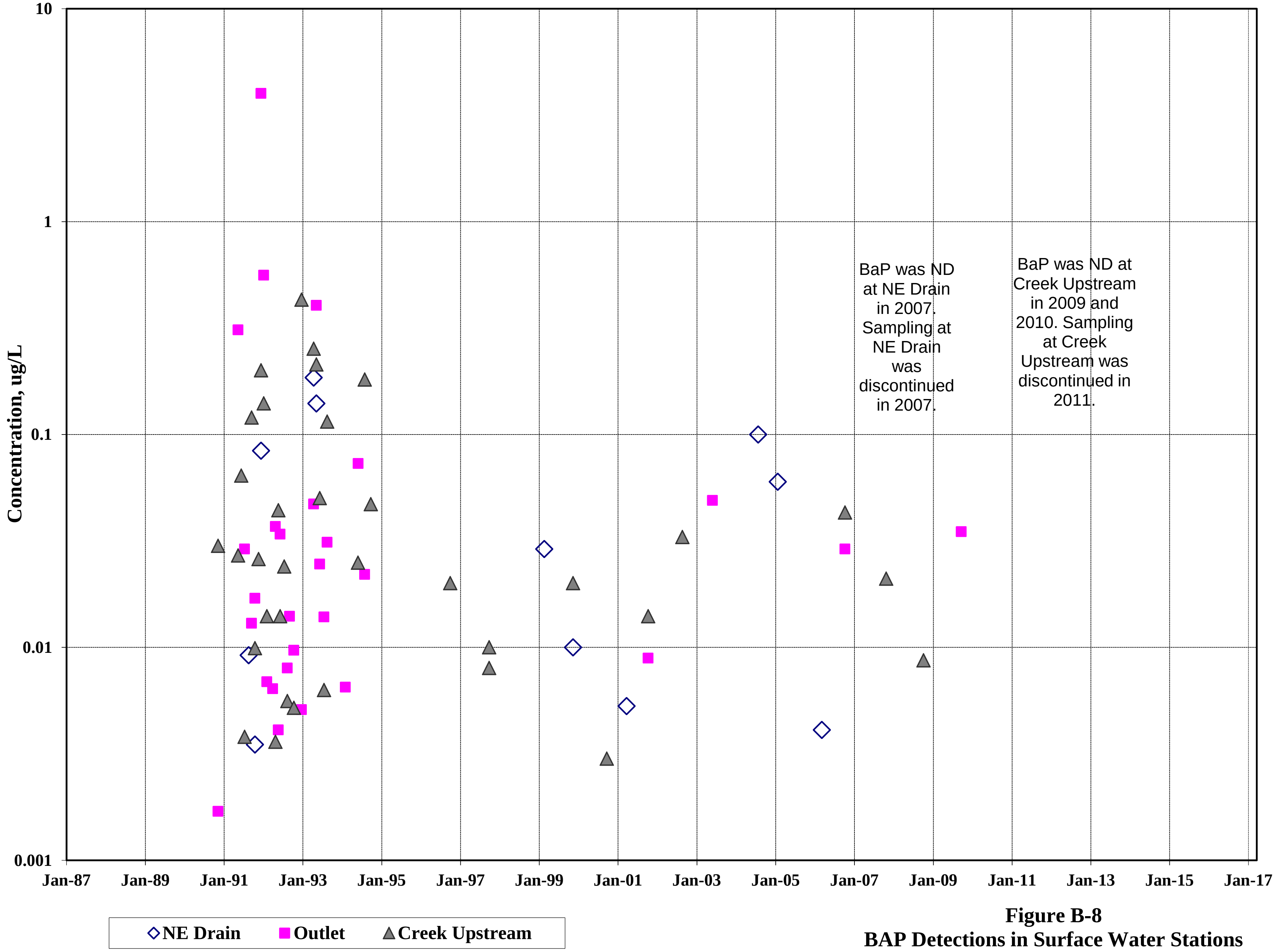


**Figure B-8**
**BAP Detections in Surface Water Stations**

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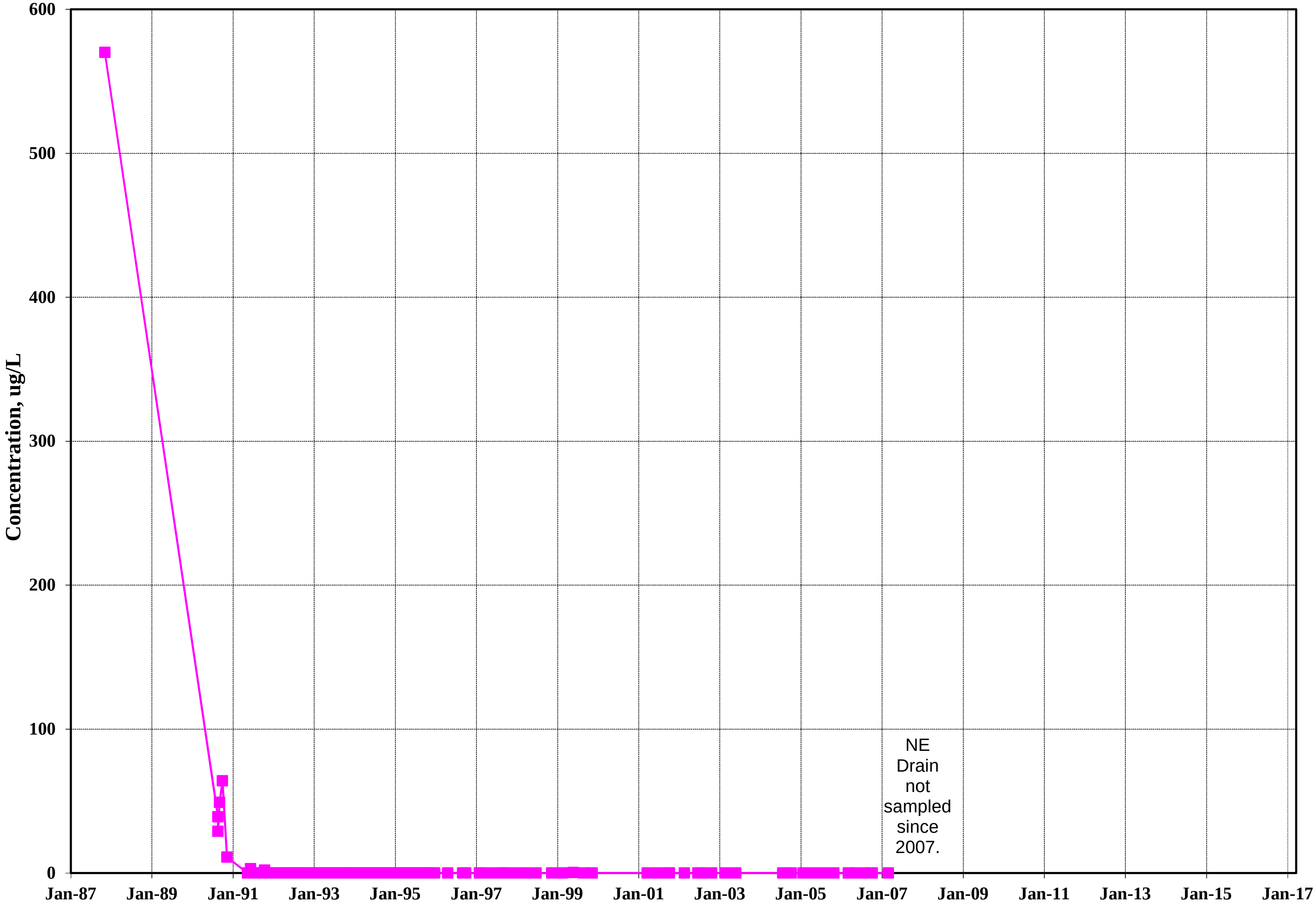

**Figure B-9**
**PCP In NE Drain Samples**

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# Appendix C

## Site Redevelopment and Operation History

# Appendix C

## Site Redevelopment and Operation History

Redevelopment of the Joslyn site began in 1999. Redevelopment at and near the site has included construction of three new buildings, regrading and landscaping, construction of Azelia Avenue across the site, and reconstruction of Highway 100 east of the site. In addition, the City has worked on replacing streets and utilities in the neighborhood south of the site. Joslyn, the redevelopers, the City, the Minnesota Department of Transportation (MnDOT), and the MPCA have coordinated activities and worked together to maintain the operations of the Joslyn remediation systems and to minimize impacts of redevelopment on the remedial systems. In each phase of redevelopment work, Joslyn wells were abandoned and replaced, including some pumpout wells. The result has been several physical changes to the site ground surface contours, surface water runoff and management, the configuration of the Joslyn OU1 pumpout system, and much of the Joslyn groundwater monitoring system. Through these physical changes to the remediation and monitoring systems, the systems have remained effective and in some instances the changes have led to improvements in the remediation systems.

### 1999-2002 Development

In 1999, work began to redevelop the site for new commercial/light industrial businesses. The site was parceled into three lots for development of the France Avenue Business Park. Development of Lot 1 was completed in December 1999, with the construction of a building (Building 1) which was leased as a furniture warehouse by Wickes Furniture.

In 2000, the subgrades were prepared at Lots 2 and 3.

In 2001, construction of an office/warehouse building (Building 2) was completed on Lot 3 (Toro/MTI). A portion of this development extends off the Joslyn site.

In 2002, Azelia Avenue was constructed as a north-south street through the middle of the site. Nearby offsite work in 2002 included: connecting 50th Street to Azelia Avenue on the north side of the site, re-constructing the CP Rail (Soo Line) railroad bridge over Highway 100, and closing France Avenue east of the site. These projects were completed in preparation for the reconstruction of Highway 100 in 2003-04. The re-construction of the CP Rail railroad bridge overpass included dewatering for the construction of new pier and abutment foundations. The dewatering typically continued for about 1 week for each foundation, at rates of 100 to 200 gpm. Barr completed modeling of the dewatering and water level monitoring to confirm the model results.

## 2003-2004 Development

Two major construction projects occurred near the Joslyn site in 2003-2004: the reconstruction of Highway 100 east of the site (including portions of France Avenue), and construction of a new office/warehouse building (Building 3) on Lot 3 which includes the eastern portion of the Joslyn site.

Late in 2003, Twin Lakes Business Park LLC began development of Lot 3, which includes the eastern portion of the Joslyn site. The new building, along with adjacent paved parking lots, was substantially completed by December 31, 2003. The effects this project had on routine Joslyn site operations included:

- Abandonment of well 112.
- Installation of new monitoring well 132 (as a replacement for 112).
- Conversion of pumpout/monitoring well U1 to an at-grade well (completed spring 2004).

In the summer of 2003, MnDOT began a project to reconstruct Highway 100. Joslyn began working with MnDOT far in advance of the start of construction to determine what impacts the project might have on the Joslyn site, and also communicated with the MPCA throughout the project. MnDOT coordinated the Highway 100 project with the MPCA Voluntary Investigation and Cleanup (VIC) program. An application and a preliminary action plan were submitted to the MPCA (May 6, 2003), and action plan addenda were submitted as each new phase of dewatering was assessed (July 21, 2003 letter to MPCA for Phase 1; August 20. 2003 letter to MPCA for Phase 2; October 21, 2003 letter for Phase 3; November 26, 2003 letter for Phase 4). Four dewatering phases resulted in groundwater pumping far in excess (600 to 2400 gpm) of the Joslyn remediation system (about 150 gpm) for periods of many weeks.

The Highway 100 reconstruction project had the following effects on the Joslyn site:

- Abandonment of monitoring wells 123, 223, and 323, which were in the construction zone. Geoprobe sampling was used in 2003 and 2004 to compensate for the loss of wells 123 and 223 (Geoprobe is not capable of reaching the depth of well 323).

- Installation of new monitoring well S-1 (the "sentinel" well) between the Joslyn site and the highway underdrain.

- Temporary re-activation of pumpout well U1 and a general increase in the pumping rate of the OU1 pumpout system. Well U1 was also operated as a pumpout well during the summer and fall of 2004.

- Installation and operation of temporary pumpout wells (the "soldier" wells) to supplement the Joslyn groundwater pumpout system.

- Groundwater flow stresses from temporary construction dewatering for the highway project (note – this report distinguishes between remedial pumping as "groundwater pumpout" and construction pumping as "dewatering").

- Increased monitoring of site wells, both for water level and water quality, including new monitoring well S-1 and the discharges from the soldier wells and the dewatering wells.

- Removal and replacement of the eastern portion of the highway underdrain system referred to in the Joslyn monitoring program as the NE Drain.

It is anticipated that MnDOT will be providing a report to the MPCA VIC program to summarize their mitigation actions during the period of the highway project. As of this writing, Joslyn has not received a copy of that report.

In the short term, the construction dewatering changed groundwater flow paths, slightly altered the shape of the plume, and removed contaminated groundwater. The OU1 and OU2 systems were operated at near-maximum capacity throughout 2003 and 2004 in order to provide the most mitigation available in response to the construction dewatering in 2003. Beginning in 2005, the pumpout rate goal was set back to be in line with typical conditions and after several years of monitoring, there appear to be little, if any, long term effects.

### 2005 Development

MnDOT completed the remaining work on Highway 100 in 2005, primarily final grading and revegetation, which had no short term or long term impact to the Joslyn site remediation.

The City of Brooklyn Center completed reconstruction of Twin Lake Avenue south of the site in late 2005. The project included replacing utilities and reconstruction of the street. The City coordinated this project with the MPCA VIC program. The utility work required dewatering along the length of the street in September and October of 2005. Dewatering was minimized on the northern most block nearest the Joslyn site, both in terms of rate and duration. Monitoring of the groundwater and dewatering discharge was conducted by Short Elliott Hendrickson Inc. (SEH) and is documented in the *Implementation Report, Twin Lake Avenue Dewatering* (SEH, 2005). SEH concluded that the contamination from the Joslyn site was not pulled into the construction area by dewatering activities. The dewatering pumping information is incomplete, and so the effects cannot be accurately modeled.

The following modifications were made to the Joslyn monitoring system in 2005:

- Well 125 was abandoned and a new well, W125N, was installed as a replacement.

- Shallow groundwater was sampled southeast of Building 3 (Caribou Coffee) using Geoprobe (GP-1) to compensate for the loss of wells 123 and 223.

Wells S2 (screened at mid-depth in the upper aquifer) and S3 (screened in the lower aquifer) were installed adjacent to well S1. These wells replaced W223 and W323, respectively.

### 2006 Repairs

In February of 2006, electrical problems resulted in the shutdown of OU1 pumpout system. Repairs were made and the system was brought back online by March 1st, with the exception pumpout wells U1A and U2A. It was determined that the electrical wires to these pumps had short-circuited together. Attempts to pull the damaged wires out of the buried conduit were unsuccessful, and directional drilling was used to install new conduit at about 24 inches below grade primarily in greenspace as well as under existing pavement. The new conduit was installed in July, and the wells were brought back online in August. The 2006 repair work was done in accordance with the Plan for Repair and Contingencies (Barr, 2006b), which was approved by the MPCA on May 19, 2006 (MPCA, 2006). The work is described in the Summary of Repairs for Short of the Electrical Wires for Pumping Wells U1A and U2A (Barr, 2006c).

### 2007 Maintenance and Repairs

In March of 2007, it was noted that the DNAPL recovery system controller did not function at the long-cycle intervals. Long-cycle intervals are now necessary to avoid pumping water due to the low DNAPL level in the recovery well that has resulted from the DNAPL system’s successful operation. The DNAPL pump was shut off for several days at a time throughout the year to allow the well to recover, but this method did not appear to optimize operation or DNAPL recovery. Barr replaced the DNAPL pump controller in December 2007 with one that allows for cycling once over several days, rather than hours, in order to maintain water-free DNAPL recovery.

Replacement of control software for the OU1 and OU2 pumps was also required in 2007. In December, the control software for OU1 and OU2 pumps failed. The original system was no longer supported, so a complete replacement was required. New Product Level Control software was installed, along with a remote system that will provide alerts through the phone line if the system shuts down. The installation of new software and remote access system resulted in the OU1, OU2 and the DNAPL pumpout systems being inoperable for about two weeks. Other repairs in 2007 included replacement of a pump at well U12 and replacement of flow meters for wells U12 and U2A.

## 2007 Program Updates

Changes were made in the 2007 program according to the recommendations in the approved 2006 Annual Monitoring Report. The following modifications were made in 2007 to the pumpout system:

- OU1 (Upper Sand): Pumping at well U1A was ceased (starting in May 2007).

- OU2 (Middle Sand): The pumping duration of the middle sand unit wells was adjusted to two months for W255 and one month for W253 in an alternating pattern to increase mass removal from the more contaminated well, W255.

The following modifications were made in 2007 to the groundwater monitoring program:

- Water level monitoring at wells S2, W252N, W254, W301 and S3 was reduced from quarterly to annually, concurrent with annual water quality monitoring.
- Water quality monitoring at U1A was discontinued and water quality monitoring was increased at U1 from an annual to a quarterly basis to monitor effects of ceasing pumping at U1A.
- Water quality monitoring at wells W125N, W127N, W128 and W129 was discontinued based on repeated results from recent years of PCP and PAH concentrations below levels of concern.
- Water quality monitoring at the NE Drain location was discontinued.

The modifications described above were implemented after approval of the 2006 Annual Report was obtained on March 26, 2007, and therefore the proposed reduced monitoring and pumping schedule was fully implemented later in 2007.

## 2008 Maintenance and Repairs

Replacement of control software for the OU1 and OU2 pumps was required after the control software failed in December 2007. A new programmable logic controller (ProControl Series 2 Plus) with a microprocessor based control and a telemonitoring system to provide remote alerts if the system shuts down was installed late in 2007 and was fully operational in February 2008. Problems were encountered with receiving communication alerts through the cellular modem from the system, so a hard line was installed in June to replace the wireless system. The entire pumpout system was temporarily shut down in May due to problems with the pump control system and for a weekend in October due to problems at the city’s lift station.

Repairs to pumpout wells in 2008 included the following:

- **Well U2A:** The pump at U2A was cleaned on July 29th to increase the achievable pumping rate at this well.

- **Well U4:** A short section of copper line between the flow meter at well U4 and the treatment tank was replaced on March 17.

- **Well U6:** The pump at U6 quit working for about 2 days in July due to a problem with the Product Level Control system.

- **Well U11:** Piping to U11 was modified to allow for cleaning of the lines (pigging) in July. The flow meter on U11 stopped working and the internal parts were replaced in August. Well U11 was also shut down on September 18th and restarted on October 8th for repairs to a leak at a pipe union just outside the well casing. Because the repairs involved soil disturbances, they were done in accordance with a work plan (Barr, 2008a), which was approved by MPCA (September 29 e-mail from Steve Schoff). The details of the repairs were described in an October report (Barr, 2008b).

- **Well U12:** The pump motor on well U12 quit working due to electrical problems in mid-March and was replaced on April 15. The pump at U12 was not operational for a few days in September due to fouling. The pump was cleaned and operational again, but electrical problems with the pump occurred in November, causing shut down of this well from about November 20 through December 5th during troubleshooting and repair of the pump motor in this well.

### 2008 Program Updates

Changes were made in the 2008 monitoring program according to the recommendations in the 2007 Annual Monitoring Report, submitted to the MPCA in July, 2008 (Barr, 2008c). The following modifications were made in 2008 to the OU1 pumpout system:

- The design pumping rate at U5 was reduced from 6 to 4 gpm to prevent air from being drawn into the pump.

- Pump U1A was kept off, except for a period in December to gain additional groundwater recovery lost when other wells were inoperable.

### 2009 Maintenance and Repairs

The system generally operated in 2009 without system-wide shut downs. The following repairs or changes were made to individual wells in 2009:

- **Well U1A**:  The flow meter was cleaned in June. Flow meter was cleaned again and parts were replaced in November.
- **Well U2A**:  On February 26, during routine cleaning of the well's discharge pipeline, the cleaning device (a styrofoam cylinder called a pipe cleaning pig, or pig) became lodge in the pipeline. Several attempts were made to remove the pig, but were unsuccessful and the well is inoperable. On March 12, well U1A was turned on to compensate for the loss of U2A to maintain plume capture on the east side of the site. On May 6, pressurized water was used to attempt to push the pig through the U2A discharge line. The water did not exit the pipe end and appeared to have created a break in the line. Well U2A remained off until repairs were completed in 2010.
- **Well U4**:  A new pump end and coupling were installed on February 6.
- **Well U5**:  Pump end and motor were replaced on November 19.
- **Well U11**:  The flow meter was cleaned on September 10 to remove an obstruction.
- **Well S1**:  Minnesota Department of Transportation inadvertently sealed well S1 in September 2009.

Other repair work in 2009 included the following:

- The explosion proof light fixture in the treatment vault was repaired on January 13, 2009.
- Air compressor oil and filter change was completed on January 23, 2009.

### 2009 Program Updates

No significant changes were made to the groundwater monitoring program in 2009; monitoring in 2009 was conducted as proposed in the 2007 and 2008 Annual Monitoring Report (Barr, 2008a and 2009a).  No changes were made to the pumpout system operations except for shut down of well U2A due to line blockage and restarting well U1A to maintain capture on the east side of the site, as described above.

In 2009, Joslyn requested (Barr, 2009b) and the MPCA approved (MPCA, 2009b) the use of U.S. Environmental Protection Agency's Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons (PAHs) (EPA/600/R-93/0089).  Therefore, beginning in 2009, this guidance was used to calculate the benzo(a)pyrene-equivalent concentrations.

### 2010 Maintenance and Repairs

The system generally operated in 2010 with only temporary system-wide shut downs. The following repairs or changes were made to individual wells in 2010:

- **Well U1:** The well riser pipe elevation was resurveyed on May 14, 2010 to verify previous survey results.

- **Well U1A**: The drop pipe was pulled and cleaned and the pump end replaced with a used one in February. The flow meter was cleaned in October and a new pump end installed in November. The well riser pipe elevation was resurveyed on May 14, 2010 to verify previous survey results.
- **Well U2A**: On February 26, 2009, during routine cleaning of the well's discharge pipeline, the cleaning device (a styrofoam cylinder called a pipe cleaning pig, or pig) became lodge in the pipeline. Several attempts were made to remove the pig, but were unsuccessful and the well became inoperable. Well U1A was turned on in March 2009 to compensate for the loss of well U2A to maintain plume capture on the east side of the site. A portion of the well U2A discharge line was replaced and the remainder of the line was cleaned and repaired in October and November 2010. In addition, the galvanized union fittings that connect the discharge lines to the wells were replaced with brass fittings to prevent corrosion and leakage. Details about the repairs are documented in the Summary of Repairs: Well U2A Water Line, Wells U2A and U12 Fittings (Barr, 2010c). Following the discharge line repairs, a new pitless adaptor, pump motor and pump end and a new flow meter internal parts kit were installed.
- **Well U4**: The breaker to the pump failed in April and was replaced. Other improvements to the control panel were also performed as described below.
- **Well U11**: Replaced the pump motor in February. Cleaned the pump screen and installed a new internal parts kit in the flow meter in November.
- **Well U12:** Installed a new internal parts kit in the flow meter in February. In November the galvanized union fitting that connects the discharge line to the well was replaced with brass fittings to prevent corrosion and leakage. Details regarding the fitting repairs are documented in the Summary of Repairs: Well U2A Water Line, Wells U2A and U12 Fittings (Barr, 2010c). After cleaning the U12 pump and drop pipe, a new pump end was installed later in November.
- **W255:** A new pump (motor and pump end) was installed in February.
- **Well S1A**: Minnesota Department of Transportation inadvertently sealed well S1 in September 2009. Well S1A was installed as a replacement well on May 7, 2010 and surveyed on May 14, 2010. The S1A well installation log is included in Appendix C of the 2012 Annual Monitoring Report.

The following electrical repairs and improvements were completed in 2010:

- Some wiring on the pumpout system control panel shorted out in April, 2010. Muska Electric re-wired the panel and installed a power distribution block to reduce the number of connections and the amount of current traveling through individual wires.
- Lightning damaged the programmable logic controller (PLC) and the surge protection (Safe Snap Barrier) in June. The PLC was repaired by the manufacturer and a new surge protector installed. A PLC was loaned to the project during the repairs to prevent a long duration of system downtime.

- In July, another power surge, originating from the sanitary sewer lift station high float, damaged the programmable logic controller (PLC). The PLC was repaired and a loaner installed to maintain operation of the pumpout system. To address the recurring storm surges, a DIN Rail Surge Protector (Citel Part #DLA-24D3) was installed on the lift station float wiring.

As mentioned previously, excavation was required at the site in 2010 to complete repairs to the water discharge line to well U2A and to replace the galvanized union fittings to prevent future leaks at wells U2A and U12. Repair work began on October 28th, 2010, after notification was made to the MPCA on October 18th. The repairs were conducted in accordance with the MPCA approved plan for repair and contingencies and are documented in a summary report (Barr, 2010b and 2010c). The lines were reconnected and the system turned on again on November 3rd, 2010. Well U2A was restarted on November 19, after receiving and installing a replacement part for this well. This well had been off since February 2009. At the time of this report, the system is operating with both wells U1A and U2A in operation.

## 2010 Program Updates

No significant changes have been made to the groundwater monitoring program since 2007. Groundwater monitoring in 2010 was conducted as proposed in the 2009 Annual Operations and Monitoring Report (Barr, 2010a) and is the same as was proposed in 2008 (Barr, 2009a). The 2008 and 2009 Annual Operations and Monitoring Reports were both approved by the MPCA in January, 2011 (MPCA, 2011a and 2011b). The only modifications made to the pumpout system operations in 2010 included restarting well U2A after removal of blockage from the line in November, as described above. Operation of well U1A was continued throughout 2010 to maintain capture on the east side of the site.

## 2011 Maintenance and Repairs

The system generally operated in 2011 with only temporary system-wide shut downs. The following repairs or changes were made to individual wells in 2011:

- **Well U1A**:
  - On April 21, 2011, a new well pump motor starter [part number ABB A26-30-10(84) 120v] was installed.
  - On May 4, 2011, water was found bubbling up through a crack in the paved parking area just west of well U2A. Field activities including line pressure testing and direct push soil borings confirmed the line and leak area. A portion of the well U1A discharge line was replaced and the remainder of the line was cleaned and returned to operation on July 20, 2011. Details regarding the repairs are documented in an August 4, 2011 letter to the MPCA (Barr, 2011c).
  - In November 2011 a new pump motor was installed and in December the pump end (Gundfos model 25S20-11) was replaced.

    - The flowmeter and the water discharge transfer pipeline were both cleaned as necessary.
- **Well U2A**:
    - Routine cleaning of the well's discharge pipeline and flowmeter was completed as necessary. Control panel on/off switch failed and a new switch was installed September, 2011.
- **Well U4**: Control panel on/off switch failed and a new switch was installed September, 2011.
- **Well U11**:
    - Routine cleaning of the well's discharge pipeline and flowmeter was completed as necessary.
    - Control panel on/off switch failed and a new switch was installed September 19, 2011.
    - In December a new pump motor (Franklin Electric ¾ HP 230v) was installed and the pump inlet cleaned.
- **Well U12:** Routine cleaning of the well's discharge pipeline and flowmeter was completed as necessary.
- **DNAPL Pump:**
    - In March 2011 the solenoid valve controlling the pump air supply was noted to be damaged and stuck in the open position, so it was replaced.
    - On November 4, 2011, the air control solenoid was removed for cleaning and found to be not repairable. The recovery pump was operated manually until December 16, when a new 2-way valve was installed to operate in conjunction with the original 3–way air supply valve. The system was returned to automatic operation after installation and testing of the new valve configuration. The DNAPL recovery pump was set to be activated or supplied with air approximately every 14 hours for approximately 4 minutes.

The following electrical repairs and improvements were completed in 2011:

- In July, a power surge, originating from the sanitary sewer lift station high float, damaged the programmable logic controller (PLC). The PLC was repaired and a loaner installed to maintain operation of the pumpout system. To address the recurring storm surges, a 24 volt powered isolation relay was installed on the lift station float wiring.
- In December, the main pump power supply 100 amp circuit breaker failed to reset and was replaced with a new part.

As mentioned previously, excavation was required at the site in 2011 to complete repairs to the water discharge line from well U1A and to replace a section of discharge line using directional drilling equipment. U2A was taken offline during U1A repair work due to the close proximity of power supply and discharge pipelines. Repair work began on July 19, 2011, after notification was made to the MPCA on June 14th (Barr, 2011b). The repairs were conducted in accordance with the MPCA approved plan for repair and contingencies and are documented in a summary report (Barr, 2011b and 2011c). Line repair was completed and well U1A and U2A resumed operation on July 20th, 2011.

### 2011 Program Updates

Groundwater monitoring in 2011 was conducted as proposed in the 2010 Annual Operations and Monitoring Report (Barr, 2011a). The 2010 Annual Operations and Monitoring Report, was approved by the MPCA on February 8, 2012 (MPCA, 2012a). Surface water quality monitoring was discontinued in 2011, in accordance with the approved 2011 monitoring program. A modification to the pumpout system operations in 2011 included replacement of a section of well U1A discharge line to repair a leak. Operation of well U1A was continued throughout 2011 to maintain capture on the east side of the site.

### 2012 Property Transaction

All the parcels that make up the Joslyn Site, except for OU5, were purchased by Artis REIT in July 2012 and are currently being managed by CBRE, Inc. The property transaction did not alter any ownership or operational responsibilities with regard to the RAP. Joslyn remains the owner of the pumpout system and its components, and the deed restrictions on the parcels are binding and remain in place.

### 2012 Maintenance and Repairs

The system generally operated in 2012 with only temporary system-wide shut downs. The following repairs or changes were made to individual wells in 2012:

- **Well U1A**:
    - A new pump end (Gundfos model 25S20-11) was installed in June.
    - The flowmeter and the water discharge pipeline were both cleaned as necessary.
- **Well U2A**:
    - New pump ends (Gundfos model 40S20-7) were installed in February and November.
    - A new pump motor (2 HP) and control box was installed in June.
    - The well's discharge pipeline and flowmeter were cleaned as necessary.
- **Well U11**:
    - The well's discharge pipeline and flowmeter were cleaned necessary.
    - In May the well was treated with acid and redeveloped in an effort to improve declining flowrates. Redevelopment water was containerized, treated with soda ash to bring the pH above 5.0 before pumping to the oil-water separator and discharged to the sanitary sewer. The work was performed with approval from the Metropolitan Council Environmental Services (MCES) under Joslyn's special discharge permit No. 2013 (MCES, 2012).

    - In December, a new pump end (Gundfos model 25S07-5) was installed and the pump inlet cleaned.
- **Well U12:**
    - Routine cleaning of the well's discharge pipeline and flowmeter was completed as necessary.
    - In May, the well was treated with a granular acid and catalyst and redeveloped in an effort to improve declining flowrates, as described above for Well U11.
    - A new 5 HP pump motor was installed in May.
    - A new pump end (Gundfos model 60S50-9) was installed in November.
- Other pumpout well flow meters were cleaned in December and internal parts were replaced as needed.
- **DNAPL Pump:**
    - Routine cleaning of the well pump was completed as necessary.
    - A new regulator and filter assembly was installed in January.
    - A new pump on/off cycle timer was installed in January to allow for more exact pump on/off time adjustments.
    - In May, inspection of the DNAPL pump indicated that the 3-way pump air supply solenoid valve was sticking, reducing the DNAPL recovery. The valve was removed and replaced with a 1/2"x4.0" pipe. The 3-way valve was no longer needed after a new 2-way valve was installed on the control building air compressor in 2011.
    - Pumping tests were conducted approximately monthly for a period in 2012 and the system timer on/off cycle was adjusted as needed to optimize product removal and minimize water intake.

The following improvements and other maintenance items were completed in 2012:

- Water that had accumulated in the subsurface DNAPL vault was pumped out in April and discharged to the sanitary sewer through the oil-water separator.
- The piping and valve assemblies for the well influent piping in the oil-water separator vault were replaced in June. Replacement was warranted based on the age and condition of the pipes to improve operation of the valves and to prevent future leaks due to corroded piping.
- In September, the pipe exiting the oil-water separator at the effluent piping elbow and was cleared with a hose and flushed with potable water to remove buildup that was restricting flow.

## 2012 Program Updates

Groundwater monitoring and pumpout system operation in 2012 was conducted as proposed in the 2011 Annual Operations and Monitoring Report (Barr, 2012) and was approved with modifications by the MPCA on July 25, 2012 (MPCA, 2012b). The modification included resuming water quality monitoring of well W7 to monitor the plume extent to the south. Pumpout well U1A was turned off in October 2012 after monitoring results indicated it was not needed to maintain capture of the OU1 plume, as approved by the MPCA (MPCA, 2012b).

Additional monitoring was performed in 2012 beyond the scope of the routine monitoring program to monitor the potential effects of construction dewatering activities south of the site, as described in Appendix E of the 2012 Annual Monitoring Report (Barr, 2013). The results of the monitoring did not indicate any changes to the monitoring program were needed in response to the dewatering.

### 2013 Maintenance and Repairs

The system generally operated as planned in 2013 with only temporary system-wide shut downs. The following repairs or changes were made to individual wells in 2013:

- **Well U2A**:
    - New pump end (Gundfos model 25S10-7) was installed in July.
    - In July the well casing and screen was jetted with high pressure water and the well redeveloped in an effort to improve declining flowrates. Redevelopment water was containerized and pumped to the oil-water separator and discharged to the sanitary sewer.
    - Well pad repair completed in May.
    - The well's discharge pipeline and flowmeter were cleaned as necessary.
- **Well U4:**
    - In February the well casing and screen was jetted with high pressure water and the well redeveloped in an effort to improve declining flowrates. Redevelopment water was containerized and pumped to the oil-water separator and discharged to the sanitary sewer.
    - The well's discharge pipeline and flowmeter were cleaned as necessary.
- **Well U11**:
    - In March the well casing and screen was jetted with high pressure water and the well redeveloped in an effort to improve declining flowrates. Redevelopment water was containerized and pumped to the oil-water separator and discharged to the sanitary sewer.
    - The well's discharge pipeline and flowmeter were cleaned as necessary.
- **Well U12:**
    - The well's discharge pipeline and flowmeter were cleaned as necessary.
- **Well U255:**

    - New pump end (Gundfos model 7S05-08 replaced 7S03-08) was installed in September.
- Other pumpout well flowmeters were cleaned and internal parts were replaced as needed.
- **DNAPL System:**
    - Pumping tests were conducted monthly in 2013 and the system timer on/off cycle was adjusted as needed to optimize product removal and minimize water intake.
    - DNAPL vault exterior manholes and vents resealed to prevent water intrusion.

## 2013 Groundwater Monitoring Program Updates

No significant changes have been made to the groundwater monitoring program since 2007. Groundwater monitoring in 2013 was conducted as proposed in the 2012 Annual Operations and Monitoring Report (Barr, 2013), with the addition of annual water quality monitoring at offsite well W127.

## 2014 Maintenance and Repairs

The system generally operated as planned in 2014 with only temporary system-wide shut downs. The following repairs, changes and maintenance was performed on system components in 2014:

- The oil/water separator tank exterior, associated piping and the stairs in the tank vault was refinished to address rust and provide future corrosion protection. The refinishing consisted of sandblast surface preparation, application of two coats of epoxy, humidity controls and quality testing of the final coat. The work required shutting off the groundwater pumpout system from May 27 through June 9.
- Control panel electrical components and wiring repair and replacement completed as necessary.
- Discharge pipeline cleaning was conducted on wells U2A, U11 and U12 as needed.
- Monthly treatments with chlorine granules to reduce iron bacteria buildup in the well screen and transfer line were applied to wells U2A, U4, U11 and U12.
- Pumpout well flowmeters were cleaned and parts were replaced as needed.

- **Well U7:**
    - In March wiring connections in the electrical junction box adjacent to the well required repair due to ice and water infiltration into the box.
- **Well U12:**
    - A new pump motor [Franklin Electric 5 Horsepower (HP)] was installed in August.
- **Well W255:**
    - Pump service was completed in January to removed build up the pump inlet.

  - A new pump motor (Franklin Electric ¾ HP) and pump end (Gundfos model 10E07-11) was installed in July.

- **DNAPL (Dense Non-Aqueous Liquid) Pumpout System:**
  - Pumping tests were conducted monthly in 2014 and the system timer on/off cycle was adjusted as needed to optimize product removal and minimize water intake.
  - DNAPL vault exterior manholes and vents were resealed to prevent water intrusion.
  - In November, standing water resulting from infiltration into the DNAPL tank outer vault was pumped out of the vault, containerized, and transferred to the oil/water separator tank.

### 2014 Groundwater Monitoring Program Updates

Capture by the groundwater pumpout system in 2014 was modeled using a MODFLOW model that was refined based on new hydraulic conductivity data collected in 2015. The 2015 refined model will continued to be used for future evaluations of groundwater pumpout system capture. Groundwater monitoring in 2014 was conducted as proposed in the 2013 Annual Operations and Monitoring Report (Barr, 2014). The 2013 report was approved by the MPCA on September 17, 2014 (MPCA, 2014).

### 2015 Maintenance and Repairs

The system generally operated as planned in 2015 with only temporary system-wide shut downs. The following repairs, changes and maintenance activities were performed on system components in 2015:

- Control panel wiring repair and installation completed during replacement of the high water alarm float in the sanitary sewer manhole, after it was damaged by city workers during sanitary sewer root-augering activities.
- Discharge pipeline cleaning was conducted on wells U2A, U11 and U12 as needed.
- Monthly treatments with chlorine granules to reduce iron bacteria buildup in the well screen and transfer line were applied to wells U2A, U4N, U11 and U12.
- Pumpout well flowmeters were cleaned and parts were replaced as needed.
- **Well U6N:**
  - A new pump end [25S07-5] and motor [Franklin Electric ¾ Horsepower (HP)] was installed in July.
  - Well jetting, surging and cleaning was performed from June 16 through June 19, 2015. Approximately 1,100 gallons of water were used in the jetting of this well. The water was collected and pumped into the oil water separator tank. Sandy material removed from the well was placed in to a 55 gallon drum and stored in the control building.

- **Well U11:**
  - Well jetting, surging and cleaning was performed from June 16 through June 19, 2015. Approximately 1,100 gallons of water were used in the jetting of this well. The combined volume of water from Wells U6N and U11 was approximately 2,200 gallons. The water was collected and pumped into the oil water separator tank. Sandy material removed from the well was placed in to a 55 gallon drum and stored in the control building. The combined volume of sand from Well U6N and U11 was approximately 35 gallons.

- **Well U12:**
  - A new pump end [40S50-15] and motor [Franklin Electric 5 Horsepower (HP)] was installed in February.
- **DNAPL (Dense Non-Aqueous Liquid) Pumpout System:**
  - Pumping tests were conducted monthly in 2015 and the system timer on/off cycle was adjusted as needed to optimize product removal and minimize water intake.
  - DNAPL vault exterior manholes and vents were resealed to prevent water intrusion.
  - On November 9, 2015, water was found in the interstitial space between the inner and secondary outer walls of the DNAPL tank, indicating a potential leak in the outer tank wall. The DNAPL pump was immediately turned off. On December 7, 2015 all material in the DNAPL tank was removed and transported to Deer Park, Texas for disposal, as documented in Section 4.3. Standing water resulting from infiltration was also pumped out of the DNAPL tank outer vault, containerized, and transferred to the oil/water separator tank at that time. The water between the inner and outer tank walls was pumped out and was not observed to contain DNAPL. A pressure test completed on December 15, 2015, confirmed a leak in the interstitial space between the tank walls. All evidence indicates that the inner tank wall is stable and DNAPL has not leaked from the tank, but that the outer wall of the tank is compromised, and no longer provides secondary containment. The DNAPL recovery system remains off until replacement options for the DNAPL tank are evaluated and a new containment system is selected and installed.

## 2015 Groundwater Monitoring Program Updates

Capture by the groundwater pumpout system in 2015 was modeled using a MODFLOW model that was refined based on new hydraulic conductivity data collected in 2015. The MPCA approved the groundwater model data collection work plan via email on May 14, 2015, and concurred with the model refinement approach during a phone call on September 24, 2015. The 2015 refined model will continued to be used for future evaluations of groundwater pumpout system capture. Additional information on the model refinement can be found in Section 4.1.4 and Appendix E of the 2014 Annual Operations and Monitoring Report (Barr, 2015).

## References:

Barr, 2006b. *Plan for Repair and Contingencies, Electrical Wires for Pumping Wells U1A and U2A. Joslyn Manufacturing Company.* May 2006.

Barr, 2006c. *Summary of Repairs for Short of the Electrical Wires for Pumping Wells U1A and U2A Joslyn Manufacturing Company.* May 2006.

Barr, 2008a. *Plan for Repair and Contingencies. Water Line Pumping Well U11. Joslyn Manufacturing Company.* September, 2008.

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Barr, 2009b. Letter from Dale Finnesgaard of Barr to Michael Kanner of the MPCA regarding request to use EPAs provisional guidance for quantitative risk assessment of polycyclic aromatic hydrocarbons. April 30, 2009.

Barr, 2010a *2009 Annual Operations and Monitoring Report, Operable Units 1, 2, and 3. Joslyn Manufacturing & Supply Company.* June, 2010.

Barr, 2010b. *Plan for Repair and Contingencies. Well U2A Water Line, Wells U2A and U12 Fittings. Joslyn Manufacturing & Supply Company.* September, 2010.

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Barr, 2011a *2010 Annual Operations and Monitoring Report, Operable Units 1, 2, and 3. Joslyn Manufacturing & Supply Company.* June, 2011.

Barr, 2011b. Letter from Jennifer Brekken to Steven Schoff of the MPCA regarding Addendum No. 1 to the Plan for Repair and Contingencies, Well U2A Water Line and Wells U2A and U12 Fittings, for the Joslyn Manufacturing & Supply Co. Site. June 14, 2011.

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Barr, 2015. 2014 Annual Operations and Monitoring Report, Operable Units 1, 2, and 3. Joslyn Manufacturing & Supply Co. August, 2015.

MPCA, 2006. Letter from Gerald Stahnke of MPCA to Paul Hyde of Real Estate Recycling, LLC, approving and modifying the Plan for Repair and Contingencies Electrical Wires for Pumping wells U1A and U2A. May 19, 2006.

MPCA, 2009b. Letter from MPCA to Carl Grabinski of Joslyn concurring with the request to use the USEPA 1993 Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons to evaluate PAHs at the site. May 26, 2009.

MPCA, 2011a. Letter from MPCA to Carl Grabinski of Joslyn approving the 2008 Annual Report. January 20, 2011.

MPCA, 2011b. Letter from MPCA to Carl Grabinski of Joslyn approving the 2009 Annual Report. January 20, 2011.

MPCA, 2012a. Letter from MPCA to Carl Grabinski of Joslyn approving the 2010 Annual Report with modifications. February 8, 2012.

MPCA, 2012b. Letter from MPCA to Carl Grabinski of Joslyn approving the 2011 Annual Report with modifications. June 25, 2012.

MPCA, 2014. Letter from MPCA to Carl Grabinski of Joslyn approving the 2013 Annual Report. September 17, 2014.

Short Elliott Hendrickson Inc. (SEH), 2005. *Implementation Report, Twin Lake Avenue Dewatering, MPCA VIC No. VP20210, City of Brooklyn Center, Minnesota.* December 28, 2005.

# Appendix D

## Quality Assurance Evaluation

# Appendix D

# Quality Assurance Evaluation

Quality control data from the monitoring program was evaluated to assess the integrity of the sampling procedures and the validity of the analytical results for the 2016 monitoring period. The review was performed in accordance with the Joslyn Quality Assurance Project Plan (QAPP), Revision 3.0, dated September 2016 (Barr, 2016b). Sample collection and analysis performed prior to September 28, 2016 were completed under the previous QAPP, dated December 2000 (Barr, 2000a). The quality control procedures followed during the collection and analysis of the samples in 2016 are described in the QAPP that was in effect at the time of the work.

Five iron bacteria maintenance (pigging or jetting) events took place at the Joslyn Site in 2016 and the subsequent samples collected were analyzed for pH, chemical oxygen demand (COD), and total suspended solids (TSS). Legend Technical Services (Legend) located in St. Paul, Minnesota performed the analyses prior to September 28, 2016, and ALS Environmental (ALS) located in Kelso, Washington performed subsequent analyses in accordance with the 2016 QAPP (Barr, 2016b). The method for pH analysis was modified after September 2016 from a laboratory method to a field method in accordance with the 2016 QAPP. This data evaluation includes sample data contained within Legend reports 1601092, 1602129, 1603917, and 1604085 and ALS report K1613449.

Groundwater monitoring well, pumpout well, and effluent samples collected during 2016 were analyzed for polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP). Effluent samples were also analyzed for pH, oil and grease, TSS, and COD. These analyses were performed by ALS. As described above, the pH analysis being performed in the laboratory was phased out after September 2016 and changed to a field method in accordance with the 2016 QAPP. This data evaluation includes sample data contained within ALS reports K1601155, K1607321, K1610781, K1612456, K1612548, K1612750, and K1612825.

Both field sampling and laboratory analytical procedures were examined in the review. Field sampling procedures were evaluated utilizing field blank samples and field (masked) duplicate samples analyses. Laboratory procedures were evaluated utilizing technical holding times, preservation procedures, method blank samples, accuracy data, precision data, and data package completeness. Barr-defined qualifiers, based on USEPA-defined qualifiers, were assigned for this project during the evaluation process.

## Field Quality Control

Field blanks were collected to monitor contamination from any or all the following sources: sample containers, sampling techniques, sample transport, and sample storage. Two field blank samples were collected during the fall groundwater monitoring event. The samples were sent to ALS for analysis of PAH and PCP. Naphthalene and 2-methylnaphthalene were detected above the reporting limit in both of the field blank samples. Because field blank detections had been observed at similar sites and over previous monitoring events, a study was conducted by ALS to investigate the possible source of the field blank contamination. ALS and Barr determined that the container in which the laboratory shipped field blank water to Barr was the issue. Future blank water will be shipped in glass containers. No other target parameters were detected above the reporting limits in any of the field blank samples.

Field (masked) duplicate samples were collected and analyzed to determine the precision of the sampling and analysis protocol. The precision was determined by calculating the relative percent differences (RPDs) for the field duplicate sample data pairs where both the original and field duplicate sample concentrations were greater than five times the reporting limit and were not qualified. The RPD formula is as follows:

$$RPD = \frac{|S - D|}{(S + D)/2} \; x \, 100$$

Where: RPD = relative percent difference
S = original sample result
D = duplicate sample result

Two field duplicate samples (U11 and W132) were collected and sent to ALS for analysis during the 2016 fall groundwater monitoring event. The RPDs calculated for the field duplicate samples met the project goal of ≤ 30 percent, reflecting acceptable precision in the sampling and analysis protocol with the following exception. The naphthalene RPD for sample U11, and the associated field duplicate, was above 30 percent. The results were qualified "*" as estimated in the data summary table. The calculated RPDs are in Table D-1.

An on-site audit of sampling activities was conducted in 2014, and another is planned for 2019 (every five years) in accordance with the QAPP (Barr, 2016b).

## Laboratory Quality Control

ALS and Legend conduct quality control/quality assurance procedures on an ongoing basis to validate the data generated by their analytical systems. Established acceptance criteria are used to judge the degree of precision and accuracy obtained by the analytical processes. Laboratory procedures were evaluated based on technical holding times, preservation procedures, method blank samples, accuracy data, precision data, and data package completeness.

Technical holding times and preservation procedures were evaluated for each sample and target parameter based on USEPA and method recommendations. The pH results were qualified "h" as outside of hold if more than 7 days passed between sample collection and analysis. The technical holding times were within criteria for the analyses with the following exception, the spring groundwater samples (U1, W6N, and W7), collected on June 30, 2016, were not analyzed by the Selective Ion Monitoring (SIM) method at the laboratory. Barr noted this during their data review and requested the laboratory to reextract and analyze the samples using SIM even though the extraction holding time of 7 days would be exceeded. Barr further instructed the laboratory to reanalyze only those parameters that were not detected in the original non-SIM analysis to obtain the lower reporting limits (RLs) provided with SIM. Parameters that had detections with the non-SIM analysis were not reanalyzed. The results reported from the SIM analysis have been qualified "h" in the data summary table.

The samples collected during the various sampling events arrived at the laboratories at the correct temperatures and with the appropriate chemical preservative with the following exception, the three COD samples collected on September 2, 2016 were not at a pH < 2 upon arrival at the laboratory. The COD results were qualified "h" in the data summary table.

Laboratory method blank analyses are used to determine the existence and magnitude of any contamination introduced at the laboratory. ALS and Legend prepared and analyzed method blank samples at the appropriate frequency as required by the methods during the analysis of the project samples. No target compounds were detected above the RLs in any of the method blank samples with the exception of naphthalene in the 8270D SIM analysis for groundwater samples collected on June 30, 2016. Sample concentrations less than five times the method blank detection were qualified "b" in the data summary table. Any sample concentrations greater than five times the method blank detection were not qualified.

The accuracy and precision data review included evaluation of laboratory control spike sample (LCS), laboratory control spike duplicate sample (LCSD), matrix spike sample (MS), matrix spike duplicate sample (MSD), surrogate standards and duplicate sample data. Accuracy was evaluated by comparing laboratory percent recoveries from LCS, LCSD, MS, and MSD samples, and surrogate standards to QAPP acceptance criteria. Precision was evaluated by calculating the RPD of the LCS/LCSD sample pairs, MS/MSD sample pairs, and laboratory duplicate samples.

All LCS and LCSD percent recoveries and RPDs met QAPP acceptance criteria with the exception of three LCS/LCSD RPD values; however, no data needed to be qualified because the recoveries were within the QAPP acceptance criteria and the laboratory noted a possible low bias of the LCSD sample results due to over-acidification.

MS/MSD sample results reported by the laboratory included project and non-project specific samples. Where MS/MSD sample recoveries and/or associated RPDs failed acceptance criteria and the original sample was associated with another project, acceptance of the sample results was based on the LCS and LCSD data. Results of MS/MSD samples not specific to this project are not discussed in this report. The MS/MSD results met QAPP acceptance criteria for the percent recoveries and RPDs of the target compounds analyzed for the project.

Surrogate standards were evaluated by comparing the percent recoveries of the surrogate standards in the sample to QAPP acceptance criteria. The surrogate spike recoveries met QAPP acceptance criteria with the following exception: The PAH surrogate spike recovery for fluoranthene-d10 exceeded QAPP acceptance criteria in sample W255 collected on October 11, 2016; however, no data needed to be qualified because the other two surrogates associated with the base/neutral fraction were within QAPP acceptance criteria.

Laboratory duplicate sample results were evaluated for compounds where both the native and duplicate sample concentrations were greater than five times the reporting limit. The RPDs for the laboratory duplicate samples were within the laboratory acceptance criteria except for TSS on sample U11 collected May 17, 2016 and on sample U12 collected on 09/02/16. The TSS results were qualified "*" as estimated in the data summary table.

It was noted by the laboratory that some PAH sample chromatograms indicated the presence of non-target background compounds. This matrix interference may have resulted in a slight bias for some samples. The affected results were qualified "*" as estimated in the data summary table.

The laboratory qualified samples U2A, U12, and U11 collected on May 17, 2016 and sample U12 collected on September 2, 2016 as being heterogeneous and sample homogeneity could not be achieved using routine laboratory practices. The data were qualified with Barr-specific qualifier "QV" as estimated in the data summary table unless already qualified "*" as estimated.

## Summary of Data Evaluation

The quality control review of the 2016 Joslyn monitoring program samples demonstrated that the data have an acceptable degree of compliance with the project's data quality objectives as measured by the quality control samples. All results reported by the laboratories are considered useable subject to the data qualifiers assigned during the data evaluation process.

# Table D-1
# 2016 Groundwater Quality Data
# Duplicate Samples with RPD Calculated
# Joslyn Manufacturing and Supply Company
# Brooklyn Center, MN

| | **Location** | **U11** | | | **W132** | | |
|---|---|---|---|---|---|---|---|
| | **Sample Date** | **10/11/2016** | | | **10/14/2016** | | |
| | **Sample Type** | **N** | **FD** | **RPD** | **N** | **FD** | **RPD** |
| Parameter | Units | | | | | | |
| SVOCs | | | | | | | |
| 2-Methylnaphthalene | ug/l | **5.6** | **4.7** | **17 %** | < 0.0034 | < 0.0033 | |
| Acenaphthene | ug/l | **79** | **76** | **3.9 %** | < 0.0034 | < 0.0033 | |
| Acenaphthylene | ug/l | **1.6** | **1.5** | **6.5 %** | < 0.0034 | < 0.0033 | |
| Anthracene | ug/l | **1.4** | **1.2** | **15 %** | **0.055** | **0.054** | **1.8 %** |
| Benz(a)anthracene | ug/l | < 0.033 | < 0.033 | | < 0.0034 | < 0.0033 | |
| Benzo(a)pyrene | ug/l | < 0.033 | < 0.033 | | < 0.0034 | < 0.0033 | |
| Benzo(b)fluoranthene | ug/l | < 0.033 c | < 0.033 c | | < 0.0034 c | < 0.0033 c | |
| Benzo(g,h,i)perylene | ug/l | < 0.033 | < 0.033 | | < 0.0034 | < 0.0033 | |
| Benzo(k)fluoranthene | ug/l | < 0.033 | < 0.033 | | < 0.0034 | < 0.0033 | |
| Chrysene | ug/l | < 0.033 | < 0.033 | | < 0.0034 | < 0.0033 | |
| Dibenz(a,h)anthracene | ug/l | < 0.033 | < 0.033 | | < 0.0034 | < 0.0033 | |
| Fluoranthene | ug/l | **3.5** | **3.4** | **2.9 %** | < 0.0034 | < 0.0033 | |
| Fluorene | ug/l | **38** | **37** | **2.7 %** | < 0.0034 | < 0.0033 | |
| Indeno(1,2,3-cd)pyrene | ug/l | < 0.033 | < 0.033 | | < 0.0034 | < 0.0033 | |
| Naphthalene | ug/l | **60 *** | **43 *** | **33% a** | < 0.0034 | < 0.0033 | |
| Pentachlorophenol | ug/l | **480** | **570** | **17 %** | **0.33** | < 0.29 | |
| Phenanthrene | ug/l | **23** | **20** | **14 %** | < 0.0034 | < 0.0033 | |
| Pyrene | ug/l | **1.2** | **1.2** | **0 %** | < 0.0034 | < 0.0033 | |

See Table 3-18 for additional data qualifiers and footnotes.

%RPD = | (N - FD) / (N + FD) / 2 | X 100
Where: N = 1st Value
FD = 2nd Value

# Appendix E

## Correspondence

resourceful. naturally.
engineering and environmental consultants
BARR

September 8, 2016

Submitted via email to:
Mr. Steve Schoff
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155

**Re: Operable Unit 3 – DNAPL Tank Replacement Plans**
**Joslyn Manufacturing & Supply Co. Site – Brooklyn Center, Minnesota**

Dear Mr. Schoff:

On behalf of Joslyn Manufacturing Company (Joslyn), Barr is submitting the attached plans for replacing the dense non-aqueous liquid (DNAPL) tank, part of Operable Unit 3 (OU3) at the Joslyn Brooklyn Center Site. DNAPL recovery at the site began in 1995 and is expected to continue for several years. The DNAPL pumping system was shut off in late 2015 when the outer wall of the DNAPL tank was observed to no longer provide secondary containment. As the inner wall remained unaffected, the tank itself retained integrity. The tank is currently empty and the DNAPL pumping system will remain off until a new tank is installed.

The attached plans are being submitted to provide the Minnesota Pollution Control Agency (MPCA) with an opportunity for review and comment. No changes are being proposed that will alter the effectiveness or operational needs for the OU3 remedy, including how the DNAPL is recovered, managed, or disposed, so it is our understanding that MPCA approval of these plans is not required.

In addition to replacing the DNAPL tank, improvements to the existing subgrade concrete vault that houses the tank are proposed to minimize infiltration of water into the vault and raise the new tank and provide a sump for water removal if and when needed. Both are expected to extend the life of the new tank. The plans include the following general components:

- Clean, demolish, and remove the existing 2,000-gallon tank and vault roof.
- Clean the subgrade concrete vault, seal walls, joints, and other potential water infiltration points.
- Construct concrete piers to place the new tank so that it is elevated.
- Add a sloped layer of grout to the vault floor to direct water to a sump area so it can be readily pumped out if needed[1].
- Install a new 2,000-gallon double-walled steel tank in the vault, of same construction as the old tank.

---

[1] Consistent with current operations, water removed from the vault will be transferred to the OU1/OU2 oil water separator tank for discharge to the sanitary sewer under the Metropolitan Council Environmental Services (MCES) permit.

- Replace the existing vault roof with a new single-panel roof, raised about one foot higher than the existing roof.
- Add clean fill and topsoil to meet the new roof elevation and regrade to direct surface drainage away from the vault. Excavation below the existing clean cover is not anticipated to be required.

The work may be done in phases in order to coordinate the various steps and contractors (e.g., cleaning, demolition and removal, vault sealing and modification, tank and roof replacement). Arrangements will be made with the site occupants to establish an exclusion zone and coordinate access for the work. Site control will be maintained by restricting access to the work zone to only Barr staff and contractors directly involved in the work, consistent with the Project Health and Safety Plan.

The work is anticipated to begin the first week of October and is estimated to be completed within four weeks. Please provide any questions or comments to me by September 16, so that modifications to the plans can be considered and incorporated prior to beginning work.

Thank you for your continued assistance on this project.

Sincerely,

Dale W. Finnesgaard

Dale W. Finnesgaard, Vice President

cc: Allan Timm, MPCA
Carl Grabinski, Joslyn Manufacturing Company
Jennifer Brekken, Barr Engineering Co.

Attachment:
Contract Drawings – DNAPL Pump-out System Modification

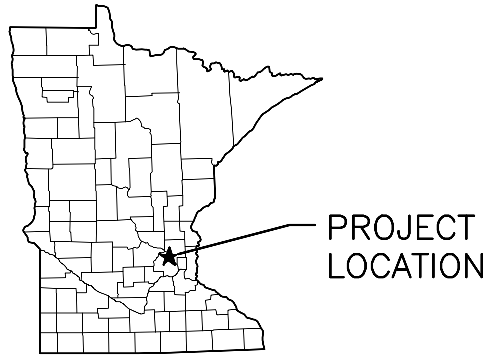
# CONTRACT DRAWINGS

# DNAPL PUMP-OUT SYSTEM MODIFICATION

## JOSLYN MANUFACTURING AND SUPPLY CO. SITE

### 4837 AZELIA AVENUE NORTH

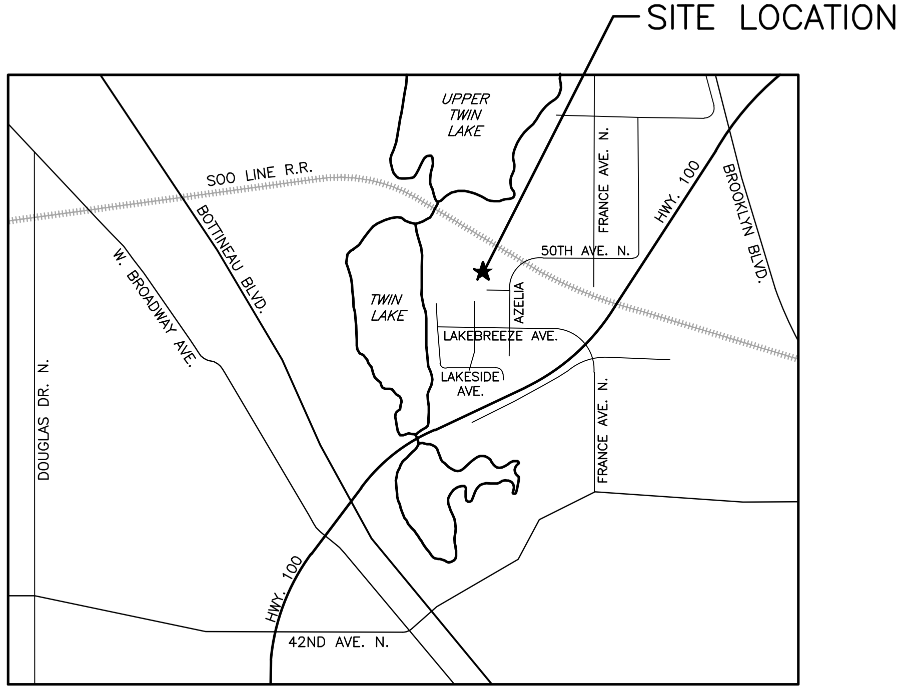
### BROOKLYN CENTER, MINNESOTA



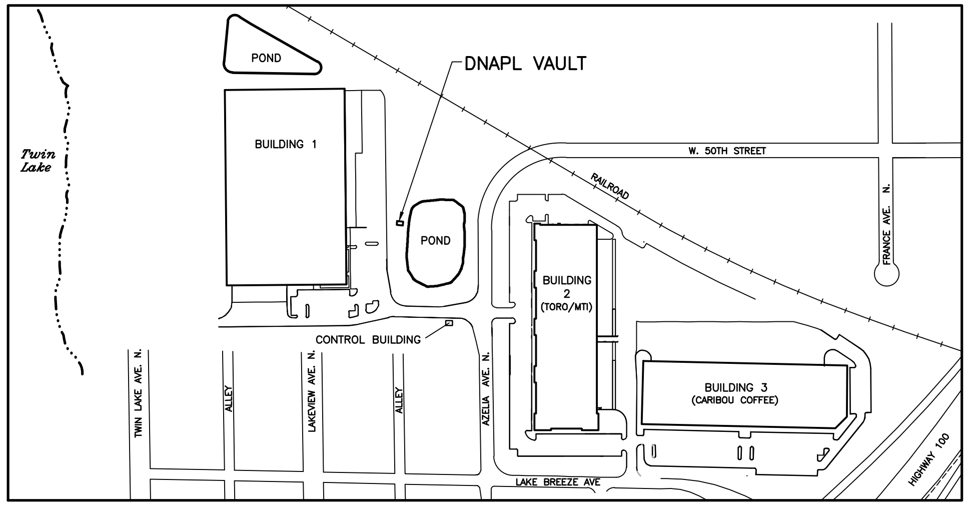
LOCATION MAP

## SHEET INDEX

| SHEET NO. | TITLE |
|---|---|
| G-01 ..... | PROJECT LOCATION AND SHEET INDEX |
| C-01 ..... | SITE PLAN MODIFICATIONS |
| C-02 ..... | DNAPL TANK VAULT PLAN AND SECTIONS |



VICINITY MAP



SITE LOCATION MAP

GOPHER STATE ONE CALL

GOPHER STATE ONE CALL:
CALL BEFORE YOU DIG.
1-800-252-1166

*ISSUED FOR CONSTRUCTION*
*09-08-16*

CADD USER: Rick Gustner FILE: M:\ADEPTWORK\RLG\2327011000_G-01.DWG PLOT SCALE: 1:2 PLOT DATE: 9/8/2016 1:05 PM

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rlg M:\AdeptWork\RLG\2327011000_G-01.dwg Plot at 0 09/08/2016 12:25:23

| NO. | BY | CHK. | APP. | DATE | REVISION DESCRIPTION |
|---|---|---|---|---|---|

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME BRYAN T. OAKLEY
SIGNATURE B. T. O.
DATE 09-08-16 LICENSE # 24480

| RELEASED TO/FOR | A | B | C | 0 | 1 | 2 | 3 |
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| CLIENT | | | | | | | |
| BID | | | | | | | |
| CONSTRUCTION | | | | 9/8/16 | | | |
| | DATE RELEASED | | | | | | |

BARR
Corporate Headquarters:
Minneapolis, Minnesota
Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

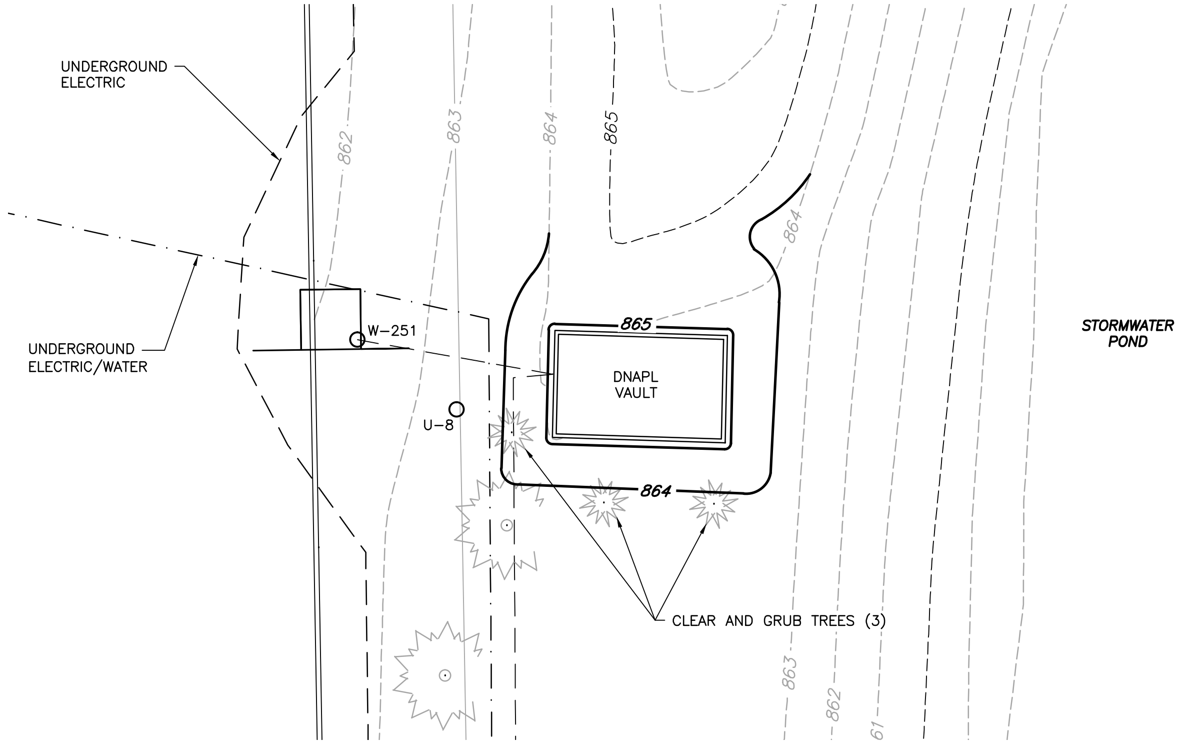
| | |
|---|---|
| Scale | AS SHOWN |
| Date | 08-03-16 |
| Drawn | RLG |
| Checked | DWF, JLB |
| Designed | KAD |
| Approved | BTO |

JOSLYN MANUFACTURING
& SUPPLY CO. SITE

DNAPL PUMP-OUT SYSTEM MODIFICATION
BROOKLYN CENTER, MINNESOTA

PROJECT LOCATION
AND SHEET INDEX

BARR PROJECT No. 23270110.00
CLIENT PROJECT No.
DWG. No. G-01
REV. No. 0



## 1 PLAN: SITE GRADING PLAN

0 10 20
SCALE IN FEET

**NOTES:**

1. INSTALL ORANGE FENCE/SAFETY BARRIER.
2. INSTALL SILT FENCE FOR EROSION CONTROL.
3. LOCATE UNDERGROUND SPRINKLER SYSTEM PRIOR TO EXCAVATION.
4. EXCAVATE AROUND VAULT TO EXPOSE JOINT WHERE NEW ROOF WILL ATTACHED.
5. BACKFILL WITH CLEAN TOPSOIL, GRADE TO PLAN.
6. RESTORE DAMAGED AREAS WITH SOD.

**LEGEND**

- – – – – – EXISTING CONTOURS
- ——— PROPOSED CONTOUR
- — — — UNDERGROUND ELECTRIC
- — · — UNDERGROUND ELECTRIC/WATER

*ISSUED FOR CONSTRUCTION*
*09-08-16*

CADD USER: Rick Gustner FILE: M:\ADEPTWORK\RLG\2327011000_C-01.DWG PLOT SCALE: 1:2 PLOT DATE: 9/8/2016 1:11 PM
rlg M:\AdeptWork\RLG\2327011000_C-01.dwg Plot at 0 09/08/2016 12:31:19

| NO. | BY | CHK. | APP. | DATE | REVISION DESCRIPTION |
|---|---|---|---|---|---|

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME BRYAN T. OAKLEY
SIGNATURE B. Oakley
DATE 09-08-16 LICENSE # 24480

| RELEASED TO/FOR | A | B | C | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| CLIENT | — | — | — | — | — | — | — |
| BID | — | — | — | — | — | — | — |
| CONSTRUCTION | — | — | — | 9/8/16 | — | — | — |
| | — | — | — | — | — | — | — |
| | — | — | — | — | — | — | — |
| | DATE RELEASED | | | | | | |

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Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

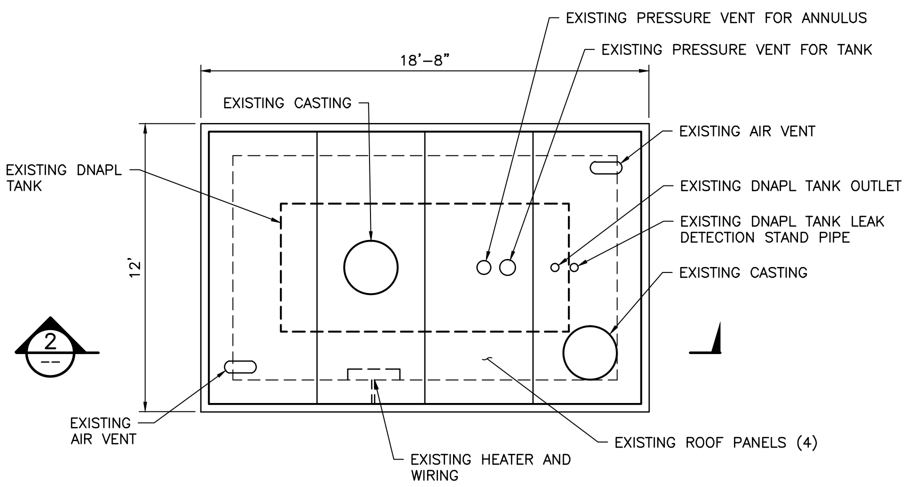
| | |
|---|---|
| Scale | AS SHOWN |
| Date | 08-03-16 |
| Drawn | RLG |
| Checked | DWF, JLB |
| Designed | KAD |
| Approved | BTO |

JOSLYN MANUFACTURING
& SUPPLY CO. SITE

DNAPL PUMP-OUT SYSTEM MODIFICATION
BROOKLYN CENTER, MINNESOTA

SITE PLAN MODIFICATIONS

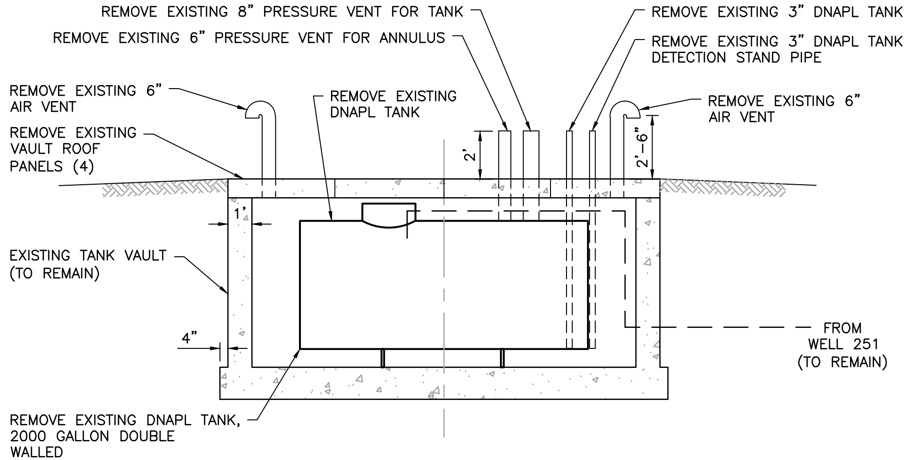
BARR PROJECT No. 23270110.00
CLIENT PROJECT No.
DWG. No. C-01
REV. No. 0



## 1 PLAN: EXISTING VAULT ROOF

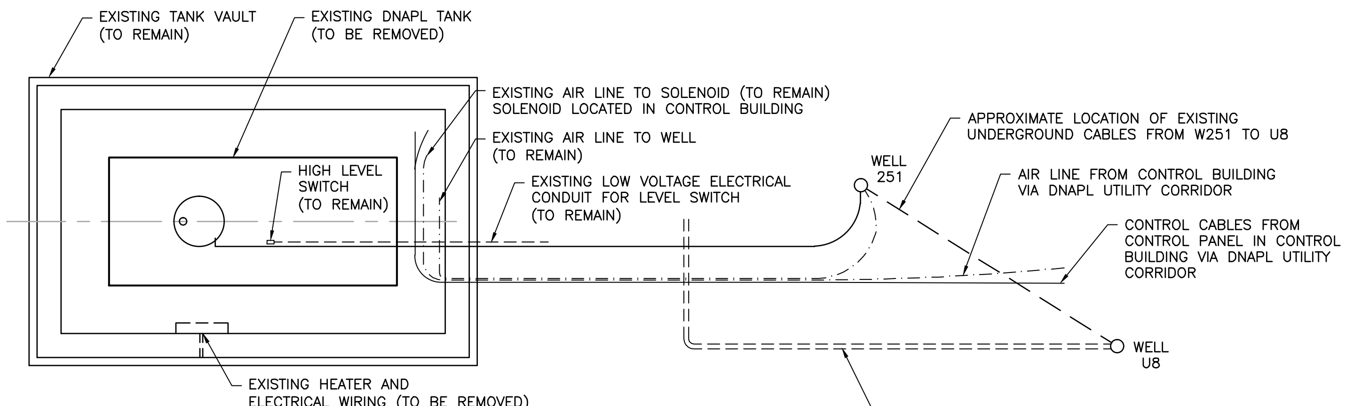
0 2 4 6 8
SCALE IN FEET

**REMOVAL NOTES:**
1. REMOVE EXISTING CONCRETE ROOF PANELS (4), CASTINGS, AND AIR VENTS AND DISPOSE.
2. CLEAN AND REMOVE DNAPL TANK, PRESSURE VENT PIPES, DNAPL TANK OUTLET PIPE AND TANK LEAK DETECTION STANDPIPE AND DISPOSE.
3. DEMO AND REMOVE EXISTING HEATER AND WIRING. DEAD END ELECTRICAL WIRING AT JUNCTION BOX.
4. CLEAN EXISTING VAULT.



## 2 SECTION: EXISTING TANK VAULT AND DNAPL TANK

0 2 4 6 8
SCALE IN FEET

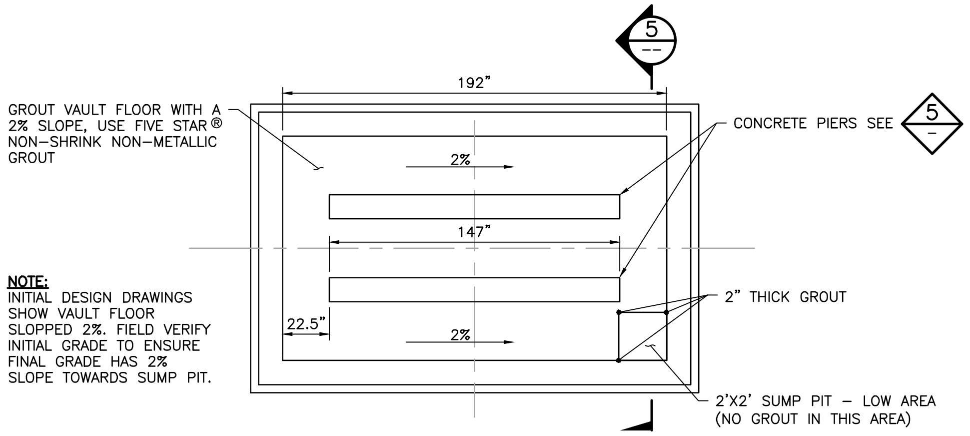


**NOTE:**
DEAD END THE HEATER ELECTRICAL LINE AT THE JUNCTION BOX AFTER HEATER IS REMOVED.

## 3 PLAN: EXISTING CONDITIONS

0 2 4 6 8
SCALE IN FEET

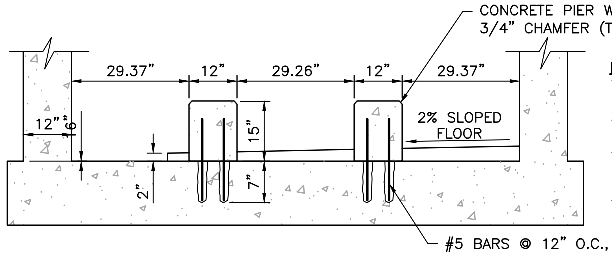
APPROXIMATE LOCATION OF EXISTING DISCHARGE PIPE FROM WELL U8. APPROXIMATE EL. 857.00



**NOTE:**
INITIAL DESIGN DRAWINGS SHOW VAULT FLOOR SLOPPED 2%. FIELD VERIFY INITIAL GRADE TO ENSURE FINAL GRADE HAS 2% SLOPE TOWARDS SUMP PIT.

## 4 PLAN: PROPOSED VAULT FLOOR

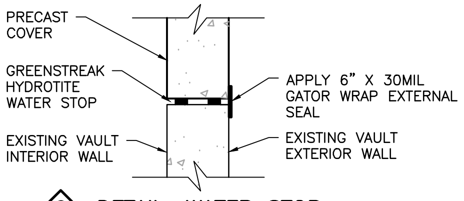
0 2 4 6 8
SCALE IN FEET



**NOTES:**
1. INSTALL CONCRETE PIERS PRIOR TO INSTALLING 2% SLOPED FLOOR.
2. ROUGHEN VAULT FLOOR BENEATH PIERS PRIOR TO INSTALLATION.
3. USE #5 BARS @ 12" O.C., E.F. DRILL 1/4" EPOXY WITH HILTI HIT HY 200 WITH 7" MINIMUM EMBEDMENT.
4. CENTER CONCRETE PIERS LENGTHWISE IN VAULT.

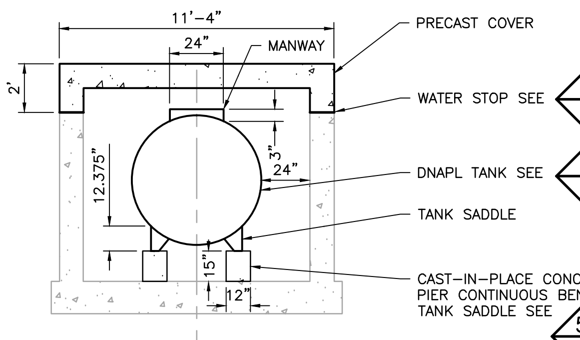
## 5 DETAIL: CONCRETE PIERS

0 1 2 3 4
SCALE IN FEET



## 6 DETAIL: WATER STOP

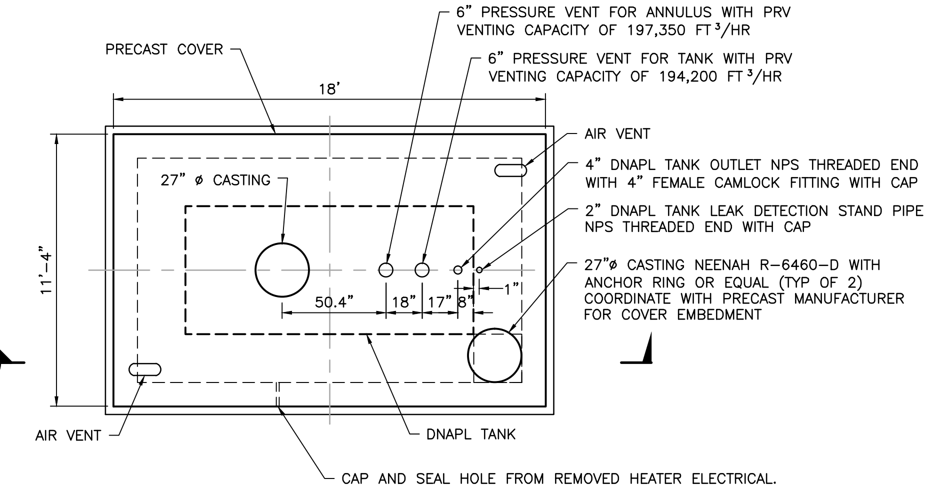
NO SCALE



## 7 SECTION: PROPOSED COVER AND DNAPL TANK

0 2 4 6 8
SCALE IN FEET

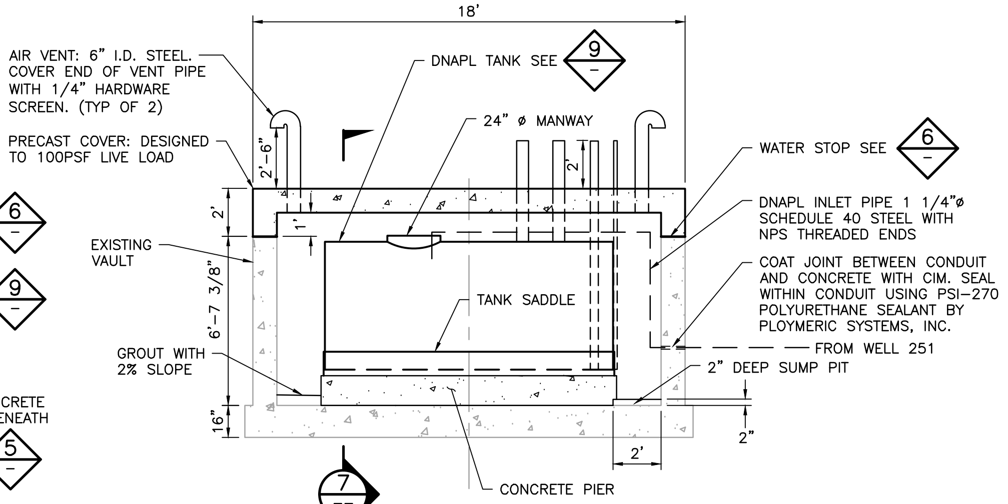
**MODIFICATION NOTES:**
1. INSTALL TWO CONCRETE PIERS TO ELEVATE TANK ABOVE EXISTING FLOOR.
2. ADD 2% SLOPE TO VAULT FLOOR TOWARDS SUMP AREA. USE FIVE STAR® NON–SHRINK NON–METALLIC GROUT. ROUGHEN VAULT FLOOR PRIOR TO INSTALLING GROUT.
3. ABRASIVE BLAST OR WATER BLAST PER ASTM D4259 ALL SURFACES PRIOR TO INSTALLING VAULT COATING (WALLS, FLOOR AND PIERS).
4. APPLY CIM 1000, FROM CIM INDUSTRIES INC. TO VAULT WALLS, SLOPED FLOOR, AND IN SUMP PIT SURFACES. REFERENCE ONLINE APPLICATION GUIDE "APPLICATION OF CIM TO CONCRETE".
5. CENTER TANK ON PIERS. CENTERLINE IN TANK IS CENTERLINE ON PIERS.
6. SECURE TANK SADDLE TO CONCRETE PIERS. COORDINATE WITH TANK MANUFACTURER THAT THEY SUPPLY WELDED TABS TO SECURE SADDLE TO PIERS. DRILL AND EPOXY TANK SADDLE.
7. COORDINATE WITH TANK MANUFACTURER THAT TANK DESIGNED WITH FLANGE TO HOUSE HIGH LEVEL SWITCH.



**NOTES:**
1. PROVIDE LOCKABLE CASTINGS, 4" OUTLET PIPE, AND LEAK DETECTION STANDPIPE. PADLOCKS FURNISHED BY OWNER. FIT PIPES AND CAPS WITH HASPS AND LOOPS OR APPROVED EQUAL.
2. SEAL AROUND ALL PENETRATIONS WITH PSI–270 SEALANT BY POLYMERIC SYSTEMS, INC. ON PRECAST COVER AND WITHIN VAULT (ALL JOINTS AND CONDUIT).

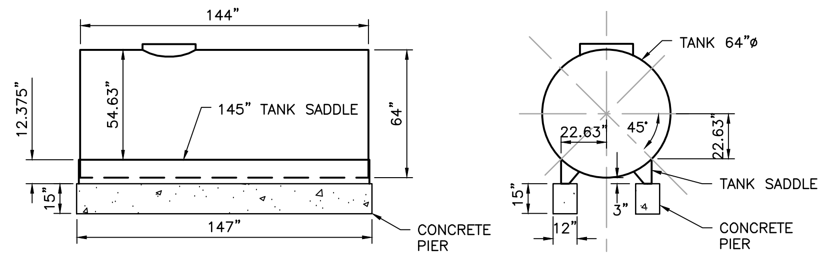
## 8 PLAN: PROPOSED COVER PLAN

0 2 4 6 8
SCALE IN FEET



## 9 SECTION: PROPOSED COVER AND DNAPL TANK

0 2 4 6 8
SCALE IN FEET



**NOTES:**
1. DNAPL TANK – 2000 GALLON DOUBLE–WALLED TANK THAT MEETS UL–142 STANDARDS.
2. INNER TANK SHELL 7 GAUGE CARBON STEEL.
3. OUTER TANK SHELL 10 GAUGE CARBON STEEL.
4. TANK EXTERIOR PRIMED AND COATED WITH WHITE EPOXY.

## 9 DETAIL: DNAPL TANK, TANK SADDLE AND CONCRETE PLATFORM

0 2 4 6 8
SCALE IN FEET

*ISSUED FOR CONSTRUCTION*
*09-08-16*

CADD USER: Rick Gustner FILE: M:\ADEPTWORK\RLG\2327011000_C–02.DWG PLOT SCALE: 1:2 PLOT DATE: 9/8/2016 12:51 PM
. . rlg M:\AdeptWork\RLG\2327011000_C–02.dwg Plot at 0 09/02/2016 10:51:51

| NO. | BY | CHK. | APP. | DATE | REVISION DESCRIPTION |
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I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME BRYAN T. OAKLEY
SIGNATURE
DATE 09–08–16 LICENSE # 24480

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| | — | — | — | — | — | — | — |

DATE RELEASED

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Minneapolis, Minnesota
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| Scale | AS SHOWN |
| Date | 08–03–16 |
| Drawn | RLG |
| Checked | DWF, JLB |
| Designed | KAD |
| Approved | BTO |

JOSLYN MANUFACTURING
& SUPPLY CO. SITE

DNAPL PUMP–OUT SYSTEM MODIFICATION
BROOKLYN CENTER, MINNESOTA

DNAPL TANK VAULT
PLAN AND SECTIONS

BARR PROJECT No. 23270110.00
CLIENT PROJECT No.
DWG. No. C–02
REV. No. 0

| | |
|---|---|
| **From:** | Schoff, Steven (MPCA) <steven.schoff@state.mn.us> |
| **Sent:** | Friday, September 09, 2016 4:07 PM |
| **To:** | Jennifer L. Brekken; Dale Finnesgaard |
| **Cc:** | Timm, Allan (MPCA); Schoff, Steven (MPCA) |
| **Subject:** | RE: Joslyn OU3 DNAPL tank replacement plans |
| **Importance:** | High |

Dear Ms. Brekken,
The Minnesota Pollution Control Agency(MPCA) has reviewed the September 8, 2016 submittal titled Operable Unit 3-DNAPL Tank Replacement Plans (Plans),Joslyn Manufacturing& Supply Co. Site-Brooklyn Center, Minnesota. MPCA Staff approve the Plans as proposed in the submittal. Please submit a letter report documenting the replacement of the tank at completion of the project.

Sincerely,
Steven M. Schoff
Project Leader
Minnesota Pollution Control Agency
651-757-2701

---

**From:** Jennifer L. Brekken [mailto:JBrekken@barr.com]
**Sent:** Thursday, September 08, 2016 3:02 PM
**To:** Schoff, Steven (MPCA) <steven.schoff@state.mn.us>
**Cc:** Dale Finnesgaard <DFinnesgaard@barr.com>; Grabinski, Carl <Carl.Grabinski@danaher.com>; Timm, Allan (MPCA) <allan.timm@state.mn.us>
**Subject:** Joslyn OU3 DNAPL tank replacement plans

Steve,
On behalf of Joslyn Manufacturing Company (Joslyn), Barr is submitting the attached plans for replacing the dense non-aqueous liquid (DNAPL) tank, part of Operable Unit 3 (OU3) at the Joslyn Brooklyn Center Site. The attached letter summarizes the plans, which generally include removing and replacing the existing tank and making improvements to the subsurface vault that houses the tank. No changes are being proposed that will alter the effectiveness or operational needs for the OU3 remedy.

If the MPCA has questions or comments on these plans, we ask that they are communicated to us by September 16, so that Barr can incorporate any changes prior to beginning the work in October.

Thank you for your assistance on this project,

Jennifer L. Brekken

Senior Environmental Engineer
Minneapolis, MN office: 952.832.2700
cell: 952.250.6005
jbrekken@barr.com
www.barr.com

---

**From:** Schoff, Steven (MPCA) <steven.schoff@state.mn.us>
**Sent:** Tuesday, September 20, 2016 4:04 PM
**To:** Grabinski, Carl
**Cc:** Jennifer L. Brekken; Dale Finnesgaard; Schoff, Steven (MPCA)
**Subject:** 2015 Annual Operations and Monitoring Report(Report) Operable Units 1,2, and 3, dated May 2016, for the Joslyn Manufacturing Site(Site) Brooklyn Center, MN

Dear Mr. Grabinski:

The Minnesota Pollution Control Agency (MPCA) staff has reviewed the document entitled, “2015 Annual Operations and Monitoring Report Operable Unit 1, 2, and 3(Report) dated May 2016. The Report was submitted by Joslyn Manufacturing and Supply Company Pursuant to the Response Order by (Consent Order) between Joslyn and the MPCA, dated May 30, 1995.

The MPCA concurs with Barr’s recommendations for monitoring as stated in the Report with the following comments:

- Replace the tank and repair the confinement system as OU3 as soon as possible.
- Continue to operate the OU1 and OU2 pumping systems.
- At OU1, Barr needs to continue to monitor the PCP concentration on the south side, particularly at W7, to evaluate if an additional pump-out well is needed to the south.
- Monitor the DNAPL thickness at OU3 to determine how much it has increased while there has been no pumping at OU3. It may useful to do an LIF study in the area to determine the extent of the NAPL. Using current technologies could give a better estimate of what remains at the Site.
- DNAPL should be analyzed to determine the percentage of PCP present in it.

Sincerely,

Steven M. Schoff
Project Manager
Site Remediation & Redevelopment Section
Remediation Division

resourceful. naturally.
engineering and environmental consultants
BARR

November 14, 2016

Mr. Steven Schoff
Minnesota Pollution Control Agency
Site Response Section
520 Lafayette Road
St. Paul, MN 55155-4194

**Re: Response to MPCA Comments on the 2015 Operable Units 1, 2, and 3 Operations and Monitoring Annual Report , Joslyn Manufacturing & Supply Co. Site, Brooklyn Center, Minnesota**

Dear Mr. Schoff:

On behalf of Joslyn Manufacturing & Supply Co. (Joslyn), Barr Engineering Co. prepared this response to Minnesota Pollution Control Agency (MPCA) comments submitted to Carl Grabinski, Joslyn, via email on September 20, 2016. We appreciate the opportunity to discuss MPCA comments briefly during our meeting on November 2. As we discussed, Joslyn acknowledges and generally agrees with MPCA's comments.

MPCA's comments are reiterated for reference and our response is shown in italic/underlined below.

**MPCA Comments:**

The MPCA concurs with Barr's recommendations for monitoring as stated in the Report with the following comments:

- Replace the tank and repair the confinement system as OU3 as soon as possible.
  - *Joslyn is proceeding to return the system to operation as soon as practicable. In August MPCA approved plans and specifications for the repair. Allowing time for bid package preparation, contactor selection, procurement and construction, we expect the repair to be completed in the spring of 2017.*
- Continue to operate the OU1 and OU2 pumping systems.
  - *Acknowledged.*
- At OU1, Barr needs to continue to monitor the PCP concentration on the south side, particularly at W7, to evaluate if an additional pump-out well is needed to the south.
  - *Acknowledged. Monitoring is planned to continue at W7 during spring and fall sampling events, as indicated in the 2015 Report.*
- Monitor the DNAPL thickness at OU3 to determine how much it has increased while there has been no pumping at OU3.
  - *Barr has continued to take monthly readings of the DNAPL thickness in the recovery well since OU3's DNAPL recovery system was halted as noted above. The attached chart shows that the thickness is relatively stable, has increased slightly in recent months, but remains at levels below the elevation in the original pool.*

- It may useful to do an LIF study in the area to determine the extent of the NAPL. Using current technologies could give a better estimate of what remains at the Site.
    - *The DNAPL Delineation Investigation Report (Barr 1990, attached) delineated the extent of the DNAPL pool. The estimated DNAPL pool volume at that time was 9,500 gallons. However, as noted in 2015 annual report, Joslyn has collected over 16,000 gallons, much more than the amount originally estimated, while dropping the DNAPL pool by about 2-feet of its total 5-foot depth. The increase in pool depth that occurred from 1990 to 1997 (The DNAPL recovery system began operation in 1997) and the recent increase in depth over the past four months supports our hypothesis that explains the difference between the estimated volume of the DNAPL pool and the volume recovered to date. Our best hypothesis is that additional DNAPL continues to migrate down into the pool from the 60-feet (or so) of unconsolidated saturated upper aquifer that overlays the DNAPL pool, which shows non-continuous segments of the soil column where wood treating fluids were observed. An alternative hypothesis is that the original estimate of the DNAPL pool volume was low. The DNAPL pool in 1997 and today is shown on the attached figure. The initial 1990 estimate was based on a lower starting pool elevation than was measured in 1997, when the DNAPL system began operation. We have confirmed the 1990 estimate volume and extent, and estimated that the initial pool volume was about 11,500 gallons in 1997 when the system began operation. It is our opinion that the pool size was correctly estimated. Joslyn will continue to monitor the DNAPL pool elevation prior to turning the system back on in 2017, and provide further evaluation of the pool volume, recharge, and recommendations regarding the value of additional investigation in the 2016 annual report.*
- DNAPL should be analyzed to determine the percentage of PCP present in it.
    - *The DNAPL is composed primarily of creosote-like materials with elevated polycyclic aromatic hydrocarbons (PAHs) and less than 0.02% pentachlorophenol (PCP). The DNAPL analytical results from 1987 and 1989 are shown on Table 4-7 in the Report; the PCP concentration was 170 mg/L and total PAH concentration was 170,000 mg/L.*
    - *We presume the MPCA does not intend for Joslyn to reanalyze the DNAPL at this time.*

Please feel free to call us (Jenni: 952-832-2700 or Dale: 952-832-2667) with any questions.

Sincerely,

Jennifer L Brekken

Dale W. Finnesgaard

Jennifer L. Brekken
Senior Environmental Engineer

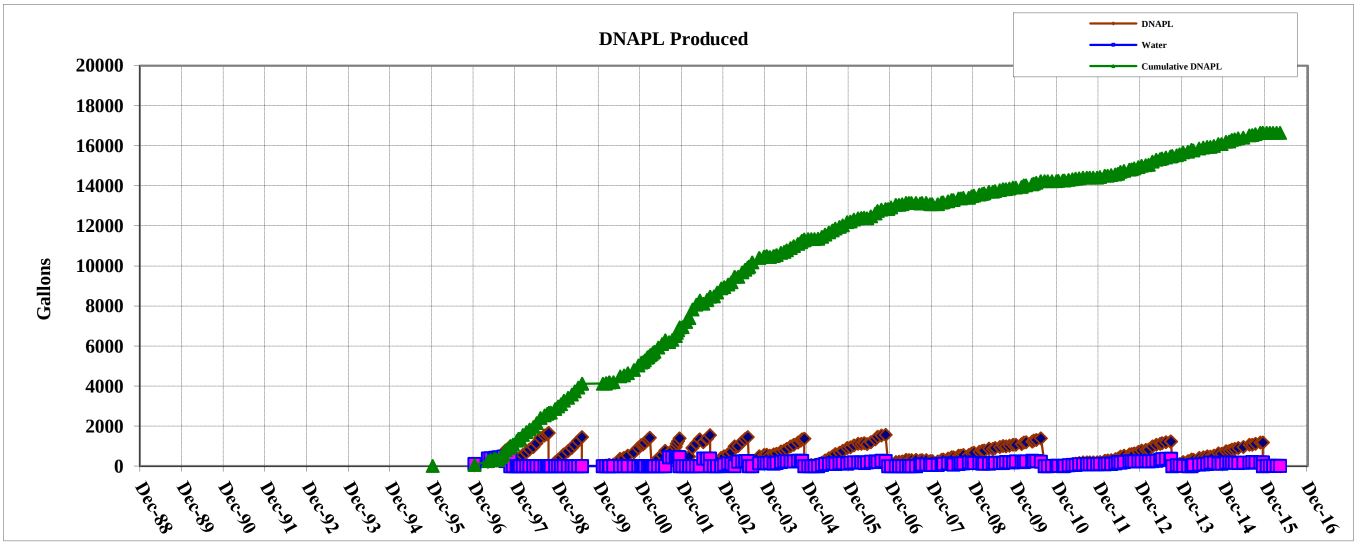
Dale W. Finnesgaard
Vice President

c: Allan Timm, MPCA
Carl Grabinski, Joslyn
Jeremy P. Greenhouse, Environmental Law Group

Attachments:

- DNAPL Data Charts
- DNAPL Delineation Investigation Report, Brooklyn Center Wood Treating Site, Prepared for Joslyn Manufacturing Co., by Barr Engineering Co., February 1990.
- Figure – Estimated Extent of DNAPL Pool and Top of Clay Elevations

# DNAPL Data
# Joslyn Manufacturing Supply Co. Site
# Brooklyn Center, MN



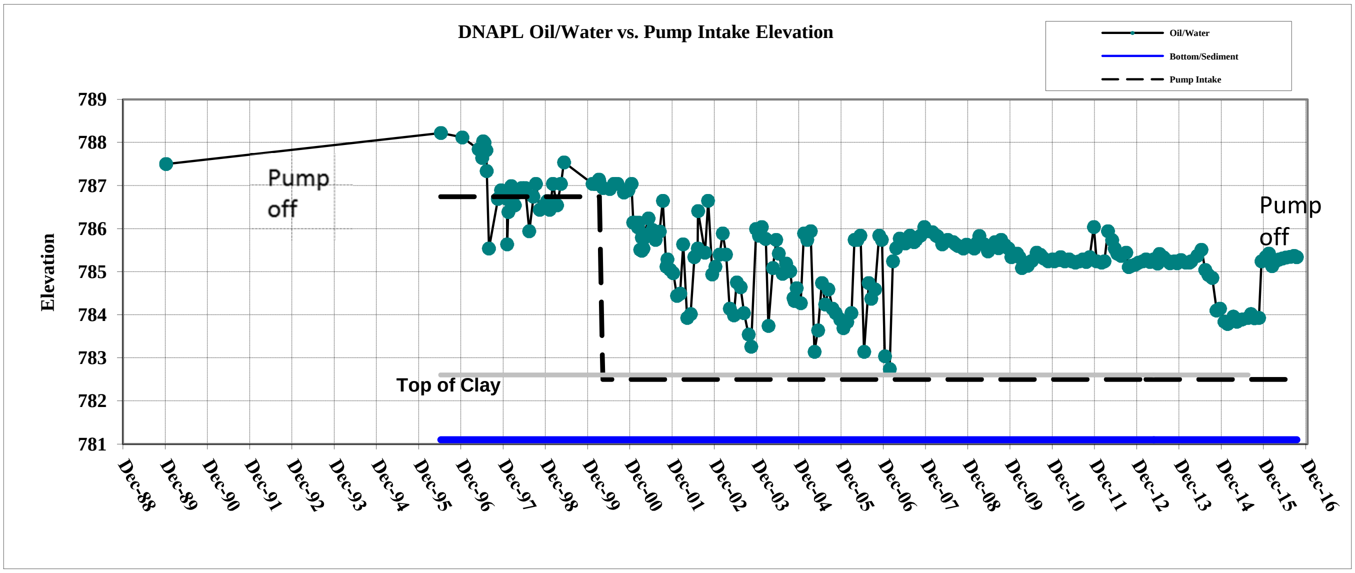


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Figure 1

Estimated Extent of DNAPL Pool
and Top of Clay Elevations
Joslyn Manufacturing and
Supply Co. Site
Brooklyn Center, MN

# DNAPL DELINEATION INVESTIGATION REPORT

## BROOKLYN CENTER WOOD TREATING SITE
## Dense Non-Aqueous Phase Liquid Operable Unit

Prepared for
JOSLYN MANUFACTURING CO.

February 1990

By
BARR ENGINEERING CO.
Minneapolis, Minnesota

# DENSE NON-AQUEOUS PHASE LIQUID DELINEATION INVESTIGATION REPORT

## JOSLYN MANUFACTURING CO.
## BROOKLYN CENTER SITE

## TABLE OF CONTENTS

## LIST OF FIGURES

# LIST OF APPENDICES

# DENSE NON-AQUEOUS PHASE LIQUID DELINEATION
# INVESTIGATION REPORT

## INTRODUCTION

This report describes the results from an additional investigation of the dense non-aqueous phase liquid (DNAPL) at Joslyn's Brooklyn Center site. The location of the site is shown in Figure 1. The additional investigation was used to define the horizontal and vertical extent of the DNAPL and the configuration of the depression in the middle confining unit. The plan for this investigation is described in the May 1988 "Plan of Interim Response Actions" (Barr Engineering Co.).

This report: 1) discusses the results from the placement of four additional soil borings in the vicinity of the DNAPL area; 2) further describes the geology of the subsurface clay-lined depression; 3) describes the design of the DNAPL recovery system; and 4) provides an implementation schedule for the DNAPL recovery system.

Relevant to the DNAPL Operable Unit is geologic data identifying the presence of a creosote-like liquid in a subsurface depression directly overlying a sandy clay layer in the west-central portion of the site. The creosote-like liquid has a specific gravity of 1.09 and is located approximately 60 feet below the water table. Its characteristics indicate that the material acts as a dense non-aqueous phase liquid (DNAPL). The DNAPL contains approximately 30 percent PAH/heterocyclic (PAH) compounds and 0.017 percent pentachlorophenol (PCP).

## SITE CONDITIONS

The setting of the site is described in the July 1987 Detailed Analysis Report, Part One -- RAP Investigation, the October 1986 Supplemental Alternatives Report, and the January 1986 Remedial Investigation/Alternatives

Report. These reports describe the detailed geology and hydrogeology of the site for purposes of identifying feasible remedial alternatives. The geology of the DNAPL area is summarized below.

## DNAPL Area Site Geology

The geologic setting of the DNAPL area consists of glaciofluvial and glaciolacustrine sediments deposited along the wall of a buried bedrock valley. Glaciofluvial sands and gravels intertongue with silt layers and likely represent lower energy depositional regimes within the glaciofluvial depositional environment. Silty and sandy clay layers may have been deposited during periods of fluvial quiescence, in ponds or slack waters as lacustrine deposits, or as abatement till from the melting of glacial ice blocks. Occurrences of peat layers are representative of swamp deposits. The glacial deposits overlie the St. Peter Sandstone and the Prairie du Chien Group bedrock units.

While the stratigraphy of the deposits at the site is relatively complex, some generalities can be made. Starting from the ground surface, the sequence of units above bedrock can be grouped as: 1) fill overlaying discontinuous lenses of peat; 2) an upper sand unit containing gravel lenses; 3) a middle sequence of interbedded sand, silt, and clay; 4) discontinuous middle sand units; 5) a lower sequence of interbedded sand and silt; 6) lower sand units; 7) a sandy clay partially lining a depression in the middle fine-grained units; and 8) a discontinuous residuum of weathered shale and sandstone overlying bedrock. Detailed descriptions of the sedimentology and stratigraphy of the site are presented in previous reports.

Previous investigations at the site indicated the presence of a subsurface stratigraphic depression lined with sandy clay. This stratigraphic depression was interpreted to be the result of melting of a buried ice block accompanied by subsequent subsidence of overlying sediments. Soil Boring DB-C2, placed during the initial RAP investigation at the site, is located in the apparent center of the depression. Split-spoon samples taken from Boring DB-C2 disclosed the presence of about 3 feet of creosote-like, viscous liquid with a density slightly greater than water directly on top of the sandy clay layer lining the depression. The liquid is identified as a dense non-aqueous phase liquid (DNAPL). The log of Boring DB-C2 is in Appendix A.

Four additional soil borings were placed on July 10-13, 1989 in the vicinity of Boring DB-C2 to further delineate the geometry of the clay-lined subsurface depression and the extent of DNAPL in the subsurface depression. The locations of the four soil borings, identified as DNB-1 through DNB-4, are shown in Figure 2. The locations of soil borings placed in earlier studies at the site are also shown in Figure 2. The four soil borings were advanced using hollow stem auger and mud rotary drilling methods. Two-foot long split-barrel samples were taken at 5-foot intervals between the ground surface and a depth of 50 feet and continuously below a depth of 50 feet. Samples were identified using ASTM Standard Method D 2488 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)". The soil borings were terminated approximately 1.5 feet into the sandy clay lining the subsurface depression. The borings ranged in depth from 65 feet (DNB-4) to 82 feet (DNB-1). Each boring was immediately grouted with neat cement grout upon completion. Ground-surface elevations of the four borings were surveyed after completion. Logs of the four borings are in Appendix A. The logs of the soil borings placed during other investigations are presented in previous reports.

Figure 2 shows contours of the elevation of the top of the sandy clay lining the subsurface depression. Figure 2 compiles geologic data collected from the four new soil borings with geologic data collected from previous investigations at the site. Cross-Sections A-A' (Figure 3) and B-B' (Figure 4) illustrate the stratigraphy near the subsurface depression. The locations of these cross sections are shown in Figure 2. Figure 5 is a fence diagram of the geology in the vicinity of the subsurface depression.

The top of the sandy clay is lowest near the locations of Borings DNB-1 and DB-C2. The bottom of the clay-lined depression appears to be slightly elongated in a north-south direction. Data from soil borings to the east and west of the area shown in Figure 2 were used to assist in verifying the trend in the slope of the top of the sandy clay.

The sandy clay appears to grade into a sandy and clayey silt south of Boring DNB-2. Sedimentological gradations such as this are common in glaciofluvial depositional environments and usually represent changes in the fluvial flow regime responsible for deposition and sediment transport. An alternative explanation is that the sandy clay represents an abatement till deposited as underlying glacial ice melted and the sandy and clayey silt represents fluvial deposition adjacent to the melting glacial ice block or deposition by meltwater coming off the glacial ice block.

The shape of the clay-lined subsurface depression is highly suggestive of a kettle depression formed as a result of the melting of a glacial ice block. This hypothesis was presented in the July 1987 "Detailed Analysis Report, Part One - RAP Investigation." Many of the lakes in Hennepin County and particularly lakes overlying bedrock valleys were formed as a result of the melting of glacial ice blocks buried or partially buried by glaciofluvial sediments. The difference between the formation of subsurface depressions such as the one observed at the Brooklyn Center site and kettle lakes formed by the melting of glacial ice blocks is that the subsurface depression at the site does not have any observable topographic expression. The reason for this is perhaps that the ice block at the Brooklyn Center site was sufficiently small to melt before the deposition of overlying sediments terminated. The presence of peat deposits above the clay-lined depression suggest that there was a topographic depression at one time that allowed the formation of swamp deposits but the depression was filled by subsequent deposition of glaciofluvial sediments.

Figure 6 is an isopach map of the thickness of the peat layer. The depression in the base of the peat layer and the thickest portion of the peat layer coincide with the depression in the top of the underlying sandy clay layer, providing further evidence to support the formation of a kettle depression that, at one time, did form a topographic depression. The elevation of the base of the peat layer is shown in Figure 7.

The isopach map of the thickness off the peat layer in Figure 6 reflects current peat thickness and does not account for the consolidation of the peat due to loading by overlying natural sediments and fill material. It is reasonable to assume that the surface of the top of the peat deposit was originally relatively flat and that consolidation, due to loading, has significantly reduced the thickness of the peat, particularly in the center of the depression where the peat deposits would have originally been thickest. The original elevations of the top of the peat was probably about 854 feet MSL. Using this original elevation value, the pre-loading peat thickness along the periphery of the peat deposit would be only 1 to 2 feet greater than the present thickness, but the original thickness in the center of the peat deposit would be about 20 feet greater than the present thickness. The reduction in thickness, due to loading, would be about 50 percent, which is consistent with the consolidation behavior of peat. By taking into account the consolidation of the peat deposit, it becomes more apparent that at one time a topographic depression existed and that the center of that depression was very near the location of Soil Boring DB-C2.

A brown, viscous, creosote-like liquid was observed partially to completely saturating the sandy and gravelly sediments directly overlying the sandy clay layer in Borings DNB-1 and DNB-3. Approximately 2 feet of DNAPL-saturated sediments were found overlying the sandy clay layer in Boring DNB-3 and approximately 6.5 feet of DNAPL-saturated sediments were found overlying the sandy clay layer in Boring DNB-1. The sediments above the DNAPL-saturated zone in Boring DNB-1 were partially saturated with DNAPL at a depth between 6.5 and 15 feet above the sandy clay layer and the sediments above the DNAPL-saturated zone in Boring DNB-3 were partially saturated with DNAPL at a depth between 2 and 4 feet above the sandy clay layer. DNAPL was not found in Borings DNB-2 and DNB-4. There was evidence of floating oil at the water table in the borings.

The thickness of DNAPL-saturated sediments overlying the sandy clay layer in Boring DB-C2 was estimated from the log of Boring DB-C2 to be 5.5 feet. The top of the DNAPL-saturated sediments in Borings DNB-1, DNB-3, and DB-C2 is at Elevation 787.6 +/- 0.9 feet MSL. The coincidental elevation of the top of the DNAPL-saturated sediments in these three soil borings suggests that the subsurface depression is saturated with DNAPL to approximately Elevation 787.5 feet MSL and that the gradient of the DNAPL surface is flat. These findings are consistent with the laboratory experiments performed by Schwille (1988) for DNAPL in a saturated porous medium.

Assuming that the sediments above the sandy clay layer are saturated with DNAPL to Elevation 787.5 feet MSL, the volume of DNAPL-saturated sediment above the sandy clay in the subsurface clay-lined depression is estimated to be 150 cubic yards. Assuming a typical porosity value of 0.3, the volume of DNAPL that is saturating the sediment in the subsurface clay-lined depression is estimated to be 9,500 gallons. The anticipated location of the saturated DNAPL sediments are shown in Figure 2.

## DESIGN OBJECTIVES AND COMPONENTS

The objectives of the DNAPL recovery system are to limit the migration of contaminants to the groundwater and remove the source of contamination. These objectives will be met by: 1) pumping the DNAPL from the depression in the confining unit between the upper and lower aquifers; 2) enhancing DNAPL recovery through pumping groundwater from the DNAPL Recovery Enhancement Well U8; and 3) recycle or dispose of the DNAPL in an environmentally sound manner.

The components of the design are a DNAPL gradient control and recovery enhancement pump-out well (U8), DNAPL recovery well (W251), and a DNAPL storage system.

## DNAPL RECOVERY SYSTEM DESIGN

The four additional soil borings described previously helped to delineate the location of the clay-lined bowl and the location of the saturated DNAPL pool. The DNAPL recovery system consists of one DNAPL recovery well (W251) screened at the bottom of the depression in the middle confining unit, and one DNAPL recovery enhancement well (U8) located adjacent to and above the screened interval of the DNAPL recover well. The well logs of W251 and U8 are in Appendix A. The DNAPL gradient control and recovery enhancement pump-out well and the DNAPL recovery well are located near the middle of both areas (see Figure 2). The 8-inch diameter well screen is open to the formation between elevations 783.1 and 788.1. The 4-inch diameter screen for U8 is open to the formation between elevations 794 and 809. The DNAPL recovery enhancement well (U8) is designed to cause upwelling of DNAPL within the immediate area of the DNAPL recovery well (W251). DNAPL will be pumped from the recovery well using a compressed air ejector type pump. The DNAPL recovery pump is capable of removing DNAPL from the formation at a rate of approximately 2 gallons per hour. A six-hour pump test was conducted in November 1988 that produced 11.7 gallons of DNAPL. Discharge piping, power and control cables, a one-horse power compressor, and a 2,000 gallon steel storage tank will be placed in a building at Well W251.

The DNAPL recovery enhancement well (U8) will remove water from above the DNAPL at an estimated rate of 30 gallons per minute (gpm). Well U8 is located 5 feet west of the DNAPL recovery well. Well U8's forcemain discharges to the oil separator tank located in the control building. The oil separator tank discharges by gravity flow to the sanitary sewer.

The recovered DNAPL will be pumped to a 2,000-gallon, steel-walled storage tank located in a heated, vented concrete block building at Well W251. The tank will be placed on a recessed 6-inch reinforced concrete slab that allows 1 foot of freeboard for leak prevention and containment. The tank will be fitted with a equipped detection monitoring system that will automatically shut down the recovery system when the liquid level reaches the activation level. The power, controls, and compressor will be located in a control room that is separated from the tank portion of the building by a concrete block wall. The recovered DNAPL will be periodically pumped from the tank and disposed of in accordance with applicable regulations.

The principal of using an enhancement well to help recover the DNAPL is discussed in the November 1988 "Pump-Out System Verification Plan" (Barr Engineering Co.). The recovery enhancement well is designed to cause upwelling of the DNAPL within the depression, thereby inducing a larger flux of DNAPL into the recovery well. Without recovery enhancement, DNAPL near the recovery well would be drawn down rapidly forcing shutdown of the well. By inducing DNAPL upwelling, it is believed that the recovery well can operate for longer periods of time and withdraw greater amounts of DNAPL.

The effectiveness of recovering the DNAPL from the base of the depression in the middle confining unit will be evaluated during the initial operation of the DNAPL recovery system.

## IMPLEMENTATION SCHEDULE

The operation of this system hinges on defining a disposal location for the DNAPL. The final plans for the DNAPL building will be submitted to the MPCA within 30 days after determination of the disposal location.

The plans will consist of the final design of the recovery system including the building, pump and controls, and storage. A monitoring plan, a contingency plan, an operating plan, and disposal option will also be included.

# REFERENCES

Barr Engineering Co., May 1988, Plan of Interim Response Actions.

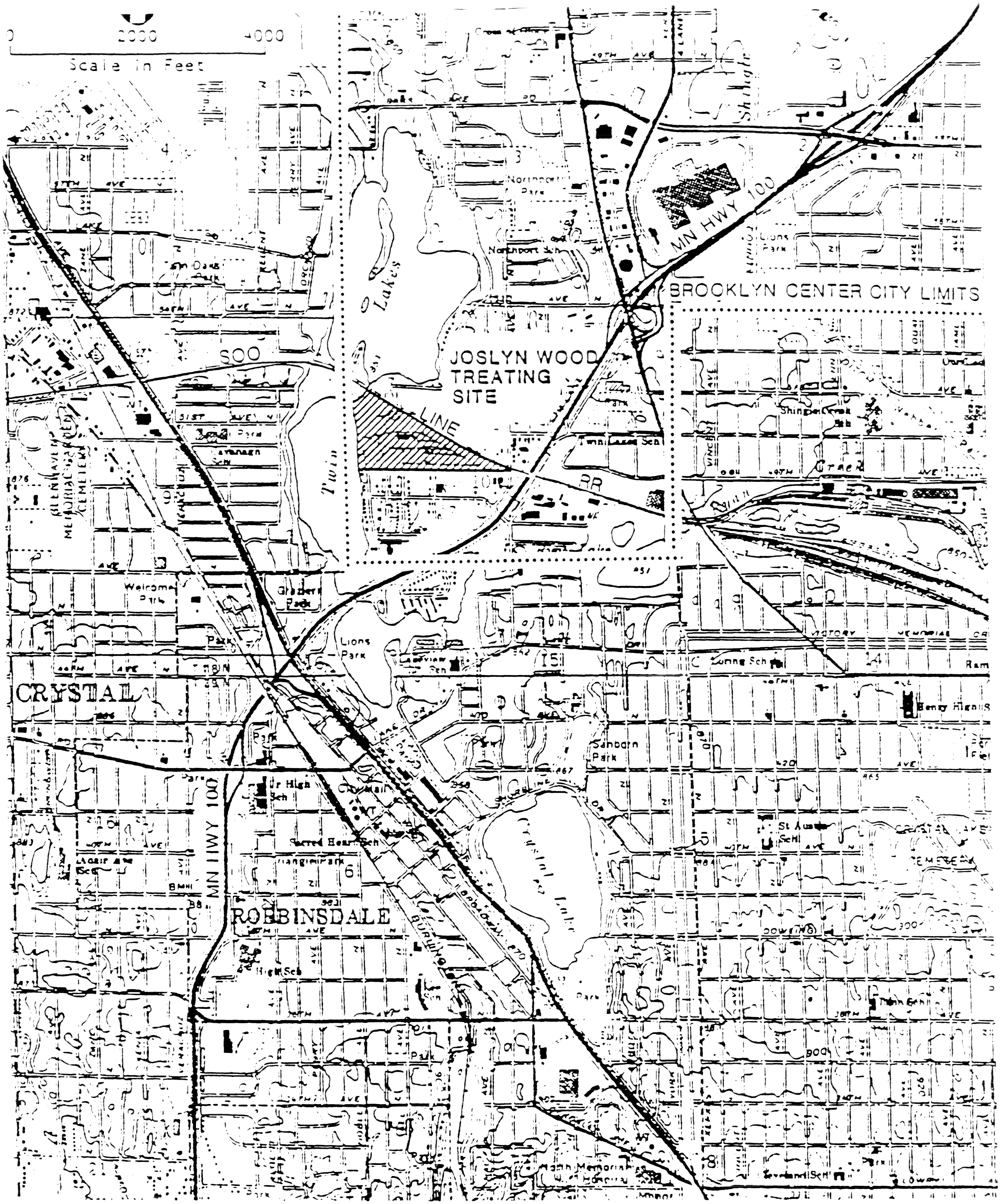
Barr Engineering Co., July 1987, Detailed Analysis Report, Part One -- RAP Investigation.

Barr Engineering Co., January 1986, Remedial Investigation/Alternatives Report.

Barr Engineering Co., November 1988, Pump-out System Verification Plan.

Schwille, F., 1988, Dense Chlorinated Solvents in Porous and Fractured Media: Model Experiments: Translated by J.F. Pankon: Lewis Publishers, Inc., MI; 146 p.

# Figures



Base Map: USGS 7 1/2 Minute Minneapolis North Quadrangle

Figure 1

LOCATION OF JOSLYN SITE

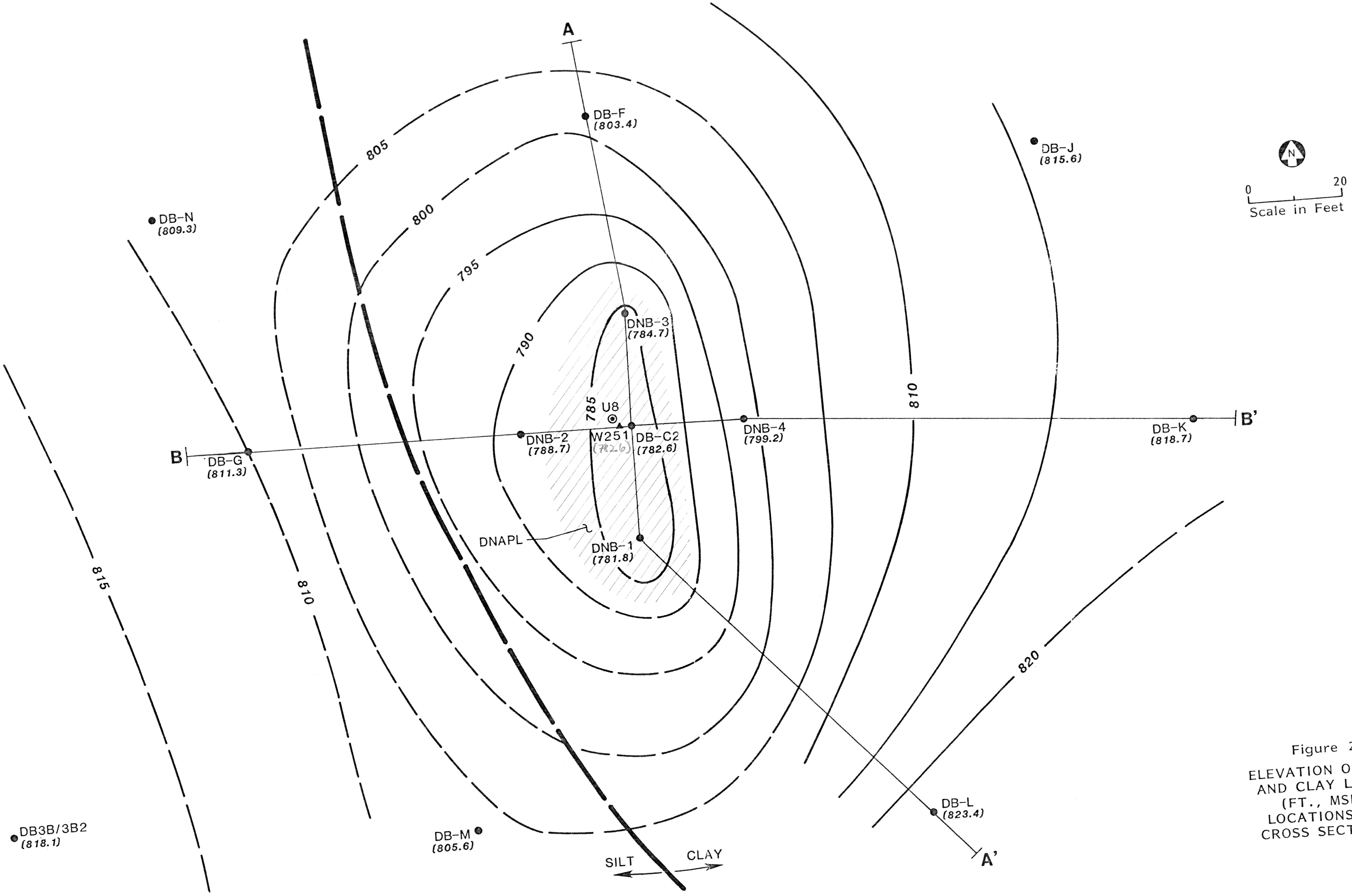


Figure 2

ELEVATION OF SILT
AND CLAY LAYER
(FT., MSL)
LOCATIONS OF
CROSS SECTIONS

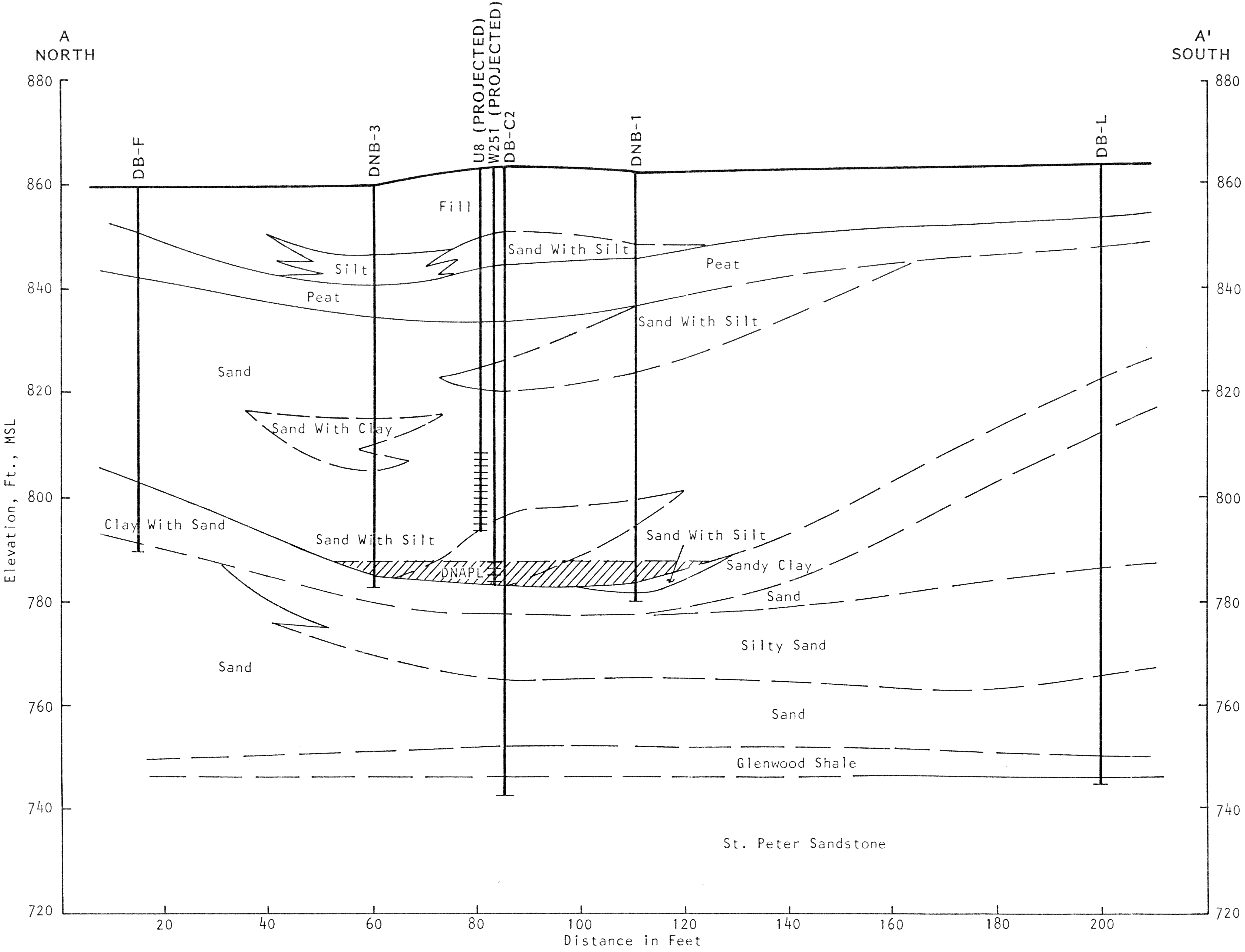


Figure 3

CROSS-SECTION A-A'

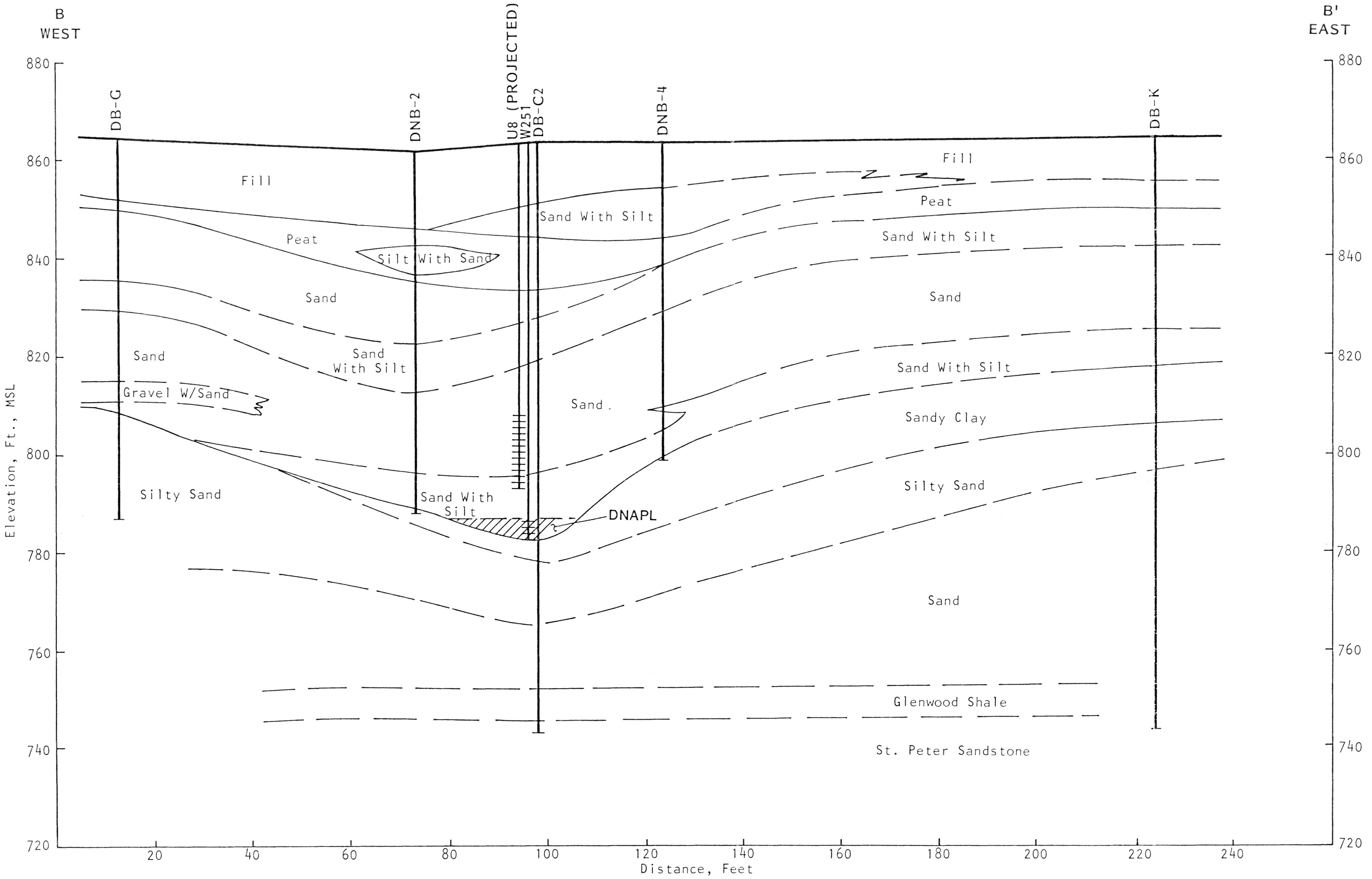


Figure 4
CROSS-SECTION B-B'

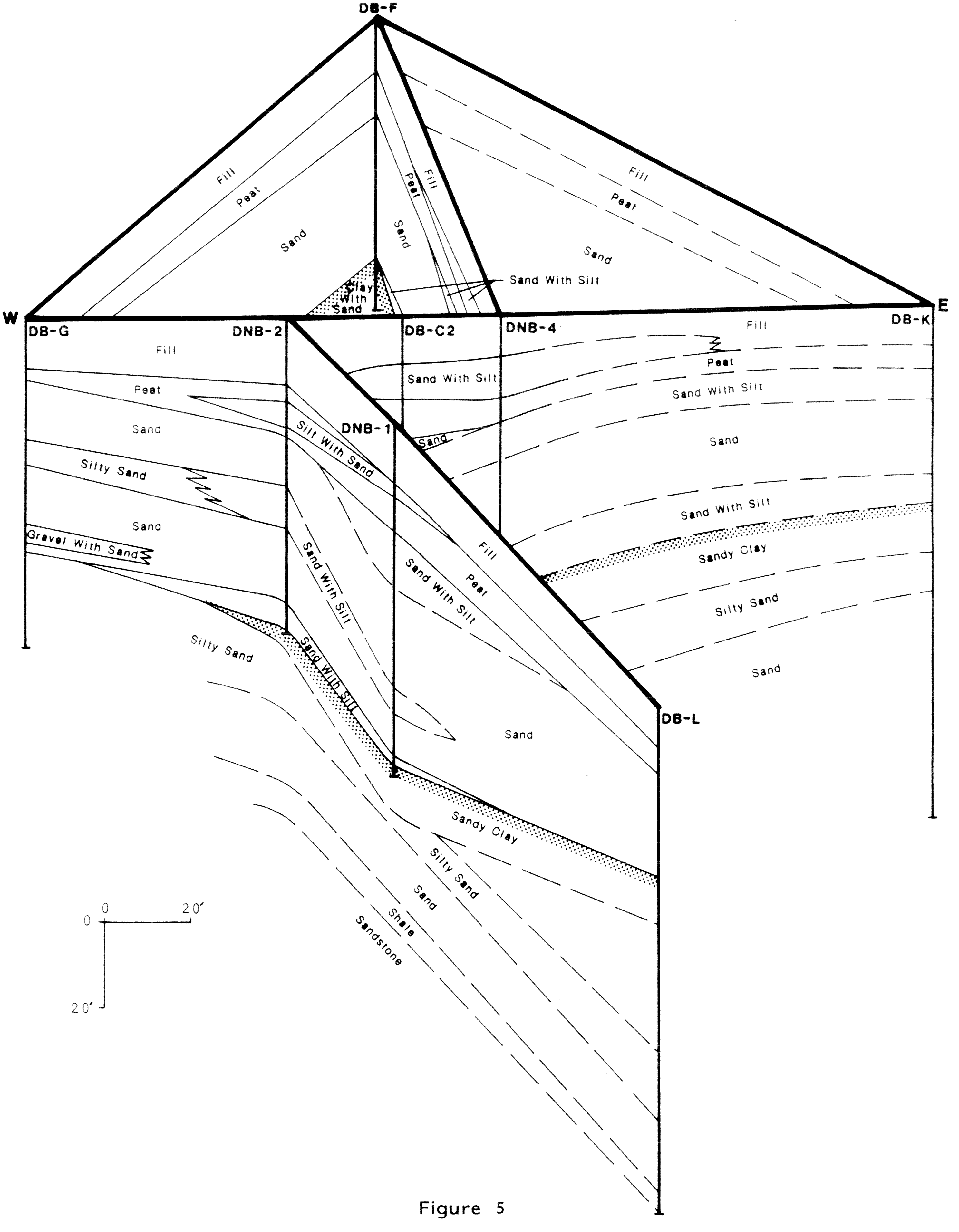


Figure 5

FENCE DIAGRAM OF
CROSS SECTIONS A-A' AND B-B'

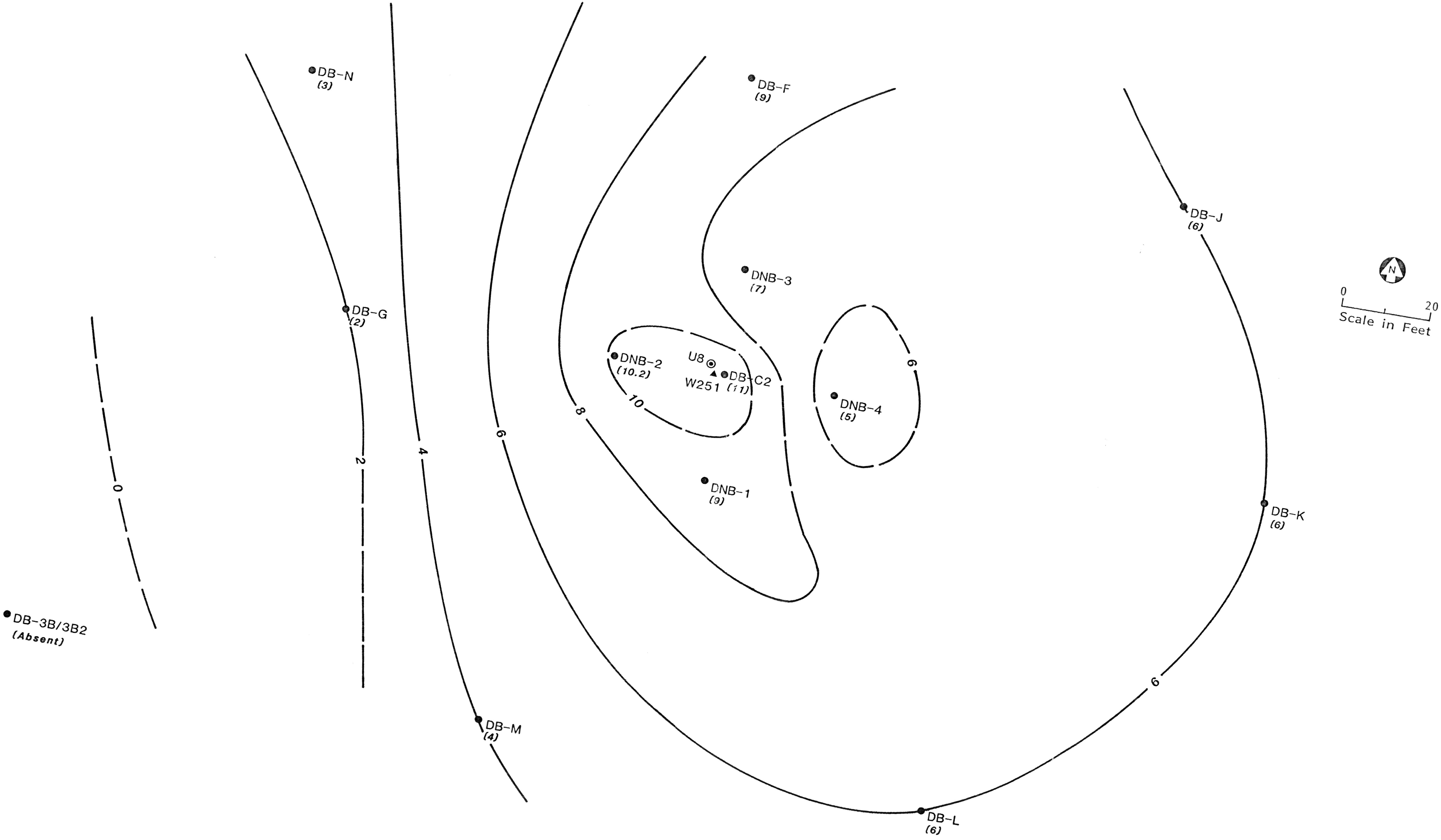


Figure 6

ISOPAC

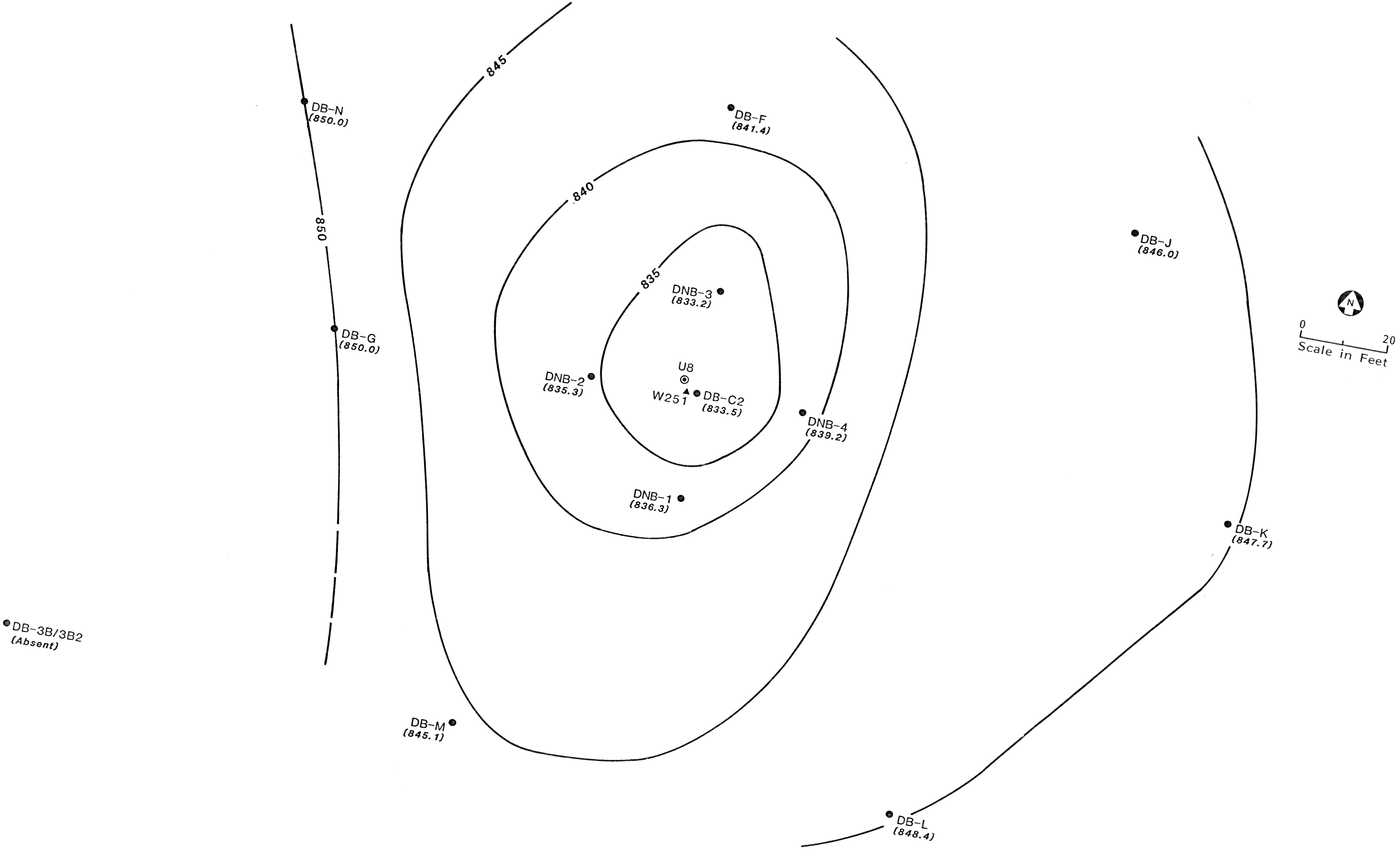


Figure 7
ELEVATION OF BASE
OF

# Appendix A

JOB NO 4200 87-387

VERTICAL SCALE 1" = 6'

BORING NO DB-C2

PROJECT SOIL BORINGS, BROOKLYN CENTER WOOD TREATING SITE

| DEPTH IN FEET | DESCRIPTION OF MATERIAL<br>SURFACE ELEVATION | GEOLOGIC ORIGIN | N | WL | SAMPLE |  | LABORATORY TESTS |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  | NO | TYPE | W | D | LL/PL | Qu |
|  | NO SAMPLES TAKEN |  |  |  |  |  |  |  |  |  |
| 32 | SAND, fine grained, waterbearing, loose to very dense to dense (SP) | COARSE ALLUVIUM | 9 |  | 1 | SB |  |  |  |  |
|  |  |  | 8 |  | 2 | SB |  |  |  |  |
|  |  |  | 6 |  | 3 | SB |  |  |  |  |
|  |  |  | 20 |  | 4 | SB |  |  |  |  |
|  |  |  | 46 |  | 5 | SB |  |  |  |  |
|  |  |  | 45 |  | 6 | SB |  |  |  |  |
| 75 | Continued on Next Page |  | 18 |  | 7 | SB |  |  |  |  |

SE-3 (77-B)-6

twin city testing corporation

# LOG OF TEST BORING

JOB NO. 4200 87-387 VERTICAL SCALE 1" = 6' BORING NO. DB-C2(Cont.)

PROJECT SOIL BORINGS, BROOKLYN CENTER WOOD TREATING SITE

| DEPTH IN FEET | DESCRIPTION OF MATERIAL | GEOLOGIC ORIGIN | N | WL | SAMPLE NO. | SAMPLE TYPE | LABORATORY TESTS W | D | L.L. / P.L. | Qu |
|---|---|---|---|---|---|---|---|---|---|---|
| 75 | SAND (Cont.) (SP) | COARSE ALLUVIUM (Cont.) | 25 | | 8 | SB | | | | |
| 78½ | SAND W/GRAVEL, medium grained, waterbearing, very dense (SP) | | 73 | | 9 | SB | | | | |
| 80½ | SANDY LEAN CLAY, brown, very stiff (CL) | TILL OR MIXED ALLUVIUM | 69 | | 10 | SB | | | | |
| | | | 32 | | 11 | SB | | | | |
| | | | 39 | | 12 | SB | | | | |
| 91 | SILT, brown, wet, very dense to dense, a few lenses of waterbearing sand below about 104' (ML) | FINE ALLUVIUM | 48 | | 13 | SB | | | | |
| | Note #1: All samples retained by Barr Engineering Company representative. | | 32 | | 14 | SB | | | | |
| | Note #2: Boring filled with neat cement grout. | | 28 | | 15 | SB | | | | |
| 117.5 | SANDSTONE | | 200/0.2 | | 16 | SB | | | | |
| 120.2 | End of Boring | | | | | | | | | |

WATER LEVEL MEASUREMENTS'

| DATE | TIME | SAMPLED DEPTH | CASING DEPTH | CAVE-IN DEPTH | BAILED DEPTHS | WATER LEVEL |
|---|---|---|---|---|---|---|
| | | | | | to | |
| 3-11 | 5:00 | 120.2' | 10' | | to | NMR |
| 3-11 | 6:00 | 120.2' | None | | to See Note #2 | |
| | | | | | to | |

START 3-11-87 COMPLETE 3-11-87

METHOD 6 FA 0'-8' @ 5:00

4 DC 0'-10', DM 10'-120'

CREW CHIEF White

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-1
DATE STARTED 7/11/89
DATE COMPLETED 7/11/89
RISER PIPE ELEVATION
FIELD INSPECTOR French (BEC)
CREW CHIEF White (TCT)
GROUND SURFACE ELEVATION 862.3 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| 0 | | | | | | POORLY GRADED SAND, SP - About 95% fine subrounded to rounded sand; about 5% silt; brown, wet; strong hydrocarbon odor. (Fill) |
| 5 | 4<br>5<br>4<br>2 | SS | | | | |
| | | | | ▽ | | |
| 10 | 0<br>0<br>0<br>1 | SS | | | | At 9.5' - 11.5', the sample has a very strong gas-like odor, a silver-gray color, and a rainbow-like sheen. The pore samples are approximately 80% saturated with a medium to dark golden brown, low viscosity oil. |
| | | | | | | 14.0' |
| 15 | 2<br>1<br>1<br>2 | SS | | | | POORLY GRADED SAND WITH SILT, SP-SM - About 90% fine subrounded sand; about 10% silt; brownish gray; wet; moderate hydrocarbon odor. (Fill) |
| | | | | | | 17.0' |
| | | | | | | PEAT, PT - Soft; fibrous; dark brown to black; organic odor; up to 30% clay and silt at 19.5-21.5' and 25.0-25.5'. |
| 20 | 1/3<br>1/3<br>1/3<br>1 | SS | | | | |
| 25 | 1/2<br>1/2<br>1<br>2 | SS | | | | |
| | | | | | | 26.0' |
| | | | | | | POORLY GRADED SAND WITH SILT, SP-SM - About 90% fine subangular to rounded sand; about 10% silt; gray; wet; moderate hydrocarbon odor; 5 mm-thick, black laminations scattered throughout. (Possibly lacustrine) |
| 30 | 2 | | | | | |

COMMENT: Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

Sheet 1 of 3
2327110/DNB-1.WP/PLS

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-1
DATE STARTED 7/11/89
DATE COMPLETED 7/11/89
RISER PIPE ELEVATION
FIELD INSPECTOR French (BEC)
CREW CHIEF White (TCT)
GROUND SURFACE ELEVATION 862.3 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| | 3 | SS | | | | |
| | 4 | | | | | |
| | 3 | | | | | |
| 35 | 2 | | | | | |
| | 2 | SS | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | | | | | | 39.0' |
| | | | | | | POORLY GRADED SAND, SP - About 95% fine subrounded sand; about 5% silt; gray; wet; black, 1-3 mm thick laminations scattered from 54.5' - 60'. (Possibly lacustrine) |
| 40 | 3 | | | | | |
| | 5 | SS | | | | |
| | 5 | | | | | |
| | 6 | | | | | |
| 45 | 3 | | | | | |
| | 3 | SS | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| | | | | | | At 49.5' - 51.5', the sample is saturated with a greenish brown, low viscosity oil. |
| 50 | 2 | | | | | |
| | 3 | SS | | | | |
| | 8 | | | | | |
| | 9 | | | | | |
| | 7 | | | | | |
| | 8 | SS | | | | |
| | 9 | | | | | |
| | 11 | | | | | |
| | 6 | | | | | |
| 55 | 10 | SS | | | | |
| | 9 | | | | | |
| | 9 | | | | | |
| | 5 | | | | | |
| | 6 | | | | | |
| | 6 | SS | | | | |
| | 9 | | | | | |
| | 4 | | | | | |
| | 6 | | | | | |
| | 7 | SS | | | | |
| 60 | 9 | | | | | |

COMMENT: Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-1
DATE STARTED 7/11/89
DATE COMPLETED 7/11/89
RISER PIPE ELEVATION
FIELD INSPECTOR French (BEC)
CREW CHIEF White (TCT)
GROUND SURFACE ELEVATION 862.3 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type |
|---|---|---|
| | 5 | SS |
| | 7 | |
| | 9 | |
| | 9 | |
| | 5 | |
| | 8 | SS |
| | 7 | |
| | 6 | |
| | 4 | |
| 65 | 4 | |
| | 6 | SS |
| | 7 | |
| | 6 | |
| | 6 | |
| | 7 | |
| | 7 | SS |
| | 5 | |
| | 7 | |
| | 4 | SS |
| 70 | 4 | |
| | 4 | |
| | 5 | |
| | 6 | SS |
| | 5 | |
| | 3 | |
| | 4 | |
| | 4 | SS |
| | 4 | |
| | 7 | |
| 75 | 9 | |
| | 6 | SS |
| | 7 | |
| | 4 | |
| | 5 | |
| | 5 | SS |
| | 6 | |
| | 5 | |
| | 12 | |
| | 21 | SS |
| 80 | 34 | |
| | 22 | |
| | 7 | |
| | 6 | SS |
| | 8 | |
| 85 | | |

DESCRIPTION OF MATERIALS AND REMARKS

62.0'

POORLY GRADED SAND, SP - About 95% subangular to subrounded, fine to medium-grained sand; trace subangular coarse sand; gray; wet. (Outwash)

64.0'

WELL GRADED SAND WITH SILT, SW-SM - About 90-95% subangular to subrounded, fine to medium-grained sand; about 5-10% silt; trace to 5% coarse sand; gray; wet; moderate to strong hydrocarbon odor. (Outwash)

At 65.3' - 66', sample has rainbow-like sheen and is at least 60% saturated with a greenish brown, low viscosity oil.

68.0'

SILTY SAND, SM - About 85-95% subangular to subrounded, fine to medium-grained sand; about 5-15% fines; trace coarse sand and gravel; gray; wet; moderate hydrocarbon odor; black laminations up to 3 mm thick. (Outwash)

70.0'

WELL GRADED SAND, SW - About 95% subangular to subrounded fine to medium-grained sand; about 5% silt; trace to 10% angular to subangular coarse sand; trace to 5% angular to subangular fine gravel; gray; wet; sand and gravel grains have miscellaneous lithologies. (Outwash)

73.8' - 80.5', samples are saturated with medium to high viscosity (butter-like), yellowish brown to dark bronze oil.

78.5'

WELL GRADED SAND WITH SILT, SW-SM - About 80% subangular to subrounded medium to fine-grained sand; about 10% silt; about 5% coarse subangular to angular sand; about 10% subangular to angular fine and coarse gravel of miscellaneous lithologies; gray; wet. (Outwash)

80.5'

LEAN CLAY WITH SAND, CL - About 70-75% lean clay; about 25-30% subangular to subrounded fine to medium sand; medium plasticity; no dilatency; medium toughness; brown, moist; slight petroleum odor; moist. (Till)

EOB 82.0'

**COMMENT:** Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-2
DATE STARTED 7/11/89
DATE COMPLETED 7/11/89
RISER PIPE ELEVATION
FIELD INSPECTOR French (BEC)
CREW CHIEF White (TCT)
GROUND SURFACE ELEVATION 861.5 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| 0 | | | | | | POORLY GRADED SAND, SP - About 95% fine subrounded to rounded sand; about 5% silt; yellowish brown and gray mottled; moist. (Fill) |
| 5 | 2<br>2<br>5<br>5 | SS | | | | |
| | | | | ▽ | | |
| | | | | | | At 9.5' - 9.7', sample has oil sheen. At 9.5' - 12.0', the auger shows oil sheen. |
| 10 | 1<br>4<br>3<br>3 | SS | | | | |
| 15 | 3<br>2<br>2<br>3 | SS | | | | |
| | | | | | | 15.8'<br>PEAT, PT - Soft; fibrous; dark brown to black; organic odor; up to 25% clay and silt. |
| | | | | | | 19.0'<br>ELASTIC SILT WITH SAND, MH - About 60% silt; about 25% fine subrounded sand; about 15% organic fibers; medium plasticity; no dilatency; low toughness; black; organic odor; moist; lens of fine sand at 21.0' to 21.2'. |
| 20 | 1/2<br>1/2<br>2<br>1 | SS | | | | |
| 25 | 1/2<br>1/2<br>2<br>3 | SS | | | | PEAT, PT - Soft; very fibrous; orange-brown; moist; less than 5% fines.<br>25.5'<br>26.0'<br>POORLY GRADED SAND, SP - About 95% fine subrounded to rounded sand; about 5% silt; gray; wet. (Possibly lacustrine) |
| 30 | 3 | | | | | |

**COMMENT:** Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method from 14.5' to E.O.B. Sampled by 2-foot split-spoon method.

Sheet 1 of 3

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-2
DATE STARTED 7/11/89
DATE COMPLETED 7/11/89
RISER PIPE ELEVATION
FIELD INSPECTOR French (BEC)
CREW CHIEF White (TCT)
GROUND SURFACE ELEVATION 861.5 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| | 3 | | | | | |
| | 4 | SS | | | | |
| | 4 | | | | | |
| 35 | 3 | | | | | |
| | 4 | | | | | |
| | 6 | SS | | | | |
| | 9 | | | | | |
| | | | | | | ---------- 39.0' ----------<br>POORLY GRADED SAND WITH SILT, SP-SM - About 90-95% fine rounded to subrounded sand; about 5-10% silt; gray; wet; fine black laminations scattered throughout. (Possibly lacustrine) |
| 40 | 5 | | | | | |
| | 5 | SS | | | | |
| | 7 | | | | | |
| | 8 | | | | | |
| 45 | 5 | | | | | |
| | 5 | SS | | | | |
| | 6 | | | | | |
| | 7 | | | | | |
| | | | | | | ---------- 49.0' ----------<br>POORLY GRADED SAND, SP - About 95% fine subrounded to rounded sand; about 5% silt; gray; wet; regularly spaced black laminations, 1-5 mm thick. (Possibly lacustrine) |
| 50 | 4 | | | | | |
| | 4 | SS | | | | |
| | 7 | | | | | |
| | 7 | | | | | |
| | 9 | | | | | |
| | 10 | SS | | | | |
| | 11 | | | | | |
| | 5 | | | | | |
| | 7 | | | | | |
| | 6 | SS | | | | |
| 55 | 8 | | | | | |
| | 6 | | | | | |
| | 11 | | | | | |
| | 10 | SS | | | | |
| | 10 | | | | | |
| | 6 | | | | | |
| | 7 | | | | | ---------- 58.0' ----------<br>WELL GRADED SAND, SW - About 95% medium to fine subangular to subrounded sand; about 5% silt; about 5% coarse subangular sand; gray; wet; trace fine to coarse subangular to angular gravel beginning at 60.8'. (Outwash) |
| | 6 | SS | | | | |
| | 6 | | | | | |
| | 4 | | | | | |
| 60 | 6 | | | | | |

COMMENT: Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method from 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-2
DATE STARTED 7/11/89
DATE COMPLETED 7/11/89
RISER PIPE ELEVATION
FIELD INSPECTOR French (BEC)
CREW CHIEF White (TCT)
GROUND SURFACE ELEVATION 861.5 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| | 7 | | | | | |
| | 5 | SS | | | | |
| | 4 | | | | | |
| | 4 | | | | | |
| | 4 | SS | | | | |
| | 6 | | | | | |
| | 4 | | | | | |
| | 3 | | | | | |
| | 4 | SS | | | | |
| 65 | 5 | | | | | 65.0' |
| | 4 | | | | | SILTY SAND, SM - About 80-85% fine to medium subangular to subrounded sand; about 15-20% silt; trace subangular coarse sand and fine gravel of miscellaneous lithologies; gray; wet. (Outwash) |
| | 5 | | | | | |
| | 5 | SS | | | | |
| | 4 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 6 | | | | | |
| | 6 | SS | | | | |
| | 4 | | | | | |
| 70 | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | SANDY LEAN CLAY, CL - About 65-70% clay; about 30-35% fine subrounded sand; medium plasticity; no dilatency; medium toughness; gray; moist. (Till) |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | SS | | | | 72.8' |
| | 4 | | | | | EOB 73.0' |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 75 | | | | | | |

**COMMENT:** Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method from 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

Sheet 3 of 3
2327110/DNB-2.WP/PLS

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-3
DATE STARTED 7/12/89
DATE COMPLETED 7/13/89
RISER PIPE ELEVATION
FIELD INSPECTOR K. French/R. Wuolo (BEC)
CREW CHIEF T. White (TCT)
GROUND SURFACE ELEVATION 859.7 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| 0 | | | | | | FILL containing wooden poles and black dirt. |
| | | | | ▽ | | No sample was retained. |
| 5 | 4<br>5<br>5<br>4 | SS | | | | |
| | | | | | | 6.0 ' |
| | | | | | | POORLY GRADED SAND WITH SILT, SP-SM - About 90 to 95% fine subrounded to rounded sand; about 5 to 10% silt; mottled black and gray; wet (Fill). |
| 10 | 4<br>3<br>5<br>2 | SS | | | | |
| | | | | | | 13.0' |
| | | | | | | ELASTIC SILT, MH - About 65% silt; about 25% organic fibers; about 5-10% fine subrounded sand; medium plasticity; no dilatency; low toughness; black; moist; organic odor. |
| 15 | 3<br>2<br>2<br>3 | SS | | | | |
| | | | | | | 19.5' |
| | | | | | | PEAT, PT - Soft; very fibrous; contains up to 25% silt; orange-brown to black; moist. |
| 20 | 1/4<br>1/4<br>1/4<br>1/4 | SS | | | | |
| | | | | | | At 25.5'-26.3', a lens of laminated fine sand with wood chips. |
| 25 | 1/2<br>1/2<br>1<br>1 | SS | | | | |
| | | | | | | 26.5' |
| | | | | | | POORLY GRADED SAND, SP - About 95% fine subrounded to rounded sand; about 5% silt; gray; wet. (Possibly lacustrine) |
| 30 | 1 | | | | | |

COMMENT: Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary from 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# BORING LOG

PROJECT Joslyn Brooklyn Center BORING NO. DNB-3
DATE STARTED 7/12/89
DATE COMPLETED 7/13/89 RISER PIPE ELEVATION
FIELD INSPECTOR K. French/R. Wuolo (BEC)
CREW CHIEF T. White (TCT) GROUND SURFACE ELEVATION 859.7 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| 30 | | | | | | |
| | 2 | | | | | |
| | 3 | SS | | | | |
| | 3 | | | | | |
| 35 | 3 | | | | | |
| | 4 | SS | | | | |
| | 4 | | | | | |
| | 4 | | | | | |
| 40 | 4 | | | | | |
| | 8 | SS | | | | |
| | 9 | | | | | |
| | 11 | | | | | |
| 45 | 6 | | | | | 45.0' |
| | 11 | SS | | | | POORLY GRADED SAND WITH CLAY, SP-SC - About 90% fine subrounded to rounded sand; about 10% clay, gray; moist to wet. (Possibly lacustrine) |
| | 14 | | | | | |
| | 13 | | | | | |
| 50 | 8 | | | | | 49.0' <br> POORLY GRADED SAND, SP - About 95% fine subrounded sand; about 5% fines; speckled gray; moist. (Possibly lacustrine) |
| | 13 | SS | | | | |
| | 15 | | | | | 51.0' |
| | 5 | | | | | POORLY GRADED SAND WITH CLAY, SP-SC - About 85-90% fine subrounded sand; about 10-15% clay; speckled gray; wet; laminated. (Possibly lacustrine) |
| | 8 | | | | | |
| | 9 | SS | | | | |
| | 11 | | | | | |
| | 5 | | | | | |
| | 7 | SS | | | | |
| | 8 | | | | | |
| 55 | 8 | | | | | 55.0' |
| | 5 | | | | | POORLY GRADED SAND, SP - About 95% fine to medium rounded to subrounded sand; about 5% silt; trace coarse sand and fine gravel; gray; wet; fine (1-5mm) laminations scattered throughout. (Possibly lacustrine) |
| | 7 | SS | | | | |
| | 9 | | | | | |
| | 8 | | | | | |
| | 3 | | | | | |
| | 5 | | | | | |
| | 7 | SS | | | | |
| | 9 | | | | | |
| | 3 | | | | | |
| 60 | 5 | | | | | |

COMMENT: Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary from 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# BORING LOG

PROJECT Joslyn Brooklyn Center BORING NO. DNB-3
DATE STARTED 7/12/89
DATE COMPLETED 7/13/89 RISER PIPE ELEVATION
FIELD INSPECTOR K. French/R. Wuolo (BEC)
CREW CHIEF T. White (TCT) GROUND SURFACE ELEVATION 859.7 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| 60 | | | | | | |
| | 7 | SS | | | | |
| | 9 | | | | | 61.0' |
| | 6 | | | | | WELL-GRADED SAND, SW - About 95% fine to medium sand; about 3% coarse sand; trace to 2% fine gravel; trace coarse gravel; speckled gray; wet; coarse grains have miscellaneous lithologies. (Outwash) |
| | 8 | SS | | | | |
| | 8 | | | | | |
| | 6 | | | | | |
| | 5 | | | | | |
| | 6 | SS | | | | |
| | 7 | | | | | |
| 65 | 6 | | | | | 65.0' |
| | 6 | | | | | POORLY GRADED SAND, SP - About 95% fine subrounded sand; about 5% silt; gray; wet. (Outwash) |
| | 7 | | | | | |
| | 9 | SS | | | | |
| | 7 | | | | | 67.0' |
| | 4 | | | | | WELL GRADED SAND, SW - About 95% fine to coarse subangular to subrounded sand; trace to 5% fines; trace to 5% fine subangular gravel; gray; wet; coarse grains have miscellaneous lithologies (Outwash). |
| | 5 | | | | | |
| | 5 | SS | | | | |
| | 7 | | | | | |
| | 5 | | | | | |
| 70 | 5 | | | | | |
| | 10 | SS | | | | |
| | | | | | | At 71' to 73', the sample is approximately 60% saturated with a brown, creosote-like substance. |
| | 6 | | | | | |
| | 7 | SS | | | | |
| | 13 | | | | | |
| | | | | | | 73.0' |
| | 19 | | | | | WELL GRADED SAND WITH GRAVEL, SW - About 70% fine to coarse subangular sand; about 30% fine to coarse subangular gravel; brownish gray; wet; approximately 50% saturated with creosote-like brown fluid (Outwash). |
| | 30 | SS | | | | |
| | 34 | | | | | |
| 75 | | | | | | 75.0' |
| | 7 | | | | | LEAN CLAY, CL - Consists of 100% fines; gray; moist to wet (Till). |
| | 8 | SS | | | | |
| | 10 | | | | | |
| | 26 | | | | | EOB 77.0' |
| 80 | | | | | | |

COMMENT: Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary from 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-4
DATE STARTED 7/10/89
DATE COMPLETED 7/10/89
RISER PIPE ELEVATION
FIELD INSPECTOR K. French (BEC)
CREW CHIEF T. White (TCT)
GROUND SURFACE ELEVATION 863.2 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| 0 | | | | | | POORLY GRADED SAND, SP - About 95% fine subangular sand; about 5% silt; brown, wet (Fill). |
| 5 | 2<br>2<br>3<br>3 | SS | | | | |
| | | | | ▽ | | 9.0'<br>POORLY GRADED SAND WITH SILT, SP-SM - About 90% fine to medium subrounded sand; about 10% silt; grayish black; wet; slight hydrocarbon oil (Fill). |
| 10 | 2<br>2<br>3<br>3 | SS | | | | |
| 15 | 0<br>2<br>2<br>3 | SS | | | | |
| | | | | | | 19.0'<br>PEAT, PT - Fibrous; contains up to 25% silt; contains 5-15% sand; brown to black; moist; organic odor. |
| 20 | 0<br>1<br>2<br>2 | SS | | | | |
| | | | | | | 24.0'<br>POORLY GRADED SAND WITH SILT, SP-SM - About 90% fine to medium subrounded sand; about 10% silt; gray; wet. (Possibly lacustrine) |
| 25 | 2<br>2<br>4<br>6 | SS | | | | |
| 30 | 3 | | | | | |

**COMMENT:** Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method from 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-4
DATE STARTED 7/10/89
DATE COMPLETED 7/10/89
RISER PIPE ELEVATION
FIELD INSPECTOR K. French (BEC)
CREW CHIEF T. White (TCT)
GROUND SURFACE ELEVATION 863.2 Ft. MSL

| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| 30 | 4<br>6<br>6 | SS | | | ▨ | |
| | | | | | ░ | 34.0'<br>POORLY GRADED SAND, SP - About 95% fine to medium subrounded sand; about 5% silt; gray; wet; regularly spaced black laminations, 1-2 mm thick (Possibly lacustrine) |
| 35 | 3<br>5<br>6<br>10 | SS | | | ░ | |
| 40 | 9<br>12<br>14<br>13 | SS | | | ░ | |
| 45 | 5<br>6<br>8<br>8 | SS | | | ░ | |
| 50 | 5<br>6<br>8 | SS | | | ░ | |
| | 5<br>5<br>4<br>5 | SS | | | ░ | 51.0'<br>WELL GRADED SAND, SW - About 40% fine subrounded sand; about 35% medium subangular sand; about 20% subangular coarse sand; about 5% silt; trace fine gravel; gray to black; wet. (Possibly lacustrine) |
| | 4<br>4<br>4 | SS | | | ▨ | 53.0'<br>SILTY SAND, SM - About 40% medium subangular sand; about 25% fine subrounded sand; about 5-10% coarse subangular sand; about 20% silt; about 5-10% fine gravel; gray; wet. (Possibly lacustrine) |
| 55 | 5<br>4<br>5<br>5<br>7<br>6<br>6<br>6<br>7 | SS<br>SS | | | ░ | 55.0'<br>WELL GRADED SAND, SW - About 40% fine rounded sand; about 40% medium subrounded sand; about 15% coarse subangular sand; trace fine gravel; gray; wet. (Possibly lacustrine) |
| | 5 | | | | ▨ | 59.0' |
| 60 | 6 | | | | | |

**COMMENT:** Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method from 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# BORING LOG

PROJECT Joslyn Brooklyn Center
BORING NO. DNB-4
DATE STARTED 7/10/89
DATE COMPLETED 7/10/89
RISER PIPE ELEVATION
FIELD INSPECTOR K. French (BEC)
CREW CHIEF T. White (TCT)
GROUND SURFACE ELEVATION 863.2 Ft. MSL

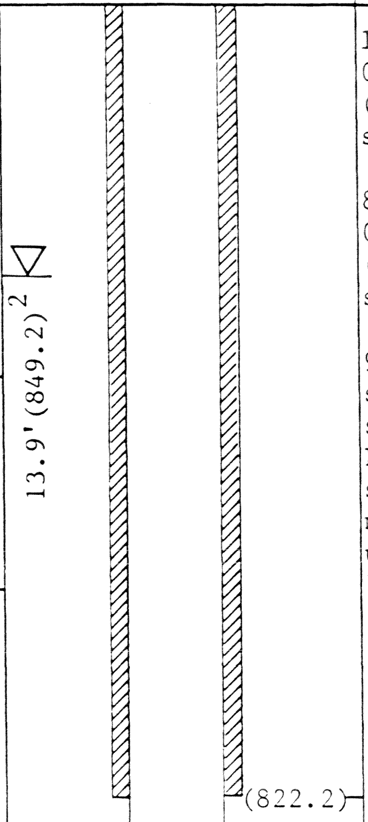
| Depth (Feet) | Blows Per 6" | Sample Type | Well Construction | Water Table | Profile | DESCRIPTION OF MATERIALS AND REMARKS |
|---|---|---|---|---|---|---|
| 60 | 7 | SS | | | ▨ | WELL GRADED SAND WITH SILT, SW-SM - About 45% medium subrounded sand; about 40% fine subrounded sand; about 10% silt; about 5% coarse sand; trace coarse gravel; grayish black; wet. (Outwash) |
| | 7 | | | | ▨ | |
| | 5 | | | | ▨ | |
| | 4 | SS | | | ▨ | |
| | 6 | | | | ▨ | |
| | 8 | | | | ▨ | SANDY CLAY, CL - About 75% clay; about 25% fine to medium sand; medium plasticity; slow dilatency; medium toughness; gray to black; moist. (Till) |
| | 6 | | | | ▨ | |
| | 13 | | | | ▨ | ------------------------------ 64.0' ------------------------------ |
| | 5 | SS | | | ▨ | |
| 65 | 5 | | | | ▨ | ------------------------------ EOB 65.0' ------------------------------ |

COMMENT: Drilled by hollow stem auger method down to 14.5'. Drilled by mud rotary method from 14.5' to E.O.B. Sampled by 2-foot long split-spoon method.

# WELL LOG

**BARR ENGINEERING CO.**
Minneapolis, Minnesota

Project Brooklyn Center Wood Treating Site
Well No. W251
Date Started 4/22/87
Date Completed 5/08/87
Riser Pipe Elevation 865.00
Field Inspector D. Ratner - BEC
Crew Chief R. Sigafoos - E.H. Renner & Sons
Ground Surface Elevation 863.1

| BOREHOLE CONSTRUCTION NOTES | LITHOLOGY | WELL CONSTRUCTION | WELL CONSTRUCTION NOTES |
|---|---|---|---|
| Cable tool method<br>14" diameter casing driven 0.0'-40.9' (863.1-822.2)[1]<br>8" diameter casing driven 0.0'-82.0' (863.1-781.1)<br>7' pullback on 8" diameter casing<br>EOB 82.0' | Fine Sand (Fill)<br>19.0'<br>Peat<br>30.0'<br>Fine Sand |  | 14" diameter casing 0.0'-40.9' (863.1-822.2), 1.1' stick-up<br>8" diameter casing 0.0'-75.0' (863.1-788.1) 1.9' stick-up<br>9.1' long, 8" diameter stainless steel, telescoping well screen. Lowermost 2.1' of screen is #0 slot sump, middle 5' is #20 slot, uppermost 2' is #0 slot 72.9-82.0'(790.2-781.1)<br>1" diameter galvanized riser pipe. T-joint at 80.2', check valve at 19.0'. 0.0'-80.2' (0.0 -782.9) 2.2' stick-up<br>Annulus filled with neat cement grout.<br>Vented locking cap fitted to 8" diameter casing.<br>Well seal.<br>4.0' x 4.0' x 1.0' H cement slab constructed around well. |

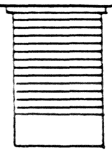
Comments: [1] Elevation ft. (MSL)
[2] Water level 5/4/87

Sheet 1 of 2

# WELL LOG

**BARR ENGINEERING CO.**
Minneapolis, Minnesota

Project Brooklyn Center Wood Treating Site
Well No. W251
Date Started 4/22/87
Date Completed 5/08/87
Riser Pipe Elevation 865.00
Field Inspector D. Ratner - BEC
Crew Chief R. Sigafoos - E.H. Renner & Sons
Ground Surface Elevation 863.1

| BOREHOLE CONSTRUCTION NOTES | LITHOLOGY | WELL CONSTRUCTION | WELL CONSTRUCTION NOTES |
|---|---|---|---|
| | 80.5'<br>Sandy Clay<br>EOB 82.0' | <br>(788.1)<br>(783.1)<br>(781.1) | 863.1<br>80.5<br>82.6 |

Comments:

Sheet 2 of 2

Hennepin

Minnesota Statutes 156A.01-.08

for Water Sample

Township Name: Brooklyn Center
Township Number: 118N
Range Number: 21W
Section No.: 10
Fraction: SE ¼ SW NW ¼

Distance and Direction from Road Intersection or Street Address and City of Well Location

Show exact location of well in section grid with "X."

N W E S ½ mi 1 mile

Sketch map of well location

Addition Name

Block Number

Lot Number

Well # U8

2. PROPERTY OWNER'S NAME

Joslyn Manufacturing Co.
Address 30 South Waker Drive
Chicago, IL 60606

| 3. FORMATION LOG | COLOR | HARDNESS OF FORMATION | FROM | TO |
|---|---|---|---|---|
| Fill | | | 0 | 15 |
| Sand & gravel | mixed | | 15 | 69 |
| | | | | |
| | | | | |
| RECEIVED | | | | |
| NOV 0 0 1988 | | | | |
| BARR ENGR. CO. | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Use a second sheet, if needed

17. REMARKS, ELEVATION, SOURCE OF DATA, etc.

4. WELL DEPTH (completed) 69 ft.

Date of Completion 10-18-88

5. DRILLING METHOD

1☐ Cable tool 4☐ Reverse 7☐ Driven 10☐ Dug
2☐ Hollow rod 5☐ Air 8☐ Bored 11☐ ________
3☒ Rotary 6☐ Jetted 9☐ Power auger

6. DRILLING FLUID bentonite

7. USE

1☐ Domestic 4☒ Monitoring 8☐ Heat Pump
2☐ Irrigation 5☐ Public 9☐ Industry
3☐ Test Well 6☐ Municipal 10☐ Commercial
7☐ Air Conditioning 11☐ ________

8. CASING

1☒ Black 4☐ Threaded
2☐ Galv. 5☒ Welded
3☐ Plastic 6☐

HEIGHT: Above/Below Surface 2 ft.
Drive Shoe? Yes ___ No X

HOLE DIAM.

4 in. to 54 ft. Weight 10.79 lbs./ft. 8 in. to 69 ft.
___ in. to ___ ft. Weight ___ lbs./ft. ___ in. to ___ ft.
___ in. to ___ ft. Weight ___ lbs./ft. ___ in. to ___ ft.

9. SCREEN

Make Johnson
Type stainless steel Dia. 4"
Slot/Gauze 15 slot Length 15'
Set between 54 ft. and 69 ft.

Or open hole from ___ ft. to ___ ft.

FITTINGS:

10. STATIC WATER LEVEL

12 ft. ☒ below ☐ above land surface Date Measured 10-18-88

11. PUMPING LEVEL (below land surface)

___ ft. after 1 hrs. pumping 60 g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.

12. HEAD WELL COMPLETION

1☐ Pitless adapter, manufacturer ________ model ________
2☐ Basement offset 3☒ At least 12" above ground
4☐ Plastic casing protection ________

13. WELL GROUTED?

☒ Yes ☐ No

1☒ Neat Cement 2☐ Bentonite 3☐ ________

Grout material 15 bags from 0 to 50 ft. cu. yds. .68

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION

___ feet ___ direction ___ type

Well disinfected upon completion? ☐ Yes ☒ No

15. PUMP

Date installed ________ ☒ Not installed
Manufacturer's name ________
Model number ________ HP ___ Volts ___
Length of drop pipe ___ ft. capacity ___ g.p.m.
Material of drop pipe ________
Type: 1☐ Submersible 3☐ L.S. Turbine 5☐ Reciprocating
2☐ Jet 4☐ Centrifugal 6☐ ________

16. EXISTING WELLS

Unused well on property? ☐ Yes ☒ No
Abandoned ☐ Permanent ☐ Temporary ☐ Not sealed

18. WATER WELL CONTRACTORS CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Stevens Well Drilling Co. 27194
Licensee Business Name License No.

Address 6240 Hwy 12 W., Maple Plain, MN 55359

Signed Thomas Stevens Date 10-27-88
Authorized Representative

Randy Johnson Date 10-27-88
Name of Driller

5/74 30M
7/76 30M
7/78 30M

HE-01205-02 Rev. 10-85

# Appendix F

## Laboratory and Field Data

(Included on CD in hard copy report)

# 2016 Field Data

# January Weekly Readings

**BARR**

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 1-5-2016
Barr Technician: PWS

Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 0 | 8 | 3 | 7 | 8 | 0 | 0 | 42 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 7 | 6 | 8 | 8 | 1 | 8 | 0 | 23 | 22 | ON |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 3 | 6 | 8 | 2 | 4 | 0 | 1 | 4 | ON |
| U4 | | 0 | 2 | 5 | 1 | 7 | 0 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 4 | 7 | 9 | 4 | 5 | 0 | 2.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 5 | 2 | 9 | 2 | 6 | 2 | 0 | 18 | 15 | ON |
| U7 | | 7 | 7 | 1 | 1 | 9 | 1 | 0 | 18 | 18 | ON |
| U11 | | 9 | 7 | 0 | 2 | 1 | 3 | 0 | 25 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | [✓ On] | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y [✓ N] (Sketch on Back)
Air compressor tank pressure 0 (psi) → Compressor off and drained until DNAPL pump is restarted.
Vault copper lines inspection: [✓ Pass] / Fail
Control panel inspection (By trained individuals only) Hot spots? Y/N Discolored wires? Y/N

Other issues: - DNAPL pump currently turned off - under evaluation

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 1-5-2016 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ✓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ ~~Daily~~ "Tool-Box" Safety Meeting Time 1200 Conducted by: PWS

Topic: -Safe driving
- Sure footing on uneven surfaces.

Attended:

☐ Instrument Calibration

Instrument ____
Time ____
☐ Calibration Check
☐ Battery Check

Instrument ____
Time ____
☐ Calibration Check
☐ Battery Check

Instrument ____
Time ____
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 1-13-2016
Barr Technician: PWS

Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 1 | 3 | 1 | 0 | 5 | 0 | 0 | 40 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 7 | 9 | 3 | 9 | 4 | 2 | 0 | 22 | 22 | ON |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | off | 0 -> 5 | Check On / [✓ Off] Schedule |
| U5 | | 3 | 3 | 8 | 0 | 5 | 9 | 0 | 1 | 4 | ON |
| U4 | | 0 | 4 | 5 | 5 | 9 | 1 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 5 | 0 | 5 | 0 | 2 | 0 | 2 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 5 | 4 | 8 | 1 | 8 | 5 | 0 | 12 | 15 | ON |
| U7 | | 7 | 9 | 2 | 0 | 7 | 6 | 0 | 18 | 18 | ON |
| U11 | | 9 | 9 | 8 | 5 | 9 | 9 | 0 | 24 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | [✓ On] | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? Y / [✓ N] Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only) Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Other issues: DNAPL pump currently off.

U6 Flow low - meter Jumping - New Internal parts Kit needed -

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 1-13-16 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time 1440 Conducted by: PWS

Topic: Snow covered walking Areas.

Attended:

☐ Instrument Calibration

Instrument __________ Instrument __________ Instrument __________

Time __________ Time __________ Time __________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 1-20-16 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N Email

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 1 | 6 | 7 | 8 | 9 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 8 | 1 | 4 | 0 | 4 | 6 | 0 | 21/22 | 22 | ON 100% open |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 3 | 9 | 0 | 7 | 9 | 0 | 1 | 4 | ON |
| U4 | | 0 | 6 | 2 | 4 | 6 | 8 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 5 | 2 | 9 | 2 | 5 | 0 | 2.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 5 | 5 | 7 | 5 | 9 | 2 | 0 | 10 * | 15 | ON |
| U7 | | 8 | 0 | 9 | 4 | 5 | 2 | 0 | 18 | 18 | ON |
| U11 | | 0 | 2 | 1 | 8 | 8 | 1 | 0 | 24 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | [✓ On] | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only) Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Other issues: * Slow flow New internal parts kit needed - Ordered.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 1-20-16 PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time 0830 Conducted by: PWS

Topic: Safe driving – snow covered roads

Attended:

☐ Instrument Calibration

Instrument ________ Instrument ________ Instrument ________

Time ________ Time ________ Time ________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 1-21-16 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N Email

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|
| U12 | | | | | | | 0 | 0 | | 42 | |
| U1A | | | | | | | | 0 | | 0 -> 10 | Used as needed |
| U2A | | | | | | | | 0 | | 22 | |
| W253 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U5 | | | | | | | | 0 | | 4 | |
| U4 | | | | | | | | 0 | | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U6 | | | | | | | | 0 | 10 / 18 | 15 | * |
| U7 | | | | | | | | 0 | | 18 | |
| U11 | | | | | | | | 0 | | 22 | |
| | | | | | | | | **Total** | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? Y / N Has there been any evidence of trespassing? Y / N

Any areas of concern with the West Area, or fence? Y / N (Sketch on Back)

Air compressor tank pressure ________(psi)

Vault copper lines inspection. Pass / Fail

Control panel inspection (By trained individuals only) Hot spots? Y/N Discolored wires? Y/N

Other issues: * U6 New internal parts kit installed,
-Flow Before 10 gpm Valve 100% open
-Flow After 18 gpm Valve restricted.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 1-21-16

PHSTL: PWS

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

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| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Contant | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | Venting | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (□) THE FOLLOWING AFTER COMPLETION

Time ___________ Conducted by: ________

☒ Daily "Tool-Box" Safety Meeting

Topic: Safe Walking on SNOW/ICE.

Attended: ______________________

☐ Instrument Calibration

Instrument _________
Time _____________
☐ Calibration Check
☐ Battery Check

Instrument _________
Time _____________
☐ Calibration Check
☐ Battery Check

Instrument _________
Time _____________
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 1-26-16
Barr Technician: PWS

Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N . Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 1 | 9 | 9 | 7 | 7 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 8 | 3 | 2 | 7 | 9 | 8 | 0 | 22 | 22 | ON |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 3 | 9 | 9 | 8 | 1 | 0 | 1 | 4 | ON |
| U4 | | 0 | 7 | 7 | 4 | 3 | 8 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 5 | 5 | 0 | 9 | 8 | 0 | 2 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 5 | 7 | 1 | 8 | 5 | 0 | 0 | 18 | 15 | ON |
| U7 | | 8 | 2 | 4 | 8 | 8 | 3 | 0 | 18 | 18 | ON |
| U11 | | 0 | 4 | 2 | 4 | 1 | 2 | 0 | 24 | 22 | ON |
| | | | | | | | | **Total** | | **144** | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | **W253** | **W255** | **W253** | **W255** | |
| January | * | On | * | [✓ On] | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] N Has there been any evidence of trespassing? Y [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only) Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Other issues: -Wells U2A, U11 and U12 Treated w/ 1 lb. of Chlorine crystals each and allowed to Soak for 1 Hr.

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 1-26-16

PHSTL: Pw S

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | Venting | | | |
| Organic Vapor Readout (ppm) | 0 | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ ~~Daily~~ "Tool-Box" Safety Meeting

Time ___________ Conducted by: ________

Topic: Sure footing on Snow/Ice Covered Surfaces.

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument _________ | Instrument _________ | Instrument _________ |
| Time _____________ | Time _____________ | Time _____________ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# February Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 2-11-16 Project manager notified prior to site visit. [✓ Y]/ N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y]/ N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 2 | 8 | 0 | 5 | 9 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 8 | 8 | 2 | 2 | 8 | 0 | 0 | 21 | 22 | ON |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 4 | 2 | 3 | 5 | 2 | 0 | 1 | 4 | ON |
| U4 | | 1 | 1 | 6 | 9 | 6 | 4 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 0 | 7 | 9 | 2 | 0 | 2.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 6 | 1 | 3 | 9 | 7 | 5 | 0 | 18 | 15 | ON |
| U7 | | 8 | 6 | 6 | 0 | 2 | 4 | 0 | 18 | 18 | ON |
| U11 | | 0 | 9 | 6 | 5 | 1 | 3 | 0 | 23 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | [✓ On] | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] N Has there been any evidence of trespassing? [✓ Y] N

Any areas of concern with the West Area, or fence? Y [✓ N] (Sketch on Back)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only) Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Other issues: - DNAPL Pump off.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 2-11-16 PHSTL: PWJ

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | Venting | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time 0830 Conducted by: PWJ

☑ Daily "Tool-Box" Safety Meeting

Topic: - Safe driving - Sure footing on Snow/ICE.

Attended:

☐ Instrument Calibration

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Date: 2-16-2016 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com Email

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 3 | 0 | 5 | 5 | 5 | 0 | 0 | 36 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 8 | 9 | 6 | 4 | 5 | 5 | 0 | 20 | 22 | ON |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 4 | 3 | 0 | 7 | 9 | 0 | 1 | 4 | ON |
| U4 | | 1 | 2 | 9 | 2 | 7 | 1 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 2 | 4 | 9 | 6 | 0 | 2.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 6 | 2 | 7 | 0 | 4 | 8 | 0 | 18 | 15 | ON |
| U7 | | 8 | 7 | 8 | 8 | 1 | 1 | 0 | 18 | 18 | ON |
| U11 | | 1 | 1 | 2 | 7 | 7 | 1 | 0 | 23 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | [✓ On] | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] N Has there been any evidence of trespassing? Y [✓ N]

Any areas of concern with the West Area, or fence? Y [✓ N] (Sketch on Back)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection. [✓ Pass] Fail

Control panel inspection (By trained individuals only) Hot spots? Y [✓ N] Discolored wires? Y [✓ N]

Other issues: 2015 EOS logging data downloaded for transfer to P Drive file

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 2-16-16 PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | PWS Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time 0800 Conducted by: PWS

Topic: Safe driving

Sure footing on Uneven Surfaces covered with Snow/ICE

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument ______ | Instrument ______ | Instrument ______ |
| Time ______ | Time ______ | Time ______ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 2-24-16 Project manager notified prior to site visit. [✓ Y] N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 3 | 4 | 5 | 2 | 2 | 0 | 0 | 36 | 42 | ON * |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 9 | 1 | 8 | 3 | 5 | 0 | 0 | 20 | 22 | ON * |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 4 | 4 | 2 | 5 | 2 | 0 | 1 | 4 | ON |
| U4 | | 1 | 4 | 8 | 9 | 2 | 6 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 5 | 2 | 9 | 1 | 0 | 2 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 6 | 4 | 8 | 0 | 7 | 4 | 0 | 18 | 15 | ON |
| U7 | | 8 | 9 | 9 | 3 | 4 | 3 | 0 | 18 | 18 | ON |
| U11 | | 1 | 3 | 8 | 3 | 2 | 4 | 0 | 22 | 22 | ON * |
| | | | | | | | | **Total** | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | [✓ On] | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Fence dropped near lakeside residence Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection [✓ Pass] / Fail

Control panel inspection (By trained individuals only) Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Other issues: * Wells U2A, U11 and U12 Treated with chlorine crystals. Wells allowed to Soak for 1 hour prior to restart.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 2-24-16 PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constent Vaulting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | 0 | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time 0800 Conducted by: PWS

Topic: Safe driving

Attended:

☐ Instrument Calibration

Instrument ________ Instrument ________ Instrument ________

Time ________ Time ________ Time ________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings – Monthly Sheet also Completed
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 2-29-16 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N EMail
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 3 | 6 | 9 | 1 | 9 | 0 | 0 | 43 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 9 | 3 | 1 | 4 | 5 | 5 | 0 | 16 / 16 | 22 | ON – New internal Parts Kit installed |
| W253 | | 3 | 4 | 4 | 1 | 0 | 3 | 0 | 0.0 / 3.0 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 4 | 5 | 0 | 2 | 7 | 0 | 1 | 4 | ON |
| U4 | | 1 | 6 | 1 | 6 | 0 | 9 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 7 | 0 | 4 | 3 | 0 | 3.0 / 0.0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 6 | 6 | 1 | 8 | 2 | 5 | 0 | 18/~~0~~ | 15 | - Small drip inside Vault |
| U7 | | 9 | 1 | 2 | 7 | 5 | 5 | 0 | 18 | 18 | ON |
| U11 | | 1 | 5 | 4 | 4 | 6 | 3 | 0 | 23 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | 255 Turned off |
| March | * | On | On | * | 253 Turned on |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection. Pass / [✓ Fail] * U6 slight drip @ wall pass through

Control panel inspection (By trained individuals only) Hot spots? Y/N Discolored wires? Y/N

Other issues: - Monthly readings recorded.
- U2A Flow down - New internal parts Kit installed - No flow change.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 2-29-16

PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time 1230 Conducted by: PWS

Topic: NO contact with impacted water

Attended:

☐ Instrument Calibration

Instrument __________ Instrument __________ Instrument __________

Time __________ Time __________ Time __________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# March Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 3-8-16 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N Email

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 4 | 0 | 5 | 9 | 5 | 0 | 0 | 32/40 | 42 | ON - Pigged 3x |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 9 | 4 | 6 | 5 | 5 | 9 | 0 | 10/23 | 22 | ON Pigged 3x → ③ |
| W253 | | 3 | 5 | 1 | 4 | 3 | 5 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 4 | 6 | 2 | 0 | 8 | 0 | 1 | 4 | ON |
| U4 | | 1 | 8 | 0 | 4 | 3 | 5 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 7 | 0 | 4 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 6 | 6 | 1 | 8 | 3 | 3 | 0 | off/ | 15 | off/LEAK/ ① |
| U7 | | 9 | 3 | 3 | 1 | 0 | 5 | 0 | /8 | 18 | ON |
| U11 | | 1 | 7 | 2 | 6 | 4 | 8 | 0 | off/22 | 22 | No flow / Pigged 3x → ② |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | [✓ On] | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? Y / N Has there been any evidence of trespassing? Y / N

Any areas of concern with the West Area, or fence? Y / N (Sketch on Back)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection. Pass / [✓ Fail]

Control panel inspection (By trained individuals only) Hot spots? Y [✓ N] Discolored wires? Y [✓ N]

Other issues: ① "T" Fitting re-soldered - line still leaking

② Internal meter parts stuck - New internal parts kit installed. Then 22 gpm.

③ Pump end replaced with cleaned - Same model.
- 6"x1.5" Nipple @ pump has 2 holes - nipple replaced. - Pigged 3x + Sampled.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

—SEE Pigging notes on Reverse side

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 3/8/16 PHSTL: PWS

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | Constant monitoring with 4GAS mete | | | |
| Organic Vapor Readout (ppm) | — | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time 1200 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting

Topic: - No Contact with impacted water

- Constant monitoring during V6 line repair -

Attended:

☒ Instrument Calibration

| | | |
|---|---|---|
| Instrument M40 | Instrument | Instrument |
| Time 1100 | Time | Time |
| ☒ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☒ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

- Well U2A pigged and Sampled @1350 Pigged 3x
  - Flow @30gpm for 28 minutes = Total Discharge = 840 gallons

- Well U12 pigged and Sampled @ 1430 Pigged 3x
  - Flow @ 55 for 18 minutes = Total discharge = 990 gallons

- Well U11 pigged and Sampled @ 1500 Pigged 3x
  - Flow @35 for 21 minutes = Total discharge = 735 gallons.

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 3-10-16 Project manager notified prior to site visit. Y / N

Barr Technician: PWS / SWS Project manager notified before leaving site. Y / N Buddy System.

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 4 | 1 | 6 | 4 | 8 | 0 | 0 | 40 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 9 | 5 | 2 | 8 | 4 | 5 | 0 | 23 | 22 | ON |
| W253 | | 3 | 5 | 3 | 1 | 9 | 9 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 4 | 6 | 4 | 9 | 4 | 0 | 1 | 4 | ON |
| U4 | | 1 | 8 | 4 | 9 | 8 | 6 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 7 | 0 | 4 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 6 | 6 | 1 | 8 | 7 | 4 | 0 | off | 15 | off |
| U7 | | 9 | 3 | 8 | 0 | 2 | 0 | 0 | 18 | 18 | ON |
| U11 | | 1 | 7 | 8 | 6 | 7 | 5 | 0 | 22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | [✓ On] | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? Y / [✓ N] Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? [✓ Y] / [✓ N] (Sketch on Back)

Air compressor tank pressure ~~0~~ (psi) off → small part of fence down along west fenceline along lake - Repaired.

Vault copper lines inspection. Pass / [✓ Fail]

Control panel inspection (By trained individuals only) Hot spots? Y/N Discolored wires? Y/N

Other issues: U6 line leaking in Vault.

~~Fixed Fence westarea~~

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 3/10/16 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

Q1 Readings

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | $H_2S$ = 0.2 ppm<br>LEL = 1%<br>CO = 0 ppm | $O_2$ = 21.0%<br>PID = 0.0 ppm (10.6eV) | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | [✓ D] Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time 10:05 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: - Safe driving

- 3 points of contact on Vault staircase

- No contact with impacted water.

Attended:

☑ Instrument Calibration

| | | |
|---|---|---|
| Instrument PID | Instrument M40 4GAS | Instrument |
| Time 0800 | Time 0800 | Time |
| ☒ Calibration Check | ☑ Calibration Check | ☐ Calibration Check |
| ☑ Battery Check | ☑ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 3-15-16
Barr Technician: PWS
Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 4 | 4 | 4 | 1 | 2 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 9 | 6 | 9 | 3 | 0 | 5 | 0 | 23 | 22 | ON |
| W253 | | 3 | 5 | 7 | 6 | 4 | 1 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 4 | 7 | 2 | 2 | 6 | 0 | 1 | 4 | ON |
| U4 | | 1 | 9 | 6 | 5 | 4 | 0 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 7 | 0 | 4 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 6 | 6 | 1 | 8 | 7 | 4 | 0 | off | 15 | off |
| U7 | | 9 | 5 | 0 | 5 | 5 | 4 | 0 | 18 | 18 | ON |
| U11 | | 1 | 9 | 4 | 3 | 2 | 5 | 0 | 22 | 22 | ON |
| | | | | | Total | | | | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | [✓ On] | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection. Pass / [✓ Fail] U6 leak. - Other lines ok.
Control panel inspection (By trained individuals only) Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Other issues: - U6 Video recorded - Copper nipple through block wall is approximately 2' long between leaking "T" Connection and ~~[illegible]~~ change to HDPE.
- No Visible sign of pipe damage at leak area.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 3/15/16 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | \| | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time 0800 Conducted by PWS

☒ Daily "Tool-Box" Safety Meeting

Topic: 3 points of contact on Vault Starcase.

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument ________ | Instrument ________ | Instrument ________ |
| Time ____________ | Time ____________ | Time ____________ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 3-22-16 Project manager notified prior to site visit. [✓ Y] N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] N
SWJ Emailed
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 4 | 8 | 3 | 8 | 9 | 0 | 0 | 40 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 9 | 9 | 2 | 2 | 6 | 9 | 0 | 22 | 22 | ON |
| W253 | | 3 | 6 | 3 | 5 | 5 | 4 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 4 | 8 | 2 | 7 | 9 | 0 | 1.25 | 4 | ON |
| U4 | | 2 | 1 | 2 | 9 | 5 | 1 | 0 | 16 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 7 | 0 | 4 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 6 | 6 | 1 | 8 | 7 | 4 | 0 | off | 15 | LEAK |
| U7 | | 9 | 7 | 1 | 5 | 0 | 3 | 0 | 20 | 18 | ON |
| U11 | | 2 | 1 | 5 | 9 | 7 | 0 | 0 | 22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | [✓ On] | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection [✓ Pass] / Fail – Except for U6 – turned off

Control panel inspection (By trained individuals only) Hot spots? Y [✓ N] Discolored wires? Y [✓ N]

Other issues:

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 3-22-16 PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time 0700 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: NO Contact with water.

Attended:

☐ Instrument Calibration

Instrument __________ Instrument __________ Instrument __________

Time __________ Time __________ Time __________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

## Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 3-30-2016 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N Email

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 5 | 1 | 9 | 2 | 7 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 0 | 1 | 3 | 4 | 8 | 0 | 0 | 24 | 22 | ON |
| W253 | | 3 | 6 | 8 | 6 | 4 | 5 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 4 | 9 | 2 | 4 | 1 | 0 | 1 | 4 | ON |
| U4 | | 2 | 2 | 7 | 7 | 2 | 9 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 7 | 0 | 4 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 6 | 6 | 1 | 8 | 7 | 4 | 0 | off | 15 | off |
| U7 | | 9 | 9 | 0 | 4 | 8 | 6 | 0 | 20 | 18 | ON |
| U11 | | 2 | 3 | 6 | 0 | 6 | 1 | 0 | 22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | [✓ On] | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only) Hot spots? Y [✓ N] Discolored wires? Y [✓ N]

Other issues: Wells U11 and U12 Treated; Well U2A lowered with MTI Pipe

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 3-30-16 PHSTL: PWS

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time 1200 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: Slip, trip and fall on wet uneven surfaces.

Attended:

☐ Instrument Calibration

Instrument _________ Instrument _________ Instrument _________

Time _________ Time _________ Time _________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# April Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 4-7-16 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: JWS Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 5 | 6 | 1 | 0 | 8 | 0 | 0 | 38 | 42 | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | | 0 | 4 | 0 | 5 | 2 | 1 | 0 | 24 | 22 | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | Check On / Off schedule |
| U5 | | 3 | 5 | 0 | 4 | 5 | 0 | 0 | 1 | 4 | |
| U4 | | 2 | 4 | 6 | 6 | 6 | 2 | 0 | 17 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 8 | 2 | 8 | 8 | 0 | 2 | 0 -> 5 | Check On / Off schedule |
| U6 | | 6 | 6 | 1 | 8 | 7 | 4 | 0 | OFF → 0 | 15 | Maintenance - TL Stevens * |
| U7 | | 0 | 1 | 2 | 1 | 3 | 4 | 0 | 21 | 18 | |
| U11 | | 2 | 6 | 1 | 1 | 4 | 5 | 0 | 22 | 22 | |
| | | | | | | | | Total | 125 | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)
Air compressor tank pressure 0 (psi) DNAPL system is OFF
Vault copper lines inspection. Pass / [✓ Fail] → UGN
Control panel inspection (By trained individuals only) Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Other issues: * UGN Pump swap out to get proper flow, TL Stevens also working on UGN Soldering joints @ wall of Vault first attempt failed

U6N Pump replaced to a 16507-8 (3/4 HP) 5-14 gpm flowrate (Same as U4)

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 4-7-16

PHSTL: JWJ

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | 3 hours | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | 0 LEL CO=0 to 11 exeted @5<br>20.9% $O_2$ $H_2S$=0 | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time ________ Conducted by: ________

☐ Daily "Tool-Box" Safety Meeting

Topic: ________

Attended: ________

☐ Instrument Calibration

Instrument ________ Instrument ________ Instrument ________

Time ________ Time ________ Time ________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

## Table 3-3

## List of Pump Models in Pumping Wells
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

| Well No. | 2015 Design Pumping Rate (gpm) | Rated Pump Flow Rate (gpm) | Pump Model | Notes |
|---|---|---|---|---|
| U1 | 0 | None | None | Well used only as needed |
| U1A | 0 | 15-30 | 25S10-07 (1 HP) | Installed in 2005<br>New pump end - 2012 |
| U2A | 22 | 18-32 | 25S10-07 ( 2 HP) | New pump end - 2013 |
| U4N | 16 | 5-14 | 16S07-8 (3/4 HP) | New pump end - 2009 |
| U5 | 4 | 3-10 | 10S05-9 (½ HP) | New in 2009 |
| U6N | 15 | 5-14<br>~~18-32~~ | ~~25S07-5 (¾ HP)~~<br>25S07-8 (3/4 HP) | New motor - ~~2015~~ 2016<br>New pump end - 2015 |
| U7N | 18 | 18-32 | 25S07-5 (¾ HP) | New in 1999 |
| U8 | NA | NA | NONE | No longer needed |
| U11 | 22 | 15-30 | 25S07-5 (¾ HP) | New motor in 2011<br>New pump end in 2012 |
| U12 | 42 | 60 | 40S50-15 (5 HP) | New motor - 2015<br>New pump end - 2015 |
| W253 | 0-5 | 3-10 | 10S05-9 (1/3 HP) | New in 1996 |
| W255 | 0-5 | 3-10 | 10E07-11 (3/4 HP) | New motor - 2014<br>New pump end - 2014 |
| **Total** | **144** | | | |

NA – Information Not Applicable

BARR

# Weekly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Date: 4-8-16 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: JWJ Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 5 | 6 | 6 | 5 | 5 | 0 | 0 | 38 | 42 | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | | 0 | 4 | 4 | 0 | 4 | 6 | 0 | 24 | 22 | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 0 | 6 | 0 | 8 | 0 | 1 | 4 | |
| U4 | | 2 | 4 | 9 | 1 | 8 | 8 | 0 | 17 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 6 | 8 | 5 | 9 | 7 | 0 | 2 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 6 | 6 | 1 | 9 | 2 | 8 | 0 | 0 → 16.5 | 15 | * |
| U7 | | 0 | 1 | 7 | 2 | 4 | 2 | 0 | 21 | 18 | |
| U11 | | 2 | 6 | 4 | 4 | 5 | 0 | 0 | 22 | 22 | |
| | | | | | | | | Total | 141.5 | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)
Air compressor tank pressure 0 (psi) OFF
Vault copper lines inspection. [✓ Pass] / Fail * After repair
Control panel inspection (By trained individuals only) Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Other issues: * Attempted do fix U6N again. Swapped out "T" fitting and re soldered it. U6N Running @16.5gpm w/ No leaks as of today.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 4-8-16 PHSTL: JWJ

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | 3 hours | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | 0 LEL CO=0 to 5 exited @ 5<br>21.0% $O_2$ $H_2S$ = 0 | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time ___________ Conducted by: ________

☐ Daily "Tool-Box" Safety Meeting

Topic: ____________________

Attended: ____________________

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument __________ | Instrument __________ | Instrument __________ |
| Time ______________ | Time ______________ | Time ______________ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 4-12-16 Project manager notified prior to site visit. Y [✓ N] Buddy system
Barr Technician: JWS/PWS Project manager notified before leaving site. Y [✓ N]
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 5 | 8 | 8 | 3 | 7 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 0 | 5 | 8 | 0 | 0 | 3 | 0 | 23 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 1 | 2 | 3 | 7 | 0 | 1 | 4 | ON |
| U4 | | 2 | 5 | 9 | 0 | 5 | 6 | 0 | 16 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 7 | 0 | 1 | 3 | 4 | 0 | 2.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 6 | 7 | 1 | 7 | 5 | 0 | 0 | 16 | 15 | ON |
| U7 | | 0 | 2 | 9 | 6 | 8 | 2 | 0 | 22 | 18 | ON |
| U11 | | 2 | 7 | 7 | 6 | 0 | 3 | 0 | 22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | [✓ On] | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only) Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Other issues: - Spring maintenance, power washing vault, Treated U11, U12/2A with Chlorine granules for Bio-fouling
- Vault Air readings collected - See reverse
- changed oil in Air compressor, drained condensate

- Vagrant activity on North side of West Area

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 4-12-16 PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | LEL 0% | $O_2$ 20.9 | $CO_2$ 0.0 | $H_2S$ 0.0 |
| Organic Vapor Readout (ppm) | PID 2-10 ppm / Cleaning Solvents | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time ______ Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: Constant Venting.

Attended:

☐ Instrument Calibration

Instrument ______ Instrument ______ Instrument ______

Time ______ Time ______ Time ______

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Date: 4-13-16 | Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: JWJ / PWS | Project manager notified before leaving site. [✓ Y] / N

JLB3 : 952-832-2700 or JLB3@barr.com

Buddy System

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | | | | | | | 0 | 0 | | 42 | |
| U1A | | | | | | | | 0 | | 0 -> 10 | Used as needed |
| U2A | | | | | | | | 0 | | 22 | |
| W253 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U5 | | | | | | | | 0 | | 4 | |
| U4 | | | | | | | | 0 | | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U6 | | | | | | | | 0 | | 15 | |
| U7 | | | | | | | | 0 | | 18 | |
| U11 | | | | | | | | 0 | | 22 | |
| | | | | | | | | **Total** | | **144** | |

NO READINGS

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | **W253** | **W255** | **W253** | **W255** | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? Y [✓ N] Has there been any evidence of trespassing? [✓ Y] / N

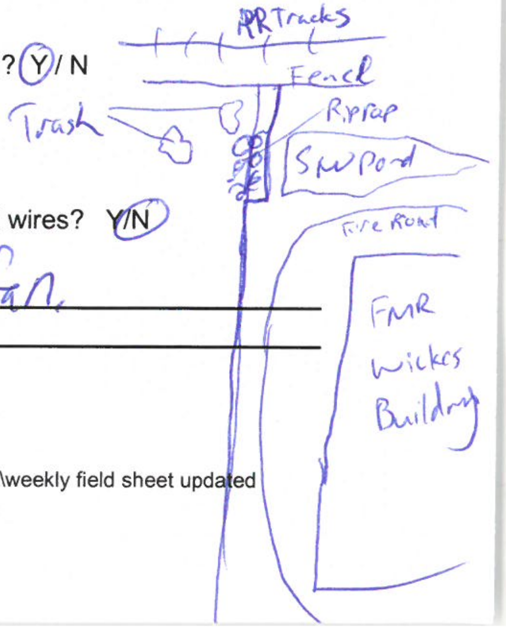
Any areas of concern with the West Area, or fence? [✓ Y] / N (Sketch on Back)

Air compressor tank pressure 0 (psi)

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only) Hot spots? Y [✓ N] Discolored wires? Y [✓ N]

Other issues: Repaired Paneling on Vault exhaust fan.



P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 4-19-16
Barr Technician: PWS

Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 6 | 2 | 3 | 5 | 6 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 0 | 8 | 0 | 6 | 8 | 2 | 0 | 23 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 2 | 1 | 9 | 9 | 0 | 1 | 4 | ON |
| U4 | | 2 | 7 | 5 | 2 | 7 | 3 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 7 | 2 | 6 | 6 | 9 | 0 | 3 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 6 | 8 | 7 | 9 | 0 | 9 | 0 | 16 | 15 | ON |
| U7 | | 0 | 5 | 0 | 0 | 7 | 8 | 0 | 20 | 18 | ON |
| U11 | | 2 | 9 | 9 | 8 | 6 | 8 | 0 | 23 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | [✓ On] | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N Has there been any evidence of trespassing? Y / [✓ N] old garbage at North end near RR TRACKS

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)

Air compressor tank pressure 0 (psi)

Vault copper lines inspection [✓ Pass] / Fail

Control panel inspection (By trained individuals only) Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Other issues: ____________________

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 4-19-16 PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | 0 | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (□) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time 0800 Conducted by: PWS

Topic: No contact with trespassers

Attended:

☐ Instrument Calibration

Instrument ________ Instrument ________ Instrument ________

Time ________ Time ________ Time ________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 4-26-16 Project manager notified prior to site visit. [✓ Y]/ N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y]/ N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 6 | 5 | 9 | 4 | 4 | 0 | 0 | 36 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 1 | 0 | 3 | 7 | d | 4 | 0 | 23 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 3 | 1 | 3 | 6 | 0 | 1 | 4 | ON |
| U4 | | 2 | 9 | 1 | 8 | 8 | 3 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 7 | 5 | 2 | 7 | 4 | 0 | 3 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 7 | 0 | 4 | 5 | 3 | 3 | 0 | 17 | 15 | ON |
| U7 | | 0 | 7 | 1 | 0 | 0 | 7 | 0 | 20 | 18 | ON |
| U11 | | 3 | 2 | 1 | 7 | 6 | 4 | 0 | 23 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2015 | | 2016 | | Schedule Notes |
|---|---|---|---|---|---|
| | W253 | W255 | W253 | W255 | |
| January | * | On | * | On | |
| February | * | On | * | On | |
| March | * | On | On | * | |
| April | On | * | * | On | |
| May | * | On | * | On | |
| June | * | On | * | On | |
| July | * | On | * | On | |
| August | * | On | * | On | |
| September | On | * | On | * | |
| October | * | On | * | On | |
| November | * | On | * | On | |
| December | * | On | * | On | |

Schedule for 2016 does not change going forward.

## Additional Maintenance Items

Is the west area fence secure? [✓ Y]/ N Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch on Back)

Air compressor tank pressure ________(psi) off

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only) Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Other issues: ____________________

____________________

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 02182015.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 4-26-16 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ✓ | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time 0740 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: Safe driving

Attended:

☐ Instrument Calibration

Instrument ____ Instrument ____ Instrument ____

Time ____ Time ____ Time ____

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# May Weekly Readings

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 5-6-16
Barr Technician: JWT

Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 7 | 1 | 0 | 1 | 5 | 0 | 0 | 32 | 42 | max below optimal – Needs pigging |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | | 1 | 3 | 5 | 5 | 8 | 7 | 0 | 21 | 22 | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | Check On / Off schedule |
| U5 | | 3 | 5 | 4 | 5 | 4 | 7 | 0 | 2 | 4 | |
| U4 | | 3 | 1 | 6 | 1 | 3 | 5 | 0 | 17 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 7 | 9 | 0 | 6 | 0 | 0 | 1 | 0 -> 5 | Check On / Off schedule |
| U6 | | 7 | 2 | 8 | 8 | 4 | 7 | 0 | 17 | 15 | |
| U7 | | 1 | 0 | 1 | 5 | 4 | 7 | 0 | 21 | 18 | |
| U11 | | 3 | 5 | 4 | 3 | 6 | 7 | 0 | 22 | 22 | |
| | | | | | | | | **Total** | | **144** | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? [✓ Y]/N Discolored wires? [✓ Y]/N

Notes:
- City workers triggered the Alarms for the
lift station. system, restarted after a few shutdowns
Automatically

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 5-6-16 PHSTL: JWJ

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☐ Daily "Tool-Box" Safety Meeting Time: ___________ Conducted by:________

Topic: ______________________________

Attended: ______________________________

☐ Instrument Calibration

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 5-10-16
Barr Technician: PWS / SWS
Project manager notified prior to site visit. Y / [✓ N]
Project manager notified before leaving site. Y / [✓ N]
JLB3 : 952-832-2700 or JLB3@barr.com
Buddy System SWS / PWS

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 7 | 2 | 8 | 9 | 1 | 0 | 0 | 30 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 1 | 4 | 7 | 7 | 5 | 9 | 0 | 21 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 5 | 1 | 1 | 7 | 0 | 1 | 4 | ON |
| U4 | | 3 | 2 | 6 | 2 | 3 | 0 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 8 | 0 | 0 | 2 | 4 | 0 | 2 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 7 | 3 | 8 | 6 | 3 | 0 | 0 | 16 | 15 | ON |
| U7 | | 1 | 1 | 3 | 8 | 0 | 6 | 0 | 20 | 18 | ON |
| U11 | | 3 | 6 | 7 | 3 | 2 | 4 | 0 | 22 | 22 | ON |
| | | | | | | | | **Total** | | **144** | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | [✓ On] |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Notes: 255, U12

-TRASH removed from South west outlots.
- Photos taken
- U255 surging on meter.
-TL Stevens to be Scheduled for U12/U255 checks/cleaning.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

- Safety – PWS
- Constant Vault venting

- 3 pts. of Contact on Vault Stairs.

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 5-17-2016 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N EMail
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 7 | 5 | 9 | 6 | 9 | 0 | 0 | 32/38 | 42 | ON - Pigged 3x, Sampled. |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 1 | 6 | 7 | 5 | 1 | 2 | 0 | 20 | 22 | ON - Pigged ~~3x~~ 6x, Sampled |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 6 | 0 | 6 | 7 | 0 | 1 | 4 | ON |
| U4 | | 3 | 4 | 2 | 8 | 0 | 6 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 8 | 1 | 7 | 0 | 4 | 0 | 2 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 7 | 5 | 4 | 8 | 3 | 9 | 0 | 16 | 15 | ON |
| U7 | | 1 | 3 | 4 | 0 | 9 | 3 | 0 | 20 | 18 | ON |
| U11 | | 3 | 8 | 8 | 9 | 7 | 1 | 0 | 22 | 22 | ON - Pigged 3x, Sampled. |
| | | | | | | | | **Total** | | **144** | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | [✓ On] |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)
Air compressor tank pressure 0 (psi) off / DNAPL pump off
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

- U255
  - Drawing down to pump inlet. ~2gpm. Steve will meet with Joe and discuss options.
- U5 @ 1gpm. - options.
  - water visible in well - High above pump inlet

Notes:
- Panel Control Switch lights replaced on switches for U5 and U6. - More light bulbs needed. PART # ZEKV1 PK10 @ Grainger.
- light Bulb for W253 out.
- TL Stevens (Steve) onsite for line pigging

| Well # | Flow | min on | Total discharge | # pigged | Time sampled |
|---|---|---|---|---|---|
| U2A | 35 | ~~27 945 min~~ | ~~945 gallons~~ | ~~3x~~ | 1045 |
| U12 | 38 | 14 min | 532 gallons | 3x | 1210 |
| U11 | 32 | 14 min | 448 gallons | 3x | 1330 |

- Pump end in U12 replaced, while current end is cleaned at TL Stevens Shop.

→ U2A 35 gpm 54 min 1890 g. 6x 1045
- Long run time due to pigs not clearing sample line.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 5/17/2016 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | Venting | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D [✓ Modified D] C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time: 0900 Conducted by: PWS

Topic: Communication with contractor during pigging event.

Attended:

☐ Instrument Calibration

Instrument ______ Instrument ______ Instrument ______

Time ______
☐ Calibration Check
☐ Battery Check

Time ______
☐ Calibration Check
☐ Battery Check

Time ______
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 5-24-2016
Barr Technician: PWS

Project manager notified prior to site visit. Y / [✓ N]
Project manager notified before leaving site. Y / [✓ N]
Buddy System
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 7 | 9 | 2 | 7 | 3 | 0 | 0 | 36 / 40 | 42 | ON * |
| U1A | | 6 | 7 | 3 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 1 | 9 | 2 | 1 | 9 | 3 | 0 | 24 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 7 | 0 | 1 | 2 | 0 | 1 | 4 | ON |
| U4 | | 3 | 5 | 9 | 9 | 0 | 4 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 8 | 3 | 3 | 1 | 1 | 0 | 1.75 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 7 | 7 | 1 | 6 | 5 | 4 | 0 | 17 | 15 | ON |
| U7 | | 1 | 5 | 5 | 0 | 3 | 6 | 0 | 20 | 18 | ON |
| U11 | | 4 | 1 | 2 | 9 | 9 | 8 | 0 | 25 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | [✓ On] |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) DNAPL pump off
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Notes: - TLStevens (Steve) onsite for U12 pump end replacement. Temporary pump end removed and cleaned high flow pump end installed.

- Well W255 scheduled for redevelopment next week pending TL Stevens schedule.

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 5-24-2016 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | V12 | | |
| Time Interval at Location | Constant | Constant | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | LOTO Applied in Control Bldg. | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time: 1000 Conducted by: PWS

Topic: Normal O&M and V12 pump and replacement.

Attended:

☐ Instrument Calibration

Instrument ________ Instrument ________ Instrument ________

Time ________ Time ________ Time ________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 5-25-16
Barr Technician: Pws/Swj

Project manager notified prior to site visit. Y / [✓ N] Buddy System
Project manager notified before leaving site. Y [✓ N]
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | | | | | | | 0 | 0 | | 42 | |
| U1A | | | | | | | | 0 | | 0 -> 10 | Used as needed |
| U2A | | | | | | | | 0 | | 22 | |
| W253 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U5 | | | | | | | | 0 | | 4 | |
| U4 | | | | | | | | 0 | | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U6 | | | | | | | | 0 | | 15 | |
| U7 | | | | | | | | 0 | | 18 | |
| U11 | | | | | | | | 0 | | 22 | |
| | | | | | | | | **Total** | | **144** | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? Y / N
Has there been any evidence of trespassing? Y / N
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)
Air compressor tank pressure ________(psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: - Onsite for jetting of drain line due to Process 04 (x3 today) Alarms - High Separator tank level. Drain line Jetted from tank stack vent toward manhole ~80' - Blockage removed - water free flowing

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 5-25-16 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

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| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Top side of Separator tank Vault | | | |
| Time Interval at Location | Constant | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | NA | | | |
| Organic Vapor Readout (ppm) | 0 | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 1630 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting

Topic: High pressure water

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument ______ | Instrument ______ | Instrument ______ |
| Time ______ | Time ______ | Time ______ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 5-31-2016
Barr Technician: PWS
Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 8 | 3 | 1 | 9 | 8 | 0 | 0 | 40 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 2 | 1 | 6 | 9 | 4 | 2 | 0 | 24 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0.0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 7 | 9 | 7 | 0 | 0 | 1 | 4 | ON |
| U4 | | 3 | 7 | 6 | 7 | 6 | 9 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 8 | 5 | 2 | 0 | 5 | 0 | 2.0 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 7 | 8 | 8 | 4 | 4 | 6 | 0 | 18/16 | 15 | ON |
| U7 | | 1 | 7 | 6 | 0 | 7 | 2 | 0 | 20/19 | 18 | ON |
| U11 | | 4 | 3 | 4 | 5 | 1 | 1 | 0 | 21/22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | [✓ On] |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection. [✓ Pass] Fail
Control panel inspection (By trained individuals only)
Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Notes:
- New Switch light needed for U12 PART #
- Flows adsusted.

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## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 5-31-2016 PHSTL: PWS

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (□) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time: 0950 Conducted by: PWS

Topic: Safe driving - Sure footing on uneven surfaces.
- No contact with groundwater.

Attended:

☐ Instrument Calibration

Instrument ______
Time ______
☐ Calibration Check
☐ Battery Check

Instrument ______
Time ______
☐ Calibration Check
☐ Battery Check

Instrument ______
Time ______
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# June Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 6-8-16 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: JWJ Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 8 | 7 | 6 | 3 | 5 | 0 | 0 | 38 | 42 | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | | 2 | 4 | 3 | 9 | 5 | 1 | 0 | 23 | 22 | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | Check On / Off schedule |
| U5 | | 3 | 5 | 9 | 0 | 4 | 2 | 0 | 1 | 4 | |
| U4 | | 3 | 9 | 6 | 1 | 2 | 9 | 0 | 17 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 8 | 6 | 7 | 9 | 0 | 0 | 1 | 0 -> 5 | Check On / Off schedule * |
| U6 | | 8 | 0 | 6 | 2 | 8 | 3 | 0 | 15.5 | 15 | |
| U7 | | 1 | 9 | 8 | 0 | 0 | 9 | 0 | 19 | 18 | |
| U11 | | 4 | 5 | 9 | 3 | 7 | 0 | 0 | 21 | 22 | |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? [✓ Y] / N (Sketch ~~Below~~)

Air compressor tank pressure 0 (psi) OFF

Property owner to the South of OUG Building shed on Joslyn property

Vault copper lines inspection [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Bottles of Dawn tally = |||| = 80 total oz. of Dawn

Gallons of water = 20+15+20+10 = 65 total gallons potable water

Notes: * Onsite with TL Stevens (JOE) to redevelop W255.

10:55 Pumped in ~20 gallons of water + One Bottle of Dawn for surging. 15'
Approximately 1.5 feet of settled material in well.
11:30 + 1 more bottle of Dawn
13:00 + 2 more bottles of Dawn, continued surging 20' ft screen

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☐ Daily "Tool-Box" Safety Meeting Time: __________ Conducted by: ________

Topic: ____________________________________________

____________________________________________

____________________________________________

Attended: ____________________________________________

☐ Instrument Calibration

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
# Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 6-14-2016
Barr Technician: PWS

Project manager notified prior to site visit. [✓ Y] / N Email
Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 9 | 0 | 7 | 2 | 0 | 0 | 0 | 36 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 2 | 6 | 3 | 2 | 9 | 9 | 0 | 22 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 5 | 9 | 8 | 5 | 5 | 0 | 1 | 4 | ON |
| U4 | | 4 | 1 | 0 | 3 | 9 | 0 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 1 | 9 | 1 | 8 | 2 | 1 | 0 | 7 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 8 | 1 | 9 | 4 | 3 | 7 | 0 | 15 | 15 | ON |
| U7 | | 2 | 1 | 4 | 1 | 8 | 5 | 0 | 19 | 18 | ON |
| U11 | | 4 | 7 | 7 | 1 | 8 | 9 | 0 | 21 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | [✓ On] |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Notes: -Wells U2A, U11 and U12 have been treated with a chlorine solution to inhibit fouling of the pump inlet, well screen and transfer line.
- wells allowed to soak for 1 hour.

-New control panel light bulbs have been installed for U2A, U12 switches.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 6-14-2016 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ✓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time: 0745 Conducted by: PWS

Topic: No contact with groundwater or well treatment chemicals.

Attended:

☐ Instrument Calibration

Instrument ______ Instrument ______ Instrument ______

Time ______ Time ______ Time ______

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 6-17-2016 Project manager notified prior to site visit. Y [✓ N]
Barr Technician: PWS / JWS Project manager notified before leaving site. Y [✓ N] Buddy System
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | | | | | | | 0 | 0 | | 42 | |
| U1A | | | | | | | | 0 | | 0 -> 10 | Used as needed |
| U2A | | | | | | | | 0 | | 22 | |
| W253 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U5 | | | | | | | | 0 | | 4 | |
| U4 | | | | | | | | 0 | | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U6 | | | | | | | | 0 | | 15 | |
| U7 | | | | | | | | 0 | | 18 | |
| U11 | | | | | | | | 0 | | 22 | |
| | | | | | | | | | **Total** | **144** | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? Y / N
Has there been any evidence of trespassing? Y / N
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)
Air compressor tank pressure ________(psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: Onsite for DNAPL Vault water removal, discharge to oil/water Separator tank.

- Depth to water from top of DNAPL manhole Vault ring. 7.34'
- Depth to bottom of Vault from manhole Ring. 7.90'

- Total of 430 gallons of water transferred.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 6-17-2016 PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | DNAPL Vault | oil/water Vault | | |
| Time Interval at Location | No entry | Constant venting | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 0900 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: – No contact with site water.

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument | Instrument | Instrument |
| Time | Time | Time |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

PU 5

Date: 6-20-16 Project manager notified prior to site visit. [✓ Y] N
Barr Technician: JWJ Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com
↖ on vacation

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 9 | 3 | 7 | 5 | 2 | 0 | 0 | 34 | 42 | |
| U1A | [redacted] | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | [redacted] | 2 | 8 | 3 | 5 | 0 | 3 | 0 | 23 | 22 | |
| W253 | [redacted] | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | [✓ 0] -> 5 | Check On / [✓ Off] schedule |
| U5 | [redacted] | 3 | 6 | 0 | 7 | 1 | 8 | 0 | 1 | 4 | |
| U4 | [redacted] | 4 | 2 | 5 | 4 | 8 | 1 | 0 | 17 | 16 | |
| U8 / U1 | [redacted] | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | [redacted] | 1 | 9 | 7 | 7 | 8 | 9 | 0 | 6.5 | 0 -> 5 | Check [✓ On] Off schedule |
| U6 | [redacted] | 8 | 3 | 3 | 2 | 9 | 7 | 0 | 15.5 | 15 | |
| U7 | [redacted] | 2 | 7 | 1 | 2 | 3 | 1 | 0 | 19 | 18 | |
| U11 | [redacted] | 4 | 9 | 5 | 8 | 0 | 6 | 0 | 21 | 22 | |
| | | | | | | | | Total | 137 | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] N

Has there been any evidence of trespassing? [✓ Y] N *

Any areas of concern with the West Area, or fence? [✓ Y] N (Sketch Below) *

Air compressor tank pressure 0 (psi) OFF

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y [✓ N] Discolored wires? Y [✓ N]

* still building shed on property end on south side

Notes: * neighbors to south of west area (along lakeshore) are still building a shed on Joslyn property

Measured water in Vault of DNAPL Vault (Not in DNAPL TANK = 7.75'

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

**CHECK (☐) THE FOLLOWING AFTER COMPLETION**

Time: __________ Conducted by: ________

☐ Daily "Tool-Box" Safety Meeting

Topic: ____________________

Attended: ____________________

☐ Instrument Calibration

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 6-28-2016 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: PWS Project manager notified before leaving site. [✓ Y] N EMAIL

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 9 | 7 | 4 | 4 | 8 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | | 3 | 0 | 8 | 6 | 0 | 7 | 0 | 22 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 6 | 1 | 7 | 3 | 2 | 0 | 1 | 4 | ON |
| U4 | | 4 | 4 | 4 | 2 | 8 | 4 | 0 | 16 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 0 | 5 | 2 | 6 | 0 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 8 | 5 | 0 | 6 | 3 | 1 | 0 | 16 | 15 | ON |
| U7 | | 2 | 5 | 2 | 5 | 2 | 1 | 0 | 19.5 | 18 | ON |
| U11 | | 5 | 1 | 9 | 1 | 4 | 6 | 0 | 21-9 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | [✓ On] |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Notes: - U11 Flow adjusted up slightly.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 6-28-2016 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | 0 | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 0730 Conducted by: PWS

☑ ~~Daily~~ "Tool-Box" Safety Meeting

Topic: - Safe driving

- No contact with impacted Groundwater.

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument ________ | Instrument ________ | Instrument ________ |
| Time ________ | Time ________ | Time ________ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# July Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 7-6-2016 Project manager notified prior to site visit. [✓ Y] / N Email
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 0 | 1 | 0 | 5 | 5 | 0 | 0 | 32 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 3 | 3 | 3 | 1 | 6 | 9 | 0 | 22 | 22 | ON |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 6 | 2 | 7 | 3 | 4 | 0 | 1 | 4 | ON |
| U4 | | 4 | 6 | 2 | 9 | 4 | 5 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 1 | 2 | 7 | 5 | 5 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 8 | 6 | 7 | 9 | 7 | 6 | 0 | 16 | 15 | ON |
| U7 | | 2 | 7 | 3 | 7 | 9 | 4 | 0 | 20 | 18 | ON |
| U11 | | 5 | 4 | 3 | 4 | 3 | 5 | 0 | 21 | 22 | ON |
| | | | | | | | | **Total** | | **144** | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | [✓ On] |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Notes: -Site inspected after Severe storms with high winds. Small branches down and leaves. No damage to West Area fence.

-U12 Flow @ ~75% of target - Discuss options

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 7-6-2016 PHSTL: PWS

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

|  | WORK LOCATION |  |  |  |
|---|---|---|---|---|
| Location Identifier | Vault |  |  |  |
| Time Interval at Location | Constant venting |  |  |  |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ |  |  |  |
| Organic Vapor Readout (ppm) | ↓ |  |  |  |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time: 1100 Conducted by: PWS

Topic: - Safe driving

- 3 points of Contact on Vault STAIRS

Attended:

☐ Instrument Calibration

Instrument _________ Instrument _________ Instrument _________

Time _________ Time _________ Time _________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Date: 7-8-16 Project manager notified prior to site visit. Y / N
Barr Technician: PWS Project manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | [redacted] | | | | | | 0 | 0 | | 42 | |
| U1A | [redacted] | | | | | | | 0 | | 0 -> 10 | Used as needed |
| U2A | [redacted] | | | | | | | 0 | | 22 | |
| W253 | [redacted] | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U5 | [redacted] | | | | | | | 0 | | 4 | |
| U4 | [redacted] | | | | | | | 0 | | 16 | |
| U8 / U1 | [redacted] | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | [redacted] | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U6 | [redacted] | | | | | | | 0 | | 15 | |
| U7 | [redacted] | | | | | | | 0 | | 18 | |
| U11 | [redacted] | | | | | | | 0 | | 22 | |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? Y / N
Has there been any evidence of trespassing? Y / N
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)
Air compressor tank pressure ________(psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: - DNAPL Vault Water Measurement
TOP Ring TO water 7.68'
~~TO inside lower ring top 7.55~~ PWS

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 7-8-16 PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | DNAPL Vault | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (□) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time: 1545 Conducted by: PWS

Topic: Be aware of DNAPL Vapors.

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument ______ | Instrument ______ | Instrument ______ |
| Time ______ | Time ______ | Time ______ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
# Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 7-13-16 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: JWS Project manager notified before leaving site. [✓ Y] / N

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 0 | 4 | 2 | 1 | 7 | 0 | 0 | 32 | 42 | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0.0 | [✓ 0] -> 10 | Used as needed |
| U2A | | 3 | 5 | 5 | 8 | 3 | 3 | 0 | 22 | 22 | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 6 | 3 | 6 | 7 | 1 | 0 | 4 | 4 | |
| U4 | | 4 | 8 | 0 | 2 | 4 | 0 | 0 | 17 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 1 | 9 | 6 | 1 | 8 | 0 | 7 | 0 -> 5 | Check [✓ On] / Off schedule -* Dripping |
| U6 | | 8 | 8 | 3 | 8 | 7 | 6 | 0 | 16 | 15 | |
| U7 | | 2 | 9 | 3 | 3 | 1 | 4 | 0 | 20 | 18 | |
| U11 | | 5 | 6 | 5 | 3 | 0 | 9 | 0 | 21.5 | 22 | |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? Y / [✓ N] XX

Has there been any evidence of trespassing? [✓ Y] / N XX

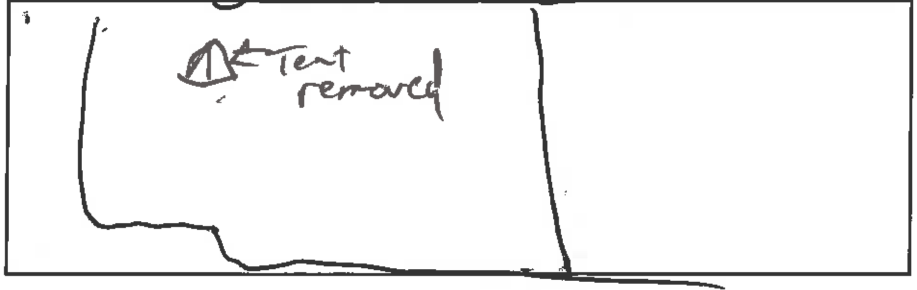
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)

Air compressor tank pressure 0 (psi)

Vault copper lines inspection. Pass / [✓ Fail] X W255

Control panel inspection (By trained individuals only)

Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]



Notes: *Well 255 is now leaking @ the "T" ~~union~~ coupling inside the Vault. Turned off 255 Turned "ON" 253

XX Fence wiring opened up, access to west area. -JLT + PLWS Removed a tent and cot and trash located in the middle of west area took photos, full truck load of junk

DNAPL Vault readings 7.83 DTB

7.69 DTW

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

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| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: __________ Conducted by: ________

☐ Daily "Tool-Box" Safety Meeting

Topic: ____________________

Attended: ____________________

☐ Instrument Calibration

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.): ____________________

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 7-22-2016 Project manager notified prior to site visit. [✓ Y] / N Email

Barr Technician: RWS Project manager notified before leaving site. [✓ Y] N

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 0 | 8 | 0 | 8 | 1 | 0 | 0 | 30 | 42 | ON |
| U1A | [redacted] | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | [redacted] | 3 | 8 | 3 | 3 | 4 | 7 | 0 | 22 | 22 | ON |
| W253 | [redacted] | 3 | 7 | 7 | 5 | 5 | 9 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | [redacted] | 3 | 6 | 4 | 8 | 4 | 2 | 0 | 1 | 4 | ON |
| U4 | [redacted] | 5 | 0 | 1 | 8 | 0 | 0 | 0 | 17 | 16 | ON |
| U8 / U1 | [redacted] | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | [redacted] | 2 | 1 | 9 | 6 | 2 | 5 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | [redacted] | 9 | 0 | 3 | 5 | 5 | 3 | 0 | 16 | 15 | ON |
| U7 | [redacted] | 3 | 1 | 7 | 4 | 3 | 5 | 0 | 19 | 18 | ON |
| U11 | [redacted] | 5 | 9 | 2 | 0 | 4 | 8 | 0 | 21 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | [✓ *] | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? Y / N

Has there been any evidence of trespassing? Y / N

Any areas of concern with the West Area, or fence? Y / N (Sketch Below)

Air compressor tank pressure ________(psi)

Vault copper lines inspection. Pass / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/N Discolored wires? Y/N

- W253 operating due to small leak on W255 line in Separator vault.
- W255 line repair and pump exchange scheduled for 7/26/16.

Notes: DNAPL Vault 7.67 to top of water from top of Ring
7.53 to Bottom of lover seat.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 7-22-16 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (□) THE FOLLOWING AFTER COMPLETION

Time: 0930 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting

Topic: -Heat Stress/Stroke. Drink water take breaks.

Attended:

☐ Instrument Calibration

Instrument ______ Instrument ______ Instrument ______

Time ______ Time ______ Time ______

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 7-29-2016
Barr Technician: PWS
Project manager notified prior to site visit. [✓ Y] / N Email
Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 1 | 1 | 0 | 7 | 6 | 0 | 0 | 30/34 | 42 | ON |
| U1A | [redacted] | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | [redacted] | 4 | 0 | 4 | 7 | 5 | 1 | 0 | 20 | 22 | ON |
| W253 | [redacted] | 3 | 8 | 3 | 4 | 0 | 3 | 0 | 5.5/8.0 | 0 -> 5 | Check [✓ On] / Off schedule Now off |
| U5 | [redacted] | 3 | 6 | 5 | 7 | 8 | 7 | 0 | 1 | 4 | ON |
| U4 | [redacted] | 5 | 1 | 9 | 1 | 7 | 8 | 0 | 18 | 16 | ON |
| U8 / U1 | [redacted] | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | [redacted] | 2 | 1 | 9 | 6 | 2 | 5 | 0 | 0/6.5 | 0 -> 5 | Check On / [✓ Off] schedule Now on |
| U6 | [redacted] | 9 | 1 | 9 | 3 | 1 | 3 | 0 | 17 | 15 | ON |
| U7 | [redacted] | 3 | 3 | 6 | 7 | 3 | 3 | 0 | 19 | 18 | ON |
| U11 | [redacted] | 6 | 1 | 3 | 1 | 3 | 3 | 0 | 21 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| . | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * Now off | On |
| June | * | On Now On |
| July | [✓ *] | [✓ On] |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection. Pass [✓ Fail] W255 leaking.
Control panel inspection (By trained individuals only)
Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

W253 on due to leaking W255 transfer line in Separator Vault.

Notes: - DNAPL Vault W.L. TOW 7.51 Bottom of Vault 7.65'
Measured from inside cover seat level.
- Wells U2A, U11 and U12 treated with 1 gallon each of Concentrated
Chlorine Solution.

- Steve from TL Stevens onsite 10E07-11 Pump and removed.
- New pump and installed in W255 - part # GRUNDFOS 5E05-8
Flow @ 6.5 GPM - No leaks on transfer piping.
- New meter internal parts kits installed in Well U12 and W255.
- Water level in U12 24.6' TOW Total Depth ~ 40.20'

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 7-29-2016 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | W255 | |
| Time Interval at Location | Constant venting | | LOTO | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | in PlACE | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D [✓ Modified D] C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time: 1015 Conducted by: PWS

Topic: Proper LOTO, Onsite/offsite Communication with PM.

Attended:

☐ Instrument Calibration

Instrument ______ Instrument ______ Instrument ______

Time ______ Time ______ Time ______

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# August Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 8-2-16 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N Email

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 1 | 2 | 7 | 7 | 3 | 0 | 0 | 30 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 4 | 1 | 7 | 0 | 8 | 1 | 0 | 21 | 22 | ON |
| W253 | | 3 | 8 | 3 | 4 | 7 | 4 | 0 | off | 0 -> 5 | Check On / [✓ Off] Schedule |
| U5 | | 3 | 6 | 6 | 3 | 7 | 0 | 0 | 1 | 4 | ON |
| U4 | | 5 | 2 | 9 | 3 | 7 | 3 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 2 | 3 | 3 | 9 | 2 | 0 | 5.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 9 | 2 | 8 | 5 | 5 | 2 | 0 | 16 | 15 | ON |
| U7 | | 3 | 4 | 8 | 0 | 2 | 7 | 0 | 19 | 18 | ON |
| U11 | | 6 | 2 | 5 | 6 | 2 | 6 | 0 | 22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | [✓ On] |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)

Air compressor tank pressure -0- (psi)

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Dnkel Vault Water level @ 7.50'
from top Cover Seat.

Notes:

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 8-2-16 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 1330 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: - Safe driving

- 3 pts of contact on Vault STAIRS

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument | Instrument | Instrument |
| Time | Time | Time |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 8-10-16 Project manager notified prior to site visit. [✓ Y]/ N

Barr Technician: JWS Project manager notified before leaving site. [✓ Y]/ N

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 1 | 5 | 9 | 1 | 1 | 0 | 0 | 30 | 42 | Below optimal! * |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | [✓ 0]-> 10 | Used as needed |
| U2A | | 4 | 3 | 9 | 2 | 1 | 1 | 0 | 20 | 22 | |
| W253 | | 3 | 8 | 3 | 4 | 7 | 4 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 6 | 7 | 4 | 3 | 5 | 0 | 1 | 4 | |
| U4 | | 5 | 4 | 8 | 5 | 2 | 6 | 0 | 17 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 3 | 0 | 5 | 2 | 8 | 0 | ~~8~~ 7.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 9 | 4 | 5 | 8 | 3 | 4 | 0 | 15 | 15 | |
| U7 | | 3 | 6 | 9 | 1 | 5 | 4 | 0 | ~~17~~ 19 | 18 | |
| U11 | | 6 | 4 | 9 | 0 | 7 | 8 | 0 | 21 | 22 | |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? ~~Y~~ / [✓ N] (Sketch Below)

Air compressor tank pressure 0 (psi)

Vault copper lines inspection [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/ [✓ N] Discolored wires? Y/ [✓ N]

Notes: LNAPL vault DTW = 7.63' DTB = 7.81' water thickness = 0.18'

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________ PHSTL: ____________

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: __________ Conducted by:________

☐ Daily "Tool-Box" Safety Meeting

Topic: ____________

Attended: ____________

☐ Instrument Calibration

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 8-16-16 Project manager notified prior to site visit. [✓ Y] N Email
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 1 | 8 | 1 | 1 | 1 | 0 | 0 | 28 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 4 | 5 | 4 | 1 | 8 | 5 | 0 | 19 | 22 | ON |
| W253 | | 3 | 8 | 3 | 4 | 7 | 4 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 6 | 8 | 2 | 1 | 2 | 0 | 1 | 4 | ON |
| U4 | | 5 | 6 | 2 | 1 | 7 | 4 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 3 | 5 | 6 | 4 | 8 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 7 | 5 | 8 | 2 | 3 | 4 | 0 | 16 | 15 | ON |
| U7 | | 3 | 8 | 4 | 2 | 9 | 3 | 0 | 19 | 18 | ON |
| U11 | | 6 | 6 | 5 | 7 | 2 | 8 | 0 | 21 | 22 | ON |
| | | | | | | | | **Total** | | **144** | |

## On / Off Schedule

| | **2016** | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | [✓ On] |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: -Wells U2A, U11 and U12 Treated to inhibit fouling of well screen, pump inlet and transfer line.

-Water level measured in DNAPL Vault T.O.W. 7.08'

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 8-16-16 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 0730 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: No contact with site groundwater.

Attended:

☐ Instrument Calibration

Instrument ____ Instrument ____ Instrument ____

Time ____ Time ____ Time ____

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 8-24-2016
Barr Technician: PWS

Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 2 | 1 | 2 | 9 | 9 | 0 | 0 | 30 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 4 | 7 | 5 | 5 | 0 | 9 | 0 | 18 | 22 | ON |
| W253 | | 3 | 8 | 3 | 4 | 7 | 4 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 6 | 9 | 3 | 4 | 1 | 0 | 1 | 4 | ON |
| U4 | | 5 | 8 | 2 | 5 | 2 | 1 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 4 | 3 | 1 | 5 | 7 | 0 | 6.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | ~~2~~ | ~~4~~ | ~~3~~ | ~~1~~ | ~~5~~ | ~~7~~ | ~~0~~ | 9764140 | 15 | Flow 16 ON |
| U7 | | 4 | 0 | 6 | 4 | 3 | 7 | 0 | 19 | 18 | ON |
| U11 | | 6 | 8 | 9 | 7 | 5 | 2 | 0 | 21 | 22 | ON |
| | | | | | | | | **Total** | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | [✓ On] |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection: [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Notes: -4 mattresses have been dumped in the Central building Parking lot.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 8-24-2016 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

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| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time: 0920 Conducted by: PWS

Topic: - Safe driving

- No contact with impacted site water.

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument | Instrument | Instrument |
| Time | Time | Time |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 8-30-16 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: JLS Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.)<br>6 2 3 7 6 2 | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 2 | 3 | 7 | 6 | 2 | 0 | 0 | 28 | 42 | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | [✓ 0] -> 10 | Used as needed |
| U2A | | 4 | 9 | 1 | 2 | 9 | 2 | 0 | 18 | 22 | |
| W253 | | 3 | 8 | 3 | 4 | 7 | 4 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 7 | 0 | 2 | 1 | 3 | 0 | <1 | 4 | |
| U4 | | 5 | 9 | 8 | 2 | 8 | 2 | 0 | 18 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 4 | 8 | 9 | 9 | 1 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 9 | 9 | 0 | 4 | 0 | 4 | 0 | 15 | 15 | |
| U7 | | 4 | 3 | 3 | 4 | 3 | 8 | 0 | 18 | 18 | |
| U11 | | 7 | 0 | 8 | 4 | 0 | 0 | 0 | 23 | 22 | |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| [✓ August] | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Notes: WL in DNAPL Vault DTW = 6.84'
DTB = 7.82'
Water thickness 0.98'

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☐ Daily "Tool-Box" Safety Meeting Time: __________ Conducted by:________

Topic: ________________________________________

________________________________________

Attended: ________________________________________

________________________________________

☐ Instrument Calibration

Instrument __________ Instrument __________ Instrument __________

Time ______________ Time ______________ Time ______________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# September Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 9-2-16
Barr Technician: JWS

Project manager notified prior to site visit. Y / [✓ N]
Project manager notified before leaving site. Y / [✓ N]
JLB3 : 952-832-2700 or JLB3@barr.com

Paddy Systems

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | | | | | | | 0 | 0 | 92 ~~[illegible]~~ | 42 | after pigging |
| U1A | | | | | | | | 0 | | 0 -> 10 | Used as needed. |
| U2A | | | | | | | | 0 | 23 | 22 | After Pigging |
| W253 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U5 | | | | | | | | 0 | | 4 | |
| U4 | | | | | | | | 0 | | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U6 | | | | | | | | 0 | | 15 | |
| U7 | | | | | | | | 0 | | 18 | |
| U11 | | | | | | | | 0 | 23 | 22 | After pigging |
| | | | | | | | | **Total** | | **144** | |

## On / Off Schedule

| | **2016** | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

~~Is the west area fence secure? Y / N~~
~~Has there been any evidence of trespassing? Y / N~~
~~Any areas of concern with the West Area, or fence? Y / N (Sketch Below)~~
~~Air compressor tank pressure________(psi)~~
~~Vault copper lines inspection. Pass / Fail~~
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

TL Stevens swapped the pump in U12
From
TO

Notes:

| | | Minutes | Flow | Volume | Sample time |
|---|---|---|---|---|---|
| pH 7.53 | Pigged 5x U12 | ~~[illegible]~~ 55 min | 42 | 2,310 gallons | 10:50 |
| 7.57 | Pigged U2A 3x | 11+11+11 33 | 23 | 726 gallons | 13:15 ~~[illegible]~~ |
| 7.63 | Pigged U11 3x | 6+6+6 | 23 | 414 gallons | 13:42 |

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (□) THE FOLLOWING AFTER COMPLETION

☐ Daily "Tool-Box" Safety Meeting Time: __________ Conducted by: ________

Topic: ____________________

Attended: ____________________

☐ Instrument Calibration

Instrument __________
Time __________
☐ Calibration Check
☐ Battery Check

Instrument __________
Time __________
☐ Calibration Check
☐ Battery Check

Instrument __________
Time __________
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

Sept.
&
Weekly

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 9/8/16 Project manager notified prior to site visit. Y / N
Barr Technician: SDI Project manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 2 | 8 | 3 | 7 | 6 | 0 | 0 | 40 | 42 | |
| U1A | | | | | | | | 0 | - | 0 -> 10 | Used as needed |
| U2A | | 5 | 1 | 7 | 3 | 3 | 1 | 0 | 22 | 22 | |
| W253 | | 3 | 8 | 3 | 4 | 7 | 7 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 7 | 1 | 4 | 7 | 4 | 0 | 1 | 4 | |
| U4 | | 6 | 2 | 0 | 6 | 7 | 5 | 0 | 18 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 5 | 7 | 1 | 7 | 1 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 0 | 1 | 0 | 2 | 6 | 1 | 0 | 16 | 15 | |
| U7 | | 4 | 4 | 7 | 5 | 2 | 0 | 0 | 20 | 18 | |
| U11 | | 7 | 3 | 8 | 0 | 3 | 7 | 0 | 24 | 22 | |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure ________(psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: 0900 W253. 15.50 on/[✓ OFF] W253. Below 60' [✓ On]/OFF 1000
W255. Below 59' [✓ on]/off W255. 15.60 on/[✓ OFF]

300SPN - 18.41
328 - 12.82
VAULT MANHOLE 7.70
W251 DNAPL - —
WATER. 13.80 water - 6.50
~~DNAPL TANK MANHOLE~~ OIL - 79.67
~~WATER~~

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: ___________ Conducted by:________

☐ Daily "Tool-Box" Safety Meeting

Topic: ______________________________

______________________________

Attended: ______________________________

______________________________

☐ Instrument Calibration

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

______________________________

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BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 9-14-16 Project manager notified prior to site visit. Y / [✓ N]

Barr Technician: PWS/SWS Project manager notified before leaving site. Y / [✓ N] Buddy System

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 3 | 2 | 0 | 5 | 7 | 0 | 0 | 40 | 42 | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | | 5 | 3 | 7 | 2 | 1 | 0 | 0 | 23 | 22 | |
| W253 | | 3 | 8 | 8 | 7 | 8 | 9 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 7 | 2 | 3 | 5 | 2 | 0 | 4 | 4 | |
| U4 | | 6 | 3 | 6 | 2 | 8 | 2 | 0 | 18 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 5 | 4 | 1 | 4 | 1 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 0 | 2 | 4 | 0 | 7 | 6 | 0 | 16 | 15 | |
| U7 | | 4 | 6 | 4 | 2 | 6 | 6 | 0 | 19 | 18 | |
| U11 | | 7 | 5 | 9 | 1 | 2 | 4 | 0 | 23 | 22 | |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)

Air compressor tank pressure 0 (psi)

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Notes: -U12 transfer line jetted from vault to well ~100'. Solid pieces to ½" thick + fine material removed. 5 gallons + of solids removed.

- Tested float alarms = Sanitary Sewer = Works
= Oil/water separator high level = works
= City lift station = Issues - City to fix 9-15-16

-Need more PSI on jetter to complete cleaning of U12 line.

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# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 9-14-16 PHSTL: JWJ

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Top of Vault | Bottom of Steps | Back wall | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | LEL 0.0%, $O_2$ 21.0%<br>CO=0ppm $H_2S$ 0.0ppm | LEL= 0.0% $O_2$=21.0<br>CO= 0 ppm $H_2S$= 0.0 | LEL 0.0%, $O_2$% 21.0<br>CO=0 ppm $H_2S$= 0.0 ppm | |
| Organic Vapor Readout (ppm) | 0.0 ppm | 0.0 ppm | 0.0 ppm | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time: 0950 Conducted by: JWJ

Topic: Buddy system, safe driving, line of fire w/ pressure washer

Attended: JWJ, RWS

☐ Instrument Calibration

Instrument ____________ Instrument ____________ Instrument ____________

Time ____________ Time ____________ Time ____________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 9-21-2016
Barr Technician: PWS

Project manager notified prior to site visit. Y [✓ N]
Project manager notified before leaving site. Y [✓ N] Buddy System
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 3 | 5 | 9 | 6 | 6 | 0 | 0 | 40/42 | 42 | * |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | [✓ 0 ->] 10 | Used as needed |
| U2A | | 5 | 5 | 9 | 2 | 1 | 7 | 0 | 22 | 22 | |
| W253 | | 3 | 9 | 5 | 1 | 8 | 0 | 0 | 6.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | ~~6~~ | ~~5~~ | ~~3~~ | ~~7~~ | ~~2~~ | ~~0~~ | 0 | 1.0 | 4 | 3733490 |
| U4 | | ~~2~~ | ~~5~~ | ~~7~~ | ~~1~~ | ~~7~~ | ~~1~~ | 0 | 18 | 16 | 6537200 |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 5 | 7 | 1 | 7 | 1 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 0 | 3 | 9 | 2 | 8 | 8 | 0 | 16 | 15 | |
| U7 | | 4 | 8 | 2 | 7 | 1 | 9 | 0 | 19 | 18 | |
| U11 | | 7 | 8 | 1 | 5 | 2 | 1 | 0 | 22.5 | 22 | |
| | | | | | | | | **Total** | | **144** | |

### On / Off Schedule

| | **2016** | |
|---|---|---|
| | **W253** | **W255** |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | [✓ On] | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure ~~0~~ (psi)
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/ [✓ N] Discolored wires? Y/ [✓ N]

Notes: -Onsite for normal weekly system/site check and flow reading.

-Setup for Jetting lines U12 - 150' of line Jetted.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 9/21/16 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | Surface | | |
| Time Interval at Location | Constant Venting | Hearing Protect | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | –<br>– Weather observer | | |
| Organic Vapor Readout (ppm) | | – Public observer. | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 0830 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: – No contact with water OR removed Solids

Attended:

☐ Instrument Calibration

Instrument ____

Time ____

☐ Calibration Check

☐ Battery Check

Instrument ____

Time ____

☐ Calibration Check

☐ Battery Check

Instrument ____

Time ____

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 9-27-2016 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 3 | 9 | 0 | 2 | 3 | 0 | 0 | 40 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 5 | 7 | 7 | 3 | 3 | 9 | 0 | 23 | 22 | ON |
| W253 | | 3 | 9 | 8 | 9 | 8 | 9 | 0 | 5.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 7 | 4 | 1 | 4 | 9 | 0 | 1 | 4 | ON |
| U4 | | 6 | 6 | 7 | 9 | 3 | 5 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 5 | 7 | 1 | 7 | 1 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 0 | 5 | 1 | 7 | 1 | 6 | 0 | 16 | 15 | ON |
| U7 | | 4 | 9 | 7 | 8 | 2 | 6 | 0 | 19 | 18 | ON |
| U11 | | 7 | 9 | 9 | 4 | 4 | 4 | 0 | 22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | [✓ On] | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection: [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? [✓ Y] / N Discolored wires? [✓ Y] / N ①

Notes: - Couch and love Seat dumped on path just east of Vacant lots on SW corner of the site.

① U11 wires leaving relay beginning to turn brown from voltage draw and heat.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 9/27/16 PHSTL: DWS

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

**CHECK (☐) THE FOLLOWING AFTER COMPLETION**

☒ Daily "Tool-Box" Safety Meeting Time: 0830 Conducted by: DWS

Topic: 3 Points of Contact on Vault Stairs

Attended:

☐ Instrument Calibration

Instrument ______ Instrument ______ Instrument ______

Time ______ Time ______ Time ______

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

**Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):**

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 9-28-16 Project manager notified prior to site visit. Y / N
Barr Technician: PWS Project manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | | | | | | | 0 | 0 | | 42 | |
| U1A | | | | | | | | 0 | | 0 -> 10 | Used as needed |
| U2A | | | | | | | | 0 | | 22 | |
| W253 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U5 | | | | | | | | 0 | | 4 | |
| U4 | | | | | | | | 0 | | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | | | | | | | 0 | | 0 -> 5 | Check On / Off schedule |
| U6 | | | | | | | | 0 | | 15 | |
| U7 | | | | | | | | 0 | | 18 | |
| U11 | | | | | | | | 0 | | 22 | |
| | | | | | | | **Total** | | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? Y / N
Has there been any evidence of trespassing? Y / N
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)
Air compressor tank pressure ________(psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: -Onsite for removal of Sofa and loveseat dumped on Vacant lot Near SW corner of the site

- DNAPL Vault reading taken

TOW 5.90'
Bottom 7.68'

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: __________ Conducted by:________

☐ Daily "Tool-Box" Safety Meeting

Topic: ______________________________

______________________________

Attended: ______________________________

______________________________

☐ Instrument Calibration

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time ______________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# October Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 10-5-2016 Project manager notified prior to site visit. [✓ Y] N
Barr Technician: PNS Project manager notified before leaving site. [✓ Y] N EMAIL
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 4 | 3 | 7 | 1 | 6 | 0 | 0 | 38 | 42 | on |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 6 | 0 | 3 | 9 | 1 | 7 | 0 | 22 | 22 | on |
| W253 | | 4 | 0 | 1 | 0 | 0 | 7 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 7 | 5 | 3 | 3 | 6 | 0 | 1 | 4 | on |
| U4 | | 6 | 8 | 9 | 1 | 1 | 6 | 0 | 18 | 16 | on |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 6 | 2 | 0 | 8 | 3 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 0 | 7 | 0 | 2 | 7 | 3 | 0 | 16 | 15 | on |
| U7 | | 5 | 2 | 0 | 3 | 3 | 4 | 0 | 18 | 18 | on |
| U11 | | 8 | 2 | 5 | 4 | 8 | 6 | 0 | 22 | 22 | on |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | ~~On~~ | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] N
Has there been any evidence of trespassing? Y [✓ N]
Any areas of concern with the West Area, or fence? Y [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y [✓ N] Discolored wires? [✓ Y] N *

Notes: * MW11 contactor Wire #2 beginning to discolor near contactor.

DNAPL Vault 5.96' to TOW.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 10-5-2016 PHSTL: PWS

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | ✓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ ~~Daily~~ "Tool-Box" Safety Meeting Time: 1330 Conducted by: PWS

Topic: Safe driving - 3 points of contact on Vault Steps

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument | Instrument | Instrument |
| Time | Time | Time |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 10-11-16 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: PWG Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 4 | 6 | 9 | 2 | 3 | 0 | 0 | 38 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 6 | 2 | 2 | 3 | 3 | 1 | 0 | 22 | 22 | ON |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 7 | 6 | 1 | 6 | 4 | 0 | 1 | 4 | ON |
| U4 | | 7 | 0 | 4 | 1 | 7 | 4 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 3 | 7 | 5 | 6 | 4 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 0 | 8 | 3 | 4 | 2 | 7 | 0 | 15 | 15 | ON |
| U7 | | 5 | 3 | 6 | 2 | 4 | 5 | 0 | 18 | 18 | ON |
| U11 | | 8 | 4 | 3 | 4 | 6 | 1 | 0 | 21 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | [✓ On] |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y / [✓ N] Discolored wires? [✓ Y] / N U11 L2

Notes:
- DNAPL Vault depth to water. 5.95'
- New field sheets onsite
- Zero supply of gloves. New case of gloves to be ordered.

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 10-11-16

PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | 0 | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 0830

Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: No contact with Campers in West Area if encountered.

- Safe driving.

Attended:

☐ Instrument Calibration

Instrument ________

Time ________

☐ Calibration Check

☐ Battery Check

Instrument ________

Time ________

☐ Calibration Check

☐ Battery Check

Instrument ________

Time ________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 10-18-16 Project manager notified prior to site visit. Y [✓ N]
Barr Technician: JWJ/PWS Project manager notified before leaving site. [✓ Y] / N Buddy System
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 5 | 0 | 6 | 7 | 6 | 0 | 0 | 33 | 42 | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | [✓ 0] -> 10 | Used as needed |
| U2A | | 6 | 4 | 4 | 6 | 8 | 0 | 0 | 22 | 22 | |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | [✓ 0] -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 7 | 7 | 2 | 3 | 1 | 0 | 1 | 4 | |
| U4 | | 7 | 2 | 2 | 7 | 5 | 3 | 0 | 18 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 7 | 4 | 3 | 5 | 3 | 0 | 6.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 0 | 9 | 9 | 6 | 7 | 3 | 0 | 15 | 15 | |
| U7 | | 5 | 5 | 5 | 8 | 7 | 4 | 0 | 20 | 18 | |
| U11 | | 8 | 6 | 5 | 2 | 1 | 2 | 0 | 21 | 22 | |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | [✓ *] | [✓ On] |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? [✓ Y]/N Discolored wires? [✓ Y]/N

Replacing wires for Well U11 replaced OLD wire (10 gauge) 3 wires with New (8 gauge) wire.

Notes:

DTB = 7.81'
DNAPL Vault DTW = 6.11'
thickness Water = 1.70'

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________

PHSTL: ____________________

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: __________ Conducted by: ________

☐ Daily "Tool-Box" Safety Meeting

Topic: ____________________________________________

____________________________________________

____________________________________________

Attended: ____________________________________________

☐ Instrument Calibration

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Instrument __________

Time __________

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.): ____________________________________________

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BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 10-25-16 Project manager notified prior to site visit. Y / [✓ N]
Barr Technician: JWS/PWJS Project manager notified before leaving site. Y / [✓ N] Buddy System
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 5 | 4 | 0 | 1 | 4 | 0 | 0 | 34 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 6 | 6 | 6 | 3 | 9 | 9 | 0 | 21 | 22 | ON |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 7 | 8 | 2 | 5 | 0 | 0 | 1 | 4 | ON |
| U4 | | 7 | 4 | 0 | 9 | 5 | 7 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 7 | 4 | 3 | 6 | 6 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 1 | 1 | 5 | 5 | 1 | 2 | 0 | 16 | 15 | ON |
| U7 | | 5 | 7 | 5 | 0 | 1 | 2 | 0 | 19 | 18 | ON |
| U11 | | 8 | 8 | 6 | 0 | 0 | 5 | 0 | 20 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | [✓ On] |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / N (Sketch Below)

Air compressor tank pressure 0 (psi) off

Vault copper lines inspection [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

DNAPL
Vault outside tank
DTW = 6.22'
DTB = 7.82'
Water thickness = 1.60'

Notes:
- Treated wells: U11 U12 U2A
w/ Chlorine solution 1 gallon $H_2O$ + 1 pound powder per well
- Fence walk

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 10-25-16 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time: 1430 Conducted by: PWS

Topic: No contact with impacted groundwater

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument ______ | Instrument ______ | Instrument ______ |
| Time ______ | Time ______ | Time ______ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# November Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 11-2-2016
Barr Technician: PWS

Project manager notified prior to site visit. Y [✓ N]
Project manager notified before leaving site. Y [✓ N]
JLB3 : 952-832-2700 or JLB3@barr.com

Buddy System w/ TL Stevens

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 5 | 7 | 5 | 0 | 2 | 0 | 0 | 30/ | 42 | ON / Pigged 5x |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | Off | 0 -> 10 | Used as needed |
| U2A | | 6 | 9 | 0 | 2 | 0 | 7 | 0 | 22/22 | 22 | ON / Pigged 3x |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 7 | 9 | 3 | 6 | 2 | 0 | 1 | 4 | ON |
| U4 | | 7 | 6 | 1 | 0 | 6 | 0 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 8 | 1 | 6 | 9 | 9 | 0 | 6.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 1 | 3 | 2 | 9 | 9 | 4 | 0 | 16 | 15 | ON |
| U7 | | 5 | 9 | 6 | 1 | 1 | 2 | 0 | 19 | 18 | ON |
| U11 | | 9 | 0 | 8 | 8 | 0 | 3 | 0 | 20/22 | 22 | ON / Pigged 3x |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | [✓ On] |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

DNAPL Depth to water 6.15'

Notes: TL Stevens onsite for U12 pump replacement and line pigging.
- U12 Used 60S50-9 Pump and installed.
- U12 pigged 5x Flow at 50gpm for 25 min 1,250 g. Discharged
Sample collected at 1100 Field pH 7.41

- U2A pigged 3x Flow at 32gpm for 33 min
Sample collected at 1150 Field pH 7.45 1,056 g. Discharged.

- U11 pigged 3x Flow at 30 gpm for 18min 540g Discharged.
Sample collected at 1245 Field pH 7.50

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 11-2-16 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time: 0950 Conducted by: PWS

Topic: Safe driving.
No contact with groundwater.

Attended:

☐ Instrument Calibration

Instrument ______ Instrument ______ Instrument ______

Time ______ Time ______ Time ______

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Date: 11-8-16 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N Email

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 6 | 0 | 5 | 7 | 3 | 0 | 0 | 38 | 42 | ON |
| U1A | [redacted] | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | [redacted] | 7 | 0 | 8 | 8 | 2 | 0 | 0 | 22 | 22 | ON |
| W253 | [redacted] | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | [redacted] | 3 | 8 | 0 | 2 | 1 | 3 | 0 | 1 | 4 | ON |
| U4 | [redacted] | 7 | 7 | 6 | 3 | 5 | 3 | 0 | 16 | 16 | ON |
| U8 / U1 | [redacted] | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | [redacted] | 2 | 8 | 7 | 3 | 8 | 5 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | [redacted] | 1 | 4 | 5 | 5 | 0 | 8 | 0 | 15 | 15 | ON |
| U7 | [redacted] | 6 | 1 | 2 | 4 | 1 | 4 | 0 | 19 | 18 | ON |
| U11 | [redacted] | 9 | 2 | 8 | 8 | 7 | 8 | 0 | 24 | 22 | ON |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | [✓ On] |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)

Air compressor tank pressure 0 (psi)

Vault copper lines inspection [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Notes: DNAPL Vault water level 6.14'

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 11-8-16 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☒ Daily "Tool-Box" Safety Meeting Time: 0800 Conducted by: PWS

Topic: Safe driving.

Attended:

☐ Instrument Calibration

Instrument ______

Time ______

☐ Calibration Check

☐ Battery Check

Instrument ______

Time ______

☐ Calibration Check

☐ Battery Check

Instrument ______

Time ______

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 11-18-2016 Project manager notified prior to site visit. Y [✓ N]
Barr Technician: PWS / SRN2 Project manager notified before leaving site. Y [✓ N]
JLB3 : 952-832-2700 or JLB3@barr.com Buddy System

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 6 | 5 | 4 | 5 | 0 | 0 | 0 | 36 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 7 | 3 | 9 | 8 | 7 | 8 | 0 | 22 | 22 | ON |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 8 | 1 | 6 | 5 | 6 | 0 | 1 | 4 | ON |
| U4 | | 8 | 0 | 1 | 8 | 4 | 6 | 0 | 18 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 9 | 7 | 0 | 1 | 0 | 0 | 6 | 0 -> 5 | Check [✓ On] Off schedule |
| U6 | | 1 | 6 | 9 | 3 | 1 | 8 | 0 | 16 | 15 | ON |
| U7 | | 6 | 3 | 9 | 9 | 3 | 9 | 0 | 19 | 18 | ON |
| U11 | | 9 | 6 | 2 | 2 | 4 | 9 | 0 | 22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | [✓ On] |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? Y / [✓ N]
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y [✓ N] Discolored wires? Y [✓ N]

DNAPL Vault Depth to water. 6.17'

Notes: -Trees removed from west Area fence. Fence repaired.
- 24' Gate on lakeside down. Roped up - will be chained Shut next week.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 11-18-2016 PHSTL: PWS

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 1130 Conducted by: PWS

☑ Daily “Tool-Box” Safety Meeting

Topic: — Buddy System during Chainsaw work and fence Repair.

Attended:

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument ________ | Instrument ________ | Instrument ________ |
| Time ________ | Time ________ | Time ________ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 11-22-16 Project manager notified prior to site visit. [✓ Y] / N

Barr Technician: PWS Project manager notified before leaving site. [✓ Y] / N Email

JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 6 | 7 | 1 | 7 | 0 | 0 | 0 | 34 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 7 | 5 | 1 | 6 | 8 | 4 | 0 | 21 | 22 | ON |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 8 | 2 | 2 | 0 | 9 | 0 | 1 | 4 | ON |
| U4 | | 8 | 1 | 1 | 2 | 9 | 3 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 3 | 0 | 0 | 6 | 7 | 0 | 0 | 6.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 1 | 7 | 7 | 9 | 7 | 8 | 0 | 16 | 15 | ON |
| U7 | | 6 | 5 | 0 | 3 | 9 | 9 | 0 | 18 | 18 | ON |
| U11 | | 9 | 7 | 4 | 5 | 4 | 9 | 0 | 22 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | [✓ On] |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / N (Sketch Below)

Air compressor tank pressure 0 (psi) Temp. off

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Notes:

- DNAPL Vault water level. TOC. 6.19'
- Wells U11, U12 and U2A Treated to inhibit fouling of well screen, pump inlet and transfer line.
- Separator Vault floor cleaned
- West Area Fence (24' Gate) Secured with chain.

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 11-22-16 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 0845 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: — Safe driving

— Sure footing on Uneven Surfaces.

Attended:

☐ Instrument Calibration

Instrument ____________ Instrument ____________ Instrument ____________

Time ____________ Time ____________ Time ____________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 11-29-2016 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 7 | 0 | 2 | 3 | 0 | 0 | 0 | 34 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 7 | 7 | 3 | 1 | 6 | 3 | 0 | 21 | 22 | ON |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 8 | 3 | 2 | 0 | 4 | 0 | 1 | 4 | ON |
| U4 | | 8 | 2 | 8 | 5 | 8 | 9 | 0 | 17 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 3 | 0 | 7 | 4 | 1 | 1 | 0 | 6.5 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 1 | 9 | 3 | 9 | 1 | 2 | 0 | 17 | 15 | ON |
| U7 | | 6 | 6 | 7 | 6 | 2 | 9 | 0 | 19 | 18 | ON |
| U11 | | 9 | 9 | 0 | 5 | 0 | 6 | 0 | 0/22 | 22 | off / ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | [✓ On] |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi) off
Vault copper lines inspection [✓ Pass] Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

* lightbulb for W255 switch out. Bulb could not be removed - stuck. Bulb will be changed the next time the system is powered down.

Notes:
- DNAPL - Depth to water. 6.17'
- U11 off when I arrived onsite. Amp monitor tripped - reset and pump restarted.
- Pump tripped Amp monitor again after 15 min. - Reset - Running.
- I will check amp draw tomorrow to check Bad Pump VS bad monitor.

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 11-29-16 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | | | | |
|---|---|---|---|---|
| | WORK LOCATION | | | |
| Location Identifier | Vault | | | |
| Time Interval at Location | Vent properly & constantly | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %O$_2$, CO, H$_2$S) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 1030 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: Sure footing on uneven surfaces.

Attended:

☐ Instrument Calibration

Instrument ________ Instrument ________ Instrument ________

Time ________ Time ________ Time ________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 11-30-16 Project manager notified prior to site visit. Y / N

Barr Technician: JWJ/PWS Project manager notified before leaving site. Y / N

JLB3 : 952-832-2700 or JLB3@barr.com

Buddy System

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 7 | 0 | 6 | 6 | 6 | 0 | 0 | 30 | 42 | on |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | | 7 | 7 | 6 | 4 | 1 | 8 | 0 | 20 | 22 | on |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 8 | 3 | 3 | 6 | 9 | 0 | 1 | 4 | on |
| U4 | | 8 | 3 | 1 | 4 | 2 | 7 | 0 | 16 | 16 | on |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 3 | 0 | 8 | 5 | 0 | 9 | 0 | 7 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 1 | 9 | 6 | 5 | 0 | 7 | 0 | 16 | 15 | on |
| U7 | | 6 | 7 | 2 | 7 | 5 | 9 | 0 | 19 | 18 | on |
| U11 | | 9 | 9 | 1 | 7 | 7 | 3 | 0 | | 22 | ✱ Replaced meter internal Parts |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? Y / N

Has there been any evidence of trespassing? Y / N

Any areas of concern with the West Area, or fence? Y / N (Sketch Below)

Air compressor tank pressure 0 (psi)

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Notes: Cleaned meters and copper pipes w/ scrubbing bubbles and power shakes to remove iron bacteria buildup.

U12, U2A, U11

✱ Replaced meter internal parts on U11

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ______________ PHSTL: ______________

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: __________ Conducted by:________

☐ Daily "Tool-Box" Safety Meeting

Topic: ______________________________

______________________________

______________________________

Attended: ______________________________

☐ Instrument Calibration

Instrument __________ Instrument __________ Instrument __________

Time __________ Time __________ Time __________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# December Weekly Readings

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 12-2-16
Barr Technician: JWS

Project manager notified prior to site visit. Y / N
Project manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 7 | 1 | 5 | 0 | 3 | 0 | 0 | 31 | 42 | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | | 7 | 8 | 2 | 1 | 3 | 6 | 0 | 22 | 22 | |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 8 | 3 | 6 | 4 | 1 | 0 | 1 | 4 | |
| U4 | | 8 | 3 | 6 | 1 | 3 | 1 | 0 | 18 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 3 | 1 | 0 | 3 | 5 | 8 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | | 2 | 0 | 0 | 8 | 8 | 3 | 0 | 17 | 15 | |
| U7 | | 6 | 7 | 8 | 0 | 9 | 1 | 0 | 20 | 18 | |
| U11 | | 9 | 9 | 1 | 8 | 1 | 1 | 0 | 25 | 22 | |
| | | | | | | | | Total | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? Y / N
Has there been any evidence of trespassing? Y / N
Any areas of concern with the West Area, or fence? Y / N (Sketch Below)
Air compressor tank pressure _________(psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Amps on U11 (New) = 8.2 Amps

Notes: Swapped internal meter parts for U12
T.L. stevens onsite to swap U11 motor & Pumpend

11 NEW 4" NEW
MOTOR=3/4 HP motor, 300 LB thrust, 3 wire, 60 Hz, 0.55 kw
PUMPEND= 7lb, 60 Hz, 1½" NPT, 25507-5

Joe will clean out and check to see if one can be kept as backup.

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

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### Safety Record for Quarterly Pigging Events and Site Air Monitoring

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| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☐ Daily "Tool-Box" Safety Meeting Time: __________ Conducted by: ________

Topic: ________________________________________

________________________________________

Attended: ________________________________________

________________________________________

☐ Instrument Calibration

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 12-6-2016
Barr Technician: PWS

Project manager notified prior to site visit. [✓ Y] / N
Project manager notified before leaving site. [✓ Y] / N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 7 | 3 | 2 | 5 | 5 | 0 | 0 | 32 | 42 | ON |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | | 7 | 9 | 3 | 4 | 3 | 6 | 0 | 20 | 22 | ON |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On [✓ Off] schedule |
| U5 | | 3 | 8 | 4 | 1 | 9 | 0 | 0 | 1 | 4 | ON |
| U4 | | 8 | 4 | 5 | 5 | 3 | 3 | 0 | 16 | 16 | ON |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 3 | 1 | 4 | 0 | 6 | 2 | 0 | 6 | 0 -> 5 | Check [✓ On] Off schedule |
| U6 | | 2 | 0 | 9 | 6 | 4 | 8 | 0 | 16 | 15 | ON |
| U7 | | 6 | 8 | 8 | 6 | 1 | 3 | 0 | 18 | 18 | ON |
| U11 | | 0 | 0 | 8 | 1 | 6 | 9 | 0 | 28/23 | 22 | ON |
| | | | | | | | | **Total** | | 144 | |

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | [✓ On] |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y [✓ N] Discolored wires? Y [✓ N]

Notes: DNAPL Vault water level 6.15'

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: 12-6-16 PHSTL: PWS

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | ↓ | | | |
| Organic Vapor Readout (ppm) | ↓ | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting Time: 1050 Conducted by: AWS

Topic: - Safe driving

- 3pts of Contact on Vault Stairs

Attended:

☐ Instrument Calibration

Instrument ________ Instrument ________ Instrument ________

Time ________ Time ________ Time ________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 12-16-16 Project manager notified prior to site visit. [✓ Y] / N
Barr Technician: SWS/ /KDM Project manager notified before leaving site. [✓ Y] / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 7 | 7 | 5 | 8 | 0 | 0 | 0 | 30 | 42 | |
| U1A | [redacted] | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | Used as needed |
| U2A | [redacted] | 8 | 2 | 1 | 9 | 9 | 1 | 0 | 20 | 22 | |
| W253 | [redacted] | 4 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | [redacted] | 3 | 8 | 5 | 2 | 5 | 6 | 0 | <1 | 4 | |
| U4 | [redacted] | 8 | 6 | 9 | 4 | 3 | 8 | 0 | 17 | 16 | |
| U8 / U1 | [redacted] | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | [redacted] | 3 | 2 | 3 | 5 | 9 | 6 | 0 | ~~4~~6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | [redacted] | | | | | | | 0 | 16 | 15 | |
| U7 | [redacted] | 7 | 1 | 5 | 8 | 4 | 9 | 0 | 19 | 18 | |
| U11 | [redacted] | ~~4~~ | ~~1~~ | ~~7~~ | ~~7~~ | ~~2~~ | ~~7~~ | 0 | 23 | 22 | |
| | | ~~041~~ | | | ~~2 0~~ | | | Total | | 144 | |

041 733

## On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

## Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)

Air compressor tank pressure 0 (psi) OFF

Vault copper lines inspection. [✓ Pass] / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y / [✓ N] Discolored wires? Y / [✓ N]

Notes:

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☐ Daily "Tool-Box" Safety Meeting Time: __________ Conducted by:________

Topic: ______________________________________________

______________________________________________

Attended: ______________________________________________

______________________________________________

☐ Instrument Calibration

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Instrument __________
Time ______________
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 12-21-16 Project manager notified prior to site visit. [✓ Y] N
Barr Technician: PWS Project manager notified before leaving site. [✓ Y] N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 7 | 9 | 5 | 7 | 9 | 0 | 0 | 22 | 42 | ON |
| U1A | [redacted] | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | Used as needed |
| U2A | [redacted] | 8 | 3 | 6 | 3 | 6 | 7 | 0 | 20 | 22 | ON |
| W253 | [redacted] | 4 | 0 | 1 | 0 | 1 | 3 | 0 | off | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | [redacted] | 3 | 8 | 6 | 3 | 3 | 8 | 0 | 1 | 4 | ON |
| U4 | [redacted] | 8 | 8 | 1 | 5 | 5 | 9 | 0 | 16 | 16 | ON |
| U8 / U1 | [redacted] | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | [redacted] | 3 | 2 | 8 | 4 | 8 | 7 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | [redacted] | 2 | 4 | 3 | 7 | 4 | 8 | 0 | 16 | 15 | ON |
| U7 | [redacted] | 7 | 2 | 9 | 8 | 2 | 7 | 0 | 19 | 18 | ON |
| U11 | [redacted] | 0 | 5 | 8 | 6 | 2 | 7 | 0 | 23 | 22 | ON |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | [✓ On] |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] N
Has there been any evidence of trespassing? Y / [✓ N]
Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)
Air compressor tank pressure 0 (psi)
Vault copper lines inspection. [✓ Pass] / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/[✓ N] Discolored wires? Y/[✓ N]

Notes: DNAPL Vault Depth to Water 6.19'

## Work Area Quarterly Safety Record
## Former Joslyn Manufacturing Site

DATE: 12-21-16

PHSTL: PWS

---

### Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | Vault | | | |
| Time Interval at Location | Constant Venting | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

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CHECK (☐) THE FOLLOWING AFTER COMPLETION

☑ Daily "Tool-Box" Safety Meeting

Time: 1400

Conducted by: PWS

Topic: - Safe driving

- Sure footing on uneven surfaces

Attended:

☐ Instrument Calibration

Instrument ______

Time ______

☐ Calibration Check

☐ Battery Check

Instrument ______

Time ______

☐ Calibration Check

☐ Battery Check

Instrument ______

Time ______

☐ Calibration Check

☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

# Monthly Readings

DEC 2015
READINGS

BARR

# Monthly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Page 1

Date: 1/6/16
Technician: SDI
Quarter 1st 2nd 3rd [✓ 4th]

Project Manager notified prior to site visit. Y / N
Project Manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 0 | 8 | 8 | 9 | 9 | 0 | 0 | 40 | 42 | | |
| U1A | | — | — | — | — | — | — | 0 | 0 | 0 -> 10 | | off |
| U2A | | 7 | 7 | 1 | 6 | 2 | 8 | 0 | 22 | 22 | | |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | 0 | 0 -> 5 | | off |
| U5 | | 3 | 3 | 6 | 9 | 5 | 9 | 0 | 1 | 6 | | |
| U4 | | 0 | 2 | 7 | 4 | 0 | 1 | 0 | 18 | 16 | | |
| U8 / U1 | | — | — | — | — | — | — | 0 | 0 | 0 | | off |
| W255 | | 1 | 4 | 8 | 2 | 3 | 8 | 0 | 2.25 | 0 -> 5 | | |
| U6 | | 5 | 3 | 1 | 5 | 1 | 7 | 0 | 18 | 15 | | |
| U7 | | 7 | 7 | 3 | 4 | 7 | 1 | 0 | 18 | 18 | | |
| U11 | | 9 | 7 | 3 | 3 | 3 | 6 | 0 | 24 | 22 | | |
| | | | | | Total | | | | | **146** | | |

## Product / Water Levels:

| | | | | Time | | | | Time |
|---|---|---|---|---|---|---|---|---|
| W 253 | Water Level | 16.10 | On/[✓ Off] | 1030 | Water Level | | On/Off | |
| W 255 | Water Level | Below 59' | [✓ On]/Off | | Water Level | | On/Off | |

W 300spn Water Level 19.30
W 328 Water Level 13.70

Tank Effluent Sample Y/[✓ N] pH ______ Temp ______ Cond ______ D.O. ______ EH ______

## DNAPL System Monitoring

| DNAPL Tank Manhole | | W251 | | Vault Manhole | |
|---|---|---|---|---|---|
| Total Depth 6.60 feet | | Total depth = 83 feet | | Total depth = 7.70 | |
| Water = | 6.50 | Water Level | 14.95 | DNAPL = | — |
| Oil = | 6.60 | DNAPL = | 79.70 | Water = | 7.50 |
| | | | | depth= | .20 |

– Is the float operating Y / N Does the float indicate water present between tanks Y / N
Is caulking on the vault in good condition [✓ Y]/ N

## West Area Inspection

Is the west area fence secure [✓ Y]/ N Has there been any evidence of trespassing Y /[✓ N]
Sketch on Back any areas of concern with the West Area, or fence

Other issues:

DNAPL PUMP IS OFF. DNAPL TANK HAS BEEN PUMPED OUT.
FLOAT HAS BEEN REMOVED.

JAN 2016

BARR

## Monthly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 2/1/16
Technician: SDI
Quarter [✓ 1st] 2nd 3rd 4th

Project Manager notified prior to site visit. Y / N
Project Manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 2 | 2 | 9 | 9 | 3 | 0 | 0 | 38 | 42 | | |
| U1A | | — | — | — | — | — | — | 0 | 0 | 0 -> 10 | | off |
| U2A | | 8 | 5 | 1 | 7 | 7 | 3 | 0 | 22 | 22 | | |
| W253 | | 3 | 4 | 4 | 0 | 9 | 7 | 0 | 0 | 0 -> 5 | | off |
| U5 | | 3 | 4 | 0 | 8 | 7 | 6 | 0 | 1 | 6 | | |
| U4 | | 0 | 9 | 2 | 2 | 7 | 2 | 0 | 17 | 16 | | |
| U8 / U1 | | — | — | — | — | — | — | 0 | 0 | 0 | | off |
| W255 | | 1 | 5 | 7 | 0 | 7 | 6 | 0 | 3 | 0 -> 5 | | |
| U6 | | 5 | 8 | 7 | 6 | 6 | 4 | 0 | 18 | 15 | | |
| U7 | | 8 | 4 | 0 | 2 | 9 | 8 | 0 | 18 | 18 | | |
| U11 | | 0 | 6 | 2 | 9 | 8 | 1 | 0 | 24 | 22 | | |
| | | | | Total | | | | | | **146** | | |

### Product / Water Levels:

W 253 Water Level 16.40 On/[✓ Off] Time 0930 Water Level ______ On/Off Time ______
W 255 Water Level Below 59' [✓ On]/Off ______ Water Level ______ On/Off ______

W 300spn Water Level 19.65
W 328 Water Level 14.05

Tank Effluent Sample Y / [✓ N] pH _____ Temp ______ Cond ______ D.O. ______ EH ______

### DNAPL System Monitoring

| DNAPL Tank Manhole | W251 | Vault Manhole |
|---|---|---|
| Total Depth 6.60 feet | Total depth = 83 feet | Total depth = 7.70 |
| Water = - | Water Level 15.25 | DNAPL = — |
| Oil = - | DNAPL = 79.65 | Water = 7.50 |
| | | depth= .20 |

Is the float operating Y / N Does the float indicate water present between tanks Y / N
Is caulking on the vault in good condition Y / N

### West Area Inspection

Is the west area fence secure Y / N Has there been any evidence of trespassing Y / N
Sketch on Back any areas of concern with the West Area, or fence

Other issues: DNAPL system is off

BARR

# Monthly Readings – Weekly Sheet also completed.

## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Page 1

Date: 2-29-16
Technician: PWS
Quarter [✓ 1st] 2nd 3rd 4th

Project Manager notified prior to site visit. [✓ Y] / N
Project Manager notified before leaving site. [✓ Y] N Email
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 3 | 6 | 9 | 1 | 9 | 0 | 0 | 43 | 42 | ON | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | off | 0 -> 10 | off | |
| U2A | | 9 | 3 | 1 | 4 | 5 | 5 | 0 | 16/16 | 22 | ON | – New internal Parts kit installed no flow change. |
| W253 | | 3 | 4 | 4 | 1 | 0 | 3 | 0 | 0.0/3.0 | 0 -> 5 | — | off/on |
| U5 | | 3 | 4 | 5 | 0 | 2 | 7 | 0 | 1 | 6 | ON | |
| U4 | | 1 | 6 | 1 | 6 | 0 | 9 | 0 | 18 | 16 | ON | |
| U8 / U1 | | | | | | | | 0 | 0.0 | 0 | — | off |
| W255 | | 1 | 6 | 7 | 0 | 4 | 3 | 0 | 3.0/0.0 | 0 -> 5 | — | on/off |
| U6 | | 6 | 6 | 1 | 8 | 2 | 5 | 0 | 18/~~0~~ | 15 Now | off | – Small drip inside Vault |
| U7 | | 9 | 1 | 2 | 7 | 5 | 5 | 0 | 18 | 18 | ON | |
| U11 | | 1 | 5 | 4 | 4 | 6 | 3 | 0 | 23 | 22 | ON | |
| | | | | | Total | | | | | 146 | | |

### Product / Water Levels:

| | | | | Time | | | Time |
|---|---|---|---|---|---|---|---|
| W 253 | Water Level | 16.47 | On/[✓ Off] | ~~16.47~~ 1320 | Water Level 59.00+ | [✓ On]/Off | 1410 |
| W 255 | Water Level | 58.35+ | [✓ On]/Off | 1340 | Water Level 20.65 | On/[✓ Off] | 1410 |

W 300spn Water Level 19.72
W 328 Water Level 14.15

Tank Effluent Sample Y / [✓ N] pH _____ Temp ______ Cond ______ D.O. ______ EH ______

### DNAPL System Monitoring

| DNAPL Tank Manhole | W251 | Vault Manhole |
|---|---|---|
| Total Depth 6.60 feet | Total depth = 83 feet | Total depth = 7.70 |
| Water = — | Water Level 15.21 | DNAPL = — |
| Oil = — | DNAPL = 79.91 | Water = 7.48 |
| | | depth= 0.22 |

Is the float operating Y / N Not Tested system off. Does the float indicate water present between tanks [✓ Y] N
Is caulking on the vault in good condition Y / [✓ N] Spring Sealing required.

### West Area Inspection

Is the west area fence secure [✓ Y] N Has there been any evidence of trespassing Y [✓ N]
Sketch on Back any areas of concern with the West Area, or fence NA

Other issues: DNAPL System off.

BARR

# Monthly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Page 1

Date: 4/1/16
Technician: SDT
Quarter 1st 2nd 3rd 4th

Project Manager notified prior to site visit. Y / N
Project Manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 5 | 2 | 9 | 0 | 6 | 0 | 0 | 40 | 42 | | |
| U1A | | 6 | 7 | 5 | 3 | 1 | 9 | 0 | 0 | 0 -> 10 | | off |
| U2A | | 0 | 1 | 9 | 9 | 9 | 5 | 0 | 24 | 22 | | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | | off |
| U5 | | 3 | 4 | 9 | 5 | 2 | 6 | 0 | 1 | 6 | | |
| U4 | | 2 | 3 | 2 | 2 | 5 | 6 | 0 | 17 | 16 | | |
| U8 / U1 | | — | — | — | — | — | — | 0 | 0 | 0 | | off |
| W255 | | 1 | 6 | 7 | 0 | 4 | 5 | 0 | 1 | 0 -> 5 | | [illegible] |
| U6 | | 6 | 6 | 1 | 8 | 7 | 4 | 0 | 0 | 15 | | off |
| U7 | | 9 | 9 | 6 | 1 | 0 | 9 | 0 | 19 | 18 | | |
| U11 | | 2 | 4 | 1 | 8 | 7 | 1 | 0 | 22 | 22 | | |
| | | | | | Total | | | | | 146 | | |

## Product / Water Levels:

W 253 Water Level Below 60' [✓ On]/Off Time 0900 Water Level 16.32 On/[✓ Off] Time 1000
W 255 Water Level 17.30 On/[✓ Off] Time 0900 Water Level Below 59' [✓ On]/Off Time 1000

W 300spn Water Level 19.50
W 328 Water Level 13.92

Tank Effluent Sample Y / [✓ N] pH _____ Temp ______ Cond ______ D.O. ______ EH ______

## DNAPL System Monitoring

| DNAPL Tank Manhole | | W251 | | Vault Manhole | |
|---|---|---|---|---|---|
| Total Depth 6.60 feet | | Total depth = 83 feet | | Total depth = 7.70 | |
| Water = | – | Water Level | 14.90 | DNAPL = | – |
| Oil = | – | DNAPL = | 79.80 | Water = | 7.50 |
| | | | | depth= | .20 |

Is the float operating Y / N Does the float indicate water present between tanks Y / N
Is caulking on the vault in good condition Y / N

## West Area Inspection

Is the west area fence secure Y / N Has there been any evidence of trespassing Y / N
Sketch on Back any areas of concern with the West Area, or fence

Other issues: DNAPL system off

# Monthly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Page 1

Date: MAY 2, 2016 Project Manager notified prior to site visit. Y / N

Technician: SDI Project Manager notified before leaving site. Y / N

Quarter 1st [✓ 2nd] 3rd 4th JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 6 | 8 | 9 | 8 | 8 | 0 | 0 | 34 | 42 | | |
| U1A | | | | | | | | 0 | 0 | 0 -> 10 | | off |
| U2A | | 1 | 2 | 2 | 9 | 0 | 0 | 0 | 21.5 | 22 | | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | | OFF |
| U5 | | 3 | 5 | 3 | 9 | 6 | 7 | 0 | 1 | 6 | | |
| U4 | | 3 | 0 | 6 | 2 | 2 | 3 | 0 | 16 | 16 | | |
| U8 / U1 | | | | | | | | 0 | 0 | 0 | | off |
| W255 | | 1 | 7 | 7 | 5 | 1 | 7 | 0 | 3 | 0 -> 5 | | |
| U6 | | 7 | 1 | 8 | 8 | 8 | 8 | 0 | 17 | 15 | | |
| U7 | | 0 | 8 | 9 | 0 | 4 | 9 | 0 | 21 | 18 | | |
| U11 | | 3 | 4 | 1 | 0 | 1 | 3 | 0 | 22 | 22 | | |
| | | | | | Total | | | | | 146 | | |

## Product / Water Levels:

| | | | | Time | | | | Time |
|---|---|---|---|---|---|---|---|---|
| W 253 | Water Level | 15.90 | On/[✓ Off] | 0830 | Water Level | | On/Off | |
| W 255 | Water Level | Below 59' | [✓ On]/Off | ↓ | Water Level | | On/Off | |

W 300spn Water Level 19.25

W 328 Water Level 13.63

Tank Effluent Sample Y / [✓ N] pH _____ Temp _____ Cond _____ D.O. _____ EH _____

## DNAPL System Monitoring

| DNAPL Tank Manhole | W251 | Vault Manhole |
|---|---|---|
| Total Depth 6.60 feet | Total depth = 83 feet | Total depth = 7.70 |
| Water = / | Water Level 14.60 | DNAPL = — |
| Oil = / | DNAPL = 79.75 | Water = 7.25 |
| | | depth= .45 |

Is the float operating Y / N Does the float indicate water present between tanks Y / N

Is caulking on the vault in good condition Y / N

## West Area Inspection

Is the west area fence secure Y / N Has there been any evidence of trespassing Y / N

Sketch on Back any areas of concern with the West Area, or fence

Other issues:

BARR

# Monthly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Page 1

Date: 6/1/16
Technician: SDI
Quarter 1st [✓ 2nd] 3rd 4th

Project Manager notified prior to site visit. Y / N
Project Manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 8 | 3 | 7 | 0 | 7 | 0 | 0 | 40 | 42 | | |
| U1A | | | | | | | | 0 | 0 | 0 -> 10 | | off |
| U2A | | 2 | 2 | 0 | 0 | 8 | 1 | 0 | 24 | 22 | | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | | off |
| U5 | | 3 | 5 | 8 | 0 | 9 | 6 | 0 | 1 | 6 | | |
| U4 | | 3 | 7 | 8 | 9 | 6 | 3 | 0 | 18 | 16 | | |
| U8 / U1 | | | | | | | | 0 | 0 | 0 | | off |
| W255 | | 1 | 8 | 5 | 4 | 4 | 9 | 0 | 2 | 0 -> 5 | | |
| U6 | | 7 | 9 | 0 | 4 | 7 | 2 | 0 | 16 | 15 | | |
| U7 | | 1 | 7 | 8 | 5 | 6 | 6 | 0 | 19 | 18 | | |
| U11 | | 4 | 3 | 7 | 3 | 6 | 5 | 0 | 22 | 22 | | |
| | | | | | Total | | | | | 146 | | |

## Product / Water Levels:

| | | | | Time | | | Time |
|---|---|---|---|---|---|---|---|
| W 253 | Water Level | 16.15 | On/[✓ Off] | 0830 | Water Level ____ | On/Off | ____ |
| W 255 | Water Level | Below 59' | [✓ On]/Off | ↓ | Water Level ____ | On/Off | ____ |

W 300spn Water Level 19.52
W 328 Water Level 13.95

Tank Effluent Sample Y / [✓ N] pH ____ Temp ____ Cond ____ D.O. ____ EH ____

## DNAPL System Monitoring

| DNAPL Tank Manhole | | W251 | | Vault Manhole | |
|---|---|---|---|---|---|
| Total Depth 6.60 feet | | Total depth = 83 feet | | Total depth = 7.70 | |
| Water = | – | Water Level | 14.86 | DNAPL = | – |
| Oil = | – | DNAPL = | 79.73 | Water = | 7.25 |
| | | | | depth= | |

Is the float operating Y / N Does the float indicate water present between tanks Y / N
Is caulking on the vault in good condition Y / N

## West Area Inspection

Is the west area fence secure Y / N Has there been any evidence of trespassing Y / N
Sketch on Back any areas of concern with the West Area, or fence

Other issues:

July

BARR

# Monthly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Page 1

Date: 7/1/16
Technician: SDZ
Quarter 1st 2nd [✓ 3rd] 4th

Project Manager notified prior to site visit. Y / N
Project Manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 5 | 9 | 8 | 8 | 7 | 6 | 0 | 0 | 33 | 42 | | |
| U1A | | — | | | | | | 0 | | 0 -> 10 | | off |
| U2A | | 3 | 1 | 8 | 2 | 4 | 4 | 0 | 22 | 22 | | |
| W253 | | 3 | 7 | 0 | 1 | 4 | 5 | 0 | 0 | 0 -> 5 | | off |
| U5 | | 3 | 6 | 2 | 1 | 2 | 1 | 0 | 1 | 6 | | |
| U4 | | 4 | 5 | 1 | 6 | 0 | 3 | 0 | 16.5 | 16 | | |
| U8 / U1 | | — | | | | | | 0 | 0 | 0 | | off |
| W255 | | 2 | 0 | 8 | 1 | 9 | 0 | 0 | 7 | 0 -> 5 | | |
| U6 | | 8 | 5 | 7 | 4 | 1 | 3 | 0 | 16 | 15 | | |
| U7 | | 2 | 6 | 0 | 8 | 3 | 9 | 0 | 19 | 18 | | |
| U11 | | 5 | 2 | 8 | 7 | 1 | 4 | 0 | 22 | 22 | | |
| | | | | Total | | | | | | 146 | | |

## Product / Water Levels:

| | | | | Time | | | | Time |
|---|---|---|---|---|---|---|---|---|
| W 253 | Water Level | 17.00 | On/[✓ Off] | | Water Level | | On/Off | |
| W 255 | Water Level | Below 59' | [✓ On]/Off | | Water Level | | On/Off | |

W 300spn Water Level 20.15
W 328 Water Level 14.50

Tank Effluent Sample Y/[✓ N] pH ____ Temp ____ Cond ____ D.O. ____ EH ____

## DNAPL System Monitoring

| DNAPL Tank Manhole | W251 | Vault Manhole |
|---|---|---|
| Total Depth 6.60 feet | Total depth = 83 feet | Total depth = 7.70 |
| Water = - | Water Level 15.11 | DNAPL = - |
| Oil = - | DNAPL = 79.71 | Water = 7.60 |
| | | depth= .10 |

Is the float operating Y / N Does the float indicate water present between tanks Y / N
Is caulking on the vault in good condition Y / N

## West Area Inspection

Is the west area fence secure Y / N Has there been any evidence of trespassing Y / N
Sketch on Back any areas of concern with the West Area, or fence

Other issues:

Aug.

BARR

# Monthly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Page 1

Date: 8/5/16
Technician: SDI
Quarter 1st 2nd [✓ 3rd] 4th

Project Manager notified prior to site visit. Y / N
Project Manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 1 | 3 | 9 | 5 | 0 | 0 | 0 | 28 | 42 | | |
| U1A | [redacted] | — | | | | | | 0 | 0 | 0 -> 10 | | off |
| U2A | [redacted] | 4 | 2 | 5 | 5 | 2 | 5 | 0 | 20 | 22 | | |
| W253 | [redacted] | 3 | 8 | 3 | 4 | 7 | 4 | 0 | 0 | 0 -> 5 | | off |
| U5 | [redacted] | 3 | 6 | 6 | 7 | 7 | 6 | 0 | 1 | 6 | | |
| U4 | [redacted] | 5 | 3 | 6 | 4 | 9 | 0 | 0 | 17 | 16 | | |
| U8 / U1 | [redacted] | — | | | | | | 0 | 0 | 0 | | off |
| W255 | [redacted] | 2 | 2 | 6 | 0 | 5 | 3 | 0 | 6 | 0 -> 5 | | |
| U6 | [redacted] | 9 | 3 | 4 | 9 | 9 | 8 | 0 | 16 | 15 | | |
| U7 | [redacted] | 8 | 5 | 5 | 9 | 1 | 9 | 0 | 20 | 18 | | |
| U11 | [redacted] | 6 | 3 | 4 | 4 | 2 | 6 | 0 | 21 | 22 | | |
| | | | | | Total | | | | | 146 | | |

## Product / Water Levels:

| | | | | Time | | | | Time |
|---|---|---|---|---|---|---|---|---|
| W 253 | Water Level | 16.00 | On/[✓ Off] | 1200 | Water Level | | On/Off | |
| W 255 | Water Level | Below 59' | [✓ On]/Off | | Water Level | | On/Off | |

W 300spn Water Level 19.07
W 328 Water Level 13.45

Tank Effluent Sample Y / N pH ____ Temp ____ Cond ____ D.O. ____ EH ____

## DNAPL System Monitoring

| DNAPL Tank Manhole | W251 | Vault Manhole |
|---|---|---|
| Total Depth 6.60 feet | Total depth = 83 feet | Total depth = 7.70 |
| Water = – | Water Level 14.32 | DNAPL = – |
| Oil = – | DNAPL = 78.69 | Water = 7.50 |
| | | depth= .20 |

Is the float operating Y / N Does the float indicate water present between tanks Y / N
Is caulking on the vault in good condition Y / N

## West Area Inspection

Is the west area fence secure Y / N Has there been any evidence of trespassing Y / N
Sketch on Back any areas of concern with the West Area, or fence

Other issues:

~~Aug.~~ Sept. & Weekly

BARR

# Weekly Readings
## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 9/8/16 Project manager notified prior to site visit. Y / N
Barr Technician: SDI Project manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 2 | 8 | 3 | 7 | 6 | 0 | 0 | 40 | 42 | |
| U1A | | | | | | | | 0 | – | 0 -> 10 | Used as needed |
| U2A | | 5 | 1 | 7 | 3 | 3 | 1 | 0 | 22 | 22 | |
| W253 | | 3 | 8 | 3 | 4 | 7 | 7 | 0 | 6 | 0 -> 5 | Check [✓ On] / Off schedule |
| U5 | | 3 | 7 | 1 | 4 | 7 | 4 | 0 | 1 | 4 | |
| U4 | | 6 | 2 | 0 | 6 | 7 | 5 | 0 | 18 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 5 | 7 | 1 | 7 | 1 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U6 | | 0 | 1 | 0 | 2 | 6 | 1 | 0 | 16 | 15 | |
| U7 | | 4 | 4 | 7 | 5 | 2 | 0 | 0 | 20 | 18 | |
| U11 | | 7 | 3 | 8 | 0 | 3 | 7 | 0 | 24 | 22 | |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? [✓ Y] / N

Has there been any evidence of trespassing? Y / [✓ N]

Any areas of concern with the West Area, or fence? Y / [✓ N] (Sketch Below)

Air compressor tank pressure ________(psi)

Vault copper lines inspection. Pass / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/N Discolored wires? Y/N

Notes: 0900 W253. 15.50 on/[✓ OFF] W253. Below 60' [✓ ON]/OFF 1000

W255. Below 59' [✓ on]/off W255. 15.60 on/[✓ OFF]

300SPN – 18.41

328 – 12.82

VAULT MANHOLE 7.70

W251

DNAPL – –

WATER. 13.80 water – 6.50

~~DNAPL TANK MANHOLE~~ OIL – 79.67

~~WATER~~

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

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## Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: __________ Conducted by: ________

☐ Daily "Tool-Box" Safety Meeting

Topic: ____________________________________________

____________________________________________

____________________________________________

Attended: ____________________________________________

☐ Instrument Calibration

Instrument _________
Time _____________
☐ Calibration Check
☐ Battery Check

Instrument _________
Time _____________
☐ Calibration Check
☐ Battery Check

Instrument _________
Time _____________
☐ Calibration Check
☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):
____________________________________________
____________________________________________
____________________________________________
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OCT.

MONTHLY

~~Weekly Readings~~

BARR

## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 9/30/16 Project manager notified prior to site visit. Y / N
Barr Technician: SDF Project manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 4 | 0 | 7 | 4 | 2 | 0 | 0 | 42 | 42 | |
| U1A | [redacted] | | | | | | | 0 | 0 | 0 -> 10 | Used as needed oFF |
| U2A | [redacted] | 5 | 8 | 7 | 1 | 2 | 5 | 0 | 22.5 | 22 | |
| W253 | [redacted] | 4 | 0 | 1 | 0 | 0 | 7 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | [redacted] | 3 | 7 | 4 | 5 | 9 | 2 | 0 | 1 | 4 | |
| U4 | [redacted] | 6 | 7 | 5 | 6 | 4 | 0 | 0 | 18 | 16 | |
| U8 / U1 | [redacted] | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | [redacted] | 2 | 5 | 7 | 1 | 7 | 5 | 0 | 7 | 0 -> 5 | Check [✓ On] / Off schedule |
| U6 | [redacted] | 0 | 5 | 8 | 4 | 7 | 9 | 0 | 15.5 | 15 | |
| U7 | [redacted] | 5 | 0 | 6 | 0 | 4 | 4 | 0 | 20 | 18 | |
| U11 | [redacted] | 8 | 0 | 9 | 0 | 3 | 0 | 0 | 22 | 22 | |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? Y / N

Has there been any evidence of trespassing? Y / N

Any areas of concern with the West Area, or fence? Y / N (Sketch Below)

Air compressor tank pressure ________(psi)

Vault copper lines inspection. Pass / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/N Discolored wires? Y/N

Notes:
W253 WL Below 60' 0900 [✓ ON]/OFF 14.04 1000 ON/[✓ OFF]
W255 WL 15.78 ↓ ON/[✓ OFF] Below 59' ↓ [✓ ON]/OFF

W300SPN WL - 18.13
W328 WL - 12.50

W251 TD = 83 VAULT MANHOLE TD 7.70
WL - 13.55 DNAPL —
DNAPL - 79.70 Water Depth - 6.10

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

---

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

---

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

☐ Daily "Tool-Box" Safety Meeting Time: ____________ Conducted by:________

Topic: ______________________________

______________________________

Attended: ______________________________

______________________________

☐ Instrument Calibration

Instrument __________ Instrument __________ Instrument __________

Time ______________ Time ______________ Time ______________

☐ Calibration Check ☐ Calibration Check ☐ Calibration Check

☐ Battery Check ☐ Battery Check ☐ Battery Check

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.):

NOV.

MONTHLY

~~Weekly Readings~~

BARR

## Former Joslyn Manufacturing Site
## Brooklyn Center, Minnesota

Date: 11/8/16 Project manager notified prior to site visit. Y / N
Barr Technician: SDF Project manager notified before leaving site. Y / N
JLB3 : 952-832-2700 or JLB3@barr.com

| Recovery Well | Meter Readings (Gal.) | | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments: meter ticks, max flow = below optimal, |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 6 | 6 | 0 | 5 | 7 | 3 | 0 | 0 | 38 | 42 | |
| U1A | | — | | | | | | 0 | 0 | 0 -> 10 | Used as needed OFF |
| U2A | | 7 | 0 | 8 | 8 | 2 | 0 | 0 | 22 | 22 | |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 0 -> 5 | Check On / [✓ Off] schedule |
| U5 | | 3 | 8 | 0 | 2 | 1 | 3 | 0 | 1 | 4 | |
| U4 | | 7 | 7 | 6 | 3 | 5 | 8 | 0 | 16 | 16 | |
| U8 / U1 | | 0 | 9 | 7 | 2 | 5 | 0 | 0 | 0.0 | 0 | Off |
| W255 | | 2 | 8 | 7 | 3 | 8 | 5 | 0 | 6 | 0 -> 5 | Check On / Off schedule |
| U6 | | 1 | 4 | 5 | 5 | 0 | 8 | 0 | 15 | 15 | |
| U7 | | 6 | 1 | 2 | 4 | 1 | 4 | 0 | 19 | 18 | |
| U11 | | 9 | 2 | 8 | 8 | 7 | 8 | 0 | 24 | 22 | |
| | | | | | | | | Total | | 144 | |

### On / Off Schedule

| | 2016 | |
|---|---|---|
| | W253 | W255 |
| January | * | On |
| February | * | On |
| March | On | * |
| April | * | On |
| May | * | On |
| June | * | On |
| July | * | On |
| August | * | On |
| September | On | * |
| October | * | On |
| November | * | On |
| December | * | On |

### Additional Maintenance Items

Is the west area fence secure? Y / N

Has there been any evidence of trespassing? Y / N

Any areas of concern with the West Area, or fence? Y / N (Sketch Below)

Air compressor tank pressure ________(psi)

Vault copper lines inspection. Pass / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/N Discolored wires? Y/N

FLOW READINGS COLLECTED BY PWS.

Notes:
W253 - 15.70 off
W255 - Below 59' on

W300SPN - 18.70
W328 - 13.11
VAULT MANHOLE TD. 7.70
W251 - TD. 83
WL - 14.25
DNAPL - 79.72
DNAPL - —
WATER - 6.20

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

# Work Area Quarterly Safety Record
# Former Joslyn Manufacturing Site

DATE: ____________________ PHSTL: ____________________

---

## Safety Record for Quarterly Pigging Events and Site Air Monitoring

| | WORK LOCATION | | | |
|---|---|---|---|---|
| Location Identifier | | | | |
| Time Interval at Location | | | | |
| Typical Combustible Gas Monitoring Readout (% LEL, %$O_2$, CO, $H_2S$) | | | | |
| Organic Vapor Readout (ppm) | | | | |
| Level of PPE worn (circle all that apply) | D Modified D C | D Modified D C | D Modified D C | D Modified D C |

---

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: __________ Conducted by: ________

☐ Daily "Tool-Box" Safety Meeting

Topic: ____________________________________________

____________________________________________

____________________________________________

Attended: ____________________________________________

☐ Instrument Calibration

| | | |
|---|---|---|
| Instrument _________ | Instrument _________ | Instrument _________ |
| Time _____________ | Time _____________ | Time _____________ |
| ☐ Calibration Check | ☐ Calibration Check | ☐ Calibration Check |
| ☐ Battery Check | ☐ Battery Check | ☐ Battery Check |

Comments (Sketch of Areas of Concern, Field Deviations, Incidents, Visitors On Site, Etc.): ____________________________________________

____________________________________________

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DEC.

BARR

# Monthly Readings
# Former Joslyn Manufacturing Site
# Brooklyn Center, Minnesota

Date: 12/1/16
Technician: SDI
Quarter 1st 2nd 3rd [✓ 4th]

| Recovery Well | Meter Readings (Gal.) | | | | | | | Actual Flow Rate GPM | Design Flow Rate GPM | Comments | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U12 | 10 | 7 | 0 | 9 | 9 | 1 | 0 | 0 | 33 | 42 | | |
| U1A | | — | — | — | — | — | — | 0 | 0 | 0 -> 10 | | oFF |
| U2A | | 7 | 7 | 8 | 5 | 8 | 2 | 0 | 21 | 22 | | |
| W253 | | 4 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 0 -> 5 | | off |
| U5 | | 3 | 8 | 3 | 4 | 7 | 3 | 0 | 1 | 6 | | |
| U4 | | 8 | 3 | 3 | 1 | 9 | 0 | 0 | 17 | 16 | | |
| U8 / U1 | | — | — | — | — | — | — | 0 | 0 | 0 | | oFF |
| W255 | | 3 | 0 | 9 | 2 | 0 | 5 | 0 | 6.5 | 0 -> 5 | | |
| U6 | | 1 | 9 | 8 | 1 | 5 | 5 | 0 | 16 | 15 | | |
| U7 | | 6 | 7 | 4 | 7 | 4 | 9 | 0 | 19 | 18 | | |
| U11 | | 9 | 9 | 1 | 7 | 7 | 7 | 0 | 6 | 22 | | off |
| | | | | | Total | | | | | **146** | | |

## Product / Water Levels:

| | | | | Time | | | Time |
|---|---|---|---|---|---|---|---|
| W 253 | Water Level | 15.45 | On/[✓ Off] | | Water Level | On/Off | |
| W 255 | Water Level | Below 59' | [✓ On]/Off | | Water Level | On/Off | |

W 300spn Water Level 18.40
W 328 Water Level 12.81

Tank Effluent Sample Y [✓ N] pH ____ Temp ____ Cond ____ D.O. ____ EH ____

## DNAPL System Monitoring

| DNAPL Tank Manhole | W251 | Vault Manhole |
|---|---|---|
| Total Depth 6.60 feet | Total depth = 83 feet | Total depth = 7.70 |
| Water = – | Water Level 13.97 | DNAPL = – |
| Oil = – | DNAPL = 79.73 | Water depth= 6.20 |

Is the float operating Y / N Does the float indicate water present between tanks Y / N
Is caulking on the vault in good condition Y / N

## West Area Inspection

Is the west area fence secure Y / N Has there been any evidence of trespassing Y / N
Sketch on Back any areas of concern with the West Area, or fence

Other issues:

# Quarterly Sampling and Water Levels

Joslyn 1st QTR.
Field data.

# WATER LEVEL SUMMARY

Project: JOSLYN

Project Number: 2327110

Date: 2/5/16

Environmental Technician: SDI

| Monitoring Location | Measuring point elevation | Water level depth | Total well depth | Static water elevation | Comments |
|---|---|---|---|---|---|
| SIA | | 21.95 | | | |
| W6N | | 17.65 | | | |
| W7 | | 14.52 | | | |
| W101 | | 4.60 | | | |
| W104 | | 9.31 | | | |
| W129 | | 5.53 | | | |
| W130 | | 19.22 | | | |
| W132 | | 18.70 | | | |
| U1 | | 16.50 | | | |
| TWIN LK. | | 18.50 | - TOP | OF ICE. | |
| OIL WATER | SEPARATOR | LNAPL | CHECK – | NONE | |
| | | | | | |
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# Barr Engineering Company
## Field Log Data Sheet

Client: Joslyn

Monitoring Point: u1

Location:

Date: 2/4/16

Project #: 2327110

Sample Time: 1010

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | N | | | | | | | |
| Casing diameter: | 8 | Time/ Volume | Temp.ºC | Cond. @ 25 | pH | Eh | D.O. | Turbidity Appearance |
| Total well depth:* | 33.8 | 0942 | 11.51 | 1037 | 7.00 | 141.2 | .51 | – |
| Static water level:* | 16.50 | 0954 | 11.55 | 1044 | 6.97 | 137.3 | .57 | – |
| Water depth:* | 17.3 | 1006 | 11.57 | 1047 | 6.97 | 134.9 | .60 | 4.15 |
| Well volume: (gal) | 45 | | | | | | | |
| Purge method: | 1.5 sub (c) | | | | | | | |
| Sample method: | Grab | | | | | | | |

| | | |
|---|---|---|
| Start time: | 0930 | Odor: YES |
| Stop time: | 1006 | Purge Appearance: cloudy → clear |
| Duration (minutes): | 36 | Sample Appearance: Clear |
| Rate, gpm: | 4 | Comments: |
| Volume, purged: | 144 gal. | |
| Duplicate collected? | - | |
| Sample collection by: | SDI | CO2- Mn2- Fe(T)- Fe2- |

Others present: -

**WELL INSPECTION** (answer each category, state if lock replaced, detail any repairs needed on back of form, and notify project manager of any deficiencies)

CASING & CAP: COLLAR: LOCK: PLUG:

FLOOD PROTECTION: MDH WELL TAG: OTHER:

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- nutrient- cyanide- DRO- Sulfide-

oil,grease- bacteria- total metal- filtered metal- methane- filter-

Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated

# Barr Engineering Company
# Field Log Data Sheet

Client: ~~BARR~~ JOSLYN
Monitoring Point: TANK EFF.
Location:
Date: 2/4/16
Project #: 23 27110
Sample Time: 1100

## GENERAL DATA

Barr lock:
Casing diameter:
Total well depth:*
Static water level:*
Water depth:*
Well volume: (gal)
Purge method: DED.
Sample method: Grab
Start time:
Stop time:
Duration (minutes):
Rate, gpm:
Volume, purged:
Duplicate collected?
Sample collection by: SDI

## STABILIZATION TEST

| Time/ Volume | Temp.°C | Cond. @ 25 | pH | Eh | D.O. | Turbidity Appearance |
|---|---|---|---|---|---|---|
| | 10.07 | 737 | 7.21 | -81.7 | 2.11 | 1.11 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Odor: YES
Purge Appearance:
Sample Appearance: CLEAR
Comments:

CO2- Mn2- Fe(T)- Fe2-

Others present:

**WELL INSPECTION** (answer each category, state if lock replaced, detail any repairs needed on back of form, and notify project manager of any deficiencies)

CASING & CAP: COLLAR: LOCK: PLUG:
FLOOD PROTECTION: MDH WELL TAG: OTHER:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 4 general- 1 nutrient- 1 cyanide- DRO- Sulfide-
oil,grease- 1 bacteria- total metal- filtered metal- methane- filter-
Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MI ☒ MN ☐ MO ☐ ND ☐ SD ☐ WI
Other:

COC Number: № 49060
COC 1 of 1

| REPORT TO | |
|---|---|
| Company: | Barr Eng. |
| Address: | |
| Name: | TAO |
| email: | |
| Copy to: datamgt@barr.com | |
| Project Name: | JOSLYN |

| INVOICE TO | |
|---|---|
| Company: | Barr Eng. |
| Address: | |
| Name: | |
| email: | |
| P.O. | |
| Barr Project No: | 23271102016270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| Location | Sample Depth Start | Sample Depth Stop | Sample Depth Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Water: SVOC | Water: SVOC | Water: DIOXIN | Water: GENERAL | Water: COD | Water: O&G | Soil | Soil | Soil | Soil | Soil | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | A | A | A | A | D | B | | | | | | | Preservative Code |
| | | | | | | | | | N | N | N | N | N | N | | | | | | | Field Filtered Y/N |
| 1. U1 | | | | 2/4/2016 | 1010 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. TANK EFF. | | | | ↓ | 1100 | GW | | | | 2 | 2 | 1 | 1 | 1 | | | | | | | TABLE 3-4 |
| 3. | | | | | | | | | | | | | | | | | | | | | |
| 4. | | | | | | | | | | | | | | | | | | | | | |
| 5. | | | | | | | | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**BARR USE ONLY**
Sampled by: SDI
Barr Proj. Manager: JLB2
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: KELSO

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| STEVE IWER | [✓ Y] N | 2/4/16 | 1200 | | | |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:

Air Bill Number:

Lab WO:

Temperature on Receipt (°C):

Custody Seal Intact? ☐ Y ☐ N ☐ None

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush (mm/dd/yyyy)

**Distribution - White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

H:RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

## Table 3-4

## MCES Effluent Monitoring Parameters

### Semivolatile Organic Compounds

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Pentachlorophenol
Phenanthrene
Pyrene
2,3,7,8-TCDD

### General Chemistry

Chemical Oxygen Demand
Oil and Grease
Total suspended Solids
pH

Note:

Analysis of 2,3,7,8-tetrachlorodibenzo-p-dioxin is required only once during the three year effective period of MCES Industrial Discharge Permit (Special Discharges) Number 2013: November 1, 2009, through October 31, 2012. Analysis was completed on the effluent sample collected in March 2010 and is not required at this time.

f

## Table 3-13

## Groundwater Monitoring Parameters

### PAH Compounds

**Carcinogenic PAHs**

Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3,cd)pyrene
Benzo(k)fluoranthene
Dibenzo(ah)anthracene
Benzo(j)fluoranthene*

**Noncarcinogenic PAHs**

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)perylene
Fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

### Phenolic Compounds

Pentachlorophenol

---

*Cannot be quantified with GC/MS analytical procedure.

## Steve Iverson

**From:** Terri A. Olson
**Sent:** Monday, December 28, 2015 10:03 AM
**To:** Steve Iverson
**Cc:** Jennifer L. Brekken
**Subject:** Re: Joslyn Q1 2016 sampling

Hi Steve,

Just a reminder that 2,3,7,8-TCDD needs to be sampled in the first quarter of 2016 for Joslyn and that the effluent sampling needs to be done by early March so we have time for reporting, which is due April 30.

Thank-you!

Terri A. Olson

Senior Data Quality Specialist
Minneapolis, MN office: 952.842.3578
TOlson@barr.com
www.barr.com

resourceful. naturally. BARR

# BARR ENGINEERING COMPANY
# METER CALIBRATION SUMMARY

PROJECT Joslyn

TECHNICIAN SDI

WEATHER CONDITIONS

| Date | Wind Direction | Wind Speed | Temperature F | Cloud Cover | Comments |
|---|---|---|---|---|---|
| 2/4/16 | SE | 0-5 | 20 | CLOUDY | |
| | | | | | |
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| Meter type and number | Date | Time | Temperature C | Standard Solution | pH Meter Reading | Cond. Cell Result | ORP Reading | DO |
|---|---|---|---|---|---|---|---|---|
| MPS | 2/4/16 | 0800 | 16 | 7/10 | 7.00/10.00 | 1409 | 245 | ok |
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| | | | | | | | | |
| 231+.-10mV @ 25C | | | | | | | | |

231mV = Display Value + [(Display Temp. - 25 C) x (1.3 mV)]

Calib.wb2

# WATER LEVEL SUMMARY

Project: JOSLYN

Project Number: 2327110

Environmental Technician: SDI

Date: 6/30/16

| Monitoring Location | Measuring point elevation | Water level depth | Total well depth | Static water elevation | Comments |
|---|---|---|---|---|---|
| S1A | 21.83 | | | | |
| W6N | 17.37 | | | | |
| W7 | 14.40 | | | | |
| W101 | 5.25 | | | | |
| W104 | 9.73 | | | | |
| W129 | 6.45 | | | | |
| W130 | 19.00 | | | | |
| U1 | 16.90 | | | | |
| W132 | 18.41 | | | | |
| TWIN LK. | 18.62 | | | | |
| OIL/WATER | TANK | — NO | LNAPL | | |
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# Barr Engineering Company
# Field Log Data Sheet

**Client:** JOSLYN

**Location:**

**Project #:** 2327110

**Monitoring Point:** 41

**Date:** 6/30/16

**Sample Time:** 0905

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | N | | | | | | | |
| Casing diameter: | 8 | Time/ Volume | Temp.°C | Cond. @ 25 | pH | Eh | D.O. | Turbidity Appearance |
| Total well depth:* | 33.8 | 0841 | 12.74 | 1139 | 7.56 | -107.1 | .62 | — |
| Static water level:* | 16.90 | 0852 | 12.70 | 1130 | 7.54 | -104.3 | .60 | — |
| Water depth:* | 16.9 | 0903 | 12.67 | 1127 | 7.53 | -101.2 | .59 | 4.00 |
| Well volume: (gal) | 44 | | | | | | | |
| Purge method: | 1.5 SUB. | | | | | | | |
| Sample method: | Grab | | | | | | | |

| | | |
|---|---|---|
| Start time: | 0830 | Odor: YES |
| Stop time: | 0903 | Purge Appearance: CLEAR |
| Duration (minutes): | 33 | Sample Appearance: CLEAR |
| Rate, gpm: | 4 | Comments: |
| Volume, purged: | 132 gal. | |
| Duplicate collected? | — | |
| Sample collection by: | SDI | CO2- Mn2- Fe(T)- Fe2- |

Others present:

**WELL INSPECTION** (answer each category, state if lock replaced, detail any repairs needed on back of form, and notify project manager of any deficiencies)

CASING & CAP: COLLAR: LOCK: PLUG:

FLOOD PROTECTION: MDH WELL TAG: OTHER:

[✓ GW:] groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 4 general- nutrient- cyanide- DRO- Sulfide-

oil,grease- bacteria- total metal- filtered metal- methane- filter-

Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated

# Barr Engineering Company
# Field Log Data Sheet

**Client:** Joslyn

**Location:**

**Project #:**

**Monitoring Point:** W6N

**Date:** 6-30-16

**Sample Time:** 0940

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bail lock: | Y | | | | | | | |
| Casing diameter: | 2 | Time/ Volume | Temp.°C | Cond. @ 25 | pH | Eh | D.O. | Turbidity Appearance |
| Total well depth:* | 22.0 | 3 gal. | 10.31 | 976 | 7.54 | -75.5 | 2.05 | — |
| Static water level:* | 17.37 | 4 | 10.29 | 973 | 7.53 | -73.0 | 2.03 | — |
| Water depth:* | 4.7 | 5 | 10.29 | 971 | 7.51 | -74.1 | 2.01 | 1.71 |
| Well volume: (gal) | 1 | | | | | | | |
| Purge method: | 1.5 Sub | | | | | | | |
| Sample method: | Grab | | | | | | | |

Start time: —

Stop time: —

Duration (minutes): —

Rate, gpm: —

Volume, purged: 5 gal

Duplicate collected?

Sample collection by: SDI

Odor: NA

Purge Appearance: CLEAR

Sample Appearance: CLEAR

Comments:

CO2-  Mn2-  Fe(T)-  Fe2-

Others present:

**WELL INSPECTION** (answer each category, state if lock replaced, detail any repairs needed on back of form, and notify project manager of any deficiencies)

CASING & CAP:  COLLAR:  LOCK:  PLUG:

FLOOD PROTECTION:  MDH WELL TAG:  OTHER:

[✓ GW: groundwater monitoring well]  WS: water supply well  SW: surface water  SE: sediment  other:

VOC-  semi-volatile- 2  general-  nutrient-  cyanide-  DRO-  Sulfide-

oil,grease-  bacteria-  total metal-  filtered metal-  methane-  filter-

Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated

BARR

# Barr Engineering Company
# Field Log Data Sheet

**Client:** Joslyn

**Location:**

**Project #:** 2327110

**Monitoring Point:** W7

**Date:** 6/30/16

**Sample Time:** 1005

## GENERAL DATA

| | |
|---|---|
| Barr lock: | y |
| Casing diameter: | 2 |
| Total well depth:* | 25.0 |
| Static water level:* | 14.40 |
| Water depth:* | 10.6 |
| Well volume: (gal) | 2 |
| Purge method: | Peristic. |
| Sample method: | Grab |
| Start time: | - |
| Stop time: | - |
| Duration: (minutes) | - |
| Rate, gpm: | - |
| Volume, purged: | 10 gl. |
| Duplicate collected? | - |
| Sample collection by: | SDI |

## STABILIZATION TEST

| Time/ Volume | Temp. °C | Cond. @ 25 | pH | Eh | D.O. | Turbidity Appearance |
|---|---|---|---|---|---|---|
| 6 gl. | 10.03 | 1053 | 7.02 | -90.1 | .57 | - |
| 8 | 10.01 | 1050 | 7.07 | -92.5 | .54 | - |
| 10 | 10.00 | 1047 | 7.08 | -93.7 | .53 | 3.71 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Odor:** YES

**Purge Appearance:** Cloudy → clear

**Sample Appearance:** clear

**Comments:**

CO2- Mn2- Fe(T)- Fe2-

**Others present:** -

WELL INSPECTION (answer for each category, state if lock replaced, detail any repairs needed on back of form)

CASING & CAP: COLLAR: LOCK: OTHER:

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- nutrient- cyanide- DRO- Sulfide-

oil,grease- bacteria- total metal- filtered metal- methane- filter-

Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

**Client:** Josly
**Monitoring Point:** Tank EFF.
**Location:**
**Date:** 6-30-16
**Project #:**
**Sample Time:** 1035

## GENERAL DATA

Barr lock:
Casing diameter:
Total well depth:*
Static water level:*
Water depth:*
Well volume: (gal)
Purge method: DED.
Sample method: Grab
Start time:
Stop time:
Duration (minutes):
Rate, gpm:
Volume, purged:
Duplicate collected?
Sample collection by:
Others present:

## STABILIZATION TEST

| Time/ Volume | Temp. °C | Cond. @ 25 | pH | Eh | D.O. | Turbidity Appearance |
|---|---|---|---|---|---|---|
|  | 10.97 | 811 | 7.11 | -57.4 | 2.14 | 2.39 |
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Odor: YES
Purge Appearance: CLEAR
Sample Appearance: CLEAR
Comments:

CO2- Mn2- Fe(T)- Fe2-

**WELL INSPECTION** (answer each category, state if lock replaced, detail any repairs needed on back of form, and notify project manager of any deficiencies)

CASING & CAP: COLLAR: LOCK: PLUG:
FLOOD PROTECTION: MDH WELL TAG: OTHER:

[✓ GW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- 1 nutrient- 1 cyanide- DRO- Sulfide-

oil,grease- 1 bacteria- total metal- filtered metal- methane- filter-

Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

**Sample Origination State:** ☐ KS ☐ MI ☒ MN ☐ MO ☐ ND ☐ SD ☐ WI Other:

COC Number: NO 49047

COC ____ of ____

| REPORT TO | | INVOICE TO | |
|---|---|---|---|
| Company: | Barr Eng. | Company: | Barr Eng. |
| Address: | | Address: | |
| Name: | | Name: | |
| email: | | email: | |
| Copy to: datamgt@barr.com | | P.O. | |
| Project Name: | JOSLYN | Barr Project No: | 23270110 2016 270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| Location | Sample Depth Start | Sample Depth Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested – Water: SVOC | GENERAL | NUTRIENTS | OIL & G | | | Soil | | | | | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Preservative Code | A | A | D | B | | | | | | | | | |
| | | | | | | | | Field Filtered Y/N | N | N | N | N | | | | | | | | | |
| 1. UI | / | / | / | 6/30/2016 | 0905 | GW | | | 4 | | | | | | | | | | | | TABLE 3-13 |
| 2. W6N | / | / | / | | 0940 | | | | 2 | | | | | | | | | | | | |
| 3. W7 | / | / | / | | 1005 | | | | 2 | | | | | | | | | | | | |
| 4. TANK EFF. | / | | / | | 1035 | | | | 2 | 1 | 1 | 1 | | | | | | | | | 3-4 |
| 5. | | | | | | | | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | |
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| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**BARR USE ONLY**

| | |
|---|---|
| Sampled by: | SDI |
| Barr Proj. Manager: | JLB III |
| Barr DQ Manager: | TAO |
| Lab Name: | CAS |
| Lab Location: | KELSO, WA |

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| STEVE IJE | [✓ Y] N | 6/30/16 | 1500 | | | |
| | Y N | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other: ____

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ____ (mm/dd/yyyy)

Lab WO:

Temperature on Receipt (°C):

Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

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# WATER LEVEL SUMMARY

Project: JOSLYN

Project Number: 2327110

Environmental Technician: SDI

Date: 9/12/16

| Monitoring Location | Measuring point elevation | Water level depth | Total well depth | Static water elevation | Comments |
|---|---|---|---|---|---|
| S1A | | 21.20 | | | |
| W6N | | 16.17 | | | |
| W7 | | 13.30 | | | |
| W101 | | 4.63 | | | |
| W104 | | 8.99 | | | |
| W129 | | 4.32 | | | |
| W130 | | 17.80 | | | |
| W132 | | 17.32 | | | |
| U1 | | 15.50 | | | |
| TWIN LK. | | 18.20 | | | |
| OIL/WATER SEP. | | NONE | | | LAMPL CHECK |
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# Barr Engineering Company
# Field Log Data Sheet

| | |
|---|---|
| Client: Joslyn | Monitoring Point: u1 |
| Location: | Date: 9/12/16 |
| Project #: 2327110 | Sample Time: 0900 |

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | N | Time/ Volume | Temp.ºC | Cond. @ 25 | pH | Eh | D.O. | Turbidity Appearance |
| Casing diameter: | 8 | | | | | | | |
| Total well depth:* | 33.8 | 0836 | 13.41 | 1300 | 7.46 | -138.4 | .97 | – |
| Static water level:* | 15.50 | 0848 | 13.37 | 1299 | 7.41 | -135.1 | 1.01 | – |
| Water depth:* | 18.3 | 0900 | 13.36 | 1295 | 7.40 | -133.4 | 1.07 | 6.39 |
| Well volume: (gal) | 47 | | | | | | | |
| Purge method: | ES (c) | | | | | | | |
| Sample method: | Grab | | | | | | | |

| | | |
|---|---|---|
| Start time: | 0824 | Odor: NA |
| Stop time: | 0900 | Purge Appearance: Cloudy → clear |
| Duration (minutes): | 36 | Sample Appearance: clear |
| Rate, gpm: | 4 | Comments: |
| Volume, purged: | 144 | |
| Duplicate collected? | – | |
| Sample collection by: | SDI | CO2- Mn2- Fe(T)- Fe2- |
| Others present: | – | |

**WELL INSPECTION** (answer each category, state if lock replaced, detail any repairs needed on back of form, and notify project manager of any deficiencies)

CASING & CAP: COLLAR: LOCK: PLUG:

FLOOD PROTECTION: MDH WELL TAG: OTHER:

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- nutrient- cyanide- DRO- Sulfide-

oil,grease- bacteria- total metal- filtered metal- methane- filter-

Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated

BARR

# Barr Engineering Company
# Field Log Data Sheet

| | |
|---|---|
| Client: JosLyn | Monitoring Point: TANK EFF. |
| Location: | Date: 9/12/16 |
| Project #: 2327110 | Sample Time: 1000 |

## GENERAL DATA

| | |
|---|---|
| Barr lock: | |
| Casing diameter: | |
| Total well depth:* | |
| Static water level:* | |
| Water depth:* | |
| Well volume: (gal) | |
| Purge method: | DED |
| Sample method: | GRAB |
| Start time: | |
| Stop time: | |
| Duration (minutes): | |
| Rate, gpm: | |
| Volume, purged: | |
| Duplicate collected? | |
| Sample collection by: | SDI |

## STABILIZATION TEST

| Time/ Volume | Temp.°C | Cond. @ 25 | pH | Eh | D.O. | Turbidity Appearance |
|---|---|---|---|---|---|---|
| - | 10.00 | 337 | 6.90 | -61.3 | 2.57 | 2.00 |
| | | | | | | |
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| | | | | | | |

Odor: YES

Purge Appearance:

Sample Appearance: CLEAR

Comments:

CO2- Mn2- Fe(T)- Fe2-

Others present:

**WELL INSPECTION** (answer each category, state if lock replaced, detail any repairs needed on back of form, and notify project manager of any deficiencies)

CASING & CAP: COLLAR: LOCK: PLUG:

FLOOD PROTECTION: MDH WELL TAG: OTHER: PUMP OUT SYSTEM

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment [✓ other:]

VOC- semi-volatile- 2 general- 1 nutrient- 1 cyanide- DRO- Sulfide-

oil,grease- 1 bacteria- total metal- filtered metal- methane- filter-

Others:

*Measurements are referenced from top of riser pipe, unless otherwise indicated

# Barr Engineering Co. Chain of Custody

☐ Ann Arbor
☐ Bismarck
☐ Duluth
☐ Hibbing
☐ Jefferson City
☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☒ MN ☐ SD

COC Number: 51152
COC 1 of 1

| **REPORT TO** | **INVOICE TO** |
|---|---|
| Company: Barr Eng. | Company: Barr Eng. |
| Address: | Address: |
| Name: | Name: |
| email: | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: JOSLYN | Barr Project No: 23270 1102016 270 |

| Location | Sample Depth | | | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Start | Stop | Unit (m./ft. or in.) | | | | | | Water | | | | | | Soil | | | | | | |
| | | | | | | | | | PAH | O&G | GEN. | COD | | | | | | | | % Solids | |
| | | | | | | | | | A | B | A | D | | | | | | | | | Preservative Code |
| | | | | | | | | | N | N | N | N | | | | | | | | | Field Filtered Y/N |
| 1. U1 | | | | 9/12/2016 | 0900 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. TANK EFF | | | | ↓ | 1000 | ↓ | | | 2 | 1 | 1 | 1 | | | | | | | | | 3-4 |
| 3. | | | | | | | | | | | | | | | | | | | | | |
| 4. | | | | | | | | | | | | | | | | | | | | | |
| 5. | | | | | | | | | | | | | | | | | | | | | |
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| 7. | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

**BARR USE ONLY**
Sampled by: SDF
Barr Proj. Manager: JLBII
Barr DQ Manager: TAD
Lab Name: CAS
Lab Location: KELSO, WA

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve F | [✓ Y] N | 9/12/16 | 1100 | | | |

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| | Y N | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other: ____

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ____ (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution - White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

H:RLGSTDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

# WATER LEVEL SUMMARY

Project: Joslyn

Project Number: 232716

Date: 10/10/16

Environmental Technician: SDI

| Monitoring Location | Measuring point elevation | Water level depth | Total well depth | Static water elevation | Comments |
|---|---|---|---|---|---|
| S1A | | 21.11 | | | |
| W2N | | 11.00 | | | |
| W6N | | 16.11 | | | |
| W7 | | 13.21 | | | |
| W10 | | 28.27 | | | |
| W101 | | 4.57 | | | |
| W104 | | 8.90 | | | |
| W125N | | 17.25 | | | |
| W126 | | 9.57 | | | |
| W127N | | 15.50 | | | |
| W129 | | 4.20 | | | |
| W130 | | 17.72 | | | |
| W132 | | 17.21 | | | |
| U1 | | 15.40 | | | |
| U1A | | 20.00 | | | |
| U2A | | 32.60 | | | |
| U4N | | 23.61 | | | |
| U5 | PROD= 23.40<br>OIL | 23.44 | | | |
| U6N | | 24.25 | | | |
| U7N | | 12.05 | | | |
| U8 | | 14.45 | | | |
| U11 | | 23.00 | | | |
| U12 | | 26.30 | | | |
| W201 | | 4.57 | | | |
| S2 | | 20.78 | | | |
| W252N | | 14.10 | | | |
| W253 | | ~~13.90~~ | 13.90 | | |
| W254 | | 20.04 | | | |

# WATER LEVEL SUMMARY

Project: Joslyn

Project Number: 232710

Date: 10/10/16

Environmental Technician: SDI

| Monitoring Location | Measuring point elevation | Water level depth | Total well depth | Static water elevation | Comments |
|---|---|---|---|---|---|
| W255 | | Below 59' | | | |
| W 300 SPN | | 18,35 | | | |
| W 328 | | 12.80 | | | |
| S3 | | 26.60 | | | |
| W251 | | 13,50 | | | |
| TWIN LK. | | 18.15 | | | |
| OIL/WATER SEPERATOR | | LNAPL = | 0 | | |
| W301 | | 4,60 | | | |
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10/11/16

JOSLYN PUMP OUT WELLS SDI

| Location | Date | Water Level TIME | Temp (°C) | Conductivity (25 °C) | pH | Eh | D.O. | Turbidity (ntu) |
|---|---|---|---|---|---|---|---|---|
| U12 | 10/11/16 | 0900 | 9.17 | 837 | 7.11 | -49.7 | 2.15 | .90 |
| U2A | | 0910 | 9.20 | 900 | 6.87 | -51.7 | 1.11 | 2.00 |
| W253 | | 0920 | 9.00 | 617 | 7.01 | -34.3 | 1.27 | 5.44 |
| U5 | | 0930 | 9.12 | 751 | 6.95 | -29.4 | 1.39 | 1.00 |
| U4N | | 0940 | 8.91 | 890 | 6.39 | -31.7 | 1.29 | 2.51 |
| W255 | | 0950 | 9.03 | 683 | 7.07 | -60.1 | 1.00 | .87 |
| U6N | | 1000 | 9.21 | 741 | 6.89 | -39.4 | 1.37 | .99 |
| U7N | | 1010 | 9.14 | 645 | 6.97 | -51.4 | 1.39 | .76 |
| M-1 U11 | | 1020 | 9.03 | 900 | 6.47 | -47.1 | 1.42 | 2.17 |
| TANK OFF | | 1050 | 9.37 | 800 | 6.77 | -59.4 | 3.00 | 1.37 |
| | | | | | | | | |
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# Barr Engineering Company
# Field Log Data Sheet

| | |
|---|---|
| Client: JOSLYN | Station: S3 |
| Location: | Date: 10/13/16 |
| Project #: 2327110 | Sample time: 0915 |

GENERAL DATA

| | |
|---|---|
| Barr lock: | Y |
| Casing diameter: | 2 |
| Total well depth:* | 144.6 |
| Static water level:* | 26.60 |
| Water depth:* | 118 |
| Well volume: (gal) | 20 |
| Purge method: | 1.5 sub(2) |
| Sample method: | Bai— |
| Start time: | 0830 |
| Stop time: | 0912 |
| Duration: (minutes) | 42 |
| Rate, gpm: | 1.5 |
| Volume purged: | 63 |
| Duplicate collected? | – |
| Sample collection by: | SDI |

STABILIZATION TEST

| Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
|---|---|---|---|---|---|---|
| 0844 | 11.36 | 457 | 8.26 | -122.4 | 1.45 | – |
| 0858 | 11.34 | 455 | 8.20 | -124.0 | 1.40 | – |
| 0912 | 11.33 | 450 | 8.19 | -125.6 | 1.37 | 39.7 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Odor: NA

Purge Appearance: CLOUDY → CLEAR

Sample Appearance: CLEAR

Comments:
WELL DRAWS DOWN.

Others present: –

Well condition: OK

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- 2 semi-volatile- general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

Client: JosLyn
Station: 51A
Location:
Date: 10/13/16
Project #: 23270110
Sample time: 0940

## GENERAL DATA

|  |  |
|---|---|
| Barr lock: | Y |
| Casing diameter: | 2 |
| Total well depth:* | 32.8 |
| Static water level:* | 21.11 |
| Water depth:* | 11.7 |
| Well volume: (gal) | 2 |
| Purge method: | 1.5 SUB. |
| Sample method: | Bailer |
| Start time: | 0925 |
| Stop time: | 0935 |
| Duration: (minutes) | 10 |
| Rate, gpm: | 1.5 |
| Volume purged: | 15gl |
| Duplicate collected? | – |
| Sample collection by: | SDI |

## STABILIZATION TEST

| Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
|---|---|---|---|---|---|---|
| 0931 | 12.97 | 1157 | 7.42 | -152.9 | 2.33 | – |
| 0933 | 12.95 | 1155 | 7.40 | -150.3 | 2.27 | – |
| 0935 | 12.95 | 1153 | 7.39 | -149.2 | 2.25 | 25.5 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Odor: NA
Purge Appearance: CLOUDY RED → CLEAR
Sample Appearance: CLEAR
Comments:

Others present: –
Well condition: OK

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- 2 semi-volatile- general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
## Field Log Data Sheet

Client: JOSLYN

Station: S2

Location:

Date: 10/13/16

Project #: 2327110

Sample time: 1005

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | N | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 2 | | | | | | | |
| Total well depth:* | 37.6 | 0956 | 12.83 | 1110 | 7.28 | -148.6 | 1.84 | — |
| Static water level:* | 20.78 | 0958 | 12.80 | 1100 | 7.20 | -140.1 | 1.80 | — |
| Water depth:* | 16.9 | 1000 | 12.79 | 1097 | 7.19 | -139.7 | 1.77 | — |
| Well volume: (gal) | 3 | 1002 | 12.78 | 1093 | 7.19 | -137.0 | 1.75 | 5.05 |
| Purge method: | 1.5 SUB. | | | | | | | |
| Sample method: | Bailer | | | | | | | |

Start time: 0950

Odor: NA

Stop time: 1002

Purge Appearance: DARK GREY → CLEAR

Duration: (minutes) 12

Sample Appearance: CLEAR

Rate, gpm: 1.5

Comments:

Volume purged: 18 gal.

Duplicate collected? —

Sample collection by: SDJ

Others present: —

Well condition: OK

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- 2 semi-volatile- general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

Client: Joslyn
Station: W132
Location:
Date: 10/14/16
Project #: 2327110
Sample time: 1030

## GENERAL DATA

Barr lock: Y
Casing diameter: 2
Total well depth:* 27.2
Static water level:* 17.21
Water depth:* 10
Well volume: (gal) 1.6
Purge method: PERSTIC.
Sample method: " "
Start time: —
Stop time: —
Duration: (minutes) —
Rate, gpm: 1
Volume purged: 10 gl.
Duplicate collected? M-2
Sample collection by: SDI

## STABILIZATION TEST

| Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
|---|---|---|---|---|---|---|
| 6 | 15.61 | 1490 | 6.96 | 149.5 | 3.43 | — |
| 8 | 15.60 | 1492 | 6.94 | 148.0 | 3.44 | — |
| 10 | 15.60 | 1493 | 6.92 | 146.2 | 3.41 | 1.22 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Odor: NA
Purge Appearance: CLEAR
Sample Appearance: CLEAR
Comments: M-2, FB-1

Others present: —
Well condition: OK

[✓ MW:] groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- [illegible] semi-volatile- 4 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

| | |
|---|---|
| Client: JOSLYN | Station: W130 |
| Location: | Date: 10/14/16 |
| Project # : 2327110 | Sample time: 1100 |

**GENERAL DATA** **STABILIZATION TEST**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | Y | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 2 | | | | | | | |
| Total well depth:* | 25.5 | 6 gal. | 13.86 | 1164 | 6.91 | -82.9 | 1.70 | — |
| Static water level:* | 17.72 | 8 | 13.86 | 1165 | 6.90 | -83.7 | 1.69 | — |
| Water depth:* | 7.8 | 10 | 13.87 | 1167 | 6.90 | -84.7 | 1.67 | 8.72 |
| Well volume: (gal) | 1.3 | | | | | | | |
| Purge method: | PERSTIC | | | | | | | |
| Sample method: | PERSTIC. | | | | | | | |

| | | |
|---|---|---|
| Start time: | — | Odor: YES |
| Stop time: | — | Purge Appearance: CLOUDY RED → CLEAR |
| Duration: (minutes) | — | Sample Appearance: CLEAR |
| Rate, gpm: | 1 | Comments: |
| Volume purged: | 10 gal. | |
| Duplicate collected? | — | |
| Sample collection by: SDI | | |

Others present: — Well condition: OK

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

| | |
|---|---|
| Client: JOSLYN | Station: W6N |
| Location: | Date: 10/14/16 |
| Project #: 2327110 | Sample time: 1130 |

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | Y | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 2 | | | | | | | |
| Total well depth:* | 22.0 | 3 gal. | 12.65 | 1027 | 6.85 | 69.7 | 1.93 | — |
| Static water level:* | 16.11 | 4 | 12.68 | 1025 | 6.84 | 71.4 | 1.94 | — |
| Water depth:* | 5.9 | 5 | 12.69 | 1020 | 6.84 | 73.7 | 1.97 | 1.21 |
| Well volume: (gal) | 1 | | | | | | | |
| Purge method: | PERISTIC. | | | | | | | |
| Sample method: | " " | | | | | | | |

| | | | |
|---|---|---|---|
| Start time: | — | Odor: | |
| Stop time: | — | Purge Appearance: | CLEAR |
| Duration: (minutes) | — | Sample Appearance: | CLEAR |
| Rate, gpm: | 1 | Comments: | |
| Volume purged: | 5 gal. | | |
| Duplicate collected? | — | | |
| Sample collection by: | SDI | | |
| Others present: | — | Well condition: | OK |

[✓ MW:] groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

Client: Joslyn

Station: W 300 SPN

Location:

Date: 10/18/16

Project # : 2327110

Sample time: 0735

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | Y | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 2 | | | | | | | |
| Total well depth:* | 135.2 | 0710 | 10.82 | 731 | 7.72 | -152.7 | .53 | — |
| Static water level:* | 18.35 | 0720 | 10.80 | 735 | 7.70 | -150.1 | .55 | — |
| Water depth:* | 116.9 | 0730 | 10.80 | 737 | 7.69 | -147.9 | .55 | .93 |
| Well volume: (gal) | 19 | | | | | | | |
| Purge method: | 1.5 sub. (c) | | | | | | | |
| Sample method: | Bailer | | | | | | | |

| | | |
|---|---|---|
| Start time: | 0700 | Odor: NA |
| Stop time: | 0730 | Purge Appearance: CLOUDY → CLEAR |
| Duration: (minutes) | 30 | Sample Appearance: CLEAR |
| Rate, gpm: | 2 | Comments: |
| Volume purged: | 60 gal. | |
| Duplicate collected? | — | |
| Sample collection by: | SDI | |

Others present: —

Well condition: OK

[✓ MW:] groundwater monitoring well  WS: water supply well  SW: surface water  SE: sediment  other:

VOC-  semi-volatile- 2  general-  COD-  TOC-  nutrient-  cyanide-

oil,grease-  whirl pak-  total metal-  filtered metal-  500 ml filter-  in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

Client: Joslyn

Station: 41

Location:

Date: 10/18/16

Project # : 2327110

Sample time: 0825

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | N | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 8 | | | | | | | |
| Total well depth:* | 33.8 | 0759 | 13.38 | 1146 | 7.29 | -120.4 | .49 | — |
| Static water level:* | 15.40 | 0811 | 13.35 | 1140 | 7.29 | -121.4 | .51 | — |
| Water depth:* | 18.4 | 0823 | 13.33 | 1137 | 7.31 | -124.0 | .52 | 8.00 |
| Well volume: (gal) | 48 | | | | | | | |
| Purge method: | 1.5 (2) | | | | | | | |
| Sample method: | Bail | | | | | | | |

| | | | |
|---|---|---|---|
| Start time: | 0747 | Odor: | SLIGHT |
| Stop time: | 0823 | Purge Appearance: | CLEAR |
| Duration: (minutes) | 36 | Sample Appearance: | CLEAR |
| Rate, gpm: | 4 | Comments: | |
| Volume purged: | 144 gal. | | |
| Duplicate collected? | - | | |
| Sample collection by: | SOI | | |

Others present: -

Well condition: OK

[✓ MW] groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

Client: Joslyn

Station: U1A

Location:

Date: 10/18/16

Project # : 2327110

Sample time: 0915

**GENERAL DATA**

| | |
|---|---|
| Barr lock: | |
| Casing diameter: | 8 |
| Total well depth:* | 35.0 |
| Static water level:* | 20.00 |
| Water depth:* | 15 |
| Well volume: (gal) | 40 |
| Purge method: | 1.5 (c) |
| Sample method: | Bail |
| Start time: | 0840 |
| Stop time: | 0910 |
| Duration: (minutes) | 30 |
| Rate, gpm: | 4 |
| Volume purged: | 120gl |
| Duplicate collected? | – |
| Sample collection by: | SDI |

**STABILIZATION TEST**

| Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
|---|---|---|---|---|---|---|
| 0850 | 13.02 | 1179 | 7.24 | -129.3 | .43 | — |
| 0900 | 13.00 | 1177 | 7.21 | -127.4 | .43 | — |
| 0910 | 13.01 | 1174 | 7.20 | -125.9 | .40 | 5.11 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Odor: slight

Purge Appearance: CLEAR

Sample Appearance: CLEAR

Comments:

Others present: —

Well condition: OK

[✓ MW:] groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
## Field Log Data Sheet

| | |
|---|---|
| Client: JOSLYN | Station: W127N |
| Location: | Date: 10/18/16 |
| Project # : 2327110 | Sample time: 0940 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **GENERAL DATA** | | **STABILIZATION TEST** | | | | | | |
| Barr lock: | Y | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 2 | | | | | | | |
| Total well depth:* | 22.6 | 3 gal. | 15.00 | 831 | 7.28 | 22.4 | 3.96 | — |
| Static water level:* | 15.50 | 4 | 14.95 | 837 | 7.25 | 27.4 | 4.00 | — |
| Water depth:* | 7.1 | 5 | 14.94 | 840 | 7.24 | 30.1 | 4.02 | — |
| Well volume: (gal) | 1 | 6 | 14.93 | 841 | 7.23 | 31.4 | 4.04 | 1.47 |
| Purge method: | PERSTC. | | | | | | | |
| Sample method: | " " | | | | | | | |
| Start time: | — | Odor: NA | | | | | | |
| Stop time: | — | Purge Appearance: CLEAR | | | | | | |
| Duration: (minutes) | — | Sample Appearance: CLEAR | | | | | | |
| Rate, gpm: | — | Comments: | | | | | | |
| Volume purged: | 6 gal | | | | | | | |
| Duplicate collected? | — | | | | | | | |
| Sample collection by: | SDJ | | | | | | | |
| Others present: | — | Well condition: OK | | | | | | |

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

| | |
|---|---|
| Client: Roslyn | Station: W254 |
| Location: | Date: 10/18/16 |
| Project # : 2327110 | Sample time: 1035 |

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | Y | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 4 | | | | | | | |
| Total well depth:* | 85.2 | 1011 | 11.61 | 663 | 8.00 | -260.3 | .33 | — |
| Static water level:* | 20.04 | 1022 | 11.57 | 670 | 7.93 | -251.4 | .34 | — |
| Water depth:* | 65.2 | 1033 | 11.56 | 671 | 7.91 | -248.4 | .36 | 3.97 |
| Well volume: (gal) | 42 | | | | | | | |
| Purge method: | 1.5 (c) | | | | | | | |
| Sample method: | Bail | | | | | | | |

| | | |
|---|---|---|
| Start time: | 1000 | Odor: NA |
| Stop time: | 1033 | Purge Appearance: CLOUDY → CLEAR |
| Duration: (minutes) | 33 | Sample Appearance: CLEAR |
| Rate, gpm: | 4 | Comments: |
| Volume purged: | 132 gl. | |
| Duplicate collected? | — | |
| Sample collection by: | SDI | |

| | |
|---|---|
| Others present: — | Well condition: OK |

[✓ MW: groundwater monitoring well] WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

| | | | |
|---|---|---|---|
| Client: | JOSLYN | Station: | W252N |
| Location: | | Date: | 10/19/16 |
| Project # : | 2327110 | Sample time: | 1115 |

GENERAL DATA | STABILIZATION TEST

| | | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | Y | | | | | | | |
| Casing diameter: | 4 | | | | | | | |
| Total well depth:* | 82.0 | 1022 | 13.71 | 600 | 7.84 | -159.6 | .79 | — |
| Static water level:* | 14.10 | 1044 | 13.67 | 609 | 7.85 | -161.7 | .77 | — |
| Water depth:* | 67.9 | 1106 | 13.66 | 611 | 7.83 | -162.3 | .74 | 39.7 |
| Well volume: (gal) | 44 | | | | | | | |
| Purge method: | 2" SUB. | | | | | | | |
| Sample method: | Bail | | | | | | | |

| | | | |
|---|---|---|---|
| Start time: | 1000 | Odor: | YES |
| Stop time: | 1106 | Purge Appearance: | CLEAR → CLOUDY |
| Duration: (minutes) | 66 | Sample Appearance: | CLOUDY |
| Rate, gpm: | 2 | Comments: | WELL DRAWS DOWN |
| Volume purged: | 132gl. | | |
| Duplicate collected? | — | | |
| Sample collection by: | SDI | | |
| Others present: | — | Well condition: | OK |

[✓ MW:] groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

Client: Joslyn
Station: W10

Location:
Date: 10/19/16

Project #: 2327110
Sample time: 1150

**GENERAL DATA**

| | |
|---|---|
| Barr lock: | Y |
| Casing diameter: | 4 |
| Total well depth:* | 38.5 |
| Static water level:* | 28.27 |
| Water depth:* | 10.3 |
| Well volume: (gal) | 7 |
| Purge method: | 1.5 SUB. |
| Sample method: | Bail |
| Start time: | – |
| Stop time: | – |
| Duration: (minutes) | – |
| Rate, gpm: | – |
| Volume purged: | ~10gal. |
| Duplicate collected? | – |
| Sample collection by: | SDI |

**STABILIZATION TEST**

| Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
|---|---|---|---|---|---|---|
| ~10gal. | 10.37 | 1112 | 6.79 | -101.2 | 1.47 | 47.9 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Odor: YES

Purge Appearance: CLOUDY

Sample Appearance: CLOUDY

Comments: WELL PURGES DRY.

Others present: /
Well condition:

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

Client: JosLyn

Station: W7

Location:

Date: 10/19/16

Project # : 2327110

Sample time: 1235

GENERAL DATA

| | |
|---|---|
| Barr lock: | Y |
| Casing diameter: | 2 |
| Total well depth:* | 25.0 |
| Static water level:* | 13.21 |
| Water depth:* | 11.8 |
| Well volume: (gal) | 2 |
| Purge method: | Peristc. |
| Sample method: | Grab |
| Start time: | – |
| Stop time: | – |
| Duration: (minutes) | – |
| Rate, gpm: | – |
| Volume purged: | 10 gls |
| Duplicate collected? | – |
| Sample collection by: | SDI |

STABILIZATION TEST

| Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
|---|---|---|---|---|---|---|
| 4 gl. | 12.47 | 800 | 7.00 | 87.9 | 1.77 | – |
| 8 | 12.51 | 801 | 7.00 | 89.3 | 1.70 | – |
| 10 | 12.52 | 809 | 7.03 | 90.4 | 1.67 | 8.88 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Odor: YES, SLIGHT

Purge Appearance: CLEAR

Sample Appearance: CLEAR

Comments:

Others present: –

Well condition: OK

[✓ MW]: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

| | | | |
|---|---|---|---|
| Client: | JOSLYN | Station: | W104 |
| Location: | | Date: | 10/20/16 |
| Project #: | 232710 | Sample time: | 0830 |

**GENERAL DATA** **STABILIZATION TEST**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | Y | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 2 | | | | | | | |
| Total well depth:* | 17.9 | ~2gl. | 12.00 | 1837 | 7.11 | -121.4 | .97 | 57.1 |
| Static water level:* | 8.90 | | | | | | | |
| Water depth:* | 9 | | | | | | | |
| Well volume: (gal) | 1.5 | | | | | | | |
| Purge method: | Bailer | | | | | | | |
| Sample method: | " " | | | | | | | |

| | | | |
|---|---|---|---|
| Start time: | – | Odor: | SWAMPY |
| Stop time: | – | Purge Appearance: | CLEAR- CLOUDY |
| Duration: (minutes) | – | Sample Appearance: | CLOUDY |
| Rate, gpm: | – | Comments: | well bails dry |
| Volume purged: | ~2gl. | | |
| Duplicate collected? | – | | |
| Sample collection by: | SDI | | |
| Others present: | – | Well condition: | OK |

[✓ MW: groundwater monitoring well] WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- - cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
# Field Log Data Sheet

Client: Joslyn

Station: W301

Location:

Date: 10/20/16

Project #: 2327110

Sample time: 1100

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | Y | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 4 | | | | | | | |
| Total well depth:* | 139.0 | — | 10.57 | 937 | 8.11 | 67.4 | 3.11 | 36.8 |
| Static water level:* | 4.60 | | | | | | | |
| Water depth:* | 134.4 | | | | | | | |
| Well volume: (gal) | 88 | | | | | | | |
| Purge method: | DED. | | | | | | | |
| Sample method: | GRAB | | | | | | | |

Start time: —

Odor: SWAMPY

Stop time: —

Purge Appearance: CLOUDY - RED

Duration: (minutes) —

Sample Appearance: CLOUDY - RED.

Rate, gpm: —

Comments:
well draws down to pump intake.
purged several times.

Volume purged: ~50gl

Duplicate collected? -

Sample collection by: SDI

Others present: SDI

Well condition: OK, LOTS OF MICE

[✓ MW:] groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# Barr Engineering Company
## Field Log Data Sheet

Client: Joslyn

Station: W328

Location:

Date: 10/20/16

Project # : 2327110

Sample time: 1215

| GENERAL DATA | | STABILIZATION TEST | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Barr lock: | Y | Time/ Volume | Temp. oC | Cond. @ 25 | pH | Eh | D.O. | Turb. NTU |
| Casing diameter: | 4 | | | | | | | |
| Total well depth:* | 125.0 | 1145 | 11.37 | 800 | 7.89 | 171.3 | 2.57 | – |
| Static water level:* | 12.80 | 1200 | 11.41 | 810 | 7.87 | 170.0 | 2.63 | – |
| Water depth:* | 112.2 | 1215 | 11.43 | 813 | 7.85 | 167.2 | 2.60 | 34.4 |
| Well volume: (gal) | 73 | | | | | | | |
| Purge method: | DED | | | | | | | |
| Sample method: | GRAB | | | | | | | |

| | | | |
|---|---|---|---|
| Start time: | 1130 | Odor: | SLIGHT |
| Stop time: | 1215 | Purge Appearance: | CLOUDY, RED |
| Duration: (minutes) | 45 | Sample Appearance: | CLOUDY |
| Rate, gpm: | 5 | Comments: | 5 gpm is MAX. |
| Volume purged: | 225 gl | | |
| Duplicate collected? | – | | |
| Sample collection by: | SDI | | |

Others present: –

Well condition: ok

[✓ MW:] groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- COD- TOC- nutrient- cyanide-

oil,grease- whirl pak- total metal- filtered metal- 500 ml filter- in-line filter-

others:

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

# BARR ENGINEERING COMPANY
# METER CALIBRATION SUMMARY

PROJECT Joslyn
TECHNICIAN SDI

WEATHER CONDITIONS

| Date | Wind Direction | Wind Speed | Temperature F | Cloud Cover | Comments |
|---|---|---|---|---|---|
| 10/11/16 | SW | 0-5 | 67 | P.C. | |
| 10/13/16 | SW | 5-10 | 65 | CLEAR | |
| 10/14/16 | N | 0-5 | 50 | P.C | |
| 10/18/16 | N | 0-5 | 50-60 | CLEAR | |
| 10/19/16 | N | 5-10 | 50-55 | CLEAR | |
| 10/20/16 | N | 0-5 | 40-45 | CLEAR | |

| Meter type and number | Date | Time | Temperature C | Standard Solution | pH Meter Reading | Cond. Cell Result | ORP Reading | DO |
|---|---|---|---|---|---|---|---|---|
| MPS | 10/11/16 | 0800 | 19.5 | 7/10 | 7.00/10.00 | 1409 | 247 | OK |
| | 10/13/16 | 0810 | 19 | 7/10 | 7.00/10.00 | 1409 | 245 | OK |
| | 10/14/16 | 0900 | 19.7 | 7/10 | 7.00/10.00 | 1409 | 245 | OK |
| | 10/18/16 | 0630 | 19 | 7/10 | 7.00/10.00 | 1409 | 244 | OK |
| | 10/19/16 | 0900 | 18.5 | 7/10 | 7.00/10.00 | 1409 | 247 | OK |
| | 10/20/16 | 0700 | 18 | 7/10 | 7.00/10.00 | 1409 | 247 | OK |

231+,- 10mV @ 25C

231mV = Display Value + [(Display Temp. - 25 C) x (1.3 mV)]

Calib.wb2

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☒ MN ☐ SD

COC Number: 52023

COC ________ of ________

| REPORT TO | |
|---|---|
| Company: | Barr Eng. |
| Address: | |
| Name: | |
| email: | |
| Copy to: datamgt@barr.com | |
| Project Name: | JOSLYN |

| INVOICE TO | |
|---|---|
| Company: | Barr Eng. |
| Address: | |
| Name: | |
| email: | |
| P.O. | |
| Barr Project No: | 23271102016270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| Location | Sample Depth | | | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Start | Stop | Unit (m./ft. or in.) | | | | | | Water | | | | | | Soil | | | | | | |
| | | | | | | | | | VOC | | | | | | | | | | | % Solids | |
| | | | | | | | | | A | | | | | | | | | | | | Preservative Code |
| | | | | | | | | | N | | | | | | | | | | | | Field Filtered Y/N |
| 1. U12 | | | | 10/11/2016 | 0900 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. U2A | | | | ↓ | 0910 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 3. W253 | | | | | 0920 | | | | | | | | | | | | | | | | |
| 4. U5 | | | | | 0930 | | | | | | | | | | | | | | | | |
| 5. U4N | | | | | 0940 | | | | | | | | | | | | | | | | |
| 6. W255 | | | | | 0950 | | | | | | | | | | | | | | | | |
| 7. U6N | | | | | 1000 | | | | | | | | | | | | | | | | |
| 8. U7N | | | | | 1010 | | | | | | | | | | | | | | | | |
| 9. U11 | | | | | 1020 | | | | | | | | | | | | | | | | |
| 10. M-1 (U11 | | | | | — | | | | | | | | | | | | | | | | |

| BARR USE ONLY | |
|---|---|
| Sampled by: | SDI |
| Barr Proj. Manager: | JLB III |
| Barr DQ Manager: | TAO |
| Lab Name: | CAS |
| Lab Location: | KELSO, WA |

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve J. | [✓ Y] N | 10/13/16 | 1400 | | | |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other: ____________

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ________ (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

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# Barr Engineering Co. Chain of Custody

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☒ MN ☐ SD

COC Number: 52024
COC 2 of 2

| REPORT TO | | INVOICE TO | |
|---|---|---|---|
| Company: | BARR Eng. | Company: | BARR Eng. |
| Address: | | Address: | |
| Name: | | Name: | |
| email: | | email: | |
| Copy to: datamgt@barr.com | | P.O. | |
| Project Name: | JOSLYN | Barr Project No: | 2327110 2016 270 |

| Location | Sample Depth | | | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Start | Stop | Unit (m./ft. or in.) | | | | | | Water | | | | | | Soil | | | | | | |
| | | | | | | | | | SVOC | GENERAL | O+G | COD | | | | | | | | % Solids | |
| | | | | | | | | | A | A | B | D | | | | | | | | | Preservative Code |
| | | | | | | | | | N | N | N | N | | | | | | | | | Field Filtered Y/N |
| 1. TANK EFF. | | | | 10/11/2016 | 1050 | GW | | | 2 | 1 | 1 | 1 | | | | | | | | | TABLE 3-4 FIELD pH= 7.27 |
| 2. S3 | | | | 10/13/2016 | 0915 | ↓ | | | ↓ | | | | | | | | | | | | 3-13 |
| 3. S1A | | | | ↓ | 0940 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 4. S2 | | | | ↓ | 1005 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 5. | | | | | | | | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| BARR USE ONLY | |
|---|---|
| Sampled by: | SDI |
| Barr Proj. Manager: | JLBIII |
| Barr DQ Manager: | TAD |
| Lab Name: | CAS |
| Lab Location: | KELSO, WA |

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve F | [✓ Y] N | 10/13/16 | 1400 | | | |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |
| | | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler
☐ Other: ____________

Air Bill Number:

Lab WO:

Temperature on Receipt (°C):

Custody Seal Intact? ☐ Y ☐ N ☐ None

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ________ (mm/dd/yyyy)

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

# Barr Engineering Co. Chain of Custody

☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MI ☒ MN ☐ MO ☐ ND ☐ SD ☐ WI
Other:

COC Number: 52044
COC 1 of 1

| REPORT TO | |
|---|---|
| Company: | BARR Eng |
| Address: | |
| Name: | |
| email: | |
| Copy to: datamgt@barr.com | |
| Project Name: | JOSLYN |

| INVOICE TO | |
|---|---|
| Company: | BARR Eng. |
| Address: | |
| Name: | |
| email: | |
| P.O. | |
| Barr Project No: | 23 27 110 2016 270 |

| | Location | Sample Depth Start | Sample Depth Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | SVOC | | | | | | | | | | | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservative Code | | | | | | | | | | A | | | | | | | | | | | | |
| Field Filtered Y/N | | | | | | | | | | N | | | | | | | | | | | | |
| 1. | W132 | / | / | / | 10/14/16 | 1030 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. | W130 | / | / | / | ↓ | 1100 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 3. | W6N | / | / | / | ↓ | 1130 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 4. | M-2 (132) | / | / | / | ↓ | — | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 5. | FB-1 | / | / | / | ↓ | — | O | | | ↓ | | | | | | | | | | | | ↓ |
| 6. | | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | | |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| BARR USE ONLY | |
|---|---|
| Sampled by: | SDI |
| Barr Proj. Manager: | JLBIII |
| Barr DQ Manager: | TAO |
| Lab Name: | CAS |
| Lab Location: | KELSO, WA |

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve Ir | [✓ Y] N | 10/14/16 | 1500 | | | |
| | Y N | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:

Air Bill Number:

Lab WO:

Temperature on Receipt (°C):

Custody Seal Intact? ☐ Y ☐ N ☐ None

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ______ (mm/dd/yyyy)

Distribution - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

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# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☐ Minneapolis

**Sample Origination State:**
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☐ MN ☐ SD

COC Number: 52053
COC 1 of 1

| REPORT TO | |
|---|---|
| Company: | Barr Eng. |
| Address: | |
| Name: | |
| email: | |
| Copy to: datamgt@barr.com | |
| Project Name: | Joslyn |

| INVOICE TO | |
|---|---|
| Company: | Barr Eng. |
| Address: | |
| Name: | |
| email: | |
| P.O. | |
| Barr Project No: | 23270110 2016 270 |

| | Location | Sample Depth | | | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Start | Stop | Unit (m./ft. or in.) | | | | | | Water | | | | | | Soil | | | | | | |
| | | | | | | | | | | SVOC | | | | | | | | | | | % Solids | |
| | Preservative Code | | | | | | | | | A | | | | | | | | | | | | |
| | Field Filtered Y/N | | | | | | | | | N | | | | | | | | | | | | |
| 1. | W 300 SPN | / | / | | 10/18/2016 | 0736 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. | U1 | / | / | / | ↓ | 0825 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 3. | U1A | / | / | / | ↓ | 0915 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 4. | W127N | / | / | / | ↓ | 0940 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 5. | W254 | | / | / | ↓ | 1035 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 6. | | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | | |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
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C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| BARR USE ONLY | |
|---|---|
| Sampled by: | SDI |
| Barr Proj. Manager: | JLB III |
| Barr DQ Manager: | TAD |
| Lab Name: | CAS |
| Lab Location: | Kelso, WA |

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve F | [✓ Y] N | 10/19/16 | 1500 | | | |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |
| | | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler
☐ Other: ____________

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ________ (mm/dd/yyyy)

Lab WO:

Temperature on Receipt (°C):

Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

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# Barr Engineering Co. Chain of Custody

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☒ MN ☐ SD

COC Number: 52059
COC 1 of 1

| REPORT TO | |
|---|---|
| Company: | Barr Eng |
| Address: | |
| Name: | |
| email: | |
| Copy to: datamgt@barr.com | |
| Project Name: | JOSLYN |

| INVOICE TO | |
|---|---|
| Company: | Barr Eng |
| Address: | |
| Name: | |
| email: | |
| P.O. | |
| Barr Project No: | 23270110 2016 270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| Location | Sample Depth Start | Sample Depth Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested: Water SVOC | | | | | | Soil | | | | | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservative Code | | | | | | | | | A | | | | | | | | | | | | |
| Field Filtered Y/N | | | | | | | | | N | | | | | | | | | | | | |
| 1. W252N | | | | 10/19/2016 | 1115 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. W10 | | | | ↓ | 1150 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 3. W7 | | | | | 1235 | | | | | | | | | | | | | | | | |
| 4. FB-2 | | | | | — | O | | | | | | | | | | | | | | | |
| 5. W104 | | | | 10/20/2016 | 0830 | GW | | | | | | | | | | | | | | | |
| 6. W301 | | | | ↓ | 1100 | ↓ | | | | | | | | | | | | | | | |
| 7. W328 | | | | | 1215 | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

| BARR USE ONLY | |
|---|---|
| Sampled by: | SDI |
| Barr Proj. Manager: | JLBTH |
| Barr DQ Manager: | TAO |
| Lab Name: | CAS |
| Lab Location: | KELSO, WA |

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve Twin | [✓ Y] N | 10/20/16 | 1530 | | | |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution - White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

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# 2016 Laboratory Data

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
**T :** +1 360 577 7222
**F :** +1 360 636 1068
**www.alsglobal.com**

March 16, 2016

**Analytical Report for Service Request No:** K1601155
**Revised Service Request No:** K1601155.01

Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435

**RE: Joslyn / 23271102016270**

Dear Terri,

Enclosed is the revised report for the samples submitted to our laboratory February 05, 2016
For your reference, these analyses have been assigned our service request number **K1601155.**

The case narrative for EPA Method 8270 has been updated in this revision which supercedes the report dated March 07, 2016.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

We apologize for any inconvenience this may have created.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Chris Leaf
Project Manager

**REVISED**
**12:02 pm, Mar 16, 2016**

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
**T :** +1 360 577 7222
**F :** +1 360 636 1068
**www.alsglobal.com**

# Table of Contents

# Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| A2LA | American Association for Laboratory Accreditation |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MCL | Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| NA | Not Applicable |
| NC | Not Calculated |
| NCASI | National Council of the Paper Industry for Air and Stream Improvement |
| ND | Not Detected |
| NIOSH | National Institute for Occupational Safety and Health |
| PQL | Practical Quantitation Limit |
| RCRA | Resource Conservation and Recovery Act |
| SIM | Selected Ion Monitoring |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. |

## Inorganic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| E | The result is an estimate amount because the value exceeded the instrument calibration range. |
| J | The result is an estimated value. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |
| H | The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory. |

## Metals Data Qualifiers

| | |
|---|---|
| # | The control limit criteria is not applicable. See case narrative. |
| J | The result is an estimated value. |
| E | The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample. |
| M | The duplicate injection precision was not met. |
| N | The Matrix Spike sample recovery is not within control limits. See case narrative. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| W | The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| + | The correlation coefficient for the MSA is less than 0.995. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Organic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| A | A tentatively identified compound, a suspected aldol-condensation product. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| C | The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data. |
| D | The reported result is from a dilution. |
| E | The result is an estimated value. |
| J | The result is an estimated value. |
| N | The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed. |
| P | The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Additional Petroleum Hydrocarbon Specific Qualifiers

| | |
|---|---|
| F | The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard. |
| L | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard. |
| H | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard. |
| O | The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard. |
| Y | The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. |
| Z | The chromatographic fingerprint does not resemble a petroleum product. |

## ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
## State Certifications, Accreditations, and Licenses

| Agency | Web Site | Number |
|---|---|---|
| Alaska DEC UST | http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx | UST-040 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0339 |
| Arkansas - DEQ | http://www.adeq.state.ar.us/techsvs/labcert.htm | 88-0637 |
| California DHS (ELAP) | http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx | 2795 |
| DOD ELAP | http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm | L14-51 |
| Florida DOH | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E87412 |
| Hawaii DOH | Not available | - |
| Idaho DHW | http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx | - |
| ISO 17025 | http://www.pjlabs.com/ | L14-50 |
| Louisiana DEQ | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 03016 |
| Maine DHS | Not available | WA01276 |
| Michigan DEQ | http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html | 9949 |
| Minnesota DOH | http://www.health.state.mn.us/accreditation | 053-999-457 |
| Montana DPHHS | http://www.dphhs.mt.gov/publichealth/ | CERT0047 |
| Nevada DEP | http://ndep.nv.gov/bsdw/labservice.htm | WA01276 |
| New Jersey DEP | http://www.nj.gov/dep/oqa/ | WA005 |
| North Carolina DWQ | http://www.dwqlab.org/ | 605 |
| Oklahoma DEQ | http://www.deq.state.ok.us/CSDnew/labcert.htm | 9801 |
| Oregon – DEQ (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | WA100010 |
| South Carolina DHEC | http://www.scdhec.gov/environment/envserv/ | 61002 |
| Texas CEQ | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704427 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C544 |
| Wisconsin DNR | http://dnr.wi.gov/ | 998386840 |
| Wyoming (EPA Region 8) | http://www.epa.gov/region8/water/dwhome/wyomingdi.html | - |
| Kelso Laboratory Website | www.alsglobal.com | NA |

Analyses were performed according to our laboratory’s NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

# Case Narrative

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

REVISED
12:02 pm, Mar 16, 2016

# ALS ENVIRONMENTAL

**Client:** Barr Engineering Company
**Project:** Joslyn/ 23271102016270
**Sample Matrix:** Water
**Service Request No.:** K1601155
**Date Received:** 02/05/16

## Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

### Sample Receipt

Two water samples were received for analysis at ALS Environmental on 02/05/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

### General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

### Semivolatile Organic Compounds by EPA Method 8270

No anomalies associated with the analysis of these samples were observed.

### Semivolatile Organic Compounds by EPA Method 8270-SIM

**Calibration Verification Exceptions:**
The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS25\0301F002.D: Benz(a)anthracene. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

No other anomalies associated with the analysis of these samples were observed.

**Approved by**____________________________________

REVISED
12:02 pm, Mar 16, 2016

# Chain of Custody

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

K1601155

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State:
☐ KS ☐ MI ☒ MN ☐ MO ☐ ND ☐ SD ☐ WI Other: ______

COC Number: № 49060

COC 1 of 1

| REPORT TO | |
|---|---|
| Company: | Barr Eng. |
| Address: | |
| Name: | TAO |
| email: | |
| Copy to: | datamgt@barr.com |
| Project Name: | JOSLYN |

| INVOICE TO | |
|---|---|
| Company: | Barr Eng |
| Address: | |
| Name: | |
| email: | |
| P.O. | |
| Barr Project No: | 23271102016270 |

Analysis Requested: Water / Soil

| | Sample Depth | | | | | | Perform MS/MSD Y / N | Total Number Of Containers | SVOC | SVOC | DIOXIN | GENERAL | COD | O&G | | | | | | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Start | Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | | | | | | | | | | | | | | | |
| | | | | | | | | Preservative Code | A | A | A | A | D | B | | | | | | | |
| | | | | | | | | Field Filtered Y/N | N | N | N | N | N | N | | | | | | | |
| 1. U1 | | | | 2/4/2016 | 1010 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. TANK EFF. | | | | ↓ | 1100 | GW | | | | 2 | 2 | 1 | 1 | 1 | | | | | | | TABLE 3-4 |
| 3. | | | | | | | | | | | | | | | | | | | | | |
| 4. | | | | | | | | | | | | | | | | | | | | | |
| 5. | | | | | | | | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**Matrix Code:**
- GW = Groundwater
- SW = Surface Water
- WW = Waste Water
- DW = Drinking Water
- S = Soil/Solid
- SD = Sediment
- O = Other

**Preservative Code:**
- A = None
- B = HCl
- C = $HNO_3$
- D = $H_2SO_4$
- E = NaOH
- F = MeOH
- G = $NaHSO_4$
- H = $Na_2S_2O_3$
- I = Ascorbic Acid
- J = $NH_4Cl$
- K = Zn Acetate
- O = Other

| BARR USE ONLY | |
|---|---|
| Sampled by: | SDF |
| Barr Proj. Manager: | JLB2 |
| Barr DQ Manager: | TAO |
| Lab Name: | CAS |
| Lab Location: | KELSO |

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| STEVE [illegible] | [✓ Y] N | 2/4/16 | 1200 | [illegible] Smith | 2/5/16 | 1040 |
| | Y N | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other: ______

Air Bill Number:

Requested Due Date:
☐ Standard Turn Around Time
☐ Rush ______ (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

H:RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

## Table 3-4

## MCES Effluent Monitoring Parameters

### Semivolatile Organic Compounds

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Pentachlorophenol
Phenanthrene
Pyrene
2,3,7,8-TCDD

### General Chemistry

Chemical Oxygen Demand
Oil and Grease
Total suspended Solids
pH

Note:

Analysis of 2,3,7,8-tetrachlorodibenzo-p-dioxin is required only once during the three year effective period of MCES Industrial Discharge Permit (Special Discharges) Number 2013: November 1, 2009, through October 31, 2012. Analysis was completed on the effluent sample collected in March 2010 and is not required at this time.

f

## Table 3-13

## Groundwater Monitoring Parameters

### PAH Compounds

**Carcinogenic PAHs**

Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3,cd)pyrene
Benzo(k)fluoranthene
Dibenzo(ah)anthracene
Benzo(j)fluoranthene*

**Noncarcinogenic PAHs**

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)perylene
Fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

### Phenolic Compounds

Pentachlorophenol

---

*Cannot be quantified with GC/MS analytical procedure.

PC______

# Cooler Receipt and Preservation Form

Client Barr Service Request **K16** 1155

Received: 2/5/16 Opened: 2/5/16 By: KO Unloaded: 2/5/16 By: KO

1. Samples were received via? *Mail* [✓ *Fed Ex*] *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other*______ *NA*
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? 1, Front

If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

| Raw Cooler Temp | Corrected. Cooler Temp | Raw Temp Blank | Corrected Temp Blank | Corr. Factor | Thermometer ID | Cooler/COC ID [✓ NA] | Tracking Number NA | Filed |
|---|---|---|---|---|---|---|---|---|
| -1.0 | -.8 | — | — | +.2 | 352 | 49060 | 6494 4054 4509 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

4. Packing material: *Inserts* [✓ *Baggies*] [✓ *Bubble Wrap*] *Gel Packs* [✓ *Wet Ice*] *Dry Ice* *Sleeves* ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

| Sample ID on Bottle | Sample ID on COC | Identified by: |
|---|---|---|
| | | |
| | | |
| | | |

| Sample ID | Bottle Count Bottle Type | Out of Temp | Head-space | Broke | pH | Reagent | Volume added | Reagent Lot Number | Initials | Time |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

SHORT HOLD TIME

***Notes, Discrepancies, & Resolutions:***______

______

______

______

***Page*____ *of*____**

# General Chemistry

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | 02/4/16 |
| **Sample Matrix:** | Water | **Date Received:** | 02/5/16 |
| **Analysis Method:** | 1664A | **Units:** | mg/L |
| **Prep Method:** | Method | **Basis:** | NA |

## Oil and Grease, Total (HEM)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Date Extracted | Q |
|---|---|---|---|---|---|---|---|
| Tank Eff. | K1601155-002 | ND U | 5.3 | 1 | 02/25/16 17:15 | 2/25/16 | |
| Method Blank | K1601155-MB1 | ND U | 5.0 | 1 | 02/25/16 17:15 | 2/25/16 | |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | N/A |
| **Sample Matrix:** | Water | **Date Received:** | N/A |
| | | **Date Analyzed:** | 02/25/16 |
| | | **Date Extracted:** | 02/25/16 |

## Matrix Spike Summary
## Oil and Grease, Total (HEM)

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1601561-001 | **Basis:** | NA |
| **Analysis Method:** | 1664A | | |
| **Prep Method:** | Method | | |

### Matrix Spike
K1601561-001MS

| Analyte Name | Sample Result | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Oil and Grease, Total (HEM) | ND U | 51.2 | 56.6 | 91 | 78-114 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Analyzed:** | 02/25/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | 02/25/16 |

## Duplicate Lab Control Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1664A | **Units:** | mg/L |
| **Prep Method:** | Method | **Basis:** | NA |
| | | **Analysis Lot:** | 485560 |

| | Lab Control Sample K1601155-LCS2 | | | Duplicate Lab Control Sample K1601155-DLCS2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Oil and Grease, Total (HEM) | 50.8 | 60.0 | 85 | 53.8 | 60.0 | 90 | 78-114 | 6 | 20 |

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | 02/4/16 |
| **Sample Matrix:** | Water | **Date Received:** | 02/5/16 |
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Solids, Total Suspended (TSS)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| Tank Eff. | K1601155-002 | ND U | 5.0 | 1 | 02/09/16 13:47 | |
| Method Blank | K1601155-MB1 | ND U | 5.0 | 1 | 02/09/16 13:47 | |
| Method Blank | K1601155-MB2 | ND U | 5.0 | 1 | 02/09/16 13:47 | |

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project** | Joslyn/23271102016270 | **Date Collected:** | 02/04/16 |
| **Sample Matrix:** | Water | **Date Received:** | 02/05/16 |
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Replicate Sample Summary
## Solids, Total Suspended (TSS)

| Sample Name: | Lab Code: | MRL | Sample Result | Duplicate Result | Average | RPD | RPD Limit | Date Analyzed |
|---|---|---|---|---|---|---|---|---|
| Batch QC | K1601112-001DUP | 5.0 | 8.0 | 8.0 | 8.00 | <1 | 10 | 02/09/16 |
| Tank Eff. | K1601155-002DUP | 5.0 | ND U | ND U | NC | NC | 10 | 02/09/16 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Printed 2/29/2016 10:42:57 AM Superset Reference:16-0000364034 rev 00

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Analyzed:** | 02/09/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## Solids, Total Suspended (TSS)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 483271 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1601155-LCS1 | 136 | 141 | 96 | 85-115 |

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | 02/4/16 |
| **Sample Matrix:** | Water | **Date Received:** | 02/5/16 |
| **Analysis Method:** | SM 4500-H+ B | **Units:** | pH Units |
| **Prep Method:** | None | **Basis:** | NA |

## pH

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| Tank Eff. | K1601155-002 | **7.58** | - | 1 | 02/05/16 16:38 | H |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project** | Joslyn/23271102016270 | **Date Collected:** | 02/04/16 |
| **Sample Matrix:** | Water | **Date Received:** | 02/05/16 |
| | | **Date Analyzed:** | 02/05/16 |

## Replicate Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Sample Name:** | Tank Eff. | **Units:** | pH Units |
| **Lab Code:** | K1601155-002 | **Basis:** | NA |

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1601155-002DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| pH | SM 4500-H+ B | - | 7.58 | 7.57 | 7.58 | <1 | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Analyzed:** | 02/05/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## pH

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 4500-H+ B | **Units:** | pH Units |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 482900 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1601155-LCS1 | 8.29 | 8.32 | 100 | 85-115 |

**ALS Group USA, Corp.**
**dba ALS Environmental**

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | 02/4/16 |
| **Sample Matrix:** | Water | **Date Received:** | 02/5/16 |
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Chemical Oxygen Demand (COD)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| Tank Eff. | K1601155-002 | **10.5** | 5.0 | 1 | 02/16/16 09:00 | |
| Method Blank | K1601155-MB1 | ND U | 5.0 | 1 | 02/16/16 09:00 | |
| Method Blank | K1601155-MB2 | ND U | 5.0 | 1 | 02/16/16 09:00 | |

| | | | | |
|---|---|---|---|---|
| **Client:** | Barr Engineering Company | | **Service Request:** | K1601155 |
| **Project** | Joslyn/23271102016270 | | **Date Collected:** | NA |
| **Sample Matrix:** | Water | | **Date Received:** | NA |
| | | | **Date Analyzed:** | 02/16/16 |

## Replicate Sample Summary
## General Chemistry Parameters

| | | | | |
|---|---|---|---|---|
| **Sample Name:** | Batch QC | | **Units:** | mg/L |
| **Lab Code:** | K1601048-001 | | **Basis:** | NA |

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1601048-001DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| Chemical Oxygen Demand (COD) | SM 5220 C | 5.0 | ND U | ND U | NC | NC | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | | |
|---|---|---|---|---|
| **Client:** | Barr Engineering Company | | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | | **Date Collected:** | N/A |
| **Sample Matrix:** | Water | | **Date Received:** | N/A |
| | | | **Date Analyzed:** | 02/16/16 |
| | | | **Date Extracted:** | NA |

## Duplicate Matrix Spike Summary
## Chemical Oxygen Demand (COD)

| | | | | |
|---|---|---|---|---|
| **Sample Name:** | Batch QC | | **Units:** | mg/L |
| **Lab Code:** | K1601048-001 | | **Basis:** | NA |
| **Analysis Method:** | SM 5220 C | | | |
| **Prep Method:** | None | | | |

| | | **Matrix Spike**<br>K1601048-001MS | | | **Duplicate Matrix Spike**<br>K1601048-001DMS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Sample Result** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Chemical Oxygen Demand (COD) | ND U | 112 | 100 | 112 | 109 | 100 | 109 | 80-128 | 2 | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

## ALS Group USA, Corp.
**dba ALS Environmental**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Analyzed:** | 02/16/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

### Lab Control Sample Summary
### Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 484121 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1601155-LCS1 | 110 | 100 | 110 | 83-117 |

# Polynuclear Aromatic Hydrocarbons

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | 02/04/2016 |
| **Sample Matrix:** | Water | **Date Received:** | 02/05/2016 |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | Tank Eff. | **Units:** | ug/L |
| **Lab Code:** | K1601155-002 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| 2-Methylnaphthalene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Acenaphthylene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Acenaphthene | **42** | | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Fluorene | **18** | | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Phenanthrene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Anthracene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Pentachlorophenol | **250** | D | 50 | 2 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Fluoranthene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Pyrene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benz(a)anthracene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Chrysene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benzo(b)fluoranthene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benzo(k)fluoranthene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benzo(a)pyrene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Dibenz(a,h)anthracene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benzo(g,h,i)perylene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2-Fluorobiphenyl | 59 | 48-114 | 02/16/16 | Acceptable |
| 2,4,6-Tribromophenol | 69 | 46-127 | 02/16/16 | Acceptable |
| Terphenyl-d14 | 60 | 32-149 | 02/16/16 | Acceptable |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1601102-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| 2-Methylnaphthalene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Acenaphthylene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Acenaphthene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Fluorene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Phenanthrene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Anthracene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Pentachlorophenol | ND | U | 25 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Fluoranthene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Pyrene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benz(a)anthracene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Chrysene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benzo(b)fluoranthene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benzo(k)fluoranthene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benzo(a)pyrene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Dibenz(a,h)anthracene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |
| Benzo(g,h,i)perylene | ND | U | 10 | 1 | 02/10/16 | 02/16/16 | KWG1601102 | |

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2-Fluorobiphenyl | 64 | 48-114 | 02/16/16 | Acceptable |
| 2,4,6-Tribromophenol | 65 | 46-127 | 02/16/16 | Acceptable |
| Terphenyl-d14 | 73 | 32-149 | 02/16/16 | Acceptable |

**Comments:**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | | |
| **Sample Matrix:** | Water | | |

## Surrogate Recovery Summary
## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | Percent |
| **Analysis Method:** | 8270D | **Level:** | Low |

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 |
|---|---|---|---|---|
| Tank Eff. | K1601155-002 | 59 | 69 | 60 |
| Method Blank | KWG1601102-3 | 64 | 65 | 73 |
| Lab Control Sample | KWG1601102-1 | 62 | 81 | 70 |
| Duplicate Lab Control Sample | KWG1601102-2 | 61 | 78 | 66 |

**Surrogate Recovery Control Limits (%)**

| | | |
|---|---|---|
| Sur1 | = 2-Fluorobiphenyl | 48-114 |
| Sur2 | = 2,4,6-Tribromophenol | 46-127 |
| Sur3 | = Terphenyl-d14 | 32-149 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

**Client:** Barr Engineering Company
**Project:** Joslyn/23271102016270
**Sample Matrix:** Water

**Service Request:** K1601155
**Date Extracted:** 02/10/2016
**Date Analyzed:** 02/16/2016

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Semi-Volatile Organic Compounds by GC/MS

**Extraction Method:** EPA 3520C
**Analysis Method:** 8270D

**Units:** ug/L
**Basis:** NA
**Level:** Low
**Extraction Lot:** KWG1601102

| | Lab Control Sample<br>KWG1601102-1<br>**Lab Control Spike** | | | Duplicate Lab Control Sample<br>KWG1601102-2<br>**Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 74.4 | 100 | 74 | 77.6 | 100 | 78 | 60-98 | 4 | 30 |
| 2-Methylnaphthalene | 78.2 | 100 | 78 | 80.5 | 100 | 81 | 57-106 | 3 | 30 |
| Acenaphthylene | 76.3 | 100 | 76 | 74.6 | 100 | 75 | 58-109 | 2 | 30 |
| Acenaphthene | 73.5 | 100 | 74 | 73.4 | 100 | 73 | 61-110 | 0 | 30 |
| Fluorene | 77.1 | 100 | 77 | 74.5 | 100 | 75 | 59-112 | 3 | 30 |
| Phenanthrene | 87.0 | 100 | 87 | 86.2 | 100 | 86 | 64-111 | 1 | 30 |
| Anthracene | 90.6 | 100 | 91 | 87.3 | 100 | 87 | 62-116 | 4 | 30 |
| Pentachlorophenol | 95.4 | 100 | 95 | 92.2 | 100 | 92 | 51-123 | 3 | 30 |
| Fluoranthene | 87.5 | 100 | 87 | 83.4 | 100 | 83 | 52-128 | 5 | 30 |
| Pyrene | 76.0 | 100 | 76 | 75.5 | 100 | 75 | 53-124 | 1 | 30 |
| Benz(a)anthracene | 88.2 | 100 | 88 | 85.4 | 100 | 85 | 69-113 | 3 | 30 |
| Chrysene | 86.4 | 100 | 86 | 84.2 | 100 | 84 | 68-114 | 3 | 30 |
| Benzo(b)fluoranthene | 97.7 | 100 | 98 | 94.1 | 100 | 94 | 66-117 | 4 | 30 |
| Benzo(k)fluoranthene | 93.7 | 100 | 94 | 90.3 | 100 | 90 | 63-119 | 4 | 30 |
| Benzo(a)pyrene | 85.8 | 100 | 86 | 83.4 | 100 | 83 | 57-124 | 3 | 30 |
| Indeno(1,2,3-cd)pyrene | 99.7 | 100 | 100 | 97.6 | 100 | 98 | 68-116 | 2 | 30 |
| Dibenz(a,h)anthracene | 92.0 | 100 | 92 | 91.6 | 100 | 92 | 65-121 | 0 | 30 |
| Benzo(g,h,i)perylene | 97.4 | 100 | 97 | 92.1 | 100 | 92 | 68-116 | 6 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

# Polynuclear Aromatic Hydrocarbons

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | 02/04/2016 |
| **Sample Matrix:** | Water | **Date Received:** | 02/05/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U1 | **Units:** | ug/L |
| **Lab Code:** | K1601155-001 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0082** | | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Acenaphthene | **0.0047** | | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Fluorene | **0.0061** | | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Anthracene | **0.011** | | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Fluoranthene | **0.0040** | | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Pyrene | **0.0078** | | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 02/11/16 | 03/01/16 | KWG1601148 | * |
| Chrysene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 02/11/16 | 03/01/16 | KWG1601148 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 58 | 46-114 | 02/29/16 | Acceptable |
| Fluoranthene-d10 | 75 | 51-121 | 02/29/16 | Acceptable |
| 2,4,6-Tribromophenol | 113 | 10-136 | 03/01/16 | Acceptable |
| Terphenyl-d14 | 67 | 58-140 | 02/29/16 | Acceptable |

**† Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1601148-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Fluorene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Anthracene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Pyrene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 02/11/16 | 03/01/16 | KWG1601148 | * |
| Chrysene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 02/11/16 | 02/29/16 | KWG1601148 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 02/11/16 | 03/01/16 | KWG1601148 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 62 | 46-114 | 02/29/16 | Acceptable |
| Fluoranthene-d10 | 74 | 51-121 | 02/29/16 | Acceptable |
| 2,4,6-Tribromophenol | 98 | 10-136 | 03/01/16 | Acceptable |
| Terphenyl-d14 | 71 | 58-140 | 02/29/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

## ALS Group USA, Corp. dba ALS Environmental

QA/QC Report

**Client:** Barr Engineering Company
**Project:** Joslyn/23271102016270
**Sample Matrix:** Water

**Service Request:** K1601155

### Surrogate Recovery Summary
### Polynuclear Aromatic Hydrocarbons

**Extraction Method:** EPA 3520C
**Analysis Method:** 8270D SIM

**Units:** Percent
**Level:** Low

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 | Sur4 |
|---|---|---|---|---|---|
| U1 | K1601155-001 | 58 | 75 | 113 D | 67 |
| Method Blank | KWG1601148-3 | 62 | 74 | 98 D | 71 |
| Lab Control Sample | KWG1601148-1 | 97 D | 110 D | 121 D | 101 D |
| Duplicate Lab Control Sample | KWG1601148-2 | 93 D | 108 D | 122 D | 100 D |

**Surrogate Recovery Control Limits (%)**

| | | | |
|---|---|---|---|
| Sur1 | = | Fluorene-d10 | 46-114 |
| Sur2 | = | Fluoranthene-d10 | 51-121 |
| Sur3 | = | 2,4,6-Tribromophenol | 10-136 |
| Sur4 | = | Terphenyl-d14 | 58-140 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Extracted:** | 02/11/2016 |
| **Sample Matrix:** | Water | **Date Analyzed:** | 02/17/2016 - 03/01/2016 |

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | ug/L |
| **Analysis Method:** | 8270D SIM | **Basis:** | NA |
| | | **Level:** | Low |
| | | **Extraction Lot:** | KWG1601148 |

| | Lab Control Sample KWG1601148-1 **Lab Control Spike** | | | Duplicate Lab Control Sample KWG1601148-2 **Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 2.14 | 2.50 | 85 | 2.05 | 2.50 | 82 | 39-110 | 4 | 30 |
| 2-Methylnaphthalene | 1.82 | 2.50 | 73 | 1.82 | 2.50 | 73 | 39-115 | 0 | 30 |
| Acenaphthylene | 2.20 | 2.50 | 88 | 2.15 | 2.50 | 86 | 44-115 | 2 | 30 |
| Acenaphthene | 2.10 | 2.50 | 84 | 2.05 | 2.50 | 82 | 44-113 | 2 | 30 |
| Fluorene | 2.10 | 2.50 | 84 | 2.04 | 2.50 | 81 | 48-118 | 3 | 30 |
| Phenanthrene | 2.19 | 2.50 | 88 | 2.13 | 2.50 | 85 | 47-120 | 3 | 30 |
| Anthracene | 2.26 | 2.50 | 90 | 2.14 | 2.50 | 86 | 44-117 | 5 | 30 |
| Fluoranthene | 2.34 | 2.50 | 94 | 2.27 | 2.50 | 91 | 48-128 | 3 | 30 |
| Pyrene | 2.22 | 2.50 | 89 | 2.16 | 2.50 | 86 | 42-133 | 3 | 30 |
| Benz(a)anthracene | 2.12 | 2.50 | 85 | 2.03 | 2.50 | 81 | 48-125 | 5 | 30 |
| Chrysene | 2.20 | 2.50 | 88 | 2.15 | 2.50 | 86 | 50-128 | 2 | 30 |
| Benzo(b)fluoranthene | 2.18 | 2.50 | 87 | 2.11 | 2.50 | 84 | 49-131 | 3 | 30 |
| Benzo(k)fluoranthene | 2.28 | 2.50 | 91 | 2.28 | 2.50 | 91 | 54-131 | 0 | 30 |
| Benzo(a)pyrene | 2.20 | 2.50 | 88 | 2.14 | 2.50 | 85 | 43-134 | 3 | 30 |
| Indeno(1,2,3-cd)pyrene | 2.07 | 2.50 | 83 | 2.03 | 2.50 | 81 | 45-133 | 2 | 30 |
| Dibenz(a,h)anthracene | 2.09 | 2.50 | 84 | 2.05 | 2.50 | 82 | 49-133 | 2 | 30 |
| Benzo(g,h,i)perylene | 2.12 | 2.50 | 85 | 2.07 | 2.50 | 83 | 51-124 | 2 | 30 |
| Pentachlorophenol | 9.76 | 10.0 | 98 | 9.98 | 10.0 | 100 | 10-123 | 2 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

# Subcontract Lab Results

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

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10450 Stancliff Rd., Suite 210
Houston, TX 77099
T: +1 713 266 1599
F: +1 713 266 1599
www.alsglobal.com

February 21, 2016. Service Request No: K1601155

Chris Leaf.

ALS Environmental
1317 South 13th Avenue
Kelso, WA 98626

**Laboratory Result for: Barr Engineering.**
Dear Chris:

Enclosed are the results of the sample(s) submitted to our laboratory on February 09, 2016. For Your reference, these analyses have been assigned our service request number: **K1601155.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current TNI standards, where applicable, and considered in their entirety, and ALS Environmental is not responsible for use of less than the final complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. In accordance to the TNI 2009 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Please contact me if you have any questions. My direct line is 281-575-2279. You may also contact me via email at Arthi.Kodur@alsglobal.com

Respectfully submitted,

**ALS Group USA Corp., dba ALS Environmental**

Arthi Kodur
Project Manager

Page 1 of 28

# Certificate of Analysis

**ALS Environmental - Houston HRMS**
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
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## ALS ENVIRONMENTAL

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request No.:** | K1601155 |
| **Project:** | Joslyn/ 23271102016270 | **Date Received:** | 2/9/16 |
| **Sample Matrix:** | Water | | |

## ALS ENVIRONMENTAL NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II. When appropriate to the method, method blank results have been reported with each analytical test.

### Sample Receipt

One water sample was received for analysis at ALS Environmental – Houston HRMS on 2/9/16.

The date of receipt currently references the date ALS Environmental-Kelso received the samples (2/5/16) and not the date ALS Environmental-Houston HRMS received the samples (2/9/16).

The sample was received at 4.6°C in good condition and is consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

### Data Validation Notes and Discussion

### Precision and Accuracy

EQ1600072: Laboratory Control Spike (LCS) sample was analyzed and reported in addition to an MS/DMS/Duplicate for this extraction batch. The batch quality control criteria were met. Batch precision (MS/DMS) measurements were determined on a sample unrelated to this Service Request. The MS/DMS/Duplicate results are not included in this report.

### Detection Limits

Detection limits are calculated for each analyte in each sample by measuring the height of the noise level for each quantitation ion for the associated labeled standard. The concentration equivalent to 2.5 times the height of the noise is then calculated using the appropriate response factor and the weight of the sample. The calculated concentration equals the detection limit.

When the EDL is greater than the MRL, the EDL will increase to equal the MRL.

*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such*

*Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*

**Client:** Barr Engineering Company **Service Request:**K1601155
**Project:** Joslyn/23271102016270

## SAMPLE CROSS-REFERENCE

| SAMPLE # | CLIENT SAMPLE ID | DATE | TIME |
|---|---|---|---|
| K1601155-001 | U1 | 2/4/2016 | 1010 |
| K1601155-002 | Tank Eff. | 2/4/2016 | 1100 |

# Service Request Summary

**Folder #:** **K1601155**
Client Name: Barr Engineering Company
Project Name: Joslyn
Project Number: 23271102016270

**Report To:** Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435
USA
Phone Number: 952-842-3578
Cell Number:
Fax Number:
E-mail: tolson@barr.com

Project Chemist: Chris Leaf
Originating Lab: KELSO
Logged By: ARYNEVICH
Date Received: 02/05/16
Internal Due Date: 2/22/2016
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: N
P.O. Number:
EDD: BARR - EQUIS

| | |
|---|---|
| 6 | 1000 ml-Glass Bottle NM AMBER Teflon Liner Unpreserved |
| 1 | 500 mL-Glass Bottle NM AMBER Teflon Liner H2SO4 |
| 1 | 1000 mL-Plastic Bottle NM CLEAR Unpreserved |
| 1 | 1000 mL-Glass Bottle NM AMBER Teflon Liner HCL |

**Location:** K-Delilah-92, K-Disposed, EHRMS-WIC 10D, E-Disposed

**Pressure Gas:**

**NPDES**

| | | | | KELSO | | KELSO | | | | HOUSTON |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lab Samp No.** | **Client Samp No** | **Matrix** | **Collected** | SVO SIM/8270D SIM | SVO/8270D | COD T/SM 5220 C | OG HEM/1664A | pH/SM 4500-H+ B | TSS/SM 2540 D | Dioxins Furans/1613B |
| K1601155-001 | U1 | Water | 02/04/16 1010 | V | | | | | | |
| K1601155-002 | Tank Eff. | Water | 02/04/16 1100 | | V | V | V | V | V | II |

## Folder Comments:

Tier II except when requested otherwise. Add narrative note that Benzo(b)fluoranthene cannot be separated from Benzo(j)fluoranthene.

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# Service Request Summary

| | | | | | |
|---|---|---|---|---|---|
| **Folder #:** | **K1601155** | Project Chemist: | Chris Leaf | 6 | 1000 ml-Glass Bottle NM AMBER Teflon Liner Unpreserved |
| Client Name: | Barr Engineering Company | Originating Lab: | KELSO | 1 | 500 mL-Glass Bottle NM AMBER Teflon Liner H2SO4 |
| Project Name: | Joslyn | Logged By: | ARYNEVICH | 1 | 1000 mL-Plastic Bottle NM CLEAR Unpreserved |
| Project Number: | 23271102016270 | Date Received: | 02/05/16 | 1 | 1000 mL-Glass Bottle NM AMBER Teflon Liner HCL |
| | | Internal Due Date: | 2/22/2016 | **Location:** | K-Delilah-92, K-Disposed, EHRMS-WIC 10D, E-Disposed |
| **Report To:** | Terri Olson<br>Barr Engineering<br>4300 MarketPointe Drive , Suite 200<br>Minneapolis, MN 55435<br>USA | QAP: | LAB QAP | **Pressure Gas:** | |
| | | Qualifier Set: | Lab Standard | **NPDES** | |
| | | Formset: | Lab Standard | | |
| | | Merged?: | Y | | |
| Phone Number: | 952-842-3578 | Report to MDL?: | N | | |
| Cell Number: | | P.O. Number: | | | |
| Fax Number: | | EDD: | BARR - EQUIS | | |
| E-mail: | tolson@barr.com | | | | |

## Test Comments:

| Group | Test/Method | Samples | Comments |
|---|---|---|---|
| Semivoa GCMS | SVO/8270D | 1 | Attached analytes |
| Semivoa GCMS | SVO SIM/8270D SIM | 1 | PAH and PCP. PAH and PCP Take extract to 3 ml FV so that PCP can be reported to 0.3 ug/L |
| Semivoa GCMS | Dioxins Furans/1613B | 1 | 2,3,7,8-TCDD only. |

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# Data Qualifiers

## HRMS Qualifier Set

| | |
|---|---|
| B | Indicates the associated analyte was found in the method blank at >1/10th the reported value. |
| E | Estimated value.  The reported concentration is above the calibration range of the instrument. |
| H | Sample extracted and/or analyzed out of suggested holding time. |
| J | Estimated value.  The reported concentration is below the MRL. |
| K | The ion abundance ratio between the primary and secondary ions were outside of theoretical acceptance limits.  Reported concentration is a conservative estimate, however EMPC correction was not applied. |
| P | Chlorodiphenyl ether interference was present at the retention time of the target analyte. Reported result should be considered an estimate. |
| Q | Monitored lock-mass indicates matrix-interference.  Reported result is estimated. |
| S | Signal saturated detector.  Result reported from dilution. |
| U | Compound was analyzed for, but was not detected (ND). |
| X | See Case Narrative. |
| Y | Isotopically Labeled Standard recovery outside of acceptance limits.  In all cases, the signal-to-nois ratios are greater than 10:1, making the recoveries acceptable. |
| i | The MDL/MRL have been elevated due to a matrix interference. |

## Acronyms

| | |
|---|---|
| Cal | Calibration |
| Conc | CONCentration |
| Dioxin(s) | Polychlorinated dibenzo-p-dioxin(s) |
| EDL | Estimated Detection Limit |
| EMPC | Estimated Maximum Possible Concentration |
| Flags | Data qualifiers |
| Furan(s) | Polychlorinated dibenzofuran(s) |
| g | Grams |
| ICAL | Initial CALibration |
| ID | IDentifier |
| Ions | Masses monitored for the analyte during data acquisition |
| L | Liter (s) |
| LCS | Laboratory Control Sample |
| DLCS | Duplicate Laboratory Control Sample |
| MB | Method Blank |
| MCL | Method Calibration Limit |
| MDL | Method Detection Limit |
| mL | Milliliters |
| MS | Matrix Spiked sample |
| DMS | Duplicate Matrix Spiked sample |
| NO | Number of peaks meeting all identification criteria |
| PCDD(s) | Polychlorinated dibenzo-p-dioxin(s) |
| PCDF(s) | Polychlorinated dibenzofuran(s) |
| ppb | Parts per billion |
| ppm | Parts per million |
| ppq | Parts per quadrillion |
| ppt | Parts per trillion |
| QA | Quality Assurance |
| QC | Quality Control |
| Ratio | Ratio of areas from monitored ions for an analyte |
| % Rec. | Percent recovery |
| RPD | Relative Percent Difference |
| RRF | Relative Response Factor |
| RT | Retention Time |
| SDG | Sample Delivery Group |
| S/N | Signal-to-noise ratio |
| TEF | Toxicity Equivalence Factor |
| TEQ | Toxicity Equivalence Quotient |

# State Certifications, Accreditations, and Licenses

| Agency | Number | Expire Date |
|---|---|---|
| American Association for Laboratory Accreditation | 2897.01 | 11/30/2017 |
| Arizona Department of Health Services | AZ0793 | 5/27/2016 |
| Arkansas Department of Environmental Quality | 14-038-0 | 6/16/2016 |
| California Department of Health Services | 2452 | 2/28/2017 |
| Florida Department of Health | E87611 | 6/30/2016 |
| Hawaii Department of Health | TX02694 | 6/30/2016 |
| Illinois Environmental Protection Agency | 200057 | 10/6/2016 |
| Kansas Department of Health and Environment | E-10406 | 5/31/2016 |
| Louisiana Department of Environmental Quality | 03048 | 6/30/2016 |
| Louisiana Department of Health and Hospitals | LA150026 | 12/31/2016 |
| Maine Center for Disease Control and Prevention | 2014019 | 6/5/2016 |
| Maryland Department of the Environment | 343 | 6/30/2016 |
| Michigan Depratment of Environmental Quality | 9971 | 6/30/2016 |
| Minnesota Department of Health | 840911 | 12/31/2016 |
| Nebraska Department of Health and Human Services | NE-OS-25-13 | 6/30/2016 |
| Nevada Department of Concervation and Natural Resources | TX014112013-2 | 7/31/2016 |
| New Jersey Department of Environmental Protection | NLC140001 | 6/30/2016 |
| New Mexico Environment Department | TX02694 | 6/30/2016 |
| New York Department of Health | 11707 | 4/1/2016 |
| Oklahoma Department of Environmental Quality | 2014 124 | 8/31/2016 |
| Oregon Environmental Laboratory Accreditation Program | TX200002 | 3/24/2016 |
| Pennsylvania Department of Environmental Protection | 68-03441 | 6/30/2016 |
| Tennessee Department of Environment and Concervation | 04016 | 6/30/2016 |
| Texas Commision on Environmental Quality | TX104704216-14-5 | 6/30/2016 |
| United States Department of Agriculture | P330-14-00067 | 2/21/2017 |
| Utah Department of Health Environmental Laboratory Certification | TX02694 | 7/31/2016 |
| Washington Department of Health | c819 | 11/14/2016 |
| West Virginia Department of Environmental Protection | 347 | 6/30/2016 |

# ALS ENVIRONMENTAL – Houston
## Data Processing/Form Production and Peer Review Signatures

SR# Unique ID K16 01155

[✓ DB-5MSUI] SPB-Octyl

**First Level - Data Processing** – to be filled by person generating the forms

| Date: | Analyst: | Samples: |
|---|---|---|
| 02/20/16 | JC | -002 |
| | | |

**Second Level - Data Review** – to be filled by person doing peer review

| Date: | Analyst: | Samples: |
|---|---|---|
| 02/21/16 | LKL | 002 |
| | | |

# Chain of Custody

**ALS Environmental - Houston HRMS**
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

# Intra-Network Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

**ALS Contact:** Chris Leaf

**Project Name:** Joslyn
**Project Number:** 23271102016270
**Project Manager:** Terri Olson
**Company:** Barr Engineering
**QAP:** LAB QAP

| Lab Code | Client Sample ID | # of Cont. | Matrix | Sample Date | Sample Time | Date Received | Send To | Dioxins Furans 1613B |
|---|---|---|---|---|---|---|---|---|
| K1601155-002 | Tank Eff. | 2 | Water | 2/4/16 | 1100 | 2/5/16 | HOUSTON | V |

**Test Comments**

| | | |
|---|---|---|
| Dioxins Furans - 1613B | K1601155-002 | 2,3,7,8-TCDD only. |

**Folder Comments:**
Tier II except when requested otherwise. Add narrative note that Benzo(b)fluoranthene cannot be separated from Benzo(j)fluoranthene.

**K1601155** **5**
**Barr Engineering**
**Joslyn**

**Special Instructions/Comments**
Please provide the electronic (PDF and EDD) report to the following e-mail address: ALKLS.Data@alsglobal.com.

**NPDES**

Cl 2/5/16

pH Checked ________

**Turnaround Requirements**

_____ **RUSH** (Surcharges Apply)

**PLEASE CIRCLE WORK DAYS**
1 2 3 4 5

✓ **STANDARD**

Requested FAX Date: ___________

Requested Report Date: 02/22/16

**Report Requirements**

____ I. Results Only
✓ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data

PQL/MDL/J N
EDD Y

**Invoice Information**

PO#
51K1601155

Bill to

Relinquished By: 2/8/16

Received By: D Woods 2.9.16 9 am

Airbill Number: ____________

ALS Environmental

# Cooler Receipt Form

Project Chemist ____________

Client/Project Kelso - ALS

Thermometer ID SMO 04

Date/Time Received: 2-9-16 8:40AM Initials: JW

Date/Time Logged in: 8:40 Initials JW

1. Method of delivery: ○ US Mail ● Fed Ex ○ UPS ○ DHL ○ Courier ○ Client

2. Samples received in: ● Cooler ○ Box ○ Envelope ○ Other ____________

3. Were custody seals on coolers? ○ Yes ○ No

If yes, how many and where? 1 seal

Were they intact? ○ Yes ○ No ○ N/A

Were they signed and dated? ○ Yes ○ No ○ N/A

4. Packing Material: ● Inserts ○ Baggies ● Bubble Wrap ● Gel Packs ○ Wet Ice ○ Sleeves ○ Other ____________

5. Foreign or Regulated Soil? ○ Yes ○ No

Location of Sampling: ____________

| Cooler Tracking Number | COC ID | Date Opened | Time Opened | Opened By | Temp °C | Temp Blank? |
|---|---|---|---|---|---|---|
| 6447 9270 2902 | | 2-9-16 | 10:04AM | JW | 2.6/4.6 | ☑ |
| | | | | | | ☐ |
| | | | | | | ☐ |
| | | | | | | ☐ |

6. Were custody papers properly filled out (ink, signed, dated, etc)? ● Yes ○ No

7. Did all bottles arrive in good condition (not broken, no signs of leakage)? ● Yes ○ No

8. Were all sample labels complete (i.e., sample ID, analysis, preservation, etc)? ● Yes ○ No

9. Were appropriate bottles/containers and volumes received for the requested tests? ● Yes ○ No

10. Did sample labels and tags agree with custody documents? ● Yes ○ No

Notes, Discrepancies, & Resolutions:

Service request Label:

K1601155 5
Barr Engineering
Joslyn

10450 Stancliff Rd., Suite 210
Houston, TX 77099
**T:** +1 713 266 1599
**F:** +1 713 266 1599
**www.alsglobal.com**

# SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental – Houston HRMS.

**Cooler Custody Seals (desirable, mandatory if specified in SAP):**

- ✓ Intact on outside of cooler, signed and dated

**Chain-of-Custody (COC) documentation (mandatory):**

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sampleThe COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

**Sample Integrity (mandatory):**

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

**Temperature Requirement (varies by sample matrix):**

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6°C.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10°C.
- ✓ Air samples are shipped and stored cold, at 0 to 6°C
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report

# Preparation Information Benchsheets

**ALS Environmental - Houston HRMS**
10450 Stancliff Rd., Suite 210, Houston, TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

# *Preparation Information Benchsheet*

**Prep Run#:** 255457 **Prep WorkFlow:** OrgExtAq(365) **Status:** Prepped
**Team:** Semivoa GCMS/DEDWARDS **Prep Method:** EPA 3510C **Prep Date/Time:** 2/11/16 01:45 PM

| # | Lab Code | Client ID | B# | Method /Test | pH | Cl | Matrix | Amt. Ext. | Sample Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | E1600081-001RE | 2120908 001 | .02 | 1613B/Dioxins Furans | 7 | - | Wastewater | 1064mL | Clear Liquid |
| 2 | E1600097-006 | BP-2200 Equistar/Basell CS | .02 | 1613B/Dioxins Furans | 7 | - | Wastewater | 1063mL | Clear Liquid |
| 3 | E1600098-001 | BP-2260 PeroxyChem BS | .02 | 1613B/Dioxins Furans | 3 | - | Wastewater | 1058mL | Clear Cloudy Liquid |
| 4 | E1600099-001 | 16-02583 | .01 | 1613B/Dioxins Furans | 7 | - | Water | 1011mL | Clear Liquid |
| 5 | E1600100-001 | DOT JAVA 1 | .01 | 1613B/Dioxins Furans | 7 | - | Drinking Water | 1024mL | Clear Liquid |
| 6 | E1600101-001 | 2122405 001 | .01 | 1613B/Dioxins Furans | 5 | - | Drinking Water | 1034mL | Clear Liquid |
| 7 | E1600102-001 | 2122262 001 | .01 | 1613B/Dioxins Furans | 7 | - | Drinking Water | 1041mL | Clear Liquid |
| 8 | E1600103-001 | 2122198 001 | .01 | 1613B/Dioxins Furans | 6 | - | Drinking Water | 1062mL | Clear Liquid |
| 9 | E1600106-001 | Bleach Plant Composite | .01 | 1613B/Dioxins Furans | 5 | - | Wastewater | 1063mL | Yellow Opaque Liquid |
| 10 | E1600118-001 | 1602184-01 | .01 | 1613B/Dioxins Furans | 6 | - | Water | 1034mL | thick tan liquid |
| 11 | EQ1600072-01 | MB | | 1613B/Dioxins Furans | 5 | - | Liquid | 1000mL | |
| 12 | EQ1600072-02 | LCS | | 1613B/Dioxins Furans | 5 | - | Liquid | 1000mL | |
| 13 | EQ1600072-03 | SI EFF Comp Dioxin log# 16012309-011 | .02 | 1613B/Dioxins Furans | 7 | - | Liquid | 1035mL | |
| 14 | EQ1600072-04 | SI EFF Comp Dioxin log# 16012309-011 | .02 | 1613B/Dioxins Furans | 7 | - | Liquid | 1023mL | |
| 15 | EQ1600072-05 | SI EFF Comp Dioxin log# 16012309-011 | .02 | 1613B/Dioxins Furans | 7 | - | Liquid | 1047mL | |
| 16 | EQ1600072-06 | MB | | 1613B/Dioxins Furans | 5 | - | Drinking Water | 1000mL | |
| 17 | EQ1600072-07 | LCS | | 1613B/Dioxins Furans | 5 | - | Drinking Water | 1000mL | |
| 18 | J1600849-001 | No 1 Liftstation | .01 | 1613B/Dioxins Furans | 7 | - | Water | 975mL | Brown Opaque Liouid |
| 19 | J1600849-002 | Fiberline Liftstation | .01 | 1613B/Dioxins Furans | 9 | - | Water | 973mL | Brown Opaque Liouid |
| 20 | J1600880-001 | Mill Discharge EFF-1 | .01 | 1613B/Dioxins Furans | 7 | - | Water | 994mL | Brown Opaque Liouid |
| 21 | K1601032-003 | SI INF Comp Dioxin log# 16012309-005 | .02 | 1613B/Dioxins Furans | 7 | - | Water | 1028mL | Green Tint Liquid w/Debri |
| 22 | K1601032-004 | SI EFF Comp Dioxin log# 16012309-011 | .02 | 1613B/Dioxins Furans | 7 | - | Water | 1038mL | Grenn Tint Liquid w/Debri |
| 23 | K1601115-001 | Downstream | .01 | 1613B/Dioxins Furans | 6 | - | Water | 938mL | Clear Liquid |
| 24 | K1601115-002 | Upstream | .01 | 1613B/Dioxins Furans | 6 | - | Water | 893mL | Clear Liquid |
| 25 | K1601155-002 | Tank Eff. | .03 | 1613B/Dioxins Furans | 7 | - | Water | 980mL | Green Tint Liquid |

# *Preparation Information Benchsheet*

**Prep Run#:** 255457
**Team:** Semivoa GCMS/DEDWARDS
**Prep WorkFlow:** OrgExtAq(365)
**Prep Method:** EPA 3510C
**Status:** Prepped
**Prep Date/Time:** 2/11/16 01:45 PM

**Spiking Solutions**

Name: 1613B Matrix Working Standard Inventory ID 87500 Logbook Ref: 87500 DE 1/20/16 2-20ng/mL Expires On: 07/18/2016

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| EQ1600072-02 | 100.00µL | EQ1600072-03 | 100.00µL | EQ1600072-04 | 100.00µL | EQ1600072-07 | 100.00µL |

Name: 8290/1613B Cleanup Working Standard Inventory ID 87876 Logbook Ref: 87876 CID 02/04/2016 8.0ng/ml Expires On: 08/02/2016

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E1600081-001 | 100.00µL | E1600097-006 | 100.00µL | E1600098-001 | 100.00µL | E1600099-001 | 100.00µL | E1600100-001 | 100.00µL | E1600101-001 | 100.00µL |
| E1600102-001 | 100.00µL | E1600103-001 | 100.00µL | E1600106-001 | 100.00µL | E1600118-001 | 100.00µL | EQ1600072-01 | 100.00µL | EQ1600072-02 | 100.00µL |
| EQ1600072-03 | 100.00µL | EQ1600072-04 | 100.00µL | EQ1600072-05 | 100.00µL | J1600849-001 | 100.00µL | J1600849-002 | 100.00µL | J1600880-001 | 100.00µL |
| K1601032-003 | 100.00µL | K1601032-004 | 100.00µL | K1601115-001 | 100.00µL | K1601115-002 | 100.00µL | K1601155-002 | 100.00µL | | |

Name: 1613B Labeled Working Standard Inventory ID 87986 Logbook Ref: TW 87986 02/10/16 2-4ng/mL Expires On: 07/03/2016

| | |
|---|---|
| E1600118-001 | 1,000.00µL |

Name: 1613B Labeled Working Standard Inventory ID 88006 Logbook Ref: 88006 DE 2/11/16 2-4ng/mL Expires On: 07/03/2016

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E1600081-001 | 1,000.00µL | E1600097-006 | 1,000.00µL | E1600098-001 | 1,000.00µL | E1600099-001 | 1,000.00µL | E1600100-001 | 1,000.00µL | E1600101-001 | 1,000.00µL |
| E1600102-001 | 1,000.00µL | E1600103-001 | 1,000.00µL | E1600106-001 | 1,000.00µL | EQ1600072-01 | 1,000.00µL | EQ1600072-02 | 1,000.00µL | EQ1600072-03 | 1,000.00µL |
| EQ1600072-04 | 1,000.00µL | EQ1600072-05 | 1,000.00µL | EQ1600072-06 | 1,000.00µL | EQ1600072-07 | 1,000.00µL | J1600849-001 | 1,000.00µL | J1600849-002 | 1,000.00µL |
| J1600880-001 | 1,000.00µL | K1601032-003 | 1,000.00µL | K1601032-004 | 1,000.00µL | K1601115-001 | 1,000.00µL | K1601115-002 | 1,000.00µL | K1601155-002 | 1,000.00µL |

## Preparation Materials

| | | | | | |
|---|---|---|---|---|---|
| Sensafe Free Chlorine WTR CHK | LM 3/19/15 (79756) | Carbon, High Purity | AL 11/02/15 (85542) | Ethyl Acetate 99.9% Minimum EtOAc | LM 10/8/15 (84814) |
| Glass Wool | AL 12/4/15 (86383) | Hexanes 95% | DE 2-2-16 (87787) | Dichloromethane (Methylene Chloride) 99.9% MeCl2 | JP 2/11/16 (88015) |
| Sodium Chloride Reagent Grade NaCl | C2-65-5 (38670) | Sodium Hydroxide Reagent Grade NaOH | LM 09/02/14 (74232) | Sodium Sulfate Anhydrous Reagent Grade Na2SO4 | AL 1/4/16 (87086) |
| Tridecane (n-Tridecane) | AL 1/04/16 (87081) | Canola Oil (Wesson) | 2-26-15 DE (79065) | Silica Gel | CID 12/21/2015 (86823) |
| sulfuric acid | CID 11/06/15 (85764) | Toluene 99.9% Minimum | CID 12/30/2015 (87037) | | |

## Preparation Steps

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Step: | Extraction | Step: | Acid Clean | Step: | Silica Gel Clean | Step: | Final Volume |
| Started: | 2/11/16 13:45 | Started: | 2/16/16 10:10 | Started: | 2/16/16 09:00 | Started: | 2/17/16 10:25 |
| Finished: | 2/12/16 13:30 | Finished: | 2/16/16 10:35 | Finished: | 2/16/16 11:00 | Finished: | 2/17/16 11:00 |
| By: | DEDWARDS | By: | CDIAZ | By: | CDIAZ | By: | CDIAZ |
| Comments | | Comments | | Comments | | Comments | |

# *Preparation Information Benchsheet*

**Prep Run#:** 255457 **Prep WorkFlow:** OrgExtAq(365) **Status:** Prepped
**Team:** Semivoa GCMS/DEDWARDS **Prep Method:** EPA 3510C **Prep Date/Time:** 2/11/16 01:45 PM

Comments:

Reviewed By: ak Date: 2/19/16

Chain of Custody

Relinquished By: Date:

Received By: Date:

Extracts Examined
Yes No

# Analytical Results

**ALS Environmental - Houston HRMS**
10450 Stancliff Rd., Suite 210, Houston, TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | 02/04/16 11:00 |
| **Sample Matrix:** | Water | **Date Received:** | 02/05/16 10:40 |
| **Sample Name:** | Tank Eff. | **Units:** | pg/L |
| **Lab Code:** | K1601155-002 | **Basis:** | NA |

## Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1613B | **Date Analyzed:** | 02/17/16 20:11 |
| **Prep Method:** | EPA 3510C | **Date Extracted:** | 2/11/16 |
| **Sample Amount:** | 980mL | **Instrument Name:** | E-HRMS-07 |
| | | **GC Column:** | DB-5MSUI |
| **Data File Name:** | P503008 | **Blank File Name:** | P402088 |
| **ICAL Date:** | 06/30/15 | **Cal Ver. File Name:** | P502999 |

### Native Analyte Results

| Analyte Name | Result | Q | EDL | MRL | Ion Ratio | RRT | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 2,3,7,8-TCDD | ND | U | 0.693 | 5.10 | | | 1 |

## ALS Group USA, Corp. dba ALS Environmental

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | 02/04/16 11:00 |
| **Sample Matrix:** | Water | **Date Received:** | 02/05/16 10:40 |
| **Sample Name:** | Tank Eff. | **Units:** | Percent |
| **Lab Code:** | K1601155-002 | **Basis:** | NA |

### Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1613B | **Date Analyzed:** | 02/17/16 20:11 |
| **Prep Method:** | EPA 3510C | **Date Extracted:** | 2/11/16 |
| **Sample Amount:** | 980mL | **Instrument Name:** | E-HRMS-07 |
| | | **GC Column:** | DB-5MSUI |
| **Data File Name:** | P503008 | **Blank File Name:** | P402088 |
| **ICAL Date:** | 06/30/15 | **Cal Ver. File Name:** | P502999 |

### Labeled Standard Results

| Labeled Compounds | Spike Conc.(pg) | Conc. Found (pg) | % Rec | Q | Control Limits | Ion Ratio | RRT |
|---|---|---|---|---|---|---|---|
| 13C-2,3,7,8-TCDD | 2000 | 1682.478 | 84 | | 25-164 | 0.79 | 1.018 |
| 37Cl-2,3,7,8-TCDD | 800 | 744.780 | 93 | | 35-197 | NA | 1.020 |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| **Sample Name:** | Method Blank | **Units:** | pg/L |
| **Lab Code:** | EQ1600072-01 | **Basis:** | NA |

## Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1613B | **Date Analyzed:** | 02/17/16 13:30 |
| **Prep Method:** | EPA 3510C | **Date Extracted:** | 2/11/16 |
| **Sample Amount:** | 1000mL | **Instrument Name:** | E-HRMS-06 |
| | | **GC Column:** | DB-5MSUI |
| **Data File Name:** | P402088 | **Blank File Name:** | P402088 |
| **ICAL Date:** | 12/10/15 | **Cal Ver. File Name:** | P402087 |

### Native Analyte Results

| Analyte Name | Result | Q | EDL | MRL | Ion Ratio | RRT | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 2,3,7,8-TCDD | ND | U | 7.44 | 7.44 | | | 1 |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| **Sample Name:** | Method Blank | **Units:** | Percent |
| **Lab Code:** | EQ1600072-01 | **Basis:** | NA |

## Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1613B | **Date Analyzed:** | 02/17/16 13:30 |
| **Prep Method:** | EPA 3510C | **Date Extracted:** | 2/11/16 |
| **Sample Amount:** | 1000mL | **Instrument Name:** | E-HRMS-06 |
| | | **GC Column:** | DB-5MSUI |
| **Data File Name:** | P402088 | **Blank File Name:** | P402088 |
| **ICAL Date:** | 12/10/15 | **Cal Ver. File Name:** | P402087 |

### Labeled Standard Results

| Labeled Compounds | Spike Conc.(pg) | Conc. Found (pg) | % Rec | Q | Control Limits | Ion Ratio | RRT |
|---|---|---|---|---|---|---|---|
| 13C-2,3,7,8-TCDD | 2000 | 1265.384 | 63 | | 25-164 | 0.75 | 1.022 |
| 37Cl-2,3,7,8-TCDD | 800 | 569.758 | 71 | | 35-197 | NA | 1.023 |

# Accuracy & Precision

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www.alsglobal.com

**ALS Group USA, Corp.**
**dba ALS Environmental**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Analyzed:** | 02/17/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | 02/11/16 |

## Lab Control Sample Summary
## Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1613B | **Units:** | pg/L |
| **Prep Method:** | EPA 3510C | **Basis:** | NA |
| | | **Analysis Lot:** | 484767 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | EQ1600072-02 | 198 | 200 | 99 | 67-158 |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| **Sample Name:** | Lab Control Sample | **Units:** | pg/L |
| **Lab Code:** | EQ1600072-02 | **Basis:** | NA |

## Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1613B | **Date Analyzed:** | 02/17/16 19:33 |
| **Prep Method:** | EPA 3510C | **Date Extracted:** | 2/11/16 |
| **Sample Amount:** | 1000mL | **Instrument Name:** | E-HRMS-08 |
| | | **GC Column:** | DB-5MSUI |
| **Data File Name:** | P602920 | **Blank File Name:** | P402088 |
| **ICAL Date:** | 08/19/15 | **Cal Ver. File Name:** | P602914 |

### Native Analyte Results

| Analyte Name | Result | Q | EDL | MRL | Ion Ratio | RRT | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 2,3,7,8-TCDD | 198 | | 2.08 | 5.00 | 0.79 | 1.001 | 1 |

## ALS Group USA, Corp. dba ALS Environmental

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1601155 |
| **Project:** | Joslyn/23271102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| **Sample Name:** | Lab Control Sample | **Units:** | Percent |
| **Lab Code:** | EQ1600072-02 | **Basis:** | NA |

### Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1613B | **Date Analyzed:** | 02/17/16 19:33 |
| **Prep Method:** | EPA 3510C | **Date Extracted:** | 2/11/16 |
| **Sample Amount:** | 1000mL | **Instrument Name:** | E-HRMS-08 |
| | | **GC Column:** | DB-5MSUI |
| **Data File Name:** | P602920 | **Blank File Name:** | P402088 |
| **ICAL Date:** | 08/19/15 | **Cal Ver. File Name:** | P602914 |

### Labeled Standard Results

| Labeled Compounds | Spike Conc.(pg) | Conc. Found (pg) | % Rec | Q | Control Limits | Ion Ratio | RRT |
|---|---|---|---|---|---|---|---|
| 13C-2,3,7,8-TCDD | 2000 | 1229.463 | 61 | | 25-164 | 0.75 | 1.023 |
| 37Cl-2,3,7,8-TCDD | 800 | 528.761 | 66 | | 35-197 | NA | 1.025 |

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August 31, 2016

**Analytical Report for Service Request No:** K1607321
**Revised Service Request No:** K1607321.03

Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435

**RE: Joslyn / 232701102016 270**

Dear Terri,

Enclosed is the revised report for the sample(s) submitted to our laboratory July 01, 2016
For your reference, these analyses have been assigned our service request number **K1607321.**

The analytes of interest reported by 8270D SIM have been corrected to lower Method Reporting Levels. This revision supersedes the report dated August 30, 2016.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

We apologize for any inconvenience this may have created.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Chris Leaf
Project Manager

**REVISED**
**2:48 pm, Aug 31, 2016**

**REVISED**
**10:29 am, Aug 30, 2016**

**REVISED**
**12:01 pm, Aug 29, 2016**

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# Table of Contents

**REVISED**
**12:04 pm, Aug 29, 2016**

# Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| A2LA | American Association for Laboratory Accreditation |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MCL | Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| NA | Not Applicable |
| NC | Not Calculated |
| NCASI | National Council of the Paper Industry for Air and Stream Improvement |
| ND | Not Detected |
| NIOSH | National Institute for Occupational Safety and Health |
| PQL | Practical Quantitation Limit |
| RCRA | Resource Conservation and Recovery Act |
| SIM | Selected Ion Monitoring |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. |

## Inorganic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| E | The result is an estimate amount because the value exceeded the instrument calibration range. |
| J | The result is an estimated value. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |
| H | The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory. |

## Metals Data Qualifiers

| | |
|---|---|
| # | The control limit criteria is not applicable. See case narrative. |
| J | The result is an estimated value. |
| E | The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample. |
| M | The duplicate injection precision was not met. |
| N | The Matrix Spike sample recovery is not within control limits. See case narrative. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| W | The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| + | The correlation coefficient for the MSA is less than 0.995. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Organic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| A | A tentatively identified compound, a suspected aldol-condensation product. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| C | The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data. |
| D | The reported result is from a dilution. |
| E | The result is an estimated value. |
| J | The result is an estimated value. |
| N | The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed. |
| P | The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Additional Petroleum Hydrocarbon Specific Qualifiers

| | |
|---|---|
| F | The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard. |
| L | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard. |
| H | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard. |
| O | The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard. |
| Y | The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. |
| Z | The chromatographic fingerprint does not resemble a petroleum product. |

## ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
## State Certifications, Accreditations, and Licenses

| Agency | Web Site | Number |
|---|---|---|
| Alaska DEC UST | http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx | UST-040 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0339 |
| Arkansas - DEQ | http://www.adeq.state.ar.us/techsvs/labcert.htm | 88-0637 |
| California DHS (ELAP) | http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx | 2795 |
| DOD ELAP | http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm | L14-51 |
| Florida DOH | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E87412 |
| Hawaii DOH | Not available | - |
| ISO 17025 | http://www.pjlabs.com/ | L16-57 |
| Louisiana DEQ | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 03016 |
| Maine DHS | Not available | WA01276 |
| Minnesota DOH | http://www.health.state.mn.us/accreditation | 053-999-457 |
| Montana DPHHS | http://www.dphhs.mt.gov/publichealth/ | CERT0047 |
| Nevada DEP | http://ndep.nv.gov/bsdw/labservice.htm | WA01276 |
| New Jersey DEP | http://www.nj.gov/dep/oqa/ | WA005 |
| North Carolina DWQ | http://www.dwqlab.org/ | 605 |
| Oklahoma DEQ | http://www.deq.state.ok.us/CSDnew/labcert.htm | 9801 |
| Oregon – DEQ (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | WA100010 |
| South Carolina DHEC | http://www.scdhec.gov/environment/envserv/ | 61002 |
| Texas CEQ | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704427 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C544 |
| Wisconsin DNR | http://dnr.wi.gov/ | 998386840 |
| Wyoming (EPA Region 8) | http://www.epa.gov/region8/water/dwhome/wyomingdi.html | - |
| Kelso Laboratory Website | www.alsglobal.com | NA |

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

# Case Narrative

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

REVISED
10:29 am, Aug 30, 2016

REVISED
12:01 pm, Aug 29, 2016

# ALS ENVIRONMENTAL

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request No.:** | K1607321 |
| **Project:** | Joslyn/ 232701102016 270 | **Date Received:** | 07/01/16 |
| **Sample Matrix:** | Water | | |

## Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

### Sample Receipt

Four water samples were received for analysis at ALS Environmental on 07/01/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

### General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

### Semivolatile Organic Compounds by EPA Method 8270

**Calibration Verification Exceptions:**
The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS07\0712F002.D and MS07\0713F003.D: 2,4,6-Tribromophenol. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

**Matrix Spike Recovery Exceptions:**
The lower control criterion was exceeded by 1-3% for several analytes in replicate Matrix Spikes (MS/DMS) KWG1605527-4 and KWG1605527-5 of sample Batch QC. The matrix spike outliers suggested a potential low bias in this matrix. No further corrective action was taken.

**Lab Control Sample Exceptions:**
The lower control criterion was exceeded by 2-3% for Acenaphthylene in replicate Laboratory Control Samples (LCS/DLCS) KWG1605527-1 and KWG1605527-2. The analyte in question was not detected in the associated field samples. The error associated with reduced recovery equates to a potential slight low bias. The results were flagged to indicate the issue. No further corrective action was taken.

**Approved by**________________________________________

The lower control criterion was exceeded by 3% for Acenaphthene in Duplicate Laboratory Control Sample (DLCS) KWG1605527-2. The analyte in question was detected in the field sample TANK EFF. The error associated with reduced recovery equates to a potential slight low bias. The results were flagged to indicate the issue. No further corrective action was taken.

No other anomalies associated with the analysis of these samples were observed.

## Polynuclear Aromatic Hydrocarbons by EPA Method 8270

**Laboratory Notes and Discussion:**
Samples U1, W6N, and W7 were initially extracted and analyzed within acceptable holding time for Polynuclear Aromatic Hydrocarbons and Pentachlorophenol by EPA Method 8270D GC/MS. The samples were re-extracted 26 days past the recommended holding time for analyzed by 8270D GC/MS SIM to meet lower detection requirements. The results are flagged to denote the holding time violation.

**Holding Time Exceptions:**
The analysis of the field samples for SVO SIM was requested past holding time. The analysis was performed as soon as possible after requested by the project manager. The data was flagged to denote the holding time violation.

**Method Blank Exceptions:**
The Method Blank (MB) KWG1606521-3 contained a low level of Naphthalene above the Method Reporting Limit (MRL). In accordance with ALS QA/QC policy, all sample results less than twenty times the level found in the Method Blank has been flagged as estimated. No further corrective action was taken.

**Elevated Detection Limits:**
The samples W6N and W7 required dilutions due to the presence of elevated levels of target analytes. The reporting limits were adjusted to reflect the dilutions.

The Method Reporting Limit (MRL) is slightly elevated for sample U1 and the Method Blank (MB) KWG1606521-3 due to the low point of the instrument calibration.

**Sample Notes and Discussion:**
The results reported for Fluorene in sample U1 may contain a slight bias. The chromatogram indicated the presence of non-target background components. The matrix interference may have resulted in a slight high bias in the affected sample. The result was flagged with “X” to indicate the issue.

No other anomalies associated with the analysis of these samples were observed.

**Approved by**________________________________________

# Chain of Custody

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

K1607321

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☒ MN ☐ SD

COC Number: № 49047
COC ____ of ____

| REPORT TO | | INVOICE TO | |
|---|---|---|---|
| Company: | Barr Eng. | Company: | Barr Eng. |
| Address: | | Address: | |
| Name: | | Name: | |
| email: | | email: | |
| Copy to: datamgt@barr.com | | P.O. | |
| Project Name: | JOSLYN | Barr Project No: | 23270110 2016 270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| Location | Sample Depth | | | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Water | | | | | | Soil | | | | | | |
| | Start | Stop | Unit (m./ft. or in.) | | | | | | SVOC | GENERAL | NUTRIENTS | OIL & G | | | | | | | | % Solids | |
| | | | | | | | | | A | A | D | B | | | | | | | | | Preservative Code |
| | | | | | | | | | N | N | N | N | | | | | | | | | Field Filtered Y/N |
| 1. UI | | | | 6/30/2016 | 0905 | GW | | | 4 | | | | | | | | | | | | TABLE 3-13 |
| 2. W6N | | | | ↓ | 0940 | ↓ | | | 2 | | | | | | | | | | | | ↓ |
| 3. W7 | | | | | 1005 | | | | 2 | | | | | | | | | | | | |
| 4. TANK EFF. | | | | | 1035 | | | | 2 | 1 | 1 | 1 | | | | | | | | | 3-4 |
| 5. | | | | | | | | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**BARR USE ONLY**
Sampled by: SDI
Barr Proj. Manager: JLB III
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: KELSO, WA

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| STEVE IVE | [✓ Y] N | 6/30/16 | 1500 | | 7/1/16 | 1045 |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other: ____

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ____ (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

H:\RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

## Table 3-13

## Groundwater Monitoring Parameters

### PAH Compounds

**Carcinogenic PAHs**

Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3,cd)pyrene
Benzo(k)fluoranthene
Dibenzo(ah)anthracene
Benzo(j)fluoranthene*

**Noncarcinogenic PAHs**

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)perylene
Fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

### Phenolic Compounds

Pentachlorophenol

---

*Cannot be quantified with GC/MS analytical procedure.

## Table 3-4

## MCES Effluent Monitoring Parameters

### Semivolatile Organic Compounds

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Pentachlorophenol
Phenanthrene
Pyrene

### General Chemistry

Chemical Oxygen Demand
Oil and Grease
Total suspended Solids
pH

Note:

Analysis of 2,3,7,8-tetrachlorodibenzo-p-dioxin is required only once during the three year effective period of MCES Industrial Discharge Permit (Special Discharges) Number 2013: November 1, 2009, through October 31, 2012. Analysis was completed on the effluent sample collected in March 2010 and is not required at this time.

PC Cl

# Cooler Receipt and Preservation Form

Client Barr Service Request **K16** 07321

Received: 7/1/16 Opened: 7/1/16 By: Unloaded: 7/1/16 By:

1. Samples were received via? *Mail* [✓ *Fed Ex*] *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? one, front

If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

| Raw Cooler Temp | Corrected. Cooler Temp | Raw Temp Blank | Corrected Temp Blank | Corr. Factor | Thermometer ID | Cooler/COC ID NA | Tracking Number NA | Filed |
|---|---|---|---|---|---|---|---|---|
| 3.4 | 3.1 | — | — | -0.3 | 348 | | 6707 5049 8647 | |
| 3.9 | 3.6 | — | — | -0.3 | 342 | | " " 8636 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

4. Packing material: [✓ *Inserts*] [✓ *Baggies*] *Bubble Wrap* *Gel Packs* [✓ *Wet Ice*] *Dry Ice* *Sleeves* ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? NA [✓ Y] N

| Sample ID on Bottle | Sample ID on COC | Identified by: |
|---|---|---|
| | | |
| | | |
| | | |

| Sample ID | Bottle Count Bottle Type | Out of Temp | Head-space | Broke | pH | Reagent | Volume added | Reagent Lot Number | Initials | Time |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

SHORT HOLD TIME

*Notes, Discrepancies, & Resolutions:* ______

***Page*** ___ ***of*** ___

# General Chemistry

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/16 |
| **Sample Matrix:** | Water | **Date Received:** | 07/1/16 |
| **Analysis Method:** | 1664A | **Units:** | mg/L |
| **Prep Method:** | Method | **Basis:** | NA |

## Oil and Grease, Total (HEM)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Date Extracted | Q |
|---|---|---|---|---|---|---|---|
| TANK EFF. | K1607321-004 | ND U | 5.2 | 1 | 07/12/16 18:30 | 7/12/16 | |
| Method Blank | K1607321-MB | ND U | 5.0 | 1 | 07/12/16 18:30 | 7/12/16 | |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Analyzed:** | 07/12/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | 07/12/16 |

## Duplicate Lab Control Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1664A | **Units:** | mg/L |
| **Prep Method:** | Method | **Basis:** | NA |
| | | **Analysis Lot:** | 505025 |

| | Lab Control Sample K1607321-LCS2 | | | Duplicate Lab Control Sample K1607321-DLCS2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Oil and Grease, Total (HEM) | 50.8 | 60.0 | 85 | 52.2 | 60.0 | 87 | 78-114 | 3 | 20 |

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/16 |
| **Sample Matrix:** | Water | **Date Received:** | 07/1/16 |
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Solids, Total Suspended (TSS)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| TANK EFF. | K1607321-004 | ND U | 5.0 | 1 | 07/05/16 14:41 | |
| Method Blank | K1607321-MB | ND U | 4.0 | 1 | 07/05/16 14:41 | |

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project** | Joslyn/232701102016 270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| | | **Date Analyzed:** | 07/05/16 |

## Replicate Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1607355-003 | **Basis:** | NA |

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1607355-003DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| Solids, Total Suspended (TSS) | SM 2540 D | 5.0 | 9.0 | 8.5 | 8.75 | 6 | 10 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Analyzed:** | 07/05/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## Solids, Total Suspended (TSS)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 504027 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1607321-LCS1 | 140 | 141 | 99 | 85-115 |

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/16 |
| **Sample Matrix:** | Water | **Date Received:** | 07/1/16 |
| **Analysis Method:** | SM 4500-H+ B | **Units:** | pH Units |
| **Prep Method:** | None | **Basis:** | NA |

### pH

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| TANK EFF. | K1607321-004 | **7.53** | - | 1 | 07/01/16 15:53 | H |

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project** | Joslyn/232701102016 270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| **Analysis Method:** | SM 4500-H+ B | **Units:** | pH Units |
| **Prep Method:** | None | **Basis:** | NA |

## Replicate Sample Summary
## pH

| Sample Name: | Lab Code: | MRL | Sample Result | Duplicate Result | Average | RPD | RPD Limit | Date Analyzed |
|---|---|---|---|---|---|---|---|---|
| Batch QC | K1607302-001DUP | - | 2.56 | 2.52 | 2.54 | 2 | 20 | 07/01/16 |
| Batch QC | K1607317-001DUP | - | 8.40 | 8.35 | 8.38 | <1 | 20 | 07/01/16 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference:16-0000383057 rev 00

|  |  |  |  |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Analyzed:** | 07/01/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## pH

|  |  |  |  |
|---|---|---|---|
| **Analysis Method:** | SM 4500-H+ B | **Units:** | pH Units |
| **Prep Method:** | None | **Basis:** | NA |
|  |  | **Analysis Lot:** | 503694 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1607321-LCS1 | 8.30 | 8.32 | 100 | 85-115 |

## ALS Group USA, Corp.

**dba ALS Environmental**

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/16 |
| **Sample Matrix:** | Water | **Date Received:** | 07/1/16 |
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

### Chemical Oxygen Demand (COD)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| TANK EFF. | K1607321-004 | **14.6** | 5.0 | 1 | 07/08/16 15:00 | |
| Method Blank | K1607321-MB | ND U | 5.0 | 1 | 07/08/16 15:00 | |

| | | | | |
|---|---|---|---|---|
| **Client:** | Barr Engineering Company | | **Service Request:** | K1607321 |
| **Project** | Joslyn/232701102016 270 | | **Date Collected:** | NA |
| **Sample Matrix:** | Water | | **Date Received:** | NA |
| | | | **Date Analyzed:** | 07/08/16 |

## Replicate Sample Summary
## General Chemistry Parameters

| | | | | |
|---|---|---|---|---|
| **Sample Name:** | Batch QC | | **Units:** | mg/L |
| **Lab Code:** | K1607255-001 | | **Basis:** | NA |

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1607255-001DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| Chemical Oxygen Demand (COD) | SM 5220 C | 5.0 | ND U | ND U | NC | NC | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | N/A |
| **Sample Matrix:** | Water | **Date Received:** | N/A |
| | | **Date Analyzed:** | 07/8/16 |
| | | **Date Extracted:** | NA |

## Duplicate Matrix Spike Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1607255-001 | **Basis:** | NA |
| **Analysis Method:** | SM 5220 C | | |
| **Prep Method:** | None | | |

| | | **Matrix Spike**<br>K1607255-001MS | | | **Duplicate Matrix Spike**<br>K1607255-001DMS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Sample Result** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Chemical Oxygen Demand (COD) | ND U | 105 | 100 | 105 | 110 | 100 | 110 | 80-128 | 4 | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Analyzed:** | 07/08/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 504576 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1607321-LCS1 | 105 | 100 | 105 | 83-117 |

# Semi-Volatile Organic Compounds by GC/MS

**ALS Environmental—Kelso Laboratory**
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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

REVISED
10:30 am, Aug 30, 2016

REVISED
12:02 pm, Aug 29, 2016

## ALS Group USA, Corp. dba ALS Environmental

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/2016 |
| **Sample Matrix:** | Water | **Date Received:** | 07/01/2016 |

### Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | W6N | **Units:** | ug/L |
| **Lab Code:** | K1607321-002 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Pentachlorophenol | **200** | D | 48 | 2 | 07/06/16 | 07/13/16 | KWG1605527 | |

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2,4,6-Tribromophenol | 104 | 36-129 | 07/12/16 | Acceptable |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/2016 |
| **Sample Matrix:** | Water | **Date Received:** | 07/01/2016 |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | W7 | **Units:** | ug/L |
| **Lab Code:** | K1607321-003 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Pentachlorophenol | **840** | D | 240 | 10 | 07/06/16 | 07/13/16 | KWG1605527 | |

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2,4,6-Tribromophenol | 109 | 36-129 | 07/12/16 | Acceptable |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/2016 |
| **Sample Matrix:** | Water | **Date Received:** | 07/01/2016 |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | TANK EFF. | **Units:** | ug/L |
| **Lab Code:** | K1607321-004 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **45** | | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| 2-Methylnaphthalene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Acenaphthylene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | * |
| Acenaphthene | **49** | | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | * |
| Fluorene | **21** | | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Phenanthrene | **15** | | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Anthracene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Pentachlorophenol | **310** | D | 50 | 2 | 07/06/16 | 07/13/16 | KWG1605527 | |
| Fluoranthene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Pyrene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benz(a)anthracene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Chrysene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benzo(b)fluoranthene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benzo(k)fluoranthene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benzo(a)pyrene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Dibenz(a,h)anthracene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benzo(g,h,i)perylene | ND | U | 9.9 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2-Fluorobiphenyl | 64 | 49-109 | 07/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 104 | 36-129 | 07/12/16 | Acceptable |
| Terphenyl-d14 | 73 | 29-136 | 07/12/16 | Acceptable |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1605527-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| 2-Methylnaphthalene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Acenaphthylene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | * |
| Acenaphthene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | * |
| Fluorene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Phenanthrene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Anthracene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Pentachlorophenol | ND | U | 24 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Fluoranthene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Pyrene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benz(a)anthracene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Chrysene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benzo(b)fluoranthene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benzo(k)fluoranthene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benzo(a)pyrene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Dibenz(a,h)anthracene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |
| Benzo(g,h,i)perylene | ND | U | 9.6 | 1 | 07/06/16 | 07/12/16 | KWG1605527 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2-Fluorobiphenyl | 70 | 49-109 | 07/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 83 | 36-129 | 07/12/16 | Acceptable |
| Terphenyl-d14 | 77 | 29-136 | 07/12/16 | Acceptable |

**Comments:**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | | |
| **Sample Matrix:** | Water | | |

## Surrogate Recovery Summary
## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | Percent |
| **Analysis Method:** | 8270D | **Level:** | Low |

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 |
|---|---|---|---|---|
| Batch QC | K1607321-001 | 61 | 85 | 72 |
| W6N | K1607321-002 | | 104 | |
| W7 | K1607321-003 | | 109 | |
| TANK EFF. | K1607321-004 | 64 | 104 | 73 |
| Method Blank | KWG1605527-3 | 70 | 83 | 77 |
| U1MS | KWG1605527-4 | 72 | 99 | 84 |
| U1DMS | KWG1605527-5 | 70 | 98 | 81 |
| Lab Control Sample | KWG1605527-1 | 73 | 96 | 84 |
| Duplicate Lab Control Sample | KWG1605527-2 | 65 | 101 | 85 |

**Surrogate Recovery Control Limits (%)**

| | | | |
|---|---|---|---|
| Sur1 | = | 2-Fluorobiphenyl | 49-109 |
| Sur2 | = | 2,4,6-Tribromophenol | 36-129 |
| Sur3 | = | Terphenyl-d14 | 29-136 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Extracted:** | 07/06/2016 |
| **Sample Matrix:** | Water | **Date Analyzed:** | 07/12/2016 |

## Matrix Spike/Duplicate Matrix Spike Summary
## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | ug/L |
| **Lab Code:** | K1607321-001 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | **Extraction Lot:** | KWG1605527 |

| | | Batch QC MS KWG1605527-4 **Matrix Spike** | | | | Batch QC DMS KWG1605527-5 **Duplicate Matrix Spike** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Sample Result** | **Result** | **Spike Amount** | **%Rec** | | **Result** | **Spike Amount** | **%Rec** | | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | ND | 62.6 | 102 | 61 | * | 60.3 | 97.3 | 62 | * | 64-98 | 4 | 30 |
| 2-Methylnaphthalene | ND | 65.7 | 102 | 64 | * | 64.4 | 97.3 | 66 | | 66-101 | 2 | 30 |
| Acenaphthylene | ND | 70.4 | 102 | 69 | | 65.5 | 97.3 | 67 | * | 69-105 | 7 | 30 |
| Acenaphthene | ND | 73.8 | 102 | 72 | | 66.4 | 97.3 | 68 | * | 69-108 | 11 | 30 |
| Fluorene | ND | 71.9 | 102 | 70 | | 65.4 | 97.3 | 67 | | 65-113 | 9 | 30 |
| Phenanthrene | ND | 78.4 | 102 | 77 | | 76.2 | 97.3 | 78 | | 67-113 | 3 | 30 |
| Anthracene | ND | 78.2 | 102 | 76 | | 78.7 | 97.3 | 81 | | 69-114 | 1 | 30 |
| Pentachlorophenol | ND | 91.3 | 102 | 89 | | 91.0 | 97.3 | 94 | | 60-113 | 0 | 30 |
| Fluoranthene | ND | 88.3 | 102 | 86 | | 85.3 | 97.3 | 88 | | 69-123 | 3 | 30 |
| Pyrene | ND | 74.7 | 102 | 73 | | 71.6 | 97.3 | 74 | | 61-121 | 4 | 30 |
| Benz(a)anthracene | ND | 85.7 | 102 | 84 | | 76.1 | 97.3 | 78 | | 72-117 | 12 | 30 |
| Chrysene | ND | 82.9 | 102 | 81 | | 79.1 | 97.3 | 81 | | 71-113 | 5 | 30 |
| Benzo(b)fluoranthene | ND | 82.7 | 102 | 81 | | 77.1 | 97.3 | 79 | | 72-116 | 7 | 30 |
| Benzo(k)fluoranthene | ND | 77.5 | 102 | 76 | | 73.2 | 97.3 | 75 | | 71-113 | 6 | 30 |
| Benzo(a)pyrene | ND | 80.6 | 102 | 79 | | 74.9 | 97.3 | 77 | | 72-115 | 7 | 30 |
| Indeno(1,2,3-cd)pyrene | ND | 82.4 | 102 | 80 | | 75.0 | 97.3 | 77 | | 70-120 | 9 | 30 |
| Dibenz(a,h)anthracene | ND | 80.3 | 102 | 78 | | 74.7 | 97.3 | 77 | | 68-120 | 7 | 30 |
| Benzo(g,h,i)perylene | ND | 77.9 | 102 | 76 | | 75.9 | 97.3 | 78 | | 67-120 | 3 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

**Client:** Barr Engineering Company
**Project:** Joslyn/232701102016 270
**Sample Matrix:** Water

**Service Request:** K1607321
**Date Extracted:** 07/06/2016
**Date Analyzed:** 07/12/2016

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Semi-Volatile Organic Compounds by GC/MS

**Extraction Method:** EPA 3520C
**Analysis Method:** 8270D

**Units:** ug/L
**Basis:** NA
**Level:** Low
**Extraction Lot:** KWG1605527

| | Lab Control Sample KWG1605527-1 **Lab Control Spike** | | | Duplicate Lab Control Sample KWG1605527-2 **Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 65.6 | 100 | 66 | 65.8 | 100 | 66 | 64-98 | 0 | 30 |
| 2-Methylnaphthalene | 66.2 | 100 | 66 | 72.8 | 100 | 73 | 66-101 | 9 | 30 |
| Acenaphthylene | 67.4 | 100 | 67 * | 65.8 | 100 | 66 * | 69-105 | 2 | 30 |
| Acenaphthene | 70.6 | 100 | 71 | 66.0 | 100 | 66 * | 69-108 | 7 | 30 |
| Fluorene | 73.1 | 100 | 73 | 69.8 | 100 | 70 | 65-113 | 5 | 30 |
| Phenanthrene | 72.6 | 100 | 73 | 74.8 | 100 | 75 | 67-113 | 3 | 30 |
| Anthracene | 78.9 | 100 | 79 | 78.3 | 100 | 78 | 69-114 | 1 | 30 |
| Pentachlorophenol | 88.7 | 100 | 89 | 92.6 | 100 | 93 | 60-113 | 4 | 30 |
| Fluoranthene | 87.6 | 100 | 88 | 82.1 | 100 | 82 | 69-123 | 6 | 30 |
| Pyrene | 74.7 | 100 | 75 | 75.0 | 100 | 75 | 61-121 | 0 | 30 |
| Benz(a)anthracene | 81.5 | 100 | 81 | 82.1 | 100 | 82 | 72-117 | 1 | 30 |
| Chrysene | 83.8 | 100 | 84 | 84.0 | 100 | 84 | 71-113 | 0 | 30 |
| Benzo(b)fluoranthene | 85.2 | 100 | 85 | 82.9 | 100 | 83 | 72-116 | 3 | 30 |
| Benzo(k)fluoranthene | 74.4 | 100 | 74 | 82.6 | 100 | 83 | 71-113 | 11 | 30 |
| Benzo(a)pyrene | 79.3 | 100 | 79 | 82.1 | 100 | 82 | 72-115 | 3 | 30 |
| Indeno(1,2,3-cd)pyrene | 82.2 | 100 | 82 | 81.7 | 100 | 82 | 70-120 | 1 | 30 |
| Dibenz(a,h)anthracene | 76.4 | 100 | 76 | 81.6 | 100 | 82 | 68-120 | 7 | 30 |
| Benzo(g,h,i)perylene | 81.5 | 100 | 81 | 82.2 | 100 | 82 | 67-120 | 1 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

# Polynuclear Aromatic Hydrocarbons

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

REVISED
2:49 pm, Aug 31, 2016

REVISED
10:31 am, Aug 30, 2016

REVISED
12:03 pm, Aug 29, 2016

RIGHT SOLUTIONS | RIGHT PARTNER

**ALS Group USA, Corp. dba ALS Environmental**

Analytical Results

**Client:** Barr Engineering Company
**Project:** Joslyn/232701102016 270
**Sample Matrix:** Water

**Service Request:** K1607321
**Date Collected:** 06/30/2016
**Date Received:** 07/01/2016

## Polynuclear Aromatic Hydrocarbons

**Sample Name:** U1
**Lab Code:** K1607321-001

**Units:** ug/L
**Basis:** NA

**Extraction Method:** EPA 3520C
**Analysis Method:** 8270D SIM

**Level:** Low

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0077** | B | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| 2-Methylnaphthalene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Acenaphthylene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Acenaphthene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Fluorene | **0.0075** | X | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Phenanthrene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Anthracene | **0.020** | | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Fluoranthene | **0.0051** | | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Pyrene | **0.0085** | | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Benz(a)anthracene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Chrysene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Benzo(b)fluoranthene† | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Benzo(k)fluoranthene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Benzo(a)pyrene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Dibenz(a,h)anthracene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Benzo(g,h,i)perylene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |
| Pentachlorophenol | ND | U | 0.20 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 75 | 28-125 | 08/12/16 | Acceptable |
| Fluoranthene-d10 | 97 | 39-123 | 08/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 102 | 10-136 | 08/12/16 | Acceptable |
| Terphenyl-d14 | 98 | 22-127 | 08/12/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/2016 |
| **Sample Matrix:** | Water | **Date Received:** | 07/01/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W6N | **Units:** | ug/L |
| **Lab Code:** | K1607321-002 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.020** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| 2-Methylnaphthalene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Acenaphthylene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Acenaphthene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Fluorene | **0.12** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Phenanthrene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Anthracene | **0.16** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Fluoranthene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Pyrene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benz(a)anthracene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Chrysene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benzo(b)fluoranthene† | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benzo(k)fluoranthene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benzo(a)pyrene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Dibenz(a,h)anthracene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benzo(g,h,i)perylene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 84 | 28-125 | 08/12/16 | Acceptable |
| Fluoranthene-d10 | 101 | 39-123 | 08/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 130 | 10-136 | 08/12/16 | Acceptable |
| Terphenyl-d14 | 107 | 22-127 | 08/12/16 | Acceptable |

| † **Analyte Comments** | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | 06/30/2016 |
| **Sample Matrix:** | Water | **Date Received:** | 07/01/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W7 | **Units:** | ug/L |
| **Lab Code:** | K1607321-003 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.44** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| 2-Methylnaphthalene | **0.019** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Acenaphthylene | **0.025** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Acenaphthene | **0.062** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Fluorene | **1.5** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Phenanthrene | **0.95** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Anthracene | **0.55** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Fluoranthene | **0.034** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Pyrene | **0.029** | D | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benz(a)anthracene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Chrysene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benzo(b)fluoranthene† | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benzo(k)fluoranthene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benzo(a)pyrene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Dibenz(a,h)anthracene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |
| Benzo(g,h,i)perylene | ND | U | 0.017 | 5 | 08/02/16 | 08/12/16 | KWG1606521 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 92 | 28-125 | 08/12/16 | Acceptable |
| Fluoranthene-d10 | 103 | 39-123 | 08/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 108 | 10-136 | 08/12/16 | Acceptable |
| Terphenyl-d14 | 96 | 22-127 | 08/12/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1606521-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0047** | | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| 2-Methylnaphthalene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Acenaphthylene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Acenaphthene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Fluorene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Phenanthrene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Anthracene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Fluoranthene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Pyrene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Benz(a)anthracene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Chrysene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Benzo(b)fluoranthene† | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Benzo(k)fluoranthene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Benzo(a)pyrene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Dibenz(a,h)anthracene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Benzo(g,h,i)perylene | ND | U | 0.0034 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |
| Pentachlorophenol | ND | U | 0.20 | 1 | 08/02/16 | 08/17/16 | KWG1606521 | |

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 73 | 28-125 | 08/12/16 | Acceptable |
| Fluoranthene-d10 | 102 | 39-123 | 08/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 61 | 10-136 | 08/12/16 | Acceptable |
| Terphenyl-d14 | 86 | 22-127 | 08/12/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

|  |  |  |  |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1607321 |
| **Project:** | Joslyn/232701102016 270 |  |  |
| **Sample Matrix:** | Water |  |  |

## Surrogate Recovery Summary
## Polynuclear Aromatic Hydrocarbons

|  |  |  |  |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | Percent |
| **Analysis Method:** | 8270D SIM | **Level:** | Low |

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 | Sur4 |
|---|---|---|---|---|---|
| U1 | K1607321-001 | 75 D | 97 D | 102 D | 98 D |
| W6N | K1607321-002 | 84 D | 101 D | 130 D | 107 D |
| W7 | K1607321-003 | 92 D | 103 D | 108 D | 96 D |
| Method Blank | KWG1606521-3 | 73 D | 102 D | 61 D | 86 D |
| Lab Control Sample | KWG1606521-1 | 86 D | 111 D | 98 D | 90 D |
| Duplicate Lab Control Sample | KWG1606521-2 | 70 D | 94 D | 75 D | 78 D |

**Surrogate Recovery Control Limits (%)**

|  |  |  |
|---|---|---|
| Sur1 | = Fluorene-d10 | 28-125 |
| Sur2 | = Fluoranthene-d10 | 39-123 |
| Sur3 | = 2,4,6-Tribromophenol | 10-136 |
| Sur4 | = Terphenyl-d14 | 22-127 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

QA/QC Report

**Client:** Barr Engineering Company
**Project:** Joslyn/232701102016 270
**Sample Matrix:** Water

**Service Request:** K1607321
**Date Extracted:** 08/02/2016
**Date Analyzed:** 08/12/2016 - 08/17/2016

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Polynuclear Aromatic Hydrocarbons

**Extraction Method:** EPA 3520C
**Analysis Method:** 8270D SIM

**Units:** ug/L
**Basis:** NA
**Level:** Low
**Extraction Lot:** KWG1606521

| | Lab Control Sample<br>KWG1606521-1<br>**Lab Control Spike** | | | Duplicate Lab Control Sample<br>KWG1606521-2<br>**Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 1.96 | 2.50 | 79 | 1.81 | 2.50 | 72 | 59-95 | 8 | 30 |
| 2-Methylnaphthalene | 1.84 | 2.50 | 74 | 1.74 | 2.50 | 69 | 42-108 | 6 | 30 |
| Acenaphthylene | 1.97 | 2.50 | 79 | 1.81 | 2.50 | 72 | 61-102 | 8 | 30 |
| Acenaphthene | 1.95 | 2.50 | 78 | 1.77 | 2.50 | 71 | 58-98 | 10 | 30 |
| Fluorene | 2.06 | 2.50 | 82 | 1.85 | 2.50 | 74 | 59-97 | 11 | 30 |
| Phenanthrene | 2.06 | 2.50 | 82 | 1.86 | 2.50 | 74 | 61-100 | 10 | 30 |
| Anthracene | 2.22 | 2.50 | 89 | 2.00 | 2.50 | 80 | 65-98 | 10 | 30 |
| Fluoranthene | 2.31 | 2.50 | 92 | 2.15 | 2.50 | 86 | 63-106 | 7 | 30 |
| Pyrene | 1.85 | 2.50 | 74 | 1.73 | 2.50 | 69 | 64-104 | 7 | 30 |
| Benz(a)anthracene | 2.10 | 2.50 | 84 | 1.94 | 2.50 | 78 | 67-96 | 8 | 30 |
| Chrysene | 2.24 | 2.50 | 89 | 2.02 | 2.50 | 81 | 67-105 | 10 | 30 |
| Benzo(b)fluoranthene | 2.30 | 2.50 | 92 | 2.14 | 2.50 | 85 | 69-104 | 7 | 30 |
| Benzo(k)fluoranthene | 2.29 | 2.50 | 92 | 2.13 | 2.50 | 85 | 68-108 | 8 | 30 |
| Benzo(a)pyrene | 2.20 | 2.50 | 88 | 2.06 | 2.50 | 82 | 68-107 | 7 | 30 |
| Indeno(1,2,3-cd)pyrene | 2.23 | 2.50 | 89 | 2.06 | 2.50 | 82 | 61-115 | 8 | 30 |
| Dibenz(a,h)anthracene | 2.12 | 2.50 | 85 | 1.93 | 2.50 | 77 | 54-118 | 9 | 30 |
| Benzo(g,h,i)perylene | 2.03 | 2.50 | 81 | 1.94 | 2.50 | 77 | 61-110 | 4 | 30 |
| Pentachlorophenol | 1.62 | 2.50 | 65 | 1.59 | 2.00 | 80 | 10-123 | 2 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
**T :** +1 360 577 7222
**F :** +1 360 636 1068
**www.alsglobal.com**

September 29, 2016

**Analytical Report for Service Request No:** K1610781

Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435

**RE: Joslyn / 232701102016270**

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory September 13, 2016
For your reference, these analyses have been assigned our service request number **K1610781.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Kelley Lovejoy for

Chris Leaf
Project Manager

# Table of Contents

# Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| A2LA | American Association for Laboratory Accreditation |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MCL | Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| NA | Not Applicable |
| NC | Not Calculated |
| NCASI | National Council of the Paper Industry for Air and Stream Improvement |
| ND | Not Detected |
| NIOSH | National Institute for Occupational Safety and Health |
| PQL | Practical Quantitation Limit |
| RCRA | Resource Conservation and Recovery Act |
| SIM | Selected Ion Monitoring |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. |

## Inorganic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| E | The result is an estimate amount because the value exceeded the instrument calibration range. |
| J | The result is an estimated value. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |
| H | The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory. |

## Metals Data Qualifiers

| | |
|---|---|
| # | The control limit criteria is not applicable. See case narrative. |
| J | The result is an estimated value. |
| E | The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample. |
| M | The duplicate injection precision was not met. |
| N | The Matrix Spike sample recovery is not within control limits. See case narrative. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| W | The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| + | The correlation coefficient for the MSA is less than 0.995. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Organic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| A | A tentatively identified compound, a suspected aldol-condensation product. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| C | The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data. |
| D | The reported result is from a dilution. |
| E | The result is an estimated value. |
| J | The result is an estimated value. |
| N | The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed. |
| P | The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Additional Petroleum Hydrocarbon Specific Qualifiers

| | |
|---|---|
| F | The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard. |
| L | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard. |
| H | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard. |
| O | The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard. |
| Y | The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. |
| Z | The chromatographic fingerprint does not resemble a petroleum product. |

## ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
## State Certifications, Accreditations, and Licenses

| Agency | Web Site | Number |
|---|---|---|
| Alaska DEC UST | http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx | UST-040 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0339 |
| Arkansas - DEQ | http://www.adeq.state.ar.us/techsvs/labcert.htm | 88-0637 |
| California DHS (ELAP) | http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx | 2795 |
| DOD ELAP | http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm | L14-51 |
| Florida DOH | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E87412 |
| Hawaii DOH | Not available | - |
| ISO 17025 | http://www.pjlabs.com/ | L16-57 |
| Louisiana DEQ | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 03016 |
| Maine DHS | Not available | WA01276 |
| Minnesota DOH | http://www.health.state.mn.us/accreditation | 053-999-457 |
| Montana DPHHS | http://www.dphhs.mt.gov/publichealth/ | CERT0047 |
| Nevada DEP | http://ndep.nv.gov/bsdw/labservice.htm | WA01276 |
| New Jersey DEP | http://www.nj.gov/dep/oqa/ | WA005 |
| North Carolina DWQ | http://www.dwqlab.org/ | 605 |
| Oklahoma DEQ | http://www.deq.state.ok.us/CSDnew/labcert.htm | 9801 |
| Oregon – DEQ (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | WA100010 |
| South Carolina DHEC | http://www.scdhec.gov/environment/envserv/ | 61002 |
| Texas CEQ | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704427 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C544 |
| Wyoming (EPA Region 8) | http://www.epa.gov/region8/water/dwhome/wyomingdi.html | - |
| Kelso Laboratory Website | www.alsglobal.com | NA |

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

# Case Narrative

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

**ALS ENVIRONMENTAL**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request No.:** | K1610781 |
| **Project:** | Joslyn/ 232701102016270 | **Date Received:** | 09/13/16 |
| **Sample Matrix:** | Water and Ground Water | | |

## Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

### Sample Receipt

Two samples were received for analysis at ALS Environmental on 09/13/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

### General Chemistry Parameters

**Chemical Oxygen Demand by Standard Method 5220 C:**
The duplicate matrix spike recovery for sample Batch QC was outside control criteria because of suspected matrix interference. Recovery in the Laboratory Control Sample (LCS) was acceptable, which indicated the analytical batch was in control. No further corrective action was taken.

The Relative Percent Difference (RPD) in the replicate matrix spike analyses of sample Batch QC was outside control criteria. Recoveries in the MS and associated Laboratory Control Sample (LCS) were within acceptance limits, indicating the analytical batch was in control. No further corrective action was appropriate.

No other anomalies associated with the analysis of these samples were observed.

### Semivolatile Organic Compounds by EPA Method 8270

**Calibration Verification Exceptions:**
The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS07\0923F022.D: Fluoranthene. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

**Approved by** Kelley Lovejoy

**Lab Control Sample Exceptions:**
The lower control criterion was exceeded by 2% for Fluoranthene in Laboratory Control Sample (LCS) KWG1608340-1. The analyte in question was not detected in the associated field sample. The error associated with reduced recovery equates to a potential slight low bias. The results were flagged to indicate the issue. No further corrective action was taken.

No other anomalies associated with the analysis of these samples were observed.

## Polynuclear Aromatic Hydrocarbons by EPA Method 8270

**Lab Control Sample Exceptions:**
The lower control criterion was exceeded by 1-5% for Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene and Benzo(a)pyrene in replicate Laboratory Control Samples (LCS/DLCS) KWG1608344-1 and KWG1608344-2. Pyrene was detected in the associated field sample. The error associated with reduced recovery equates to a potential slight low bias. The results were flagged to indicate the issue. No further corrective action was taken.

No other anomalies associated with the analysis of these samples were observed.

**Approved by** Kelley Lovejoy

# Chain of Custody

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

K1610781

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☒ MN ☐ SD

COC Number: **51152**
COC 1 of 1

| REPORT TO | | INVOICE TO | |
|---|---|---|---|
| Company: | Barr Eng. | Company: | Barr Eng. |
| Address: | | Address: | |
| Name: | | Name: | |
| email: | | email: | |
| Copy to: datamgt@barr.com | | P.O. | |
| Project Name: | JOSLYN | Barr Project No: | 23270 1102016 270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| | Sample Depth | | | | | | | | Analysis Requested | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Water | | | | | | Soil | | | | | | |
| Location | Start | Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | PAH | O&G | GEN | COD | | | | | | | | % Solids | |
| Preservative Code | | | | | | | | | A | B | A | D | | | | | | | | | |
| Field Filtered Y/N | | | | | | | | | N | N | N | N | | | | | | | | | |
| 1. U1 | / | / | / | 9/12/2016 | 0900 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. TANK EFF. | | | | ↓ | 1000 | ↓ | | | 2 | 1 | 1 | 1 | | | | | | | | | 3-4 |
| 3. | | | | | | | | | | | | | | | | | | | | | |
| 4. | | | | | | | | | | | | | | | | | | | | | |
| 5. | | | | | | | | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**BARR USE ONLY**
Sampled by: SDF
Barr Proj. Manager: JLB II
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: KELSO, WA

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve F | [✓ Y] N | 9/12/16 | 1100 | | 9-13-16 | 9:45 |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush (mm/dd/yyyy)

Lab WO:
Temperature on Receipt (°C):
Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution - White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

H:\RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

U1 SAMPLE

# Table 3-13

## Groundwater Monitoring Parameters
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

LJ 13573

### PAH Compounds – EPA 8270 SIM

**Carcinogenic PAHs**

| | |
|---|---|
| Benzo(a)anthracene | Indeno(1,2,3,cd)pyrene |
| Chrysene | Benzo(k)fluoranthene |
| Benzo(b)fluoranthene | Dibenzo(ah)anthracene |
| Benzo(a)pyrene | Benzo(j)fluoranthene* |

**Noncarcinogenic PAHs**

| | |
|---|---|
| Acenaphthene | Fluorene |
| Acenaphthylene | 2-Methylnaphthalene |
| Anthracene | Naphthalene |
| Benzo(ghi)perylene | Phenanthrene |
| Fluoranthene | Pyrene |

### Phenolic Compounds – EPA 8270 SIM

Pentachlorophenol

---

*Co-elutes with benz(b)fluoranthene

Target reporting limits: PAHs = 0.0033 µg/L, PCP = 0.3 µg/L

TANK EFFLUENT

## Table 3-4

## MCES Effluent Monitoring Parameters
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

LJ13590

### Semivolatile Organic Compounds – EPA 8270

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Pentachlorophenol
Phenanthrene
Pyrene

### General Chemistry

Chemical Oxygen Demand – SM 5220 C
Oil and Grease – EPA 1664
Total suspended Solids – SM 2540 D
pH – SM 4500-$H^+$ B

Note:

Analysis of 2,3,7,8-tetrachlorodibenzo-p-dioxin is required only once, between January and March 2016, for the MCES Industrial Discharge Permit (Special Discharges) Number 2013, effective November 1, 2015, through October 31, 2018.

PC cl

# Cooler Receipt and Preservation Form

Client Barr Engineering Service Request K16 10781

Received: 9-13-16 Opened: 9-13-16 By: es Unloaded: 9-13-16 By: ES

1. Samples were received via? USPS [✓ Fed Ex] UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ______ NA
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? 1-front

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

| Raw Cooler Temp | Corrected. Cooler Temp | Raw Temp Blank | Corrected Temp Blank | Corr. Factor | Thermometer ID | Cooler/COC ID NA | Tracking Number NA | Filed |
|---|---|---|---|---|---|---|---|---|
| 3.1 | 3.0 | – | – | -0.1 | 362 | | 7060 3331 8672 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

4. Packing material: Inserts Baggies [✓ Bubble Wrap] Gel Packs [✓ Wet Ice] Dry Ice Sleeves ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

| Sample ID on Bottle | Sample ID on COC | Identified by: |
|---|---|---|
| | | |
| | | |
| | | |

| Sample ID | Bottle Count Bottle Type | Out of Temp | Head-space | Broke | pH | Reagent | Volume added | Reagent Lot Number | Initials | Time |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

*Notes, Discrepancies, & Resolutions:* ______

7/25/16

*Page ____ of ____*

# General Chemistry

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 09/12/16 |
| **Sample Matrix:** | Water | **Date Received:** | 09/13/16 |
| **Analysis Method:** | 1664A | **Units:** | mg/L |
| **Prep Method:** | Method | **Basis:** | NA |

## Oil and Grease, Total (HEM)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Date Extracted | Q |
|---|---|---|---|---|---|---|---|
| Tank Effluent | K1610781-001 | ND U | 5.3 | 1 | 09/27/16 10:30 | 9/27/16 | |
| Method Blank | K1610781-MB1 | ND U | 5.0 | 1 | 09/27/16 10:30 | 9/27/16 | |

| | | | | |
|---|---|---|---|---|
| **Client:** | Barr Engineering Company | | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | | **Date Collected:** | N/A |
| **Sample Matrix:** | Water | | **Date Received:** | N/A |
| | | | **Date Analyzed:** | 09/27/16 |
| | | | **Date Extracted:** | 09/27/16 |

## Matrix Spike Summary
## Oil and Grease, Total (HEM)

| | | | | |
|---|---|---|---|---|
| **Sample Name:** | Batch QC | | **Units:** | mg/L |
| **Lab Code:** | K1610233-001 | | **Basis:** | NA |
| **Analysis Method:** | 1664A | | | |
| **Prep Method:** | Method | | | |

### Matrix Spike
K1610233-001MS

| Analyte Name | Sample Result | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Oil and Grease, Total (HEM) | ND U | 51.3 | 57.1 | 90 | 78-114 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Analyzed:** | 09/27/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | 09/27/16 |

## Duplicate Lab Control Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1664A | **Units:** | mg/L |
| **Prep Method:** | Method | **Basis:** | NA |
| | | **Analysis Lot:** | 516119 |

| | Lab Control Sample K1610781-LCS2 | | | Duplicate Lab Control Sample K1610781-DLCS2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Oil and Grease, Total (HEM) | 51.4 | 60.0 | 86 | 51.7 | 60.0 | 86 | 78-114 | <1 | 20 |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 09/12/16 |
| **Sample Matrix:** | Water | **Date Received:** | 09/13/16 |
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Solids, Total Suspended (TSS)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| Tank Effluent | K1610781-001 | ND U | 5.0 | 1 | 09/19/16 13:38 | |
| Method Blank | K1610781-MB1 | ND U | 5.0 | 1 | 09/19/16 13:38 | |
| Method Blank | K1610781-MB2 | ND U | 5.0 | 1 | 09/19/16 13:38 | |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project** | Joslyn/232701102016270 | **Date Collected:** | 09/12/16 |
| **Sample Matrix:** | Water | **Date Received:** | 09/13/16 |
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Replicate Sample Summary
## Solids, Total Suspended (TSS)

| Sample Name: | Lab Code: | MRL | Sample Result | Duplicate Result | Average | RPD | RPD Limit | Date Analyzed |
|---|---|---|---|---|---|---|---|---|
| Tank Effluent | K1610781-001DUP | 5.0 | ND U | ND U | NC | NC | 10 | 09/19/16 |
| Batch QC | K1610931-006DUP | 10 | 193 | 192 | 193 | <1 | 10 | 09/19/16 |

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Analyzed:** | 09/19/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## Solids, Total Suspended (TSS)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 514780 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1610781-LCS1 | 138 | 141 | 98 | 85-115 |

Analytical Report

**Client:** Barr Engineering Company
**Project:** Joslyn/232701102016270
**Sample Matrix:** Water

**Service Request:** K1610781
**Date Collected:** 09/12/16
**Date Received:** 09/13/16

**Analysis Method:** SM 4500-H+ B
**Prep Method:** None

**Units:** pH Units
**Basis:** NA

## pH

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| Tank Effluent | K1610781-001 | **7.43** | - | 1 | 09/13/16 19:00 | H |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project** | Joslyn/232701102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| | | **Date Analyzed:** | 09/13/16 |

## Replicate Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | pH Units |
| **Lab Code:** | K1610739-001 | **Basis:** | NA |

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1610739-001DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| pH | SM 4500-H+ B | - | 7.34 | 7.36 | 7.35 | <1 | 20 |

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| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Analyzed:** | 09/13/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## pH

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 4500-H+ B | **Units:** | pH Units |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 513991 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1610781-LCS1 | 8.27 | 8.32 | 99 | 85-115 |

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 09/12/16 |
| **Sample Matrix:** | Water | **Date Received:** | 09/13/16 |
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Chemical Oxygen Demand (COD)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| Tank Effluent | K1610781-001 | **12.4** | 5.0 | 1 | 09/26/16 10:00 | |
| Method Blank | K1610781-MB1 | ND U | 5.0 | 1 | 09/26/16 10:00 | |

**Client:** Barr Engineering Company
**Project** Joslyn/232701102016270
**Sample Matrix:** Water

**Service Request:** K1610781
**Date Collected:** NA
**Date Received:** NA
**Date Analyzed:** 09/26/16

## Replicate Sample Summary
## General Chemistry Parameters

**Sample Name:** Batch QC
**Lab Code:** K1610528-001

**Units:** mg/L
**Basis:** NA

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1610528-001DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| Chemical Oxygen Demand (COD) | SM 5220 C | 50 | 662 | 565 | 613 | 16 | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | N/A |
| **Sample Matrix:** | Water | **Date Received:** | N/A |
| | | **Date Analyzed:** | 09/26/16 |
| | | **Date Extracted:** | NA |

## Duplicate Matrix Spike Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1610528-001 | **Basis:** | NA |
| **Analysis Method:** | SM 5220 C | | |
| **Prep Method:** | None | | |

| | | **Matrix Spike** K1610528-001MS | | | **Duplicate Matrix Spike** K1610528-001DMS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Sample Result** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Chemical Oxygen Demand (COD) | 662 | 1520 | 1000 | 86 | 2070 | 1000 | 141 * | 80-128 | 31* | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Analyzed:** | 09/26/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 515813 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1610781-LCS1 | 119 | 121 | 99 | 83-117 |

# Semi-Volatile Organic Compounds by GC/MS

**ALS Environmental—Kelso Laboratory**
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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 09/12/2016 |
| **Sample Matrix:** | Water | **Date Received:** | 09/13/2016 |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | Tank Effluent | **Units:** | ug/L |
| **Lab Code:** | K1610781-001 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| 2-Methylnaphthalene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Acenaphthylene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Acenaphthene | **37** | | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Fluorene | **12** | | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Phenanthrene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Anthracene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Pentachlorophenol | **260** | D | 50 | 2 | 09/19/16 | 09/25/16 | KWG1608340 | |
| Fluoranthene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | * |
| Pyrene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benz(a)anthracene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Chrysene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benzo(b)fluoranthene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benzo(k)fluoranthene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benzo(a)pyrene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Dibenz(a,h)anthracene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benzo(g,h,i)perylene | ND | U | 10 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2-Fluorobiphenyl | 67 | 49-109 | 09/23/16 | Acceptable |
| 2,4,6-Tribromophenol | 79 | 36-129 | 09/23/16 | Acceptable |
| Terphenyl-d14 | 84 | 29-136 | 09/23/16 | Acceptable |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1608340-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| 2-Methylnaphthalene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Acenaphthylene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Acenaphthene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Fluorene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Phenanthrene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Anthracene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Pentachlorophenol | ND | U | 24 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Fluoranthene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | * |
| Pyrene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benz(a)anthracene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Chrysene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benzo(b)fluoranthene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benzo(k)fluoranthene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benzo(a)pyrene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Dibenz(a,h)anthracene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |
| Benzo(g,h,i)perylene | ND | U | 9.5 | 1 | 09/19/16 | 09/23/16 | KWG1608340 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2-Fluorobiphenyl | 71 | 49-109 | 09/23/16 | Acceptable |
| 2,4,6-Tribromophenol | 65 | 36-129 | 09/23/16 | Acceptable |
| Terphenyl-d14 | 102 | 29-136 | 09/23/16 | Acceptable |

**Comments:**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | | |
| **Sample Matrix:** | Water | | |

## Surrogate Recovery Summary
## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | Percent |
| **Analysis Method:** | 8270D | **Level:** | Low |

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 |
|---|---|---|---|---|
| Tank Effluent | K1610781-001 | 67 | 79 | 84 |
| Method Blank | KWG1608340-3 | 71 | 65 | 102 |
| Lab Control Sample | KWG1608340-1 | 72 | 83 | 71 |
| Duplicate Lab Control Sample | KWG1608340-2 | 72 | 85 | 79 |

**Surrogate Recovery Control Limits (%)**

| | | |
|---|---|---|
| Sur1 = | 2-Fluorobiphenyl | 49-109 |
| Sur2 = | 2,4,6-Tribromophenol | 36-129 |
| Sur3 = | Terphenyl-d14 | 29-136 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

**ALS Group USA, Corp. dba ALS Environmental**

QA/QC Report

**Client:** Barr Engineering Company
**Project:** Joslyn/232701102016270
**Sample Matrix:** Water

**Service Request:** K1610781
**Date Extracted:** 09/19/2016
**Date Analyzed:** 09/23/2016

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Semi-Volatile Organic Compounds by GC/MS

**Extraction Method:** EPA 3520C
**Analysis Method:** 8270D

**Units:** ug/L
**Basis:** NA
**Level:** Low
**Extraction Lot:** KWG1608340

| | Lab Control Sample<br>KWG1608340-1<br>**Lab Control Spike** | | | Duplicate Lab Control Sample<br>KWG1608340-2<br>**Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 73.4 | 100 | 73 | 68.7 | 100 | 69 | 64-98 | 7 | 30 |
| 2-Methylnaphthalene | 79.9 | 100 | 80 | 74.3 | 100 | 74 | 66-101 | 7 | 30 |
| Acenaphthylene | 75.2 | 100 | 75 | 71.7 | 100 | 72 | 69-105 | 5 | 30 |
| Acenaphthene | 75.1 | 100 | 75 | 78.5 | 100 | 79 | 69-108 | 5 | 30 |
| Fluorene | 86.8 | 100 | 87 | 86.4 | 100 | 86 | 65-113 | 0 | 30 |
| Phenanthrene | 82.1 | 100 | 82 | 80.9 | 100 | 81 | 67-113 | 1 | 30 |
| Anthracene | 80.2 | 100 | 80 | 81.6 | 100 | 82 | 69-114 | 2 | 30 |
| Pentachlorophenol | 66.5 | 100 | 67 | 72.9 | 100 | 73 | 60-113 | 9 | 30 |
| Fluoranthene | 66.9 | 100 | 67 * | 71.5 | 100 | 71 | 69-123 | 7 | 30 |
| Pyrene | 72.7 | 100 | 73 | 79.2 | 100 | 79 | 61-121 | 9 | 30 |
| Benz(a)anthracene | 79.3 | 100 | 79 | 80.0 | 100 | 80 | 72-117 | 1 | 30 |
| Chrysene | 78.1 | 100 | 78 | 83.5 | 100 | 83 | 71-113 | 7 | 30 |
| Benzo(b)fluoranthene | 80.9 | 100 | 81 | 84.3 | 100 | 84 | 72-116 | 4 | 30 |
| Benzo(k)fluoranthene | 82.1 | 100 | 82 | 86.4 | 100 | 86 | 71-113 | 5 | 30 |
| Benzo(a)pyrene | 79.3 | 100 | 79 | 80.7 | 100 | 81 | 72-115 | 2 | 30 |
| Indeno(1,2,3-cd)pyrene | 82.2 | 100 | 82 | 87.3 | 100 | 87 | 70-120 | 6 | 30 |
| Dibenz(a,h)anthracene | 86.6 | 100 | 87 | 88.8 | 100 | 89 | 68-120 | 3 | 30 |
| Benzo(g,h,i)perylene | 84.8 | 100 | 85 | 87.9 | 100 | 88 | 67-120 | 4 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

# Polynuclear Aromatic Hydrocarbons

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 09/12/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 09/13/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U1 | **Units:** | ug/L |
| **Lab Code:** | K1610781-002 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0050** | | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Acenaphthene | **0.0040** | | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Fluorene | **0.0067** | | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Anthracene | **0.011** | | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Fluoranthene | **0.0053** | | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Pyrene | **0.0085** | | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Chrysene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 64 | 28-125 | 09/21/16 | Acceptable |
| Fluoranthene-d10 | 78 | 39-123 | 09/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 90 | 10-136 | 09/21/16 | Acceptable |
| Terphenyl-d14 | 82 | 22-127 | 09/21/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Ground water | **Date Received:** | NA |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1608344-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Fluorene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Anthracene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Pyrene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Chrysene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 09/19/16 | 09/21/16 | KWG1608344 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 71 | 28-125 | 09/21/16 | Acceptable |
| Fluoranthene-d10 | 83 | 39-123 | 09/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 92 | 10-136 | 09/21/16 | Acceptable |
| Terphenyl-d14 | 80 | 22-127 | 09/21/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

## ALS Group USA, Corp. dba ALS Environmental

QA/QC Report

**Client:** Barr Engineering Company
**Service Request:** K1610781
**Project:** Joslyn/232701102016270
**Sample Matrix:** Ground water

## Surrogate Recovery Summary
## Polynuclear Aromatic Hydrocarbons

**Extraction Method:** EPA 3520C
**Units:** Percent
**Analysis Method:** 8270D SIM
**Level:** Low

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 | Sur4 |
|---|---|---|---|---|---|
| U1 | K1610781-002 | 64 | 78 | 90 D | 82 |
| Method Blank | KWG1608344-3 | 71 | 83 | 92 D | 80 |
| Lab Control Sample | KWG1608344-1 | 78 D | 99 D | 109 D | 97 D |
| Duplicate Lab Control Sample | KWG1608344-2 | 77 D | 97 D | 108 D | 94 D |

**Surrogate Recovery Control Limits (%)**

| | | |
|---|---|---|
| Sur1 | = Fluorene-d10 | 28-125 |
| Sur2 | = Fluoranthene-d10 | 39-123 |
| Sur3 | = 2,4,6-Tribromophenol | 10-136 |
| Sur4 | = Terphenyl-d14 | 22-127 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1610781 |
| **Project:** | Joslyn/232701102016270 | **Date Extracted:** | 09/19/2016 |
| **Sample Matrix:** | Ground water | **Date Analyzed:** | 09/21/2016 |

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | ug/L |
| **Analysis Method:** | 8270D SIM | **Basis:** | NA |
| | | **Level:** | Low |
| | | **Extraction Lot:** | KWG1608344 |

| | Lab Control Sample KWG1608344-1 **Lab Control Spike** | | | Duplicate Lab Control Sample KWG1608344-2 **Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 1.62 | 2.50 | 65 | 1.71 | 2.50 | 68 | 59-95 | 5 | 30 |
| 2-Methylnaphthalene | 1.54 | 2.50 | 62 | 1.67 | 2.50 | 67 | 42-108 | 8 | 30 |
| Acenaphthylene | 1.67 | 2.50 | 67 | 1.76 | 2.50 | 70 | 61-102 | 5 | 30 |
| Acenaphthene | 1.62 | 2.50 | 65 | 1.70 | 2.50 | 68 | 58-98 | 5 | 30 |
| Fluorene | 1.69 | 2.50 | 68 | 1.75 | 2.50 | 70 | 59-97 | 4 | 30 |
| Phenanthrene | 1.66 | 2.50 | 66 | 1.68 | 2.50 | 67 | 61-100 | 1 | 30 |
| Anthracene | 1.68 | 2.50 | 67 | 1.73 | 2.50 | 69 | 65-98 | 3 | 30 |
| Fluoranthene | 1.76 | 2.50 | 70 | 1.80 | 2.50 | 72 | 63-106 | 3 | 30 |
| Pyrene | 1.47 | 2.50 | 59 * | 1.48 | 2.50 | 59 * | 64-104 | 0 | 30 |
| Benz(a)anthracene | 1.57 | 2.50 | 63 * | 1.60 | 2.50 | 64 * | 67-96 | 2 | 30 |
| Chrysene | 1.61 | 2.50 | 64 * | 1.65 | 2.50 | 66 * | 67-105 | 2 | 30 |
| Benzo(b)fluoranthene | 1.60 | 2.50 | 64 * | 1.63 | 2.50 | 65 * | 69-104 | 2 | 30 |
| Benzo(k)fluoranthene | 1.57 | 2.50 | 63 * | 1.60 | 2.50 | 64 * | 68-108 | 2 | 30 |
| Benzo(a)pyrene | 1.57 | 2.50 | 63 * | 1.59 | 2.50 | 64 * | 68-107 | 1 | 30 |
| Indeno(1,2,3-cd)pyrene | 1.89 | 2.50 | 76 | 1.87 | 2.50 | 75 | 61-115 | 1 | 30 |
| Dibenz(a,h)anthracene | 1.90 | 2.50 | 76 | 1.71 | 2.50 | 68 | 54-118 | 11 | 30 |
| Benzo(g,h,i)perylene | 1.66 | 2.50 | 67 | 1.67 | 2.50 | 67 | 61-110 | 0 | 30 |
| Pentachlorophenol | 10.3 | 10.0 | 103 | 10.2 | 10.0 | 102 | 10-123 | 1 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Environmental
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October 31, 2016

**Analytical Report for Service Request No:** K1612456

Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435

**RE: Joslyn / 23/27-1102016270**

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory October 14, 2016
For your reference, these analyses have been assigned our service request number **K1612456.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

C Leaf

Chris Leaf
Project Manager

# Table of Contents

# Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| A2LA | American Association for Laboratory Accreditation |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MCL | Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| NA | Not Applicable |
| NC | Not Calculated |
| NCASI | National Council of the Paper Industry for Air and Stream Improvement |
| ND | Not Detected |
| NIOSH | National Institute for Occupational Safety and Health |
| PQL | Practical Quantitation Limit |
| RCRA | Resource Conservation and Recovery Act |
| SIM | Selected Ion Monitoring |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. |

## Inorganic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| E | The result is an estimate amount because the value exceeded the instrument calibration range. |
| J | The result is an estimated value. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |
| H | The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory. |

## Metals Data Qualifiers

| | |
|---|---|
| # | The control limit criteria is not applicable. See case narrative. |
| J | The result is an estimated value. |
| E | The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample. |
| M | The duplicate injection precision was not met. |
| N | The Matrix Spike sample recovery is not within control limits. See case narrative. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| W | The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| + | The correlation coefficient for the MSA is less than 0.995. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Organic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| A | A tentatively identified compound, a suspected aldol-condensation product. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| C | The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data. |
| D | The reported result is from a dilution. |
| E | The result is an estimated value. |
| J | The result is an estimated value. |
| N | The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed. |
| P | The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Additional Petroleum Hydrocarbon Specific Qualifiers

| | |
|---|---|
| F | The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard. |
| L | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard. |
| H | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard. |
| O | The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard. |
| Y | The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. |
| Z | The chromatographic fingerprint does not resemble a petroleum product. |

## ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
## State Certifications, Accreditations, and Licenses

| **Agency** | **Web Site** | **Number** |
|---|---|---|
| Alaska DEC UST | http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx | UST-040 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0339 |
| Arkansas - DEQ | http://www.adeq.state.ar.us/techsvs/labcert.htm | 88-0637 |
| California DHS (ELAP) | http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx | 2795 |
| DOD ELAP | http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm | L14-51 |
| Florida DOH | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E87412 |
| Hawaii DOH | Not available | - |
| ISO 17025 | http://www.pjlabs.com/ | L16-57 |
| Louisiana DEQ | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 03016 |
| Maine DHS | Not available | WA01276 |
| Minnesota DOH | http://www.health.state.mn.us/accreditation | 053-999-457 |
| Montana DPHHS | http://www.dphhs.mt.gov/publichealth/ | CERT0047 |
| Nevada DEP | http://ndep.nv.gov/bsdw/labservice.htm | WA01276 |
| New Jersey DEP | http://www.nj.gov/dep/oqa/ | WA005 |
| North Carolina DWQ | http://www.dwqlab.org/ | 605 |
| Oklahoma DEQ | http://www.deq.state.ok.us/CSDnew/labcert.htm | 9801 |
| Oregon – DEQ (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | WA100010 |
| South Carolina DHEC | http://www.scdhec.gov/environment/envserv/ | 61002 |
| Texas CEQ | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704427 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C544 |
| Wyoming (EPA Region 8) | http://www.epa.gov/region8/water/dwhome/wyomingdi.html | - |
| Kelso Laboratory Website | www.alsglobal.com | NA |

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

# Case Narrative

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

# ALS ENVIRONMENTAL

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request No.:** | K1612456 |
| **Project:** | Joslyn/ 23/27-1102016270 | **Date Received:** | 10/14/16 |
| **Sample Matrix:** | Ground Water | | |

## Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

### Sample Receipt

Fourteen ground water samples were received for analysis at ALS Environmental on 10/14/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

### General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

### Semivolatile Organic Compounds by EPA Method 8270

No anomalies associated with the analysis of these samples were observed.

### Polynuclear Aromatic Hydrocarbons by EPA Method 8270

**Calibration Verification Exceptions:**
The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1021F002.D: Benzo(g,h,i)perylene. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1024F002.D: Indeno(1,2,3-cd)pyrene. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

**Surrogate Exceptions:**
The control criteria were exceeded for Terphenyl-d14 in sample U2A due to matrix interferences. The presence of non-target background components prevented adequate resolution of the surrogate. Accurate quantitation was not possible. No further corrective action was appropriate.

**Approved by**____________________________________

The control criteria were exceeded for Fluoranthene-d10 in sample W255 due to matrix interferences. The presence of non-target background components prevented adequate resolution of the surrogate. Accurate quantitation was not possible. No further corrective action was appropriate.

**Elevated Detection Limits:**
Several field samples required dilutions due to the presence of elevated levels of target analytes. The reporting limits were adjusted to reflect the dilution.

No other anomalies associated with the analysis of these samples were observed.

**Approved by**____________________________________

# Chain of Custody

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

K1612456

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☒ Minneapolis

Sample Origination State:
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☒ MN ☐ SD

COC Number: **52023**
COC 1 of 2

| REPORT TO | INVOICE TO |
|---|---|
| Company: Barr Eng. | Company: Barr Eng. |
| Address: | Address: |
| Name: | Name: |
| email: | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: JOSLYN | Barr Project No: 23271102016270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| Location | Sample Depth Start | Sample Depth Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested – Water: SVOC | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservative Code | | | | | | | | | A | | |
| Field Filtered Y/N | | | | | | | | | N | | |
| 1. U12 | | | | 10/11/2016 | 0900 | GW | | | 2 | | TABLE 3-13 |
| 2. U2A | | | | | 0910 | | | | | | |
| 3. W253 | | | | | 0920 | | | | | | |
| 4. U5 | | | | | 0930 | | | | | | |
| 5. U4N | | | | | 0940 | | | | | | |
| 6. W255 | | | | | 0950 | | | | | | |
| 7. U6N | | | | | 1000 | | | | | | |
| 8. U7N | | | | | 1010 | | | | | | |
| 9. U11 | | | | | 1020 | | | | | | |
| 10. M-1 | | | | | — | | | | | | |

**BARR USE ONLY**
Sampled by: SDI
Barr Proj. Manager: JLB III
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: KELSO, WA

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve I | [✓ Y] N | 10/13/16 | 1400 | | 10/14/16 | 09:40 |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

H:\RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

K1612456

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MI ☒ MN ☐ MO ☐ ND ☐ SD ☐ WI Other: ______

COC Number: **52024**

COC 2 of 2

| REPORT TO | INVOICE TO |
|---|---|
| Company: BARR Eng. | Company: BARR Eng. |
| Address: | Address: |
| Name: | Name: |
| email: | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: JOSLYN | Barr Project No: 23271102016270 |

| Location | Sample Depth Start | Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Water: SVOC | GENERAL | O&G | COD | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservative Code | | | | | | | | | A | A | B | D | | |
| Field Filtered Y/N | | | | | | | | | N | N | N | N | | |
| 1. TANK EFF. | | | | 10/11/2016 | 1050 | GW | | | 2 | 1 | 1 | 1 | | TABLE 3-4 FIELD pH=7.27 |
| 2. S3 | | | | 10/13/2016 | 0915 | ↓ | | | ↓ | | | | | 3-13 |
| 3. S1A | | | | ↓ | 0940 | | | | | | | | | ↓ |
| 4. S2 | | | | | 1005 | | | | | | | | | |
| 5. | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

**BARR USE ONLY**
Sampled by: SDI
Barr Proj. Manager: JLBIII
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: KELSO, WA

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve Fo | [✓ Y] N | 10/13/16 | 1400 | | 10-14-16 | 9:40 |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other: ______

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ______ (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

H:RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

ALS

PC Cl

# Cooler Receipt and Preservation Form

Client BARR Service Request K16 12456

Received: 10-14-16 Opened: 10-14-16 By: eg Unloaded: 10-14-16 By: eg

1. Samples were received via? USPS [✓ Fed Ex] UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other________ NA
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where?________

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

| Raw Cooler Temp | Corrected. Cooler Temp | Raw Temp Blank | Corrected Temp Blank | Corr. Factor | Thermometer ID | Cooler/COC ID NA | Tracking Number NA | Filed |
|---|---|---|---|---|---|---|---|---|
| 0.7 | 0.8 | 1.9 | 2.0 | +0.1 | 356 | 52024/ | 706033220444 | |
| 0 | 0 | 0 | 0 | 0 | 351 | 52023 | 706033220455 | |
| 0.5 | 0.6 | 1.3 | 1.4 | +0.1 | 327 | | 706033320433 | |
| | | | | | | | | |
| | | | | | | | | |

4. Packing material: [✓ Inserts] Baggies Bubble Wrap Gel Packs [✓ Wet Ice] Dry Ice Sleeves ________
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

| Sample ID on Bottle | Sample ID on COC | Identified by: |
|---|---|---|
| | | |
| | | |
| | | |

| Sample ID | Bottle Count Bottle Type | Out of Temp | Head-space | Broke | pH | Reagent | Volume added | Reagent Lot Number | Initials | Time |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

***Notes, Discrepancies, & Resolutions:***________

SHORT HOLD TIME

## Table 3-4

### MCES Effluent Monitoring Parameters
### Joslyn Manufacturing & Supply Co.
### Brooklyn Center, MN

### Semivolatile Organic Compounds – EPA 8270

2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Pentachlorophenol
Phenanthrene
Pyrene

### General Chemistry

Chemical Oxygen Demand – SM 5220 C
Oil and Grease – EPA 1664
Total suspended Solids – SM 2540 D
pH (field parameter)

Note:

Analysis of 2,3,7,8-tetrachlorodibenzo-p-dioxin is required only once, between January and March 2016, for the MCES Industrial Discharge Permit (Special Discharges) Number 2013, effective November 1, 2015, through October 31, 2018.

# Table 3-13

## Groundwater Monitoring Parameters
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

### PAH Compounds – EPA 8270 SIM

**Carcinogenic PAHs**

Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3,cd)pyrene
Benzo(k)fluoranthene
Dibenzo(ah)anthracene
Benzo(j)fluoranthene*

**Noncarcinogenic PAHs**

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)perylene
Fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

### Phenolic Compounds – EPA 8270 SIM

Pentachlorophenol

---

*Co-elutes with benz(b)fluoranthene

Target reporting limits: PAHs = 0.0033 µg/L, PCP = 0.3 µg/L

# General Chemistry

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/16 |
| **Sample Matrix:** | Ground Water | **Date Received:** | 10/14/16 |
| **Analysis Method:** | 1664A | **Units:** | mg/L |
| **Prep Method:** | Method | **Basis:** | NA |

## Oil and Grease, Total (HEM)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Date Extracted | Q |
|---|---|---|---|---|---|---|---|
| Tank Effluent | K1612456-011 | ND U | 5.0 | 1 | 10/24/16 16:00 | 10/21/16 | |
| Method Blank | K1612456-MB1 | ND U | 5.0 | 1 | 10/24/16 16:00 | 10/21/16 | |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | N/A |
| **Sample Matrix:** | Ground Water | **Date Received:** | N/A |
| | | **Date Analyzed:** | 10/24/16 |
| | | **Date Extracted:** | 10/21/16 |

## Matrix Spike Summary
## Oil and Grease, Total (HEM)

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1612264-001 | **Basis:** | NA |
| **Analysis Method:** | 1664A | | |
| **Prep Method:** | Method | | |

### Matrix Spike
K1612264-001MS

| Analyte Name | Sample Result | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Oil and Grease, Total (HEM) | ND U | 63.8 | 69.8 | 91 | 78-114 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Analyzed:** | 10/24/16 |
| **Sample Matrix:** | Ground Water | **Date Extracted:** | 10/21/16 |

## Duplicate Lab Control Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Analysis Method:** | 1664A | **Units:** | mg/L |
| **Prep Method:** | Method | **Basis:** | NA |
| | | **Analysis Lot:** | 520036 |

| | Lab Control Sample K1612456-LCS3 | | | Duplicate Lab Control Sample K1612456-DLCS3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Oil and Grease, Total (HEM) | 57.5 | 60.0 | 96 | 56.1 | 60.0 | 93 | 78-114 | 2 | 20 |

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/16 |
| **Sample Matrix:** | Ground Water | **Date Received:** | 10/14/16 |
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Solids, Total Suspended (TSS)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| Tank Effluent | K1612456-011 | ND U | 5.0 | 1 | 10/17/16 14:14 | |
| Method Blank | K1612456-MB1 | ND U | 5.0 | 1 | 10/17/16 14:14 | |
| Method Blank | K1612456-MB2 | ND U | 5.0 | 1 | 10/17/16 14:14 | |

**Client:** Barr Engineering Company
**Project** Joslyn/23/27-1102016270
**Sample Matrix:** Ground Water

**Service Request:** K1612456
**Date Collected:** NA
**Date Received:** NA
**Date Analyzed:** 10/17/16

## Replicate Sample Summary
## General Chemistry Parameters

**Sample Name:** Batch QC
**Lab Code:** K1612478-003

**Units:** mg/L
**Basis:** NA

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1612478-003DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| Solids, Total Suspended (TSS) | SM 2540 D | 5.0 | ND U | ND U | NC | NC | 10 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Analyzed:** | 10/17/16 |
| **Sample Matrix:** | Ground Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## Solids, Total Suspended (TSS)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 519154 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1612456-LCS1 | 134 | 141 | 95 | 85-115 |

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/16 |
| **Sample Matrix:** | Ground Water | **Date Received:** | 10/14/16 |
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Chemical Oxygen Demand (COD)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| Tank Effluent | K1612456-011 | **17.5** | 5.0 | 1 | 10/24/16 13:00 | |
| Method Blank | K1612456-MB1 | ND U | 5.0 | 1 | 10/24/16 13:00 | |
| Method Blank | K1612456-MB2 | ND U | 5.0 | 1 | 10/24/16 13:00 | |

# ALS Group USA, Corp.

**dba ALS Environmental**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/16 |
| **Sample Matrix:** | Ground Water | **Date Received:** | 10/14/16 |

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Replicate Sample Summary

## Chemical Oxygen Demand (COD)

| Sample Name: | Lab Code: | MRL | Sample Result | Duplicate Result | Average | RPD | RPD Limit | Date Analyzed |
|---|---|---|---|---|---|---|---|---|
| Batch QC | K1612451-001DUP | 5.0 | 87.1 | 85.6 | 86.3 | 2 | 20 | 10/24/16 |
| Tank Effluent | K1612456-011DUP | 5.0 | 17.5 | 15.5 | 16.5 | 12 | 20 | 10/24/16 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | N/A |
| **Sample Matrix:** | Ground Water | **Date Received:** | N/A |
| | | **Date Analyzed:** | 10/24/16 |
| | | **Date Extracted:** | NA |

## Duplicate Matrix Spike Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1612451-001 | **Basis:** | NA |
| **Analysis Method:** | SM 5220 C | | |
| **Prep Method:** | None | | |

| | | **Matrix Spike**<br>K1612451-001MS | | | **Duplicate Matrix Spike**<br>K1612451-001DMS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Sample Result** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Chemical Oxygen Demand (COD) | 87.1 | 190 | 100 | 103 | 185 | 100 | 98 | 80-128 | 3 | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/16 |
| **Sample Matrix:** | Ground Water | **Date Received:** | 10/14/16 |
| | | **Date Analyzed:** | 10/24/16 |
| | | **Date Extracted:** | NA |

## Duplicate Matrix Spike Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Sample Name:** | Tank Effluent | **Units:** | mg/L |
| **Lab Code:** | K1612456-011 | **Basis:** | NA |
| **Analysis Method:** | SM 5220 C | | |
| **Prep Method:** | None | | |

| | | Matrix Spike<br>K1612456-011MS | | | Duplicate Matrix Spike<br>K1612456-011DMS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Sample Result** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Chemical Oxygen Demand (COD) | 17.5 | 128 | 100 | 110 | 131 | 100 | 114 | 80-128 | 3 | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Analyzed:** | 10/24/16 |
| **Sample Matrix:** | Ground Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 520214 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1612456-LCS1 | 127 | 121 | 105 | 83-117 |
| Lab Control Sample | K1612456-LCS2 | 127 | 121 | 105 | 83-117 |

# Semi-Volatile Organic Compounds by GC/MS

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | Tank Effluent | **Units:** | ug/L |
| **Lab Code:** | K1612456-011 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| 2-Methylnaphthalene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Acenaphthylene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Acenaphthene | **49** | | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Fluorene | **18** | | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Phenanthrene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Anthracene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Pentachlorophenol | **330** | D | 130 | 5 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Fluoranthene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Pyrene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benz(a)anthracene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Chrysene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benzo(b)fluoranthene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benzo(k)fluoranthene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benzo(a)pyrene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Dibenz(a,h)anthracene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benzo(g,h,i)perylene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2-Fluorobiphenyl | 81 | 49-109 | 10/22/16 | Acceptable |
| 2,4,6-Tribromophenol | 99 | 36-129 | 10/22/16 | Acceptable |
| Terphenyl-d14 | 114 | 29-136 | 10/22/16 | Acceptable |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Ground water | **Date Received:** | NA |

## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1609449-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| 2-Methylnaphthalene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Acenaphthylene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Acenaphthene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Fluorene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Phenanthrene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Anthracene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Pentachlorophenol | ND | U | 25 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Fluoranthene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Pyrene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benz(a)anthracene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Chrysene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benzo(b)fluoranthene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benzo(k)fluoranthene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benzo(a)pyrene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Dibenz(a,h)anthracene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |
| Benzo(g,h,i)perylene | ND | U | 10 | 1 | 10/18/16 | 10/22/16 | KWG1609449 | |

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| 2-Fluorobiphenyl | 83 | 49-109 | 10/22/16 | Acceptable |
| 2,4,6-Tribromophenol | 88 | 36-129 | 10/22/16 | Acceptable |
| Terphenyl-d14 | 109 | 29-136 | 10/22/16 | Acceptable |

**Comments:**

**Client:** Barr Engineering Company
**Service Request:** K1612456
**Project:** Joslyn/23/27-1102016270
**Sample Matrix:** Ground water

## Surrogate Recovery Summary
## Semi-Volatile Organic Compounds by GC/MS

**Extraction Method:** EPA 3520C
**Units:** Percent
**Analysis Method:** 8270D
**Level:** Low

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 |
|---|---|---|---|---|
| Tank Effluent | K1612456-011 | 81 | 99 | 114 |
| Method Blank | KWG1609449-3 | 83 | 88 | 109 |
| Lab Control Sample | KWG1609449-1 | 70 | 92 | 90 |
| Duplicate Lab Control Sample | KWG1609449-2 | 90 | 102 | 93 |

**Surrogate Recovery Control Limits (%)**

| | | |
|---|---|---|
| Sur1 | = 2-Fluorobiphenyl | 49-109 |
| Sur2 | = 2,4,6-Tribromophenol | 36-129 |
| Sur3 | = Terphenyl-d14 | 29-136 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Extracted:** | 10/18/2016 |
| **Sample Matrix:** | Ground water | **Date Analyzed:** | 10/22/2016 |

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Semi-Volatile Organic Compounds by GC/MS

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | ug/L |
| **Analysis Method:** | 8270D | **Basis:** | NA |
| | | **Level:** | Low |
| | | **Extraction Lot:** | KWG1609449 |

| | Lab Control Sample<br>KWG1609449-1<br>**Lab Control Spike** | | | Duplicate Lab Control Sample<br>KWG1609449-2<br>**Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 72.5 | 100 | 73 | 88.6 | 100 | 89 | 64-98 | 20 | 30 |
| 2-Methylnaphthalene | 69.9 | 100 | 70 | 86.4 | 100 | 86 | 66-101 | 21 | 30 |
| Acenaphthylene | 78.8 | 100 | 79 | 92.6 | 100 | 93 | 69-105 | 16 | 30 |
| Acenaphthene | 82.0 | 100 | 82 | 95.7 | 100 | 96 | 69-108 | 15 | 30 |
| Fluorene | 85.4 | 100 | 85 | 93.6 | 100 | 94 | 65-113 | 9 | 30 |
| Phenanthrene | 92.0 | 100 | 92 | 97.2 | 100 | 97 | 67-113 | 5 | 30 |
| Anthracene | 90.4 | 100 | 90 | 96.5 | 100 | 97 | 69-114 | 7 | 30 |
| Pentachlorophenol | 88.1 | 100 | 88 | 98.7 | 100 | 99 | 60-113 | 11 | 30 |
| Fluoranthene | 96.8 | 100 | 97 | 107 | 100 | 107 | 69-123 | 10 | 30 |
| Pyrene | 96.5 | 100 | 97 | 99.5 | 100 | 99 | 61-121 | 3 | 30 |
| Benz(a)anthracene | 89.7 | 100 | 90 | 93.7 | 100 | 94 | 72-117 | 4 | 30 |
| Chrysene | 89.0 | 100 | 89 | 91.4 | 100 | 91 | 71-113 | 3 | 30 |
| Benzo(b)fluoranthene | 84.1 | 100 | 84 | 86.1 | 100 | 86 | 72-116 | 2 | 30 |
| Benzo(k)fluoranthene | 86.3 | 100 | 86 | 86.0 | 100 | 86 | 71-113 | 0 | 30 |
| Benzo(a)pyrene | 87.4 | 100 | 87 | 87.9 | 100 | 88 | 72-115 | 0 | 30 |
| Indeno(1,2,3-cd)pyrene | 91.9 | 100 | 92 | 92.6 | 100 | 93 | 70-120 | 1 | 30 |
| Dibenz(a,h)anthracene | 91.5 | 100 | 91 | 95.1 | 100 | 95 | 68-120 | 4 | 30 |
| Benzo(g,h,i)perylene | 95.1 | 100 | 95 | 95.0 | 100 | 95 | 67-120 | 0 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

# Polynuclear Aromatic Hydrocarbons

**ALS Environmental—Kelso Laboratory**
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RIGHT SOLUTIONS | RIGHT PARTNER

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U12 | **Units:** | ug/L |
| **Lab Code:** | K1612456-001 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **2.9** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| 2-Methylnaphthalene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **0.86** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **56** | D | 0.17 | 50 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluorene | **23** | D | 0.17 | 50 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Phenanthrene | **0.65** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Anthracene | **0.67** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **4.5** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **1.9** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **12** | D | 2.9 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 81 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 91 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 66 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 87 | 22-127 | 10/21/16 | Acceptable |

**† Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U2A | **Units:** | ug/L |
| **Lab Code:** | K1612456-002 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.066** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| 2-Methylnaphthalene | ND | U | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **0.063** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **0.76** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluorene | **0.050** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Phenanthrene | **0.046** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Anthracene | **0.11** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **0.084** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **0.10** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | **0.036** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | **0.042** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | **0.035** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | **0.034** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | **0.035** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | **0.035** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | **0.036** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | **0.041** | D | 0.034 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **46** | D | 30 | 100 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 85 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 102 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 93 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 139 | 22-127 | 10/21/16 | Outside Control Limits |

**† Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W253 | **Units:** | ug/L |
| **Lab Code:** | K1612456-003 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.028** | D | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | **0.013** | D | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Acenaphthylene | **0.12** | D | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Acenaphthene | **10** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluorene | **1.4** | D | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Phenanthrene | **0.14** | D | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Anthracene | **0.049** | D | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluoranthene | **0.023** | D | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Pyrene | **0.012** | D | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Chrysene | ND | U | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | * |
| Dibenz(a,h)anthracene | ND | U | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.0065 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Pentachlorophenol | ND | U | 0.57 | 2 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 84 | 28-125 | 10/24/16 | Acceptable |
| Fluoranthene-d10 | 83 | 39-123 | 10/24/16 | Acceptable |
| 2,4,6-Tribromophenol | 63 | 10-136 | 10/24/16 | Acceptable |
| Terphenyl-d14 | 86 | 22-127 | 10/24/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U5 | **Units:** | ug/L |
| **Lab Code:** | K1612456-004 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **2.1** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| 2-Methylnaphthalene | **0.32** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **1.3** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **120** | D | 0.33 | 100 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | **57** | D | 0.33 | 100 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Phenanthrene | **2.8** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Anthracene | **2.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **18** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **8.1** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | **0.14** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | **0.052** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **16** | D | 5.7 | 20 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 79 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 104 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 81 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 114 | 22-127 | 10/21/16 | Acceptable |

**† Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

## ALS Group USA, Corp. dba ALS Environmental

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

### Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U4N | **Units:** | ug/L |
| **Lab Code:** | K1612456-005 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **47** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | **2.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **0.35** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **33** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | **9.1** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Phenanthrene | **4.4** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Anthracene | **0.63** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **0.81** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **0.29** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **110** | D | 29 | 100 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 67 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 89 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 59 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 100 | 22-127 | 10/21/16 | Acceptable |

**† Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W255 | **Units:** | ug/L |
| **Lab Code:** | K1612456-006 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **2800** | D | 6.5 | 2000 | 10/18/16 | 10/26/16 | KWG1609371 | |
| 2-Methylnaphthalene | **110** | D | 3.3 | 1000 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **5.0** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **210** | D | 3.3 | 1000 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluorene | **110** | D | 3.3 | 1000 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Phenanthrene | **170** | D | 3.3 | 1000 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Anthracene | **10** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **85** | D | 3.3 | 1000 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **48** | D | 3.3 | 1000 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | **17** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | **9.6** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | **14** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | **4.7** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | **9.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | **4.1** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | **1.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | **3.3** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **14** | D | 2.9 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 101 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 252 | 39-123 | 10/21/16 | Outside Control Limits |
| 2,4,6-Tribromophenol | 70 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 124 | 22-127 | 10/21/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

## ALS Group USA, Corp. dba ALS Environmental

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

### Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U6N | **Units:** | ug/L |
| **Lab Code:** | K1612456-007 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **25** | D | 0.065 | 20 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | **8.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **0.44** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **28** | D | 0.065 | 20 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | **16** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Phenanthrene | **13** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Anthracene | **1.4** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **10** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **5.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | **0.47** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | **0.14** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | **0.25** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | **0.083** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | **0.13** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | **0.055** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | **0.057** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **650** | D | 570 | 2000 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 83 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 86 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 64 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 90 | 22-127 | 10/21/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U7N | **Units:** | ug/L |
| **Lab Code:** | K1612456-008 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **32** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | **1.9** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **0.60** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **69** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | **20** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Phenanthrene | **13** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Anthracene | **1.0** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **9.6** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **4.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | **0.075** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **53** | D | 15 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 83 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 89 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 66 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 90 | 22-127 | 10/21/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U11 | **Units:** | ug/L |
| **Lab Code:** | K1612456-009 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **60** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | **5.6** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **1.6** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **79** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | **38** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Phenanthrene | **23** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Anthracene | **1.4** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **3.5** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **1.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **480** | D | 290 | 1000 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 82 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 113 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 74 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 106 | 22-127 | 10/21/16 | Acceptable |

**† Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:** ______

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/11/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | M-1 | **Units:** | ug/L |
| **Lab Code:** | K1612456-010 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **43** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | **4.7** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | **1.5** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | **76** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | **37** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Phenanthrene | **20** | D | 0.17 | 50 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Anthracene | **1.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | **3.4** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | **1.2** | D | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.033 | 10 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | **570** | D | 150 | 500 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 86 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 113 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 72 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 98 | 22-127 | 10/21/16 | Acceptable |

**† Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

## ALS Group USA, Corp. dba ALS Environmental

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/13/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

### Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | S3 | **Units:** | ug/L |
| **Lab Code:** | K1612456-012 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0044** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Anthracene | **0.016** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Chrysene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | * |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 76 | 28-125 | 10/24/16 | Acceptable |
| Fluoranthene-d10 | 79 | 39-123 | 10/24/16 | Acceptable |
| 2,4,6-Tribromophenol | 68 | 10-136 | 10/24/16 | Acceptable |
| Terphenyl-d14 | 99 | 22-127 | 10/24/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/13/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | S1A | **Units:** | ug/L |
| **Lab Code:** | K1612456-013 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0091** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Acenaphthylene | **0.0049** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Acenaphthene | **0.0066** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Anthracene | **0.024** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Chrysene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | * |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 76 | 28-125 | 10/24/16 | Acceptable |
| Fluoranthene-d10 | 84 | 39-123 | 10/24/16 | Acceptable |
| 2,4,6-Tribromophenol | 66 | 10-136 | 10/24/16 | Acceptable |
| Terphenyl-d14 | 98 | 22-127 | 10/24/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

**ALS Group USA, Corp. dba ALS Environmental**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | 10/13/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/14/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | S2 | **Units:** | ug/L |
| **Lab Code:** | K1612456-014 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0067** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Acenaphthylene | **0.0036** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Acenaphthene | **0.0038** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluorene | **0.012** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Phenanthrene | **0.0040** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Anthracene | **0.020** | | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Chrysene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | * |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/18/16 | 10/24/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 73 | 28-125 | 10/24/16 | Acceptable |
| Fluoranthene-d10 | 107 | 39-123 | 10/24/16 | Acceptable |
| 2,4,6-Tribromophenol | 64 | 10-136 | 10/24/16 | Acceptable |
| Terphenyl-d14 | 85 | 22-127 | 10/24/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

# ALS Group USA, Corp. dba ALS Environmental

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Ground water | **Date Received:** | NA |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1609371-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Chrysene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | * |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/18/16 | 10/21/16 | KWG1609371 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 75 | 28-125 | 10/21/16 | Acceptable |
| Fluoranthene-d10 | 83 | 39-123 | 10/21/16 | Acceptable |
| 2,4,6-Tribromophenol | 43 | 10-136 | 10/21/16 | Acceptable |
| Terphenyl-d14 | 82 | 22-127 | 10/21/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | | |
| **Sample Matrix:** | Ground water | | |

## Surrogate Recovery Summary
## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | Percent |
| **Analysis Method:** | 8270D SIM | **Level:** | Low |

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 | Sur4 |
|---|---|---|---|---|---|
| U12 | K1612456-001 | 81 D | 91 D | 66 D | 87 D |
| U2A | K1612456-002 | 85 D | 102 D | 93 D | 139 D * |
| W253 | K1612456-003 | 84 D | 83 D | 63 D | 86 D |
| U5 | K1612456-004 | 79 D | 104 D | 81 D | 114 D |
| U4N | K1612456-005 | 67 D | 89 D | 59 D | 100 D |
| W255 | K1612456-006 | 101 D | 252 D * | 70 D | 124 D |
| U6N | K1612456-007 | 83 D | 86 D | 64 D | 90 D |
| U7N | K1612456-008 | 83 D | 89 D | 66 D | 90 D |
| U11 | K1612456-009 | 82 D | 113 D | 74 D | 106 D |
| M-1 | K1612456-010 | 86 D | 113 D | 72 D | 98 D |
| S3 | K1612456-012 | 76 | 79 | 68 | 99 |
| S1A | K1612456-013 | 76 | 84 | 66 | 98 |
| S2 | K1612456-014 | 73 | 107 | 64 | 85 |
| Method Blank | KWG1609371-3 | 75 | 83 | 43 | 82 |
| Lab Control Sample | KWG1609371-1 | 79 D | 88 D | 51 D | 88 D |
| Duplicate Lab Control Sample | KWG1609371-2 | 79 D | 87 D | 55 D | 86 D |

**Surrogate Recovery Control Limits (%)**

| | | | |
|---|---|---|---|
| Sur1 | = | Fluorene-d10 | 28-125 |
| Sur2 | = | Fluoranthene-d10 | 39-123 |
| Sur3 | = | 2,4,6-Tribromophenol | 10-136 |
| Sur4 | = | Terphenyl-d14 | 22-127 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612456 |
| **Project:** | Joslyn/23/27-1102016270 | **Date Extracted:** | 10/18/2016 |
| **Sample Matrix:** | Ground water | **Date Analyzed:** | 10/21/2016 |

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | ug/L |
| **Analysis Method:** | 8270D SIM | **Basis:** | NA |
| | | **Level:** | Low |
| | | **Extraction Lot:** | KWG1609371 |

| | Lab Control Sample<br>KWG1609371-1<br>**Lab Control Spike** | | | Duplicate Lab Control Sample<br>KWG1609371-2<br>**Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 0.408 | 0.500 | 82 | 0.421 | 0.500 | 84 | 59-95 | 3 | 30 |
| 2-Methylnaphthalene | 0.399 | 0.500 | 80 | 0.412 | 0.500 | 82 | 42-108 | 3 | 30 |
| Acenaphthylene | 0.403 | 0.500 | 81 | 0.417 | 0.500 | 83 | 61-102 | 3 | 30 |
| Acenaphthene | 0.398 | 0.500 | 80 | 0.415 | 0.500 | 83 | 58-98 | 4 | 30 |
| Fluorene | 0.401 | 0.500 | 80 | 0.419 | 0.500 | 84 | 59-97 | 4 | 30 |
| Phenanthrene | 0.390 | 0.500 | 78 | 0.405 | 0.500 | 81 | 61-100 | 4 | 30 |
| Anthracene | 0.427 | 0.500 | 85 | 0.436 | 0.500 | 87 | 65-98 | 2 | 30 |
| Fluoranthene | 0.411 | 0.500 | 82 | 0.425 | 0.500 | 85 | 63-106 | 3 | 30 |
| Pyrene | 0.348 | 0.500 | 70 | 0.362 | 0.500 | 72 | 64-104 | 4 | 30 |
| Benz(a)anthracene | 0.357 | 0.500 | 71 | 0.366 | 0.500 | 73 | 67-96 | 2 | 30 |
| Chrysene | 0.362 | 0.500 | 72 | 0.389 | 0.500 | 78 | 67-105 | 7 | 30 |
| Benzo(b)fluoranthene | 0.387 | 0.500 | 77 | 0.402 | 0.500 | 80 | 69-104 | 4 | 30 |
| Benzo(k)fluoranthene | 0.402 | 0.500 | 80 | 0.422 | 0.500 | 84 | 68-108 | 5 | 30 |
| Benzo(a)pyrene | 0.367 | 0.500 | 73 | 0.386 | 0.500 | 77 | 68-107 | 5 | 30 |
| Indeno(1,2,3-cd)pyrene | 0.346 | 0.500 | 69 | 0.362 | 0.500 | 72 | 61-115 | 5 | 30 |
| Dibenz(a,h)anthracene | 0.366 | 0.500 | 73 | 0.403 | 0.500 | 81 | 54-118 | 10 | 30 |
| Benzo(g,h,i)perylene | 0.348 | 0.500 | 70 | 0.373 | 0.500 | 75 | 61-110 | 7 | 30 |
| Pentachlorophenol | 2.03 | 2.50 | 81 | 2.18 | 2.50 | 87 | 10-123 | 7 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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November 04, 2016

**Analytical Report for Service Request No:** K1612548

Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435

**RE: Joslyn / 2327110 2016 270**

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory October 15, 2016
For your reference, these analyses have been assigned our service request number **K1612548.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

C Leaf

Chris Leaf
Project Manager

# Table of Contents

# Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| A2LA | American Association for Laboratory Accreditation |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MCL | Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| NA | Not Applicable |
| NC | Not Calculated |
| NCASI | National Council of the Paper Industry for Air and Stream Improvement |
| ND | Not Detected |
| NIOSH | National Institute for Occupational Safety and Health |
| PQL | Practical Quantitation Limit |
| RCRA | Resource Conservation and Recovery Act |
| SIM | Selected Ion Monitoring |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. |

## Inorganic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| E | The result is an estimate amount because the value exceeded the instrument calibration range. |
| J | The result is an estimated value. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |
| H | The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory. |

## Metals Data Qualifiers

| | |
|---|---|
| # | The control limit criteria is not applicable. See case narrative. |
| J | The result is an estimated value. |
| E | The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample. |
| M | The duplicate injection precision was not met. |
| N | The Matrix Spike sample recovery is not within control limits. See case narrative. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| W | The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| + | The correlation coefficient for the MSA is less than 0.995. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Organic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| A | A tentatively identified compound, a suspected aldol-condensation product. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| C | The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data. |
| D | The reported result is from a dilution. |
| E | The result is an estimated value. |
| J | The result is an estimated value. |
| N | The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed. |
| P | The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Additional Petroleum Hydrocarbon Specific Qualifiers

| | |
|---|---|
| F | The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard. |
| L | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard. |
| H | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard. |
| O | The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard. |
| Y | The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. |
| Z | The chromatographic fingerprint does not resemble a petroleum product. |

# ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
## State Certifications, Accreditations, and Licenses

| Agency | Web Site | Number |
|---|---|---|
| Alaska DEC UST | http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx | UST-040 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0339 |
| Arkansas - DEQ | http://www.adeq.state.ar.us/techsvs/labcert.htm | 88-0637 |
| California DHS (ELAP) | http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx | 2795 |
| DOD ELAP | http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm | L14-51 |
| Florida DOH | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E87412 |
| Hawaii DOH | Not available | - |
| ISO 17025 | http://www.pjlabs.com/ | L16-57 |
| Louisiana DEQ | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 03016 |
| Maine DHS | Not available | WA01276 |
| Minnesota DOH | http://www.health.state.mn.us/accreditation | 053-999-457 |
| Montana DPHHS | http://www.dphhs.mt.gov/publichealth/ | CERT0047 |
| Nevada DEP | http://ndep.nv.gov/bsdw/labservice.htm | WA01276 |
| New Jersey DEP | http://www.nj.gov/dep/oqa/ | WA005 |
| North Carolina DWQ | http://www.dwqlab.org/ | 605 |
| Oklahoma DEQ | http://www.deq.state.ok.us/CSDnew/labcert.htm | 9801 |
| Oregon – DEQ (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | WA100010 |
| South Carolina DHEC | http://www.scdhec.gov/environment/envserv/ | 61002 |
| Texas CEQ | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704427 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C544 |
| Wyoming (EPA Region 8) | http://www.epa.gov/region8/water/dwhome/wyomingdi.html | - |
| Kelso Laboratory Website | www.alsglobal.com | NA |

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

# Case Narrative

**ALS Environmental—Kelso Laboratory**
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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

## ALS ENVIRONMENTAL

**Client:** Barr Engineering Company
**Project:** Joslyn 2327110 2016 270
**Sample Matrix:** Ground Water

**Service Request No.:** K1612548
**Date Received:** 10/15/16

### Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

### Sample Receipt

Five ground water samples were received for analysis at ALS Environmental on 10/15/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

### Semivolatile Organic Compounds by EPA Method 8270

**Lab Control Sample Exceptions:**
The lower control criterion was exceeded by 1-3% for Benzo(a)pyrene in replicate Laboratory Control Samples (LCS/DLCS) KWG1609595-1 and KWG1609595-2. The analyte in question was not detected in the associated field samples. The error associated with reduced recovery equates to a potential slight low bias. The results were flagged to indicate the issue. No further corrective action was taken.

**Approved by**____________________________________

# Chain of Custody

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

K1612548

# Barr Engineering Co. Chain of Custody

☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MI ☒ MN ☐ MO ☐ ND ☐ SD ☐ WI Other: ______

COC Number: **52044**
COC 1 of 1

| REPORT TO | INVOICE TO |
|---|---|
| Company: BARR Eng. | Company: BARR Eng. |
| Address: | Address: |
| Name: | Name: |
| email: | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: JOSLYN | Barr Project No: 23 27 110 2016 270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| | Location | Sample Depth Start | Sample Depth Stop | Sample Depth Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested Water: SVOC | Water | Water | Water | Water | Water | Soil | Soil | Soil | Soil | Soil | Soil: % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | A | | | | | | | | | | | | Preservative Code |
| | | | | | | | | | | N | | | | | | | | | | | | Field Filtered Y/N |
| 1. | W132 | | | | 10/14/16 | 1030 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. | W130 | | | | | 1100 | | | | | | | | | | | | | | | | |
| 3. | W6N | | | | | 1130 | | | | | | | | | | | | | | | | |
| 4. | M-2 | | | | | — | | | | | | | | | | | | | | | | |
| 5. | FB-1 | | | | | — | O | | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | | |

**BARR USE ONLY**
Sampled by: SDI
Barr Proj. Manager: JLBIII
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: KELSO, WA

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve I | [✓ Y] N | 10/14/16 | 1500 | | 10/15/16 | 0910 |
| | Y N | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other: ______

Air Bill Number:

Lab WO:

Temperature on Receipt (°C):

Custody Seal Intact? ☐ Y ☐ N ☐ None

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ______ (mm/dd/yyyy)

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

H:\RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

## Table 3-13

## Groundwater Monitoring Parameters
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

### PAH Compounds – EPA 8270 SIM

#### Carcinogenic PAHs

Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3,cd)pyrene
Benzo(k)fluoranthene
Dibenzo(ah)anthracene
Benzo(j)fluoranthene*

#### Noncarcinogenic PAHs

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)perylene
Fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

### Phenolic Compounds – EPA 8270 SIM

Pentachlorophenol

---

*Co-elutes with benz(b)fluoranthene

Target reporting limits: PAHs = 0.0033 µg/L, PCP = 0.3 µg/L

ALS

PC CN

# Cooler Receipt and Preservation Form

Client Barr Service Request **K16** 12548

Received: 10/15/16 Opened: 10/15/16 By: Unloaded: 10/15/16 By:

1. Samples were received via? *USPS* [✓ *Fed Ex*] *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? One, front

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

| Raw Cooler Temp | Corrected. Cooler Temp | Raw Temp Blank | Corrected Temp Blank | Corr. Factor | Thermometer ID | Cooler/COC ID NA | Tracking Number NA | Filed |
|---|---|---|---|---|---|---|---|---|
| 0.7 | 0.6 | 2.8 | 2.7 | -0.1 | 362 | | 7060 3332 0514 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

4. Packing material: [✓ *Inserts*] [✓ *Baggies*] *Bubble Wrap* *Gel Packs* [✓ *Wet Ice*] *Dry Ice* *Sleeves* ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: ***Frozen*** ***Partially Thawed*** ***Thawed***
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? NA [✓ Y] N

| Sample ID on Bottle | Sample ID on COC | Identified by: |
|---|---|---|
| | | |
| | | |
| | | |

| Sample ID | Bottle Count Bottle Type | Out of Temp | Head-space | Broke | pH | Reagent | Volume added | Reagent Lot Number | Initials | Time |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

***Notes, Discrepancies, & Resolutions:***

*7/25/16*

***Page*** ____ ***of*** ____

# Semi-Volatile Organic Compounds by GC/MS

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612548 |
| **Project:** | Joslyn/2327110 2016 270 | **Date Collected:** | 10/14/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/15/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W132 | **Units:** | ug/L |
| **Lab Code:** | K1612548-001 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| 2-Methylnaphthalene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthylene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluorene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Phenanthrene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Anthracene | **0.055** | | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluoranthene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pyrene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benz(a)anthracene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Chrysene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(b)fluoranthene† | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(k)fluoranthene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(a)pyrene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Dibenz(a,h)anthracene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(g,h,i)perylene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pentachlorophenol | **0.33** | | 0.30 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 74 | 28-125 | 10/25/16 | Acceptable |
| Fluoranthene-d10 | 101 | 39-123 | 10/25/16 | Acceptable |
| 2,4,6-Tribromophenol | 63 | 10-136 | 10/25/16 | Acceptable |
| Terphenyl-d14 | 93 | 22-127 | 10/25/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612548 |
| **Project:** | Joslyn/2327110 2016 270 | **Date Collected:** | 10/14/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/15/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W130 | **Units:** | ug/L |
| **Lab Code:** | K1612548-002 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0047** | | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| 2-Methylnaphthalene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthylene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluorene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Phenanthrene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Anthracene | **0.013** | | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluoranthene | **0.0038** | | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pyrene | **0.0038** | | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benz(a)anthracene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Chrysene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(b)fluoranthene† | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(k)fluoranthene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(a)pyrene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Dibenz(a,h)anthracene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(g,h,i)perylene | ND | U | 0.0034 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pentachlorophenol | ND | U | 0.30 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 75 | 28-125 | 10/25/16 | Acceptable |
| Fluoranthene-d10 | 78 | 39-123 | 10/25/16 | Acceptable |
| 2,4,6-Tribromophenol | 64 | 10-136 | 10/25/16 | Acceptable |
| Terphenyl-d14 | 94 | 22-127 | 10/25/16 | Acceptable |

| † **Analyte Comments** | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612548 |
| **Project:** | Joslyn/2327110 2016 270 | **Date Collected:** | 10/14/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/15/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W6N | **Units:** | ug/L |
| **Lab Code:** | K1612548-003 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.020** | | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthylene | **0.0065** | | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluorene | **0.064** | | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Anthracene | **0.14** | | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Chrysene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pentachlorophenol | **49** | D | 15 | 50 | 10/21/16 | 10/27/16 | KWG1609595 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 78 | 28-125 | 10/25/16 | Acceptable |
| Fluoranthene-d10 | 84 | 39-123 | 10/25/16 | Acceptable |
| 2,4,6-Tribromophenol | 68 | 10-136 | 10/25/16 | Acceptable |
| Terphenyl-d14 | 95 | 22-127 | 10/25/16 | Acceptable |

| † **Analyte Comments** | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

# ALS Group USA, Corp. dba ALS Environmental

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612548 |
| **Project:** | Joslyn/2327110 2016 270 | **Date Collected:** | 10/14/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/15/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | M-2 | **Units:** | ug/L |
| **Lab Code:** | K1612548-004 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Anthracene | **0.054** | | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Chrysene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 77 | 28-125 | 10/25/16 | Acceptable |
| Fluoranthene-d10 | 97 | 39-123 | 10/25/16 | Acceptable |
| 2,4,6-Tribromophenol | 60 | 10-136 | 10/25/16 | Acceptable |
| Terphenyl-d14 | 96 | 22-127 | 10/25/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612548 |
| **Project:** | Joslyn/2327110 2016 270 | **Date Collected:** | 10/14/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/15/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | FB-1 | **Units:** | ug/L |
| **Lab Code:** | K1612548-005 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.038** | | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| 2-Methylnaphthalene | **0.015** | | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Chrysene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 75 | 28-125 | 10/25/16 | Acceptable |
| Fluoranthene-d10 | 78 | 39-123 | 10/25/16 | Acceptable |
| 2,4,6-Tribromophenol | 55 | 10-136 | 10/25/16 | Acceptable |
| Terphenyl-d14 | 91 | 22-127 | 10/25/16 | Acceptable |

**† Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612548 |
| **Project:** | Joslyn/2327110 2016 270 | **Date Collected:** | NA |
| **Sample Matrix:** | Ground water | **Date Received:** | NA |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1609595-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Chrysene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | * |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/21/16 | 10/25/16 | KWG1609595 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 72 | 28-125 | 10/25/16 | Acceptable |
| Fluoranthene-d10 | 100 | 39-123 | 10/25/16 | Acceptable |
| 2,4,6-Tribromophenol | 48 | 10-136 | 10/25/16 | Acceptable |
| Terphenyl-d14 | 86 | 22-127 | 10/25/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

## ALS Group USA, Corp. dba ALS Environmental

QA/QC Report

**Client:** Barr Engineering Company
**Service Request:** K1612548
**Project:** Joslyn/2327110 2016 270
**Sample Matrix:** Ground water

### Surrogate Recovery Summary
### Polynuclear Aromatic Hydrocarbons

**Extraction Method:** EPA 3520C
**Units:** Percent
**Analysis Method:** 8270D SIM
**Level:** Low

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 | Sur4 |
|---|---|---|---|---|---|
| W132 | K1612548-001 | 74 | 101 | 63 | 93 |
| W130 | K1612548-002 | 75 | 78 | 64 | 94 |
| W6N | K1612548-003 | 78 | 84 | 68 | 95 |
| M-2 | K1612548-004 | 77 | 97 | 60 | 96 |
| FB-1 | K1612548-005 | 75 | 78 | 55 | 91 |
| Method Blank | KWG1609595-3 | 72 | 100 | 48 | 86 |
| Lab Control Sample | KWG1609595-1 | 77 | 91 | 61 | 93 |
| Duplicate Lab Control Sample | KWG1609595-2 | 77 | 88 | 63 | 89 |

**Surrogate Recovery Control Limits (%)**

| | | | |
|---|---|---|---|
| Sur1 | = | Fluorene-d10 | 28-125 |
| Sur2 | = | Fluoranthene-d10 | 39-123 |
| Sur3 | = | 2,4,6-Tribromophenol | 10-136 |
| Sur4 | = | Terphenyl-d14 | 22-127 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

| | | | | |
|---|---|---|---|---|
| **Client:** | Barr Engineering Company | | **Service Request:** | K1612548 |
| **Project:** | Joslyn/2327110 2016 270 | | **Date Extracted:** | 10/21/2016 |
| **Sample Matrix:** | Ground water | | **Date Analyzed:** | 10/25/2016 - 10/27/2016 |

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Polynuclear Aromatic Hydrocarbons

| | | | | |
|---|---|---|---|---|
| **Extraction Method:** | EPA 3520C | | **Units:** | ug/L |
| **Analysis Method:** | 8270D SIM | | **Basis:** | NA |
| | | | **Level:** | Low |
| | | | **Extraction Lot:** | KWG1609595 |

| | Lab Control Sample<br>KWG1609595-1<br>**Lab Control Spike** | | | Duplicate Lab Control Sample<br>KWG1609595-2<br>**Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 0.380 | 0.500 | 76 | 0.391 | 0.500 | 78 | 59-95 | 3 | 30 |
| 2-Methylnaphthalene | 0.375 | 0.500 | 75 | 0.381 | 0.500 | 76 | 42-108 | 2 | 30 |
| Acenaphthylene | 0.372 | 0.500 | 74 | 0.375 | 0.500 | 75 | 61-102 | 1 | 30 |
| Acenaphthene | 0.374 | 0.500 | 75 | 0.389 | 0.500 | 78 | 58-98 | 4 | 30 |
| Fluorene | 0.374 | 0.500 | 75 | 0.387 | 0.500 | 77 | 59-97 | 4 | 30 |
| Phenanthrene | 0.373 | 0.500 | 75 | 0.388 | 0.500 | 78 | 61-100 | 4 | 30 |
| Anthracene | 0.367 | 0.500 | 73 | 0.380 | 0.500 | 76 | 65-98 | 3 | 30 |
| Fluoranthene | 0.400 | 0.500 | 80 | 0.411 | 0.500 | 82 | 63-106 | 3 | 30 |
| Pyrene | 0.346 | 0.500 | 69 | 0.348 | 0.500 | 70 | 64-104 | 1 | 30 |
| Benz(a)anthracene | 0.341 | 0.500 | 68 | 0.355 | 0.500 | 71 | 67-96 | 4 | 30 |
| Chrysene | 0.341 | 0.500 | 68 | 0.350 | 0.500 | 70 | 67-105 | 3 | 30 |
| Benzo(b)fluoranthene | 0.363 | 0.500 | 73 | 0.401 | 0.500 | 80 | 69-104 | 10 | 30 |
| Benzo(k)fluoranthene | 0.366 | 0.500 | 73 | 0.403 | 0.500 | 81 | 68-108 | 9 | 30 |
| Benzo(a)pyrene | 0.326 | 0.500 | 65 * | 0.336 | 0.500 | 67 * | 68-107 | 3 | 30 |
| Indeno(1,2,3-cd)pyrene | 0.394 | 0.500 | 79 | 0.440 | 0.500 | 88 | 61-115 | 11 | 30 |
| Dibenz(a,h)anthracene | 0.403 | 0.500 | 81 | 0.456 | 0.500 | 91 | 54-118 | 12 | 30 |
| Benzo(g,h,i)perylene | 0.369 | 0.500 | 74 | 0.414 | 0.500 | 83 | 61-110 | 12 | 30 |
| Pentachlorophenol | 1.31 | 2.50 | 52 | 1.75 | 2.50 | 70 | 10-123 | 29 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Environmental
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**www.alsglobal.com**

December 08, 2016

**Analytical Report for Service Request No:** K1612750
**Revised Service Request No:** K1612750.01

Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435

**RE: Joslyn / 232701102016270**

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory October 20, 2012
For your reference, these analyses have been assigned our service request number **K1612750.**

Please find the report reflecting our original testing within hold time.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

We apologize for any inconvenience this may have created.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Janet.Malloch@ALSGlobal.com.

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Janet Malloch

Janet Malloch
Project Manager

# Table of Contents

# Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| A2LA | American Association for Laboratory Accreditation |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MCL | Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| NA | Not Applicable |
| NC | Not Calculated |
| NCASI | National Council of the Paper Industry for Air and Stream Improvement |
| ND | Not Detected |
| NIOSH | National Institute for Occupational Safety and Health |
| PQL | Practical Quantitation Limit |
| RCRA | Resource Conservation and Recovery Act |
| SIM | Selected Ion Monitoring |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. |

## Inorganic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| E | The result is an estimate amount because the value exceeded the instrument calibration range. |
| J | The result is an estimated value. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |
| H | The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory. |

## Metals Data Qualifiers

| | |
|---|---|
| # | The control limit criteria is not applicable. See case narrative. |
| J | The result is an estimated value. |
| E | The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample. |
| M | The duplicate injection precision was not met. |
| N | The Matrix Spike sample recovery is not within control limits. See case narrative. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| W | The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| + | The correlation coefficient for the MSA is less than 0.995. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Organic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| A | A tentatively identified compound, a suspected aldol-condensation product. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| C | The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data. |
| D | The reported result is from a dilution. |
| E | The result is an estimated value. |
| J | The result is an estimated value. |
| N | The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed. |
| P | The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Additional Petroleum Hydrocarbon Specific Qualifiers

| | |
|---|---|
| F | The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard. |
| L | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard. |
| H | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard. |
| O | The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard. |
| Y | The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. |
| Z | The chromatographic fingerprint does not resemble a petroleum product. |

# ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
## State Certifications, Accreditations, and Licenses

| Agency | Web Site | Number |
|---|---|---|
| Alaska DEC UST | http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx | UST-040 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0339 |
| Arkansas - DEQ | http://www.adeq.state.ar.us/techsvs/labcert.htm | 88-0637 |
| California DHS (ELAP) | http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx | 2795 |
| DOD ELAP | http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm | L14-51 |
| Florida DOH | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E87412 |
| Hawaii DOH | Not available | - |
| ISO 17025 | http://www.pjlabs.com/ | L16-57 |
| Louisiana DEQ | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 03016 |
| Maine DHS | Not available | WA01276 |
| Minnesota DOH | http://www.health.state.mn.us/accreditation | 053-999-457 |
| Montana DPHHS | http://www.dphhs.mt.gov/publichealth/ | CERT0047 |
| Nevada DEP | http://ndep.nv.gov/bsdw/labservice.htm | WA01276 |
| New Jersey DEP | http://www.nj.gov/dep/oqa/ | WA005 |
| North Carolina DWQ | http://www.dwqlab.org/ | 605 |
| Oklahoma DEQ | http://www.deq.state.ok.us/CSDnew/labcert.htm | 9801 |
| Oregon – DEQ (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | WA100010 |
| South Carolina DHEC | http://www.scdhec.gov/environment/envserv/ | 61002 |
| Texas CEQ | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704427 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C544 |
| Wyoming (EPA Region 8) | http://www.epa.gov/region8/water/dwhome/wyomingdi.html | - |
| Kelso Laboratory Website | www.alsglobal.com | NA |

Analyses were performed according to our laboratory’s NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

# Case Narrative

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

## ALS ENVIRONMENTAL

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request No.:** | K1612750 |
| **Project:** | Joslyn/ 232701102016270 | **Date Received:** | 10/20/16 |
| **Sample Matrix:** | Ground Water | | |

## Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

### Sample Receipt

Five ground water samples were received for analysis at ALS Environmental on 10/20/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

### Polynuclear Aromatic Hydrocarbons by EPA Method 8270

### Data Validation Notes and Discussion

**Calibration Verification Exceptions:**

The following analytes were flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1111F015.D: Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene and Pentachlorophenol. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1112F002.D: Benzo(k)fluoranthene. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

The following analytes were flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1115F002.D: Pentachlorophenol and Terphenyl-d14. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

**Surrogate Exceptions:**

The upper control criterion was exceeded by 19% for the surrogates Terphenyl-d14 in the Duplicate Laboratory Control Sample (DLCS) KWG1609693-2. The error associated with elevated recovery equates to a potential slight bias. The DLCS sample was over-acidified and a potential explanation for the low recovery results. The results were flagged to indicate the issue.

**Approved by** Janet Mallah

**Lab Control Sample Exceptions:**

The lower control criterion was exceeded for Benz(a)anthracene in the Laboratory Control Sample (LCS) KWG1609693-1. The analyte in question was not detected in the associated field samples. The error associated with reduced recovery indicated a potential low bias. The data was flagged to indicate the violation. No further corrective action was taken.

The upper control criterion was exceeded for Pentachlorophenol in the Duplicate Laboratory Control Sample (DLCS) KWG1609693-2. The analyte in question was not detected in the associated field samples. The error associated with elevated recovery indicated a high bias. The sample data was not significantly affected. No further corrective action was appropriate.

The lower control criterion was exceeded for Acenaphthylene and Pyrene in the Duplicate Laboratory Control Sample (DLCS) KWG1609693-2 The analytes in question were detected in samples U1 and U1A. The error associated with reduced recovery indicated a potential low bias, possibly due to the overacidification. The data was flagged to indicate the violation. No further corrective action was taken.

**Relative Percent Difference Exceptions:**
The Relative Percent Difference (RPD) for several analytes in the replicate Laboratory Control Samples (LCS/DLCS) KWG1609693-1 and KWG1609693-2 were outside control criterion. The data was flagged to indicate the violation. One potential explanation is that the DLCS was over acidified. No further corrective action was taken.

**Elevated Detection Limits:**
The reporting limit was elevated for Fluoranthene in sample U1A. The chromatogram indicated the presence of non-target background components. The result was flagged to indicate the matrix interferences.

**Sample Notes and Discussion:**
The result reported for Fluorene in sample U1 may contain a slight bias. The chromatogram indicated the presence of non-target background components. The matrix interference may have resulted in a slight high bias in the affected sample. The result was flagged with “X” to indicate the issue.

No other anomalies associated with the analysis of these samples were observed.

**Approved by** Janet Mallach

# Chain of Custody

**ALS Environmental—Kelso Laboratory**
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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

K1612750

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☐ Minneapolis

Sample Origination State:
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other: ______
☐ MN ☐ SD

COC Number: **52053**

COC 1 of 1

| REPORT TO | INVOICE TO |
|---|---|
| Company: BARR Eng. | Company: BARR Eng. |
| Address: | Address: |
| Name: | Name: |
| email: | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: JOSLYN | Barr Project No: 23270110 2016270 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

| Location | Sample Depth Start | Sample Depth Stop | Sample Depth Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested (Water): SVOC | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservative Code | | | | | | | | | A | | |
| Field Filtered Y/N | | | | | | | | | N | | |
| 1. W300 SPN | | | | 10/18/2016 | 0736 | GW | | | 2 | | TABLE 3-13 |
| 2. U1 | | | | ↓ | 0825 | ↓ | | | ↓ | | ↓ |
| 3. U1A | | | | ↓ | 0915 | ↓ | | | ↓ | | ↓ |
| 4. WJ27N | | | | ↓ | 0940 | ↓ | | | ↓ | | ↓ |
| 5. W254 | | | | ↓ | 1035 | ↓ | | | ↓ | | ↓ |
| 6. | | | | | | | | | | | |
| 7. | | | | | | | | | | | |
| 8. | | | | | | | | | | | |
| 9. | | | | | | | | | | | |
| 10. | | | | | | | | | | | |

**BARR USE ONLY**
Sampled by: SDI
Barr Proj. Manager: JLB III
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: KELSO, WA

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve F | [✓ Y] N | 10/19/16 | 1500 | ALS | 10/20/16 | 1000 |
| | Y N | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other: ______

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ______ (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

H:RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

**Distribution** - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

# Table 3-13

## Groundwater Monitoring Parameters
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

### PAH Compounds – EPA 8270 SIM

**Carcinogenic PAHs**

Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3,cd)pyrene
Benzo(k)fluoranthene
Dibenzo(ah)anthracene
Benzo(j)fluoranthene*

**Noncarcinogenic PAHs**

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)perylene
Fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

### Phenolic Compounds – EPA 8270 SIM

Pentachlorophenol

---

*Co-elutes with benz(b)fluoranthene

Target reporting limits: PAHs = 0.0033 µg/L, PCP = 0.3 µg/L

PC CK

# Cooler Receipt and Preservation Form

Client BARR Service Request K16 12750

Received: 10/20/16 Opened: 10/20/16 By: CG Unloaded: 10/20/16 By: CG

1. Samples were received via? USPS [✓ Fed Ex] UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ____ NA
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? 1 Front

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

| Raw Cooler Temp | Corrected. Cooler Temp | Raw Temp Blank | Corrected Temp Blank | Corr. Factor | Thermometer ID | Cooler/COC ID NA | Tracking Number NA | Filed |
|---|---|---|---|---|---|---|---|---|
| -0.2 | -0.3 | 4.3 | 4.2 | -0.1 | 362 | 52053 | 7060 3332 0606 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

4. Packing material: [✓ Inserts] [✓ Baggies] Bubble Wrap Gel Packs [✓ Wet Ice] Dry Ice Sleeves ____
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? NA [✓ Y] N

| Sample ID on Bottle | Sample ID on COC | Identified by: |
|---|---|---|
| | | |
| | | |
| | | |

| Sample ID | Bottle Count Bottle Type | Out of Temp | Head-space | Broke | pH | Reagent | Volume added | Reagent Lot Number | Initials | Time |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

***Notes, Discrepancies, & Resolutions:***

7/25/16

*Page* ____ *of* ____

# Polynuclear Aromatic Hydrocarbons

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
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## ALS Group USA, Corp. dba ALS Environmental

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612750 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/18/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/20/2016 |

### Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W300SPN | **Units:** | ug/L |
| **Lab Code:** | K1612750-001 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.011** | | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| 2-Methylnaphthalene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Acenaphthylene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Acenaphthene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluorene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Phenanthrene | **0.0035** | | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Anthracene | **0.0049** | | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluoranthene | **0.0036** | | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pyrene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Benz(a)anthracene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Chrysene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(b)fluoranthene† | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(k)fluoranthene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(a)pyrene | ND | U | 0.0034 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0034 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Dibenz(a,h)anthracene | ND | U | 0.0034 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Benzo(g,h,i)perylene | ND | U | 0.0034 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pentachlorophenol | ND | U | 0.30 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 91 | 28-125 | 11/11/16 | Acceptable |
| Fluoranthene-d10 | 109 | 39-123 | 11/11/16 | Acceptable |
| 2,4,6-Tribromophenol | 80 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 101 | 22-127 | 11/11/16 | Acceptable |

| † **Analyte Comments** | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612750 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/18/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/20/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U1 | **Units:** | ug/L |
| **Lab Code:** | K1612750-002 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0097** | | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| 2-Methylnaphthalene | **0.0038** | | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Acenaphthylene | **0.0049** | | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Acenaphthene | **0.0096** | | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluorene | **0.015** | X | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Phenanthrene | **0.0045** | | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Anthracene | **0.030** | | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluoranthene | **0.0067** | | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pyrene | **0.013** | | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Benz(a)anthracene | ND | U | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Chrysene | ND | U | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(b)fluoranthene† | ND | U | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(k)fluoranthene | ND | U | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(a)pyrene | ND | U | 0.0035 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0035 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Dibenz(a,h)anthracene | ND | U | 0.0035 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Benzo(g,h,i)perylene | ND | U | 0.0035 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pentachlorophenol | ND | U | 0.31 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 86 | 28-125 | 11/11/16 | Acceptable |
| Fluoranthene-d10 | 104 | 39-123 | 11/11/16 | Acceptable |
| 2,4,6-Tribromophenol | 74 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 95 | 22-127 | 11/11/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612750 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/18/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/20/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | U1A | **Units:** | ug/L |
| **Lab Code:** | K1612750-003 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.013** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| 2-Methylnaphthalene | **0.0044** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Acenaphthylene | **0.012** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Acenaphthene | **0.35** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluorene | **0.0087** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Phenanthrene | **0.0071** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Anthracene | **0.062** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluoranthene | ND | Ui | 0.012 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pyrene | **0.021** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Chrysene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 86 | 28-125 | 11/11/16 | Acceptable |
| Fluoranthene-d10 | 108 | 39-123 | 11/11/16 | Acceptable |
| 2,4,6-Tribromophenol | 75 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 96 | 22-127 | 11/11/16 | Acceptable |

| † **Analyte Comments** | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612750 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/18/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/20/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W127N | **Units:** | ug/L |
| **Lab Code:** | K1612750-004 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0034** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Acenaphthene | **0.0053** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Anthracene | **0.0047** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Chrysene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 88 | 28-125 | 11/11/16 | Acceptable |
| Fluoranthene-d10 | 104 | 39-123 | 11/11/16 | Acceptable |
| 2,4,6-Tribromophenol | 77 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 98 | 22-127 | 11/11/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612750 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/18/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/20/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W254 | **Units:** | ug/L |
| **Lab Code:** | K1612750-005 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.0046** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Anthracene | **0.0097** | | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Chrysene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/15/16 | KWG1609693 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 94 | 28-125 | 11/11/16 | Acceptable |
| Fluoranthene-d10 | 110 | 39-123 | 11/11/16 | Acceptable |
| 2,4,6-Tribromophenol | 80 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 105 | 22-127 | 11/11/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

## ALS Group USA, Corp. dba ALS Environmental

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612750 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Ground water | **Date Received:** | NA |

### Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1609693-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | * |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | * |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |
| Chrysene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/25/16 | 11/13/16 | KWG1609693 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/25/16 | 11/11/16 | KWG1609693 | * |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 85 | 28-125 | 11/13/16 | Acceptable |
| Fluoranthene-d10 | 99 | 39-123 | 11/13/16 | Acceptable |
| 2,4,6-Tribromophenol | 65 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 102 | 22-127 | 11/13/16 | Acceptable |

| † **Analyte Comments** | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

**Client:** Barr Engineering Company
**Service Request:** K1612750
**Project:** Joslyn/232701102016270
**Sample Matrix:** Ground water

## Surrogate Recovery Summary
## Polynuclear Aromatic Hydrocarbons

**Extraction Method:** EPA 3520C
**Units:** Percent
**Analysis Method:** 8270D SIM
**Level:** Low

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 | Sur4 | |
|---|---|---|---|---|---|---|
| W300SPN | K1612750-001 | 91 | 109 | 80 | 101 | |
| U1 | K1612750-002 | 86 | 104 | 74 | 95 | |
| U1A | K1612750-003 | 86 | 108 | 75 | 96 | |
| W127N | K1612750-004 | 88 | 104 | 77 | 98 | |
| W254 | K1612750-005 | 94 | 110 | 80 | 105 | |
| Method Blank | KWG1609693-3 | 85 | 99 | 65 | 102 | |
| Lab Control Sample | KWG1609693-1 | 79 D | 97 D | 69 | 99 D | |
| Duplicate Lab Control Sample | KWG1609693-2 | 80 D | 85 D | 85 | 146 D | * |

**Surrogate Recovery Control Limits (%)**

| | | | |
|---|---|---|---|
| Sur1 | = | Fluorene-d10 | 28-125 |
| Sur2 | = | Fluoranthene-d10 | 39-123 |
| Sur3 | = | 2,4,6-Tribromophenol | 10-136 |
| Sur4 | = | Terphenyl-d14 | 22-127 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

QA/QC Report

**Client:** Barr Engineering Company
**Project:** Joslyn/232701102016270
**Sample Matrix:** Ground water

**Service Request:** K1612750
**Date Extracted:** 10/25/2016
**Date Analyzed:** 11/12/2016 - 11/13/2016

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Polynuclear Aromatic Hydrocarbons

**Extraction Method:** EPA 3520C
**Analysis Method:** 8270D SIM

**Units:** ug/L
**Basis:** NA
**Level:** Low
**Extraction Lot:** KWG1609693

| | Lab Control Sample<br>KWG1609693-1<br>**Lab Control Spike** | | | Duplicate Lab Control Sample<br>KWG1609693-2<br>**Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 0.392 | 0.500 | 78 | 0.383 | 0.500 | 77 | 59-95 | 2 | 30 |
| 2-Methylnaphthalene | 0.382 | 0.500 | 76 | 0.373 | 0.500 | 75 | 42-108 | 2 | 30 |
| Acenaphthylene | 0.451 | 0.500 | 90 | 0.167 | 0.500 | 33 * | 61-102 | 92 * | 30 |
| Acenaphthene | 0.404 | 0.500 | 81 | 0.368 | 0.500 | 74 | 58-98 | 9 | 30 |
| Fluorene | 0.398 | 0.500 | 80 | 0.397 | 0.500 | 79 | 59-97 | 0 | 30 |
| Phenanthrene | 0.407 | 0.500 | 81 | 0.408 | 0.500 | 82 | 61-100 | 0 | 30 |
| Anthracene | 0.413 | 0.500 | 83 | 0.372 | 0.500 | 74 | 65-98 | 10 | 30 |
| Fluoranthene | 0.459 | 0.500 | 92 | 0.409 | 0.500 | 82 | 63-106 | 11 | 30 |
| Pyrene | 0.494 | 0.500 | 99 | 0.168 | 0.500 | 34 * | 64-104 | 98 * | 30 |
| Benz(a)anthracene | 0.498 | 0.500 | 100 * | 0.322 | 0.500 | 64 * | 67-96 | 43 * | 30 |
| Chrysene | 0.463 | 0.500 | 93 | 0.516 | 0.500 | 103 | 67-105 | 11 | 30 |
| Benzo(b)fluoranthene | 0.464 | 0.500 | 93 | 0.513 | 0.500 | 103 | 69-104 | 10 | 30 |
| Benzo(k)fluoranthene | 0.479 | 0.500 | 96 | 0.505 | 0.500 | 101 | 68-108 | 5 | 30 |
| Benzo(a)pyrene | 0.457 | 0.500 | 91 | 0.419 | 0.500 | 84 | 68-107 | 9 | 30 |
| Indeno(1,2,3-cd)pyrene | 0.434 | 0.500 | 87 | 0.449 | 0.500 | 90 | 61-115 | 3 | 30 |
| Dibenz(a,h)anthracene | 0.432 | 0.500 | 86 | 0.488 | 0.500 | 98 | 54-118 | 12 | 30 |
| Benzo(g,h,i)perylene | 0.430 | 0.500 | 86 | 0.443 | 0.500 | 89 | 61-110 | 3 | 30 |
| Pentachlorophenol | 2.55 | 2.50 | 102 | 3.25 | 2.50 | 130 * | 10-123 | 24 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Environmental
ALS Group USA, Corp
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**www.alsglobal.com**

December 01, 2016

**Analytical Report for Service Request No:** K1612825
**Revised Service Request No:** K1612825.01

Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435

**RE: Joslyn / 232701102016270**

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory October 21, 2016
For your reference, these analyses have been assigned our service request number **K1612825.**

Please find our corrected result for sample W7 test method 8270 SIM.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

WE apologize for any inconvenience this may have created.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Janet.Malloch@ALSGlobal.com.

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Janet Malloch

Janet Malloch
Project Manager

REVISED
3:48 pm, Dec 01, 2016

# Table of Contents

# Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| A2LA | American Association for Laboratory Accreditation |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MCL | Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| NA | Not Applicable |
| NC | Not Calculated |
| NCASI | National Council of the Paper Industry for Air and Stream Improvement |
| ND | Not Detected |
| NIOSH | National Institute for Occupational Safety and Health |
| PQL | Practical Quantitation Limit |
| RCRA | Resource Conservation and Recovery Act |
| SIM | Selected Ion Monitoring |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. |

## Inorganic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| E | The result is an estimate amount because the value exceeded the instrument calibration range. |
| J | The result is an estimated value. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |
| H | The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory. |

## Metals Data Qualifiers

| | |
|---|---|
| # | The control limit criteria is not applicable. See case narrative. |
| J | The result is an estimated value. |
| E | The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample. |
| M | The duplicate injection precision was not met. |
| N | The Matrix Spike sample recovery is not within control limits. See case narrative. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| W | The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| + | The correlation coefficient for the MSA is less than 0.995. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Organic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| A | A tentatively identified compound, a suspected aldol-condensation product. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| C | The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data. |
| D | The reported result is from a dilution. |
| E | The result is an estimated value. |
| J | The result is an estimated value. |
| N | The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed. |
| P | The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Additional Petroleum Hydrocarbon Specific Qualifiers

| | |
|---|---|
| F | The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard. |
| L | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard. |
| H | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard. |
| O | The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard. |
| Y | The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. |
| Z | The chromatographic fingerprint does not resemble a petroleum product. |

# ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
# State Certifications, Accreditations, and Licenses

| Agency | Web Site | Number |
|---|---|---|
| Alaska DEC UST | http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx | UST-040 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0339 |
| Arkansas - DEQ | http://www.adeq.state.ar.us/techsvs/labcert.htm | 88-0637 |
| California DHS (ELAP) | http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx | 2795 |
| DOD ELAP | http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm | L14-51 |
| Florida DOH | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E87412 |
| Hawaii DOH | Not available | - |
| ISO 17025 | http://www.pjlabs.com/ | L16-57 |
| Louisiana DEQ | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 03016 |
| Maine DHS | Not available | WA01276 |
| Minnesota DOH | http://www.health.state.mn.us/accreditation | 053-999-457 |
| Montana DPHHS | http://www.dphhs.mt.gov/publichealth/ | CERT0047 |
| Nevada DEP | http://ndep.nv.gov/bsdw/labservice.htm | WA01276 |
| New Jersey DEP | http://www.nj.gov/dep/oqa/ | WA005 |
| North Carolina DWQ | http://www.dwqlab.org/ | 605 |
| Oklahoma DEQ | http://www.deq.state.ok.us/CSDnew/labcert.htm | 9801 |
| Oregon – DEQ (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | WA100010 |
| South Carolina DHEC | http://www.scdhec.gov/environment/envserv/ | 61002 |
| Texas CEQ | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704427 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C544 |
| Wyoming (EPA Region 8) | http://www.epa.gov/region8/water/dwhome/wyomingdi.html | - |
| Kelso Laboratory Website | www.alsglobal.com | NA |

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

# Case Narrative

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

## ALS ENVIRONMENTAL

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request No.:** | K1612825 |
| **Project:** | Joslyn/ 232701102016270 | **Date Received:** | 10/21/16 |
| **Sample Matrix:** | Ground Water | | |

## Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

### Sample Receipt

Seven ground water samples were received for analysis at ALS Environmental on 10/21/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

### Polynuclear Aromatic Hydrocarbons by EPA Method 8270

**Calibration Verification Exceptions:**
The following analytes were flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1111F015.D: Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene and Pentachlorophenol. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1112F002.D: Benzo(k)fluoranthene. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

The following analytes were flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1115F002.D: Pentachlorophenol and Terphenyl-d14. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS11\1115F013.D: Terphenyl-d14. In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.

**Approved by**________________________ Janet Mallish

**Surrogate Exceptions:**
The control criteria were exceeded for Fluorene-d10 and Fluoranthene-d10 in sample W7 due to matrix interferences. The presence of non-target background components prevented adequate resolution of the surrogates. Accurate quantitation was not possible. No further corrective action was appropriate.

**Lab Control Sample Exceptions:**
The upper control criterion of 96% was exceeded by 2% at 98% recovery for Benz(a)anthracene in replicate Laboratory Control Samples (LCS/DLCS) KWG1609750-1 and KWG1609750-2. The analyte in question was detected in the associated field sample W301. The error associated with elevated recovery equates to a potential slight high bias. The results were flagged to indicate the issue. No further corrective action was taken.

**Elevated Detection Limits:**
The samples W10 and W7 required dilutions due to the presence of elevated levels of target analytes. The reporting limits were adjusted to reflect the dilutions.

No other anomalies associated with the analysis of these samples were observed.

**Approved by** Janet Mallock

# Chain of Custody

**ALS Environmental—Kelso Laboratory**
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K1612825

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☒ Minneapolis

**Sample Origination State:**
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☒ MN ☐ SD

COC Number: **52059**
COC 1 of 1

| REPORT TO | INVOICE TO |
|---|---|
| Company: Barr Eng | Company: Barr Eng |
| Address: | Address: |
| Name: | Name: |
| email: | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: JOSLYN | Barr Project No: 23270110 2016 270 |

**Matrix Code:**
- GW = Groundwater
- SW = Surface Water
- WW = Waste Water
- DW = Drinking Water
- S = Soil/Solid
- SD = Sediment
- O = Other

**Preservative Code:**
- A = None
- B = HCl
- C = $HNO_3$
- D = $H_2SO_4$
- E = NaOH
- F = MeOH
- G = $NaHSO_4$
- H = $Na_2S_2O_3$
- I = Ascorbic Acid
- J = $NH_4Cl$
- K = Zn Acetate
- O = Other

| Location | Sample Depth Start | Sample Depth Stop | Sample Depth Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested Water: SVOC | Water | Water | Water | Water | Water | Soil | Soil | Soil | Soil | Soil | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservative Code | | | | | | | | | A | | | | | | | | | | | | |
| Field Filtered Y/N | | | | | | | | | N | | | | | | | | | | | | |
| 1. W252N | | | | 10/19/2016 | 1115 | GW | | | 2 | | | | | | | | | | | | TABLE 3-13 |
| 2. W10 | | | | ↓ | 1150 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 3. W7 | | | | ↓ | 1235 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 4. FB-2 | | | | ↓ | — | O | | | ↓ | | | | | | | | | | | | ↓ |
| 5. W104 | | | | 10/20/2016 | 0830 | GW | | | ↓ | | | | | | | | | | | | ↓ |
| 6. W301 | | | | ↓ | 1100 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 7. W328 | | | | ↓ | 1215 | ↓ | | | ↓ | | | | | | | | | | | | ↓ |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**BARR USE ONLY**

Sampled by: SDI
Barr Proj. Manager: JLB III
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: KELSO, WA

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| Steve Ivor | [✓ Y] N | 10/20/16 | 1530 | | 10/21/16 | 0945 |
| | Y N | | | | | |

Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution - White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

H:\RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

## Table 3-13

## Groundwater Monitoring Parameters
## Joslyn Manufacturing & Supply Co.
## Brooklyn Center, MN

### PAH Compounds – EPA 8270 SIM

**Carcinogenic PAHs**

Benzo(a)anthracene
Chrysene
Benzo(b)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3,cd)pyrene
Benzo(k)fluoranthene
Dibenzo(ah)anthracene
Benzo(j)fluoranthene*

**Noncarcinogenic PAHs**

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)perylene
Fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

### Phenolic Compounds – EPA 8270 SIM

Pentachlorophenol

---

*Co-elutes with benz(b)fluoranthene

Target reporting limits: PAHs = 0.0033 µg/L, PCP = 0.3 µg/L

PC CV

# Cooler Receipt and Preservation Form

Client Barr  Service Request K16 12825

Received: 10/21/16  Opened: 10/21/16  By:  Unloaded: 10/21/16  By:

1. Samples were received via? Mail [✓ Fed Ex] UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ______ NA
3. Were custody seals on coolers? NA [✓ Y] N  If yes, how many and where? one, front

   If present, were custody seals intact? [✓ Y] N  If present, were they signed and dated? [✓ Y] N

| Raw Cooler Temp | Corrected. Cooler Temp | Raw Temp Blank | Corrected Temp Blank | Corr. Factor | Thermometer ID | Cooler/COC ID NA | Tracking Number NA | Filed |
|---|---|---|---|---|---|---|---|---|
| 0.8 | 1.4 | 2.4 | 2.4 | +0.2 | 364 | | 7060 3332 0661 | |
| -0.4 | -0.4 | 5.9 | 5.9 | 0 | 370 | | " " 0650 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

4. Packing material: [✓ Inserts] [✓ Baggies] Bubble Wrap Gel Packs [✓ Wet Ice] Dry Ice Sleeves ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? NA [✓ Y] N

| Sample ID on Bottle | Sample ID on COC | Identified by: |
|---|---|---|
| | | |
| | | |
| | | |

| Sample ID | Bottle Count Bottle Type | Out of Temp | Head-space | Broke | pH | Reagent | Volume added | Reagent Lot Number | Initials | Time |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

*Notes, Discrepancies, & Resolutions:*

*Page* ____ *of* ____

# Polynuclear Aromatic Hydrocarbons

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/19/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/21/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W252N | **Units:** | ug/L |
| **Lab Code:** | K1612825-001 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.058** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| 2-Methylnaphthalene | **0.0054** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Fluorene | **0.0066** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Phenanthrene | **0.012** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Anthracene | **0.010** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Fluoranthene | **0.0074** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Pyrene | **0.0083** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | * |
| Chrysene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 87 | 28-125 | 11/11/16 | Acceptable |
| Fluoranthene-d10 | 102 | 39-123 | 11/11/16 | Acceptable |
| 2,4,6-Tribromophenol | 78 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 92 | 22-127 | 11/11/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/19/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/21/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W10 | **Units:** | ug/L |
| **Lab Code:** | K1612825-002 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **12** | D | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| 2-Methylnaphthalene | **0.13** | D | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Acenaphthylene | **0.73** | D | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Acenaphthene | **35** | D | 0.34 | 100 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Fluorene | **14** | D | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Phenanthrene | **3.4** | D | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Anthracene | **0.93** | D | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Fluoranthene | **0.30** | D | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Pyrene | **0.12** | D | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benz(a)anthracene | ND | U | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | * |
| Chrysene | ND | U | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(b)fluoranthene† | ND | U | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(k)fluoranthene | ND | U | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(a)pyrene | ND | U | 0.034 | 10 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.034 | 10 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Dibenz(a,h)anthracene | ND | U | 0.034 | 10 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Benzo(g,h,i)perylene | ND | U | 0.034 | 10 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Pentachlorophenol | **200** | D | 30 | 100 | 10/26/16 | 11/12/16 | KWG1609750 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 117 | 28-125 | 11/12/16 | Acceptable |
| Fluoranthene-d10 | 122 | 39-123 | 11/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 71 | 10-136 | 11/12/16 | Acceptable |
| Terphenyl-d14 | 89 | 22-127 | 11/12/16 | Acceptable |

| † **Analyte Comments** | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/19/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/21/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W7 | **Units:** | ug/L |
| **Lab Code:** | K1612825-003 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.58** | D | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| 2-Methylnaphthalene | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Acenaphthylene | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Acenaphthene | **0.13** | DX | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Fluorene | **1.6** | D | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Phenanthrene | **0.91** | D | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Anthracene | **0.48** | D | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Fluoranthene | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Pyrene | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benz(a)anthracene | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | * |
| Chrysene | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(b)fluoranthene† | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(k)fluoranthene | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(a)pyrene | ND | U | 0.067 | 20 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.067 | 20 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Dibenz(a,h)anthracene | ND | U | 0.067 | 20 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Benzo(g,h,i)perylene | ND | U | 0.067 | 20 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Pentachlorophenol | **1200** | D | 300 | 1000 | 10/26/16 | 11/12/16 | KWG1609750 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 132 | 28-125 | 11/12/16 | Outside Control Limits |
| Fluoranthene-d10 | 142 | 39-123 | 11/12/16 | Outside Control Limits |
| 2,4,6-Tribromophenol | 80 | 10-136 | 11/12/16 | Acceptable |
| Terphenyl-d14 | 104 | 22-127 | 11/12/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

REVISED
3:50 pm, Dec 01, 2016

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/19/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/21/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | FB-2 | **Units:** | ug/L |
| **Lab Code:** | K1612825-004 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.031** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| 2-Methylnaphthalene | **0.015** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | * |
| Chrysene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 87 | 28-125 | 11/11/16 | Acceptable |
| Fluoranthene-d10 | 104 | 39-123 | 11/11/16 | Acceptable |
| 2,4,6-Tribromophenol | 75 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 100 | 22-127 | 11/11/16 | Acceptable |

| † **Analyte Comments** | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/20/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/21/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W104 | **Units:** | ug/L |
| **Lab Code:** | K1612825-005 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.011** | | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| 2-Methylnaphthalene | **0.0054** | | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Acenaphthylene | **0.013** | | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Acenaphthene | ND | U | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Fluorene | **0.015** | | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Phenanthrene | ND | U | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Anthracene | **1.9** | | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Fluoranthene | **0.0081** | | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Pyrene | ND | U | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benz(a)anthracene | ND | U | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | * |
| Chrysene | **0.018** | | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(b)fluoranthene† | ND | U | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(k)fluoranthene | ND | U | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(a)pyrene | ND | U | 0.0037 | 1 | 10/26/16 | 11/16/16 | KWG1609750 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0037 | 1 | 10/26/16 | 11/16/16 | KWG1609750 | |
| Dibenz(a,h)anthracene | ND | U | 0.0037 | 1 | 10/26/16 | 11/16/16 | KWG1609750 | |
| Benzo(g,h,i)perylene | ND | U | 0.0037 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Pentachlorophenol | **0.37** | | 0.32 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 84 | 28-125 | 11/12/16 | Acceptable |
| Fluoranthene-d10 | 90 | 39-123 | 11/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 74 | 10-136 | 11/12/16 | Acceptable |
| Terphenyl-d14 | 81 | 22-127 | 11/12/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

| | | | | |
|---|---|---|---|---|
| **Client:** | Barr Engineering Company | | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | | **Date Collected:** | 10/20/2016 |
| **Sample Matrix:** | Ground water | | **Date Received:** | 10/21/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | | |
|---|---|---|---|---|
| **Sample Name:** | W301 | | **Units:** | ug/L |
| **Lab Code:** | K1612825-006 | | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.018** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| 2-Methylnaphthalene | **0.0083** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Acenaphthene | **0.0075** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Fluorene | **0.0073** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Phenanthrene | **0.041** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Anthracene | **0.018** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Fluoranthene | **0.012** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Pyrene | **0.017** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benz(a)anthracene | **0.0065** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | * |
| Chrysene | **0.025** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(b)fluoranthene† | **0.0057** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Benzo(a)pyrene | **0.0084** | | 0.0033 | 1 | 10/26/16 | 11/16/16 | KWG1609750 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/16/16 | KWG1609750 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/16/16 | KWG1609750 | |
| Benzo(g,h,i)perylene | **0.0034** | | 0.0033 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/26/16 | 11/12/16 | KWG1609750 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 87 | 28-125 | 11/12/16 | Acceptable |
| Fluoranthene-d10 | 99 | 39-123 | 11/12/16 | Acceptable |
| 2,4,6-Tribromophenol | 74 | 10-136 | 11/12/16 | Acceptable |
| Terphenyl-d14 | 81 | 22-127 | 11/12/16 | Acceptable |

| † Analyte Comments | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | 10/20/2016 |
| **Sample Matrix:** | Ground water | **Date Received:** | 10/21/2016 |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | W328 | **Units:** | ug/L |
| **Lab Code:** | K1612825-007 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | **0.013** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| 2-Methylnaphthalene | **0.0061** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Fluorene | **0.0037** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Phenanthrene | **0.0083** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Anthracene | **0.013** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Fluoranthene | **0.0050** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Pyrene | **0.0041** | | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | * |
| Chrysene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/15/16 | KWG1609750 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 78 | 28-125 | 11/11/16 | Acceptable |
| Fluoranthene-d10 | 96 | 39-123 | 11/11/16 | Acceptable |
| 2,4,6-Tribromophenol | 76 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 92 | 22-127 | 11/11/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

Analytical Results

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | **Date Collected:** | NA |
| **Sample Matrix:** | Ground water | **Date Received:** | NA |

## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Sample Name:** | Method Blank | **Units:** | ug/L |
| **Lab Code:** | KWG1609750-3 | **Basis:** | NA |
| **Extraction Method:** | EPA 3520C | **Level:** | Low |
| **Analysis Method:** | 8270D SIM | | |

| Analyte Name | Result | Q | MRL | Dilution Factor | Date Extracted | Date Analyzed | Extraction Lot | Note |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| 2-Methylnaphthalene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Acenaphthylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Acenaphthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Fluorene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Phenanthrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Fluoranthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Benz(a)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | * |
| Chrysene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Benzo(b)fluoranthene† | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Benzo(k)fluoranthene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Benzo(a)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Indeno(1,2,3-cd)pyrene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Dibenz(a,h)anthracene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Benzo(g,h,i)perylene | ND | U | 0.0033 | 1 | 10/26/16 | 11/13/16 | KWG1609750 | |
| Pentachlorophenol | ND | U | 0.29 | 1 | 10/26/16 | 11/11/16 | KWG1609750 | |

* See Case Narrative

| Surrogate Name | %Rec | Control Limits | Date Analyzed | Note |
|---|---|---|---|---|
| Fluorene-d10 | 80 | 28-125 | 11/13/16 | Acceptable |
| Fluoranthene-d10 | 93 | 39-123 | 11/13/16 | Acceptable |
| 2,4,6-Tribromophenol | 56 | 10-136 | 11/11/16 | Acceptable |
| Terphenyl-d14 | 95 | 22-127 | 11/13/16 | Acceptable |

† **Analyte Comments**

| | |
|---|---|
| Benzo(b)fluoranthene | This analyte cannot be separated from Benzo(j)fluoranthene. |

**Comments:**

**ALS Group USA, Corp. dba ALS Environmental**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | | |
| **Sample Matrix:** | Ground water | | |

## Surrogate Recovery Summary
## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | Percent |
| **Analysis Method:** | 8270D SIM | **Level:** | Low |

| Sample Name | Lab Code | Sur1 | Sur2 | Sur3 | Sur4 |
|---|---|---|---|---|---|
| W252N | K1612825-001 | 87 | 102 | 78 | 92 |
| W10 | K1612825-002 | 117 D | 122 D | 71 D | 89 D |
| W7 | K1612825-003 | 132 D * | 142 D * | 80 D | 104 D |
| FB-2 | K1612825-004 | 87 | 104 | 75 | 100 |
| W104 | K1612825-005 | 84 | 90 | 74 | 81 |
| W301 | K1612825-006 | 87 | 99 | 74 | 81 |
| W328 | K1612825-007 | 78 | 96 | 76 | 92 |
| Method Blank | KWG1609750-3 | 80 | 93 | 56 | 95 |
| Lab Control Sample | KWG1609750-1 | 81 | 94 | 64 | 95 |
| Duplicate Lab Control Sample | KWG1609750-2 | 83 | 95 | 63 | 94 |

**Surrogate Recovery Control Limits (%)**

| | | |
|---|---|---|
| Sur1 | = Fluorene-d10 | 28-125 |
| Sur2 | = Fluoranthene-d10 | 39-123 |
| Sur3 | = 2,4,6-Tribromophenol | 10-136 |
| Sur4 | = Terphenyl-d14 | 22-127 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1612825 |
| **Project:** | Joslyn/232701102016270 | **Date Extracted:** | 10/26/2016 |
| **Sample Matrix:** | Ground water | **Date Analyzed:** | 11/11/2016 - 11/13/2016 |

## Lab Control Spike/Duplicate Lab Control Spike Summary
## Polynuclear Aromatic Hydrocarbons

| | | | |
|---|---|---|---|
| **Extraction Method:** | EPA 3520C | **Units:** | ug/L |
| **Analysis Method:** | 8270D SIM | **Basis:** | NA |
| | | **Level:** | Low |
| | | **Extraction Lot:** | KWG1609750 |

| | Lab Control Sample<br>KWG1609750-1<br>**Lab Control Spike** | | | Duplicate Lab Control Sample<br>KWG1609750-2<br>**Duplicate Lab Control Spike** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **%Rec** | **Result** | **Spike Amount** | **%Rec** | **%Rec Limits** | **RPD** | **RPD Limit** |
| Naphthalene | 0.380 | 0.500 | 76 | 0.400 | 0.500 | 80 | 59-95 | 5 | 30 |
| 2-Methylnaphthalene | 0.376 | 0.500 | 75 | 0.395 | 0.500 | 79 | 42-108 | 5 | 30 |
| Acenaphthylene | 0.458 | 0.500 | 92 | 0.477 | 0.500 | 95 | 61-102 | 4 | 30 |
| Acenaphthene | 0.411 | 0.500 | 82 | 0.430 | 0.500 | 86 | 58-98 | 5 | 30 |
| Fluorene | 0.406 | 0.500 | 81 | 0.428 | 0.500 | 86 | 59-97 | 5 | 30 |
| Phenanthrene | 0.410 | 0.500 | 82 | 0.438 | 0.500 | 88 | 61-100 | 7 | 30 |
| Anthracene | 0.429 | 0.500 | 86 | 0.459 | 0.500 | 92 | 65-98 | 7 | 30 |
| Fluoranthene | 0.444 | 0.500 | 89 | 0.458 | 0.500 | 92 | 63-106 | 3 | 30 |
| Pyrene | 0.490 | 0.500 | 98 | 0.503 | 0.500 | 101 | 64-104 | 3 | 30 |
| Benz(a)anthracene | 0.489 | 0.500 | 98 * | 0.490 | 0.500 | 98 * | 67-96 | 0 | 30 |
| Chrysene | 0.451 | 0.500 | 90 | 0.457 | 0.500 | 91 | 67-105 | 1 | 30 |
| Benzo(b)fluoranthene | 0.454 | 0.500 | 91 | 0.456 | 0.500 | 91 | 69-104 | 1 | 30 |
| Benzo(k)fluoranthene | 0.465 | 0.500 | 93 | 0.470 | 0.500 | 94 | 68-108 | 1 | 30 |
| Benzo(a)pyrene | 0.465 | 0.500 | 93 | 0.470 | 0.500 | 94 | 68-107 | 1 | 30 |
| Indeno(1,2,3-cd)pyrene | 0.418 | 0.500 | 84 | 0.427 | 0.500 | 85 | 61-115 | 2 | 30 |
| Dibenz(a,h)anthracene | 0.416 | 0.500 | 83 | 0.425 | 0.500 | 85 | 54-118 | 2 | 30 |
| Benzo(g,h,i)perylene | 0.410 | 0.500 | 82 | 0.422 | 0.500 | 84 | 61-110 | 3 | 30 |
| Pentachlorophenol | 2.01 | 2.50 | 80 | 1.90 | 2.50 | 76 | 10-123 | 5 | 30 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Environmental
ALS Group USA, Corp
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**F :** +1 360 636 1068
**www.alsglobal.com**

November 14, 2016

**Analytical Report for Service Request No:** K1613449

Terri Olson
Barr Engineering
4300 MarketPointe Drive , Suite 200
Minneapolis, MN 55435

**RE: Joslyn / 23270110**

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory November 03, 2016
For your reference, these analyses have been assigned our service request number **K1613449.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

C Leaf

Chris Leaf
Project Manager

# Table of Contents

# Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| A2LA | American Association for Laboratory Accreditation |
| CARB | California Air Resources Board |
| CAS Number | Chemical Abstract Service registry Number |
| CFC | Chlorofluorocarbon |
| CFU | Colony-Forming Unit |
| DEC | Department of Environmental Conservation |
| DEQ | Department of Environmental Quality |
| DHS | Department of Health Services |
| DOE | Department of Ecology |
| DOH | Department of Health |
| EPA | U. S. Environmental Protection Agency |
| ELAP | Environmental Laboratory Accreditation Program |
| GC | Gas Chromatography |
| GC/MS | Gas Chromatography/Mass Spectrometry |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LUFT | Leaking Underground Fuel Tank |
| M | Modified |
| MCL | Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA. |
| MDL | Method Detection Limit |
| MPN | Most Probable Number |
| MRL | Method Reporting Limit |
| NA | Not Applicable |
| NC | Not Calculated |
| NCASI | National Council of the Paper Industry for Air and Stream Improvement |
| ND | Not Detected |
| NIOSH | National Institute for Occupational Safety and Health |
| PQL | Practical Quantitation Limit |
| RCRA | Resource Conservation and Recovery Act |
| SIM | Selected Ion Monitoring |
| TPH | Total Petroleum Hydrocarbons |
| tr | Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. |

## Inorganic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| E | The result is an estimate amount because the value exceeded the instrument calibration range. |
| J | The result is an estimated value. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |
| H | The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory. |

## Metals Data Qualifiers

| | |
|---|---|
| # | The control limit criteria is not applicable. See case narrative. |
| J | The result is an estimated value. |
| E | The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample. |
| M | The duplicate injection precision was not met. |
| N | The Matrix Spike sample recovery is not within control limits. See case narrative. |
| S | The reported value was determined by the Method of Standard Additions (MSA). |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| W | The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a matrix interference. |
| X | See case narrative. |
| + | The correlation coefficient for the MSA is less than 0.995. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Organic Data Qualifiers

| | |
|---|---|
| * | The result is an outlier. See case narrative. |
| # | The control limit criteria is not applicable. See case narrative. |
| A | A tentatively identified compound, a suspected aldol-condensation product. |
| B | The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards. |
| C | The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data. |
| D | The reported result is from a dilution. |
| E | The result is an estimated value. |
| J | The result is an estimated value. |
| N | The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed. |
| P | The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results. |
| U | The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.<br>*DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution. |
| i | The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference. |
| X | See case narrative. |
| Q | See case narrative. One or more quality control criteria was outside the limits. |

## Additional Petroleum Hydrocarbon Specific Qualifiers

| | |
|---|---|
| F | The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard. |
| L | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard. |
| H | The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard. |
| O | The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard. |
| Y | The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. |
| Z | The chromatographic fingerprint does not resemble a petroleum product. |

## ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
## State Certifications, Accreditations, and Licenses

| Agency | Web Site | Number |
|---|---|---|
| Alaska DEC UST | http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx | UST-040 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0339 |
| Arkansas - DEQ | http://www.adeq.state.ar.us/techsvs/labcert.htm | 88-0637 |
| California DHS (ELAP) | http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx | 2795 |
| DOD ELAP | http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm | L14-51 |
| Florida DOH | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E87412 |
| Hawaii DOH | Not available | - |
| ISO 17025 | http://www.pjlabs.com/ | L16-57 |
| Louisiana DEQ | http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx | 03016 |
| Maine DHS | Not available | WA01276 |
| Minnesota DOH | http://www.health.state.mn.us/accreditation | 053-999-457 |
| Montana DPHHS | http://www.dphhs.mt.gov/publichealth/ | CERT0047 |
| Nevada DEP | http://ndep.nv.gov/bsdw/labservice.htm | WA01276 |
| New Jersey DEP | http://www.nj.gov/dep/oqa/ | WA005 |
| North Carolina DWQ | http://www.dwqlab.org/ | 605 |
| Oklahoma DEQ | http://www.deq.state.ok.us/CSDnew/labcert.htm | 9801 |
| Oregon – DEQ (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | WA100010 |
| South Carolina DHEC | http://www.scdhec.gov/environment/envserv/ | 61002 |
| Texas CEQ | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704427 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C544 |
| Wyoming (EPA Region 8) | http://www.epa.gov/region8/water/dwhome/wyomingdi.html | - |
| Kelso Laboratory Website | www.alsglobal.com | NA |

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

# Case Narrative

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

**ALS ENVIRONMENTAL**

**Client:** Barr Engineering Company
**Service Request No.:** K1613449
**Project:** Joslyn/ 23270110
**Date Received:** 11/03/16
**Sample Matrix:** Water

## Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Matrix/Duplicate Matrix Spike (MS/DMS).

### Sample Receipt

Three water samples were received for analysis at ALS Environmental on 11/03/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

### General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

**Approved by**________________________________________

# Chain of Custody

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

K1613449

# Barr Engineering Co. Chain of Custody

BARR

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☑ Minneapolis

Sample Origination State:
☐ KS ☐ MO ☐ WI
☐ MI ☐ ND Other:
☑ MN ☐ SD

COC Number: **51095**

COC ____ of ____

| REPORT TO | INVOICE TO |
|---|---|
| Company: BARR ENG. | Company: BARR ENG. |
| Address: | Address: |
| Name: | Name: |
| email: TAO@BARR.com | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: Joslyn | Barr Project No: 23270110. |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
[✓ WW = Waste Water]
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
[✓ A = None]
B = HCl
C = $HNO_3$
[✓ D = $H_2SO_4$]
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

Analysis Requested

| | Sample Depth | | | | | | | | Water | | | | | | Soil | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Start | Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | TSS | pH | COD | | | | | | | | | % Solids | |
| | | | | | | | | | A | A | D | | | | | | | | | | Preservative Code |
| | | | | | | | | | | | ● | | | | | | | | | | Field Filtered Y/[✓ N] |
| 1. U12 | | | | 11/02/16 | 1100 | WW | | 2 | ✓ | ✓ | ✓ | | | | | | | | | | TSS, COD + pH<br>Field pH 7.41 |
| 2. U2A | | | | ↓ | 1150 | WW | | 2 | ✓ | ✓ | ✓ | | | | | | | | | | ↓<br>Field pH 7.45 |
| 3. U11 | | | | | 1245 | WW | | 2 | ✓ | ✓ | ✓ | | | | | | | | | | Field pH 7.50 |
| 4. | | | | | | | | | | | | | | | | | | | | | |
| 5. | | | | | | | | | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | | | | | | | | | |

**Container Supply Number**
74651

BARR USE ONLY
Sampled by: PWS
Barr Proj. Manager: JLB3
Barr DQ Manager: TAO
Lab Name: ALS
Lab Location: Kelso, WA

| | | | | | | |
|---|---|---|---|---|---|---|
| Relinquished by: | On Ice? [✓ Y] N | Date 11/2/16 | Time 1400 | Received by: | Date 11/3/16 | Time 1000 |
| Relinquished by: | On Ice? Y N | Date | Time | Received by: | Date | Time |

Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☐ Other: ____________

Air Bill Number:

**Requested Due Date:**
☐ Standard Turn Around Time
☐ Rush ________ (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☐ N ☐ None

**Distribution - White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

H:RLG\STDFORMS\Chain Of Custody Form 2015 RLG Rev. 06/16/15

PC CV

# Cooler Receipt and Preservation Form

Client Barr Service Request **K16** 13449

Received: 11/3/16 Opened: 11/3/16 By: Unloaded: 11/3/16 By:

1. Samples were received via? *USPS* [✓ *Fed Ex*] *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? one, front

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

| Raw Cooler Temp | Corrected. Cooler Temp | Raw Temp Blank | Corrected Temp Blank | Corr. Factor | Thermometer ID | Cooler/COC ID NA | Tracking Number NA | Filed |
|---|---|---|---|---|---|---|---|---|
| -0.2 | -0.3 | 5.6 | 5.5 | -0.1 | 366 | 74651 | 7060 3332 1223 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

4. Packing material: *Inserts* [✓ *Baggies*] [✓ *Bubble Wrap*] *Gel Packs* [✓ *Wet Ice*] *Dry Ice* *Sleeves* ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

| Sample ID on Bottle | Sample ID on COC | Identified by: |
|---|---|---|
| | | |
| | | |
| | | |

| Sample ID | Bottle Count Bottle Type | Out of Temp | Head-space | Broke | pH | Reagent | Volume added | Reagent Lot Number | Initials | Time |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

*Notes, Discrepancies, & Resolutions:* SHORT HOLD TIME

7/25/16

*Page* ____ *of* ____

# General Chemistry

**ALS Environmental—Kelso Laboratory**
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1613449 |
| **Project:** | Joslyn/23270110 | **Date Collected:** | 11/2/16 |
| **Sample Matrix:** | Water | **Date Received:** | 11/3/16 |
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Solids, Total Suspended (TSS)

| Sample Name | Lab Code | Result | | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|---|
| U12 | K1613449-001 | **26500** | | 500 | 1 | 11/09/16 13:23 | |
| U2A | K1613449-002 | **169000** | | 500 | 1 | 11/09/16 13:23 | |
| U11 | K1613449-003 | **95900** | | 500 | 1 | 11/09/16 13:23 | |
| Method Blank | K1613449-MB1 | ND | U | 5.0 | 1 | 11/09/16 13:23 | |
| Method Blank | K1613449-MB2 | ND | U | 1.0 | 1 | 11/09/16 13:23 | |

**ALS Group USA, Corp.**
**dba ALS Environmental**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1613449 |
| **Project** | Joslyn/23270110 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| | | **Date Analyzed:** | 11/09/16 |

## Replicate Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1613404-001 | **Basis:** | NA |

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1613404-001DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| Solids, Total Suspended (TSS) | SM 2540 D | 5.0 | ND U | ND U | NC | NC | 10 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1613449 |
| **Project:** | Joslyn/23270110 | **Date Analyzed:** | 11/09/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Duplicate Lab Control Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 2540 D | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 522998 |

| | Lab Control Sample<br>K1613449-LCS2 | | | Duplicate Lab Control Sample<br>K1613449-DLCS2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte Name** | **Result** | **Spike Amount** | **% Rec** | **Result** | **Spike Amount** | **% Rec** | **% Rec Limits** | **RPD** | **RPD Limit** |
| Solids, Total Suspended (TSS) | 6.6 | 7.1 | 94 | 6.7 | 7.1 | 95 | 85-115 | 2 | 20 |

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1613449 |
| **Project:** | Joslyn/23270110 | **Date Collected:** | 11/2/16 |
| **Sample Matrix:** | Water | **Date Received:** | 11/3/16 |
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |

## Chemical Oxygen Demand (COD)

| Sample Name | Lab Code | Result | MRL | Dil. | Date Analyzed | Q |
|---|---|---|---|---|---|---|
| U12 | K1613449-001 | **184** | 50 | 1 | 11/08/16 16:00 | |
| U2A | K1613449-002 | **546** | 50 | 1 | 11/08/16 16:00 | |
| U11 | K1613449-003 | **1170** | 50 | 1 | 11/08/16 16:00 | |
| Method Blank | K1613449-MB1 | ND U | 50 | 1 | 11/08/16 16:00 | |

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1613449 |
| **Project** | Joslyn/23270110 | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |
| | | **Date Analyzed:** | 11/08/16 |

## Replicate Sample Summary
## General Chemistry Parameters

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1613132-003 | **Basis:** | NA |

| Analyte Name | Analysis Method | MRL | Sample Result | Duplicate Sample K1613132-003DUP Result | Average | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|
| Chemical Oxygen Demand (COD) | SM 5220 C | 100 | 2310 | 2270 | 2290 | 2 | 20 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1613449 |
| **Project:** | Joslyn/23270110 | **Date Collected:** | N/A |
| **Sample Matrix:** | Water | **Date Received:** | N/A |
| | | **Date Analyzed:** | 11/8/16 |
| | | **Date Extracted:** | NA |

## Matrix Spike Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Sample Name:** | Batch QC | **Units:** | mg/L |
| **Lab Code:** | K1613132-003 | **Basis:** | NA |
| **Analysis Method:** | SM 5220 C | | |
| **Prep Method:** | None | | |

### Matrix Spike
K1613132-003MS

| Analyte Name | Sample Result | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Chemical Oxygen Demand (COD) | 2310 | 3280 | 1000 | 98 | 80-128 |

**Results flagged with an asterisk (*) indicate values outside control criteria.**

**Results flagged with a pound (#) indicate the control criteria is not applicable.**

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

| | | | |
|---|---|---|---|
| **Client:** | Barr Engineering Company | **Service Request:** | K1613449 |
| **Project:** | Joslyn/23270110 | **Date Analyzed:** | 11/08/16 |
| **Sample Matrix:** | Water | **Date Extracted:** | NA |

## Lab Control Sample Summary
## Chemical Oxygen Demand (COD)

| | | | |
|---|---|---|---|
| **Analysis Method:** | SM 5220 C | **Units:** | mg/L |
| **Prep Method:** | None | **Basis:** | NA |
| | | **Analysis Lot:** | 522712 |

| Sample Name | Lab Code | Result | Spike Amount | % Rec | % Rec Limits |
|---|---|---|---|---|---|
| Lab Control Sample | K1613449-LCS1 | 264 | 242 | 109 | 83-117 |

LEGEND
Technical Services, Inc.
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88 Empire Drive
St Paul, MN  55103
Tel:  651-642-1150
Fax:  651-642-1239

March 21, 2016

# REVISION

Ms. Terri Olson
Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435

Work Order Number: 1601092
RE: 23270110

This is a revised report.  The details of the revision are listed in the case narrative on the following page.

Enclosed are the results of analyses for samples received by the laboratory on 03/09/16. If you have any questions concerning this report, please feel free to contact me.

Results are not blank corrected unless noted within the report. Additionally, all QC results meet requirements unless noted.

All samples will be retained by Legend Technical Services, Inc., unless consumed in the analysis, at ambient conditions for 30 days from the date of this report and then discarded unless other arrangements are made.  All samples were received in acceptable condition unless otherwise noted.

All test results and QC meet requirements of the 2003 NELAC standard.

MDH (NELAC) Accreditation #027-123-295

Prepared by,
LEGEND TECHNICAL SERVICES, INC

Bach Pham
Client Manager II
bpham@legend-group.com

| | | | |
|---|---|---|---|
| Barr Engineering Co. | Project: 23270110 | | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: 23270110 .00 2016 100 | Work Order #: | 1601092 |
| Minneapolis, MN 55435 | Project Manager: Ms. Terri Olson | Date Reported: | 03/21/16 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| U2A | 1601092-01 | Discharge Water | 03/08/16 13:50 | 03/09/16 10:30 |
| U12 | 1601092-02 | Discharge Water | 03/08/16 14:30 | 03/09/16 10:30 |
| U11 | 1601092-03 | Discharge Water | 03/08/16 15:00 | 03/09/16 10:30 |

### Shipping Container Information

**Default Cooler** Temperature (°C): 1.7

Received on ice: Yes
Received on melt water: No
Custody seals: Yes

Temperature blank was present
Ambient: No

Received on ice pack: No
Acceptable (IH/ISO only): No

**Case Narrative:**

The MSD recovery for COD was outside the method control limits for the 6010C batch BC1007. The LCS, LCS duplicate, and % RPD were within the control limits. The source sample was U2A.

Ths report was revised on March 21, 2016 to include a missing M2 qualifier for sample U2A. This report supersedes the report dated March 21, 2016.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435

Project: 23270110
Project Number: 23270110 .00 2016 100
Project Manager: Ms. Terri Olson

Work Order #: 1601092
Date Reported: 03/21/16

## WET CHEMISTRY
## Legend Technical Services, Inc.

| Analyte | Result | RL | MDL | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **U2A (1601092-01) Discharge Water Sampled: 03/08/16 13:50 Received: 03/09/16 10:30** | | | | | | | | | | |
| **Chemical Oxygen Demand** | **5400** | 2000 | 450 | mg/L | 20 | B6C1007 | 03/10/16 | 03/15/16 | SM 5220 D-97 | M2 |
| **pH** | **7.1** | | | Std. Units | 1 | B6C1006 | 03/10/16 | 03/10/16 | SM 4500 H+ B-00 | H3 |
| **Total Suspended Solids** | **77000** | 4.0 | | mg/L | 1 | B6C1005 | 03/10/16 | 03/11/16 | SM 2540 D-97 | |
| **U12 (1601092-02) Discharge Water Sampled: 03/08/16 14:30 Received: 03/09/16 10:30** | | | | | | | | | | |
| **Chemical Oxygen Demand** | **7300** | 5000 | 1100 | mg/L | 50 | B6C1007 | 03/10/16 | 03/15/16 | SM 5220 D-97 | |
| **pH** | **6.9** | | | Std. Units | 1 | B6C1006 | 03/10/16 | 03/10/16 | SM 4500 H+ B-00 | H3 |
| **Total Suspended Solids** | **180000** | 4.0 | | mg/L | 1 | B6C1005 | 03/10/16 | 03/11/16 | SM 2540 D-97 | |
| **U11 (1601092-03) Discharge Water Sampled: 03/08/16 15:00 Received: 03/09/16 10:30** | | | | | | | | | | |
| **Chemical Oxygen Demand** | **13000** | 2000 | 450 | mg/L | 20 | B6C1007 | 03/10/16 | 03/15/16 | SM 5220 D-97 | |
| **pH** | **7.1** | | | Std. Units | 1 | B6C1006 | 03/10/16 | 03/10/16 | SM 4500 H+ B-00 | H3 |
| **Total Suspended Solids** | **21000** | 4.0 | | mg/L | 1 | B6C1005 | 03/10/16 | 03/11/16 | SM 2540 D-97 | |

| | | | | |
|---|---|---|---|---|
| Barr Engineering Co. | Project: | 23270110 | | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: | 23270110 .00 2016 100 | Work Order #: | 1601092 |
| Minneapolis, MN  55435 | Project Manager: | Ms. Terri Olson | Date Reported: | 03/21/16 |

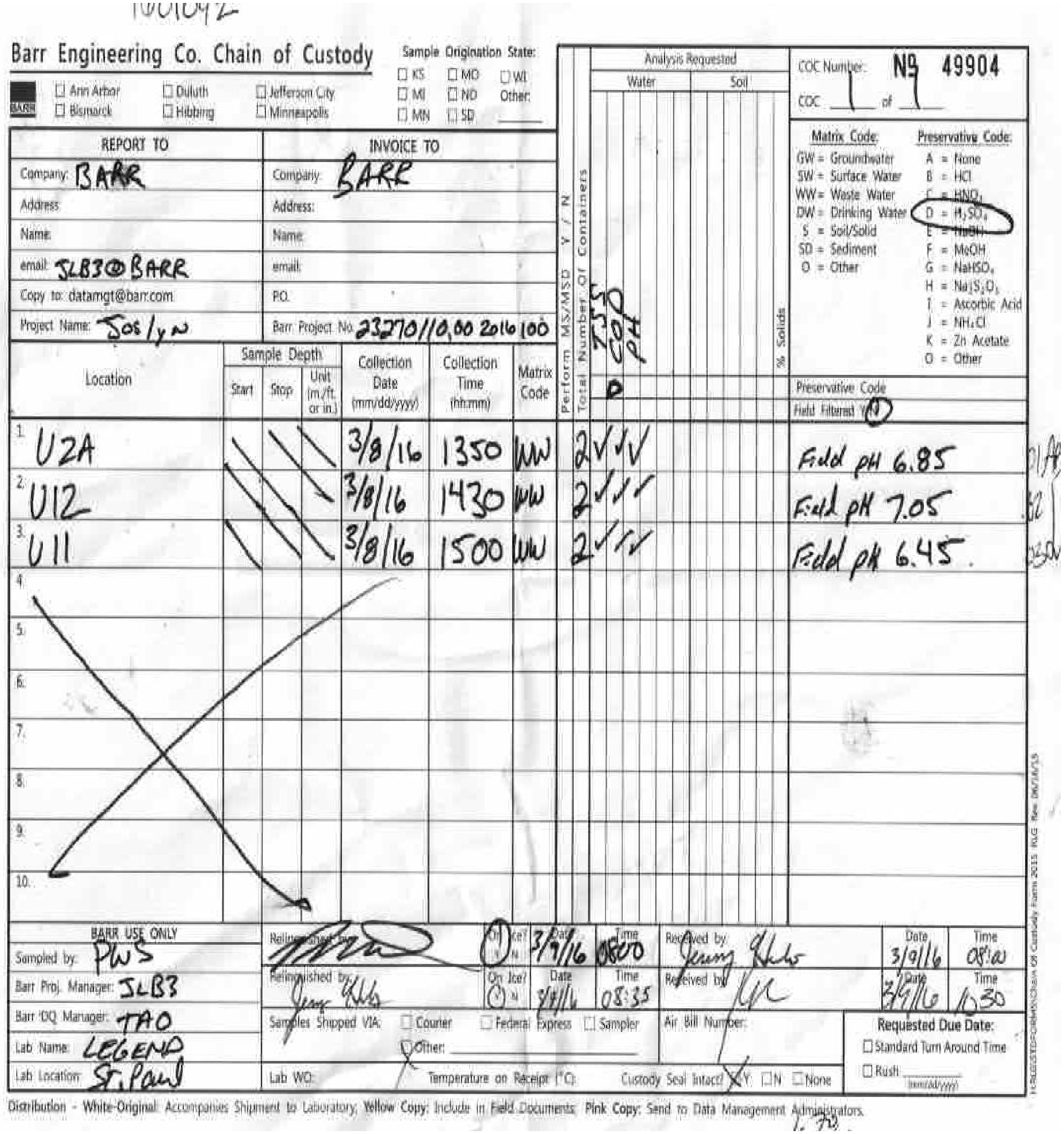
## WET CHEMISTRY - Quality Control
## Legend Technical Services, Inc.

| Analyte | Result | RL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | %RPD | %RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B6C1005 - General Prep** | | | | | | | | | | | |
| **Blank (B6C1005-BLK1)** | | | | | Prepared: 03/10/16  Analyzed: 03/11/16 | | | | | | |
| Total Suspended Solids | < 4.0 | 4.0 | | mg/L | | | | | | | |
| **Duplicate (B6C1005-DUP1)** | **Source: 1601092-03** | | | | Prepared: 03/10/16  Analyzed: 03/11/16 | | | | | | |
| Total Suspended Solids | 21500 | 4.0 | | mg/L | | 20700 | | | 3.79 | 10 | |
| **Reference (B6C1005-SRM1)** | | | | | Prepared: 03/10/16  Analyzed: 03/11/16 | | | | | | |
| Total Suspended Solids | 64.0 | | | mg/L | 69.8 | | 91.7 | 81-112 | | | |
| **Batch B6C1006 - General Prep** | | | | | | | | | | | |
| **Duplicate (B6C1006-DUP1)** | **Source: 1601092-03** | | | | Prepared & Analyzed: 03/10/16 | | | | | | |
| pH | 7.09 | | | Std. Units | | 7.13 | | | 0.563 | 20 | H3 |
| **Reference (B6C1006-SRM1)** | | | | | Prepared & Analyzed: 03/10/16 | | | | | | |
| pH | 6.01 | | | Std. Units | 6.00 | | 100 | 98-102 | | | |
| **Reference (B6C1006-SRM2)** | | | | | Prepared & Analyzed: 03/10/16 | | | | | | |
| pH | 6.07 | | | Std. Units | 6.00 | | 101 | 98-102 | | | |
| **Batch B6C1007 - General Prep** | | | | | | | | | | | |
| **Blank (B6C1007-BLK1)** | | | | | Prepared: 03/10/16  Analyzed: 03/15/16 | | | | | | |
| Chemical Oxygen Demand | < 100 | 100 | 23 | mg/L | | | | | | | |
| **LCS (B6C1007-BS1)** | | | | | Prepared: 03/10/16  Analyzed: 03/15/16 | | | | | | |
| Chemical Oxygen Demand | 364 | 100 | 23 | mg/L | 400 | | 91.0 | 85-115 | | | |
| **LCS Dup (B6C1007-BSD1)** | | | | | Prepared: 03/10/16  Analyzed: 03/15/16 | | | | | | |
| Chemical Oxygen Demand | 373 | 100 | 23 | mg/L | 400 | | 93.2 | 85-115 | 2.50 | 20 | |
| **Matrix Spike (B6C1007-MS1)** | **Source: 1601092-01** | | | | Prepared: 03/10/16  Analyzed: 03/15/16 | | | | | | |
| Chemical Oxygen Demand | 12400 | 2000 | 450 | mg/L | 8000 | 5430 | 86.7 | 85-115 | | | |
| **Matrix Spike Dup (B6C1007-MSD1)** | **Source: 1601092-01** | | | | Prepared: 03/10/16  Analyzed: 03/15/16 | | | | | | |
| Chemical Oxygen Demand | 12200 | 2000 | 450 | mg/L | 8000 | 5430 | 84.5 | 85-115 | 1.47 | 20 | M2 |

| | | | | | |
|---|---|---|---|---|---|
| Barr Engineering Co. | Project: | 23270110 | | | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: | 23270110 .00 2016 100 | | Work Order #: | 1601092 |
| Minneapolis, MN  55435 | Project Manager: | Ms. Terri Olson | | Date Reported: | 03/21/16 |

## Notes and Definitions

| | |
|---|---|
| M2 | Matrix spike recovery was low, the associated blank spike recovery was acceptable. |
| H3 | Sample was received and/ or analysis requested past holding time. |
| < | Less than value listed |
| dry | Sample results reported on a dry weight basis |
| NA | Not applicable.  The %RPD is not calculated from values less than the reporting limit. |
| MDL | Method Detection Limit;  Equivalent to the method LOD (Limit of Detection) |
| RL | Reporting Limit |
| RPD | Relative Percent Difference |
| LCS | Laboratory Control Spike = Blank Spike (BS) = Laboratory Fortified Blank (LFB) |
| MS | Matrix Spike = Laboratory Fortified Matrix (LFM) |



1601092

## Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☐ Minneapolis

Sample Origination State: ☐ KS ☐ MI ☐ MN ☐ MO ☐ ND ☐ SD ☐ WI Other: ____

COC Number: № 49904
COC 1 of 1

| REPORT TO | INVOICE TO |
|---|---|
| Company: BARR | Company: BARR |
| Address: | Address: |
| Name: | Name: |
| email: SLB3@BARR | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: Joslyn | Barr Project No. 23270110.00 2016100 |

Analysis Requested: Water / Soil

| Location | Sample Depth Start | Sample Depth Stop | Unit (m/ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | TSS | COD | pH | % Solids | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservative Code | | | | | | | | | | D | | | |
| Field Filtered Y/[✓ N] | | | | | | | | | | | | | |
| 1. U2A | \ | \ | \ | 3/8/16 | 1350 | WW | | 2 | ✓ | ✓ | ✓ | | Field pH 6.85 |
| 2. U12 | \ | \ | \ | 3/8/16 | 1430 | WW | | 2 | ✓ | ✓ | ✓ | | Field pH 7.05 |
| 3. U11 | \ | \ | \ | 3/8/16 | 1500 | WW | | 2 | ✓ | ✓ | ✓ | | Field pH 6.45. |
| 4. | | | | | | | | | | | | | |
| 5. | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | |

Matrix Code:
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

Preservative Code:
A = None
B = HCl
C = $HNO_3$
[✓ D = $H_2SO_4$]
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

BARR USE ONLY
Sampled by: PWS
Barr Proj. Manager: SLB3
Barr DQ Manager: TAO
Lab Name: LEGEND
Lab Location: St. Paul

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| | [✓ Y] N | 3/9/16 | 0800 | Jenny Hels | 3/9/16 | 08:00 |
| Jenny Hels | [✓ Y] N | 3/9/16 | 08:35 | | 3/9/16 | 1030 |

Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☒ Other: ____
Air Bill Number:
Lab WO:
Temperature on Receipt (°C):
Custody Seal Intact? ☒ Y ☐ N ☐ None

Requested Due Date:
☐ Standard Turn Around Time
☐ Rush: ____ (mm/dd/yyyy)

Distribution - White-Original: Accompanies Shipment to Laboratory; Yellow Copy: Include in Field Documents; Pink Copy: Send to Data Management Administrators.

LEGEND
Technical Services, Inc.
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Tel:  651-642-1150
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June 10, 2016

# REVISION

Ms. Terri Olson
Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435

Work Order Number: 1602129
RE: 23270110

This is a revised report.  The details of the revision are listed in the case narrative on the following page.

Enclosed are the results of analyses for samples received by the laboratory on 05/17/16. If you have any questions concerning this report, please feel free to contact me.

Results are not blank corrected unless noted within the report. Additionally, all QC results meet requirements unless noted.

All samples will be retained by Legend Technical Services, Inc., unless consumed in the analysis, at ambient conditions for 30 days from the date of this report and then discarded unless other arrangements are made.   All samples were received in acceptable condition unless otherwise noted.

All test results and QC meet requirements of the 2003 NELAC standard.

MDH (NELAC) Accreditation #027-123-295

Prepared by,
LEGEND TECHNICAL SERVICES, INC

Bach Pham
Client Manager II
bpham@legend-group.com

| | | |
|---|---|---|
| Barr Engineering Co. | Project: 23270110 | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: 23270110 | Work Order #: 1602129 |
| Minneapolis, MN  55435 | Project Manager: Ms. Terri Olson | Date Reported: 06/10/16 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| U2A | 1602129-01 | Wastewater | 05/17/16 10:45 | 05/17/16  15:50 |
| U12 | 1602129-02 | Wastewater | 05/17/16 12:10 | 05/17/16  15:50 |
| U11 | 1602129-03 | Wastewater | 05/17/16 13:30 | 05/17/16  15:50 |

### Shipping Container Information

**Default Cooler** Temperature (°C):  0.7

Received on ice: Yes
Received on melt water: Yes
Custody seals: Yes

Temperature blank was present
Ambient: No

Received on ice pack: No
Acceptable (IH/ISO only): No

**Case Narrative:**

All samples were about 1/3 solid, and heterogeneous.  The samples could not be made homogeneous within laboratory practices.

The % RPD for TSS exceeded the method acceptance limits for batch B6E2308.

This report was revised on June 10, 2016 due to a laboratory error that affected the sample results for COD analysis.  The samples were reanalyzed for COD, and only the reanalysis results have been reported.  This report supersedes the report dated May 31, 2016.

## WET CHEMISTRY
## Legend Technical Services, Inc.

| Analyte | Result | RL | MDL | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **U2A (1602129-01) Wastewater Sampled: 05/17/16 10:45 Received: 05/17/16 15:50** | | | | | | | | | | |
| **pH** | **7.1** | | | Std. Units | 1 | B6E1813 | 05/18/16 | 05/18/16 | SM 4500 H+ B-00 | H3 |
| **Total Suspended Solids** | **93000** | 4.0 | | mg/L | 1 | B6E2308 | 05/23/16 | 05/25/16 | SM 2540 D-97 | Q11 |
| **U2A (1602129-01RE1) Wastewater Sampled: 05/17/16 10:45 Received: 05/17/16 15:50** | | | | | | | | | | |
| **Chemical Oxygen Demand** | **150** | 100 | 23 | mg/L | 1 | B6F0902 | 05/20/16 | 06/09/16 | SM 5220 D-97 | |
| **U12 (1602129-02) Wastewater Sampled: 05/17/16 12:10 Received: 05/17/16 15:50** | | | | | | | | | | |
| **pH** | **7.0** | | | Std. Units | 1 | B6E1813 | 05/18/16 | 05/18/16 | SM 4500 H+ B-00 | H3 |
| **Total Suspended Solids** | **51000** | 4.0 | | mg/L | 1 | B6E2308 | 05/23/16 | 05/25/16 | SM 2540 D-97 | Q11 |
| **U12 (1602129-02RE1) Wastewater Sampled: 05/17/16 12:10 Received: 05/17/16 15:50** | | | | | | | | | | |
| **Chemical Oxygen Demand** | **400** | 100 | 23 | mg/L | 1 | B6F0902 | 05/20/16 | 06/09/16 | SM 5220 D-97 | |
| **U11 (1602129-03) Wastewater Sampled: 05/17/16 13:30 Received: 05/17/16 15:50** | | | | | | | | | | |
| **pH** | **7.1** | | | Std. Units | 1 | B6E1813 | 05/18/16 | 05/18/16 | SM 4500 H+ B-00 | H3 |
| **Total Suspended Solids** | **23000** | 4.0 | | mg/L | 1 | B6E2308 | 05/23/16 | 05/25/16 | SM 2540 D-97 | Q11, R1 |
| **U11 (1602129-03RE1) Wastewater Sampled: 05/17/16 13:30 Received: 05/17/16 15:50** | | | | | | | | | | |
| **Chemical Oxygen Demand** | **480** | 100 | 23 | mg/L | 1 | B6F0902 | 05/20/16 | 06/09/16 | SM 5220 D-97 | |

| | | |
|---|---|---|
| Barr Engineering Co. | Project: 23270110 | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: 23270110 | Work Order #: 1602129 |
| Minneapolis, MN 55435 | Project Manager: Ms. Terri Olson | Date Reported: 06/10/16 |

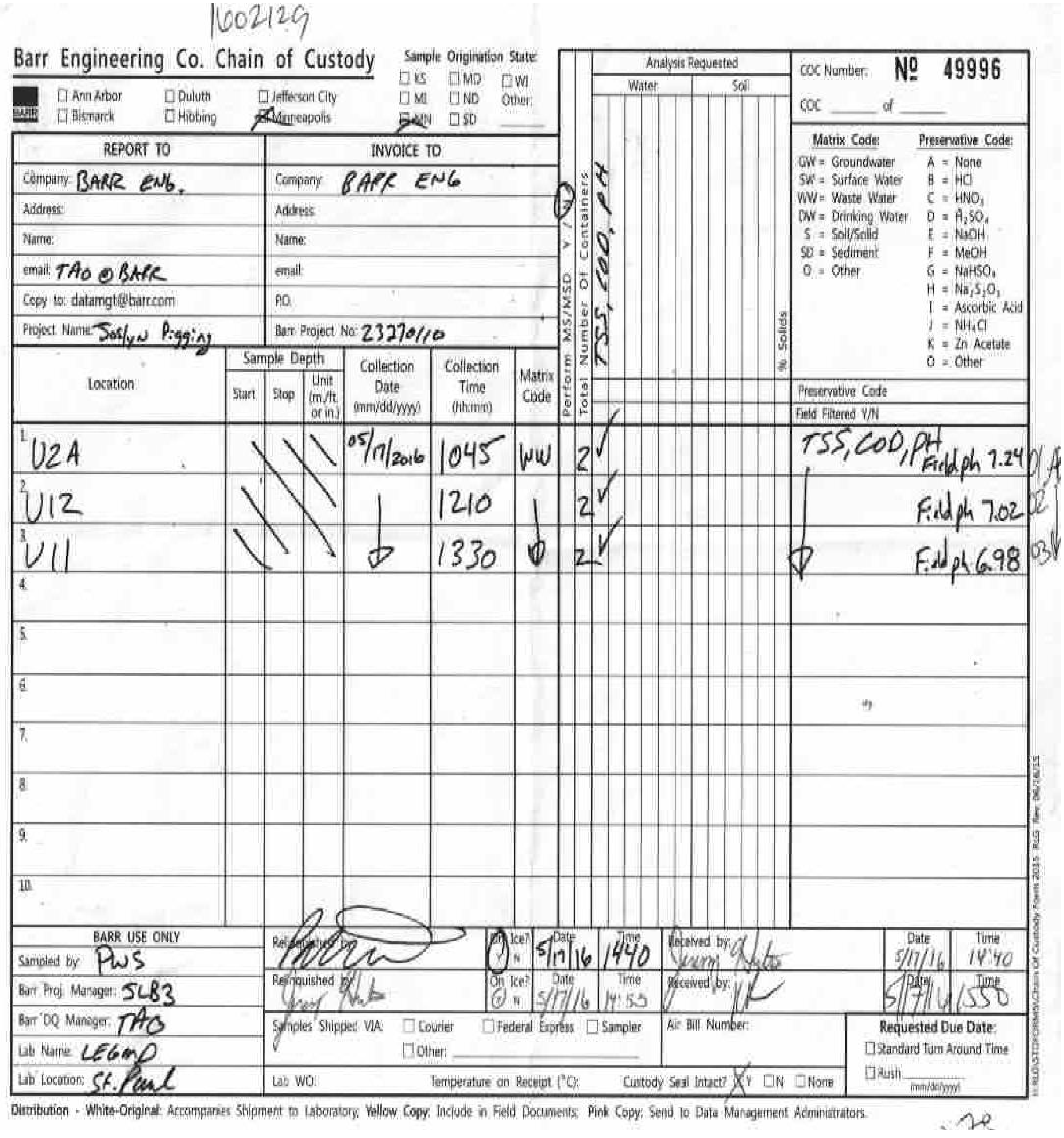
## WET CHEMISTRY - Quality Control
## Legend Technical Services, Inc.

| Analyte | Result | RL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | %RPD | %RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B6E1813 - General Prep** | | | | | | | | | | | |
| **Duplicate (B6E1813-DUP1)** **Source: 1602102-01** Prepared & Analyzed: 05/18/16 | | | | | | | | | | | |
| pH | 7.65 | | | Std. Units | | 7.64 | | | 0.131 | 20 | H3 |
| **Reference (B6E1813-SRM1)** Prepared & Analyzed: 05/18/16 | | | | | | | | | | | |
| pH | 6.04 | | | Std. Units | 6.00 | | 101 | 98-102 | | | |
| **Reference (B6E1813-SRM2)** Prepared & Analyzed: 05/18/16 | | | | | | | | | | | |
| pH | 6.02 | | | Std. Units | 6.00 | | 100 | 98-102 | | | |
| **Batch B6E2308 - General Prep** | | | | | | | | | | | |
| **Blank (B6E2308-BLK1)** Prepared: 05/23/16 Analyzed: 05/25/16 | | | | | | | | | | | |
| Total Suspended Solids | < 4.0 | 4.0 | | mg/L | | | | | | | |
| **Duplicate (B6E2308-DUP1)** **Source: 1602129-03** Prepared: 05/23/16 Analyzed: 05/25/16 | | | | | | | | | | | |
| Total Suspended Solids | 19800 | 4.0 | | mg/L | | 23400 | | | 16.7 | 10 | Q11, R1 |
| **Reference (B6E2308-SRM1)** Prepared: 05/23/16 Analyzed: 05/25/16 | | | | | | | | | | | |
| Total Suspended Solids | 91.0 | | | mg/L | 90.0 | | 101 | 82.3-111 | | | |
| **Batch B6F0902 - General Prep** | | | | | | | | | | | |
| **Blank (B6F0902-BLK1)** Prepared & Analyzed: 06/09/16 | | | | | | | | | | | |
| Chemical Oxygen Demand | < 100 | 100 | 23 | mg/L | | | | | | | |
| **LCS (B6F0902-BS1)** Prepared & Analyzed: 06/09/16 | | | | | | | | | | | |
| Chemical Oxygen Demand | 427 | 100 | 23 | mg/L | 400 | | 107 | 85-115 | | | |
| **LCS Dup (B6F0902-BSD1)** Prepared & Analyzed: 06/09/16 | | | | | | | | | | | |
| Chemical Oxygen Demand | 427 | 100 | 23 | mg/L | 400 | | 107 | 85-115 | 0.0234 | 20 | |
| **Matrix Spike (B6F0902-MS1)** **Source: 1602129-01RE1** Prepared & Analyzed: 06/09/16 | | | | | | | | | | | |
| Chemical Oxygen Demand | 584 | 100 | 23 | mg/L | 400 | 147 | 109 | 85-115 | | | |
| **Matrix Spike Dup (B6F0902-MSD1)** **Source: 1602129-01RE1** Prepared & Analyzed: 06/09/16 | | | | | | | | | | | |
| Chemical Oxygen Demand | 589 | 100 | 23 | mg/L | 400 | 147 | 110 | 85-115 | 0.802 | 20 | |

| | | | | | |
|---|---|---|---|---|---|
| Barr Engineering Co. | Project: | 23270110 | | | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: | 23270110 | | Work Order #: | 1602129 |
| Minneapolis, MN  55435 | Project Manager: | Ms. Terri Olson | | Date Reported: | 06/10/16 |

## Notes and Definitions

| | |
|---|---|
| R1 | RPD/RSD exceeded the method acceptance limit.  See case narrative. |
| Q11 | Sample is heterogeneous.  Sample homogeneity could not be readily achieved using routine laboratory practices. |
| H3 | Sample was received and/ or analysis requested past holding time. |
| < | Less than value listed |
| dry | Sample results reported on a dry weight basis |
| NA | Not applicable.  The %RPD is not calculated from values less than the reporting limit. |
| MDL | Method Detection Limit;  Equivalent to the method LOD (Limit of Detection) |
| RL | Reporting Limit |
| RPD | Relative Percent Difference |
| LCS | Laboratory Control Spike = Blank Spike (BS) = Laboratory Fortified Blank (LFB) |
| MS | Matrix Spike = Laboratory Fortified Matrix (LFM) |



1002129

## Barr Engineering Co. Chain of Custody

☐ Ann Arbor ☐ Duluth ☐ Jefferson City
☐ Bismarck ☐ Hibbing ☒ Minneapolis

Sample Origination State:
☐ KS ☐ MD ☐ WI
☐ MI ☐ ND Other: ______
☒ MN ☐ SD

COC Number: № 49996
COC ______ of ______

| REPORT TO | INVOICE TO |
|---|---|
| Company: BARR ENG. | Company: BARR ENG |
| Address: | Address: |
| Name: | Name: |
| email: TAO @ BARR | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: Joslyn Pigging | Barr Project No: 23270110 |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

Analysis Requested: Water / Soil

| | Location | Sample Depth Start | Sample Depth Stop | Sample Depth Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD [✓ Y] / N | Total Number Of Containers | Water: TSS, COD, PH | % Solids | Preservative Code / Field Filtered Y/N | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | U2A | \ | \ | \ | 05/17/2016 | 1045 | WW | | 2 | ✓ | | TSS, COD, PH Field ph 7.24 | 01 A |
| 2. | U12 | \ | \ | \ | ↓ | 1210 | ↓ | | 2 | ✓ | | ↓ Field ph 7.02 | 02 |
| 3. | U11 | \ | \ | \ | ↓ | 1330 | ↓ | | 2 | ✓ | | ↓ Field ph 6.98 | 03 ↓ |
| 4. | | | | | | | | | | | | | |
| 5. | | | | | | | | | | | | | |
| 6. | | | | | | | | | | | | | |
| 7. | | | | | | | | | | | | | |
| 8. | | | | | | | | | | | | | |
| 9. | | | | | | | | | | | | | |
| 10. | | | | | | | | | | | | | |

**BARR USE ONLY**
Sampled by: PWS
Barr Proj. Manager: SLB3
Barr DQ Manager: TAO
Lab Name: LEGEND
Lab Location: St. Paul

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| | [✓ Y] N | 5/17/16 | 1440 | Jeremy White | 5/17/16 | 14:40 |
| Jeremy White | [✓ Y] N | 5/17/16 | 14:55 | | 5/17/16 | 1550 |

Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☐ Other: ______

Air Bill Number:

Requested Due Date:
☐ Standard Turn Around Time
☐ Rush ______ (mm/dd/yyyy)

Lab WO:
Temperature on Receipt (°C):
Custody Seal Intact? ☒ Y ☐ N ☐ None

Distribution - **White-Original:** Accompanies Shipment to Laboratory; **Yellow Copy:** Include in Field Documents; **Pink Copy:** Send to Data Management Administrators.

Chain of Custody Form 2015 RLG Rev. 06/24/15

LEGEND
Technical Services, Inc.
www.legend-group.com

88 Empire Drive
St Paul, MN 55103
Tel: 651-642-1150
Fax: 651-642-1239

September 22, 2016

# REVISION

Ms. Terri Olson
Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435

Work Order Number: 1603917
RE: 23270110

This is a revised report. The details of the revision are listed in the case narrative on the following page.

Enclosed are the results of analyses for samples received by the laboratory on 09/02/16. If you have any questions concerning this report, please feel free to contact me.

Results are not blank corrected unless noted within the report. Additionally, all QC results meet requirements unless noted.

All samples will be retained by Legend Technical Services, Inc., unless consumed in the analysis, at ambient conditions for 30 days from the date of this report and then discarded unless other arrangements are made. All samples were received in acceptable condition unless otherwise noted.

All test results and QC meet requirements of the 2003 NELAC standard.

MDH (NELAC) Accreditation #027-123-295

Prepared by,
LEGEND TECHNICAL SERVICES, INC

Bach Pham
Client Manager II
bpham@legend-group.com

| | | |
|---|---|---|
| Barr Engineering Co. | Project: 23270110 | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: 23270110 | Work Order #: 1603917 |
| Minneapolis, MN  55435 | Project Manager: Ms. Terri Olson | Date Reported: 09/22/16 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| U12 | 1603917-01 | Discharge Water | 09/02/16 10:50 | 09/02/16  15:00 |
| U2A | 1603917-02 | Discharge Water | 09/02/16 13:15 | 09/02/16  15:00 |
| U11 | 1603917-03 | Discharge Water | 09/02/16 13:42 | 09/02/16  15:00 |

### Shipping Container Information

**Default Cooler** Temperature (°C):  5.2

| | | |
|---|---|---|
| Received on ice: Yes | Temperature blank was present | Received on ice pack: No |
| Received on melt water: No | Ambient: No | Acceptable (IH/ISO only): No |
| Custody seals: No | | |

**Case Narrative:**

All samples were about 1/3 solid, and heterogeneous.  The samples could not be made homogeneous within laboratory practices.

The % RPD for TSS exceeded the method acceptance limits for batch B6I0708.

All samples were received with a pH above 2 for the COD analysis.  Additional sulfuric acid was used to bring the pH below 2 for all the samples, and they were allowed to sit for 24 hours prior to analysis.

This report was revised on September 22, 2016 to correct the RL for the TSS analysis, and to correct the sampling time for sample U11. This report supersedes the report dated September 16, 2016.

| | | | |
|---|---|---|---|
| Barr Engineering Co. | Project: 23270110 | | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: 23270110 | Work Order #: | 1603917 |
| Minneapolis, MN 55435 | Project Manager: Ms. Terri Olson | Date Reported: | 09/22/16 |

## WET CHEMISTRY
## Legend Technical Services, Inc.

| Analyte | Result | RL | MDL | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **U12 (1603917-01) Discharge Water** | **Sampled: 09/02/16 10:50** | | | **Received: 09/02/16 15:00** | | | | | | |
| **Chemical Oxygen Demand** | **4700** | 2000 | 450 | mg/L | 1 | B6I1403 | 09/14/16 | 09/14/16 | SM 5220 D-97 | Q5 |
| **Total Suspended Solids** | **92000** | 1000 | | mg/L | 1 | B6I0708 | 09/07/16 | 09/07/16 | SM 2540 D-97 | Q11, R1 |
| **U2A (1603917-02) Discharge Water** | **Sampled: 09/02/16 13:15** | | | **Received: 09/02/16 15:00** | | | | | | |
| **Chemical Oxygen Demand** | **6000** | 2000 | 450 | mg/L | 1 | B6I1403 | 09/14/16 | 09/14/16 | SM 5220 D-97 | Q5 |
| **Total Suspended Solids** | **100000** | 1000 | | mg/L | 1 | B6I0708 | 09/07/16 | 09/07/16 | SM 2540 D-97 | |
| **U11 (1603917-03) Discharge Water** | **Sampled: 09/02/16 13:42** | | | **Received: 09/02/16 15:00** | | | | | | |
| **Chemical Oxygen Demand** | **12000** | 2000 | 450 | mg/L | 1 | B6I1403 | 09/14/16 | 09/14/16 | SM 5220 D-97 | Q5 |
| **Total Suspended Solids** | **85000** | 1000 | | mg/L | 1 | B6I0708 | 09/07/16 | 09/07/16 | SM 2540 D-97 | |

Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435

Project: 23270110
Project Number: 23270110
Project Manager: Ms. Terri Olson

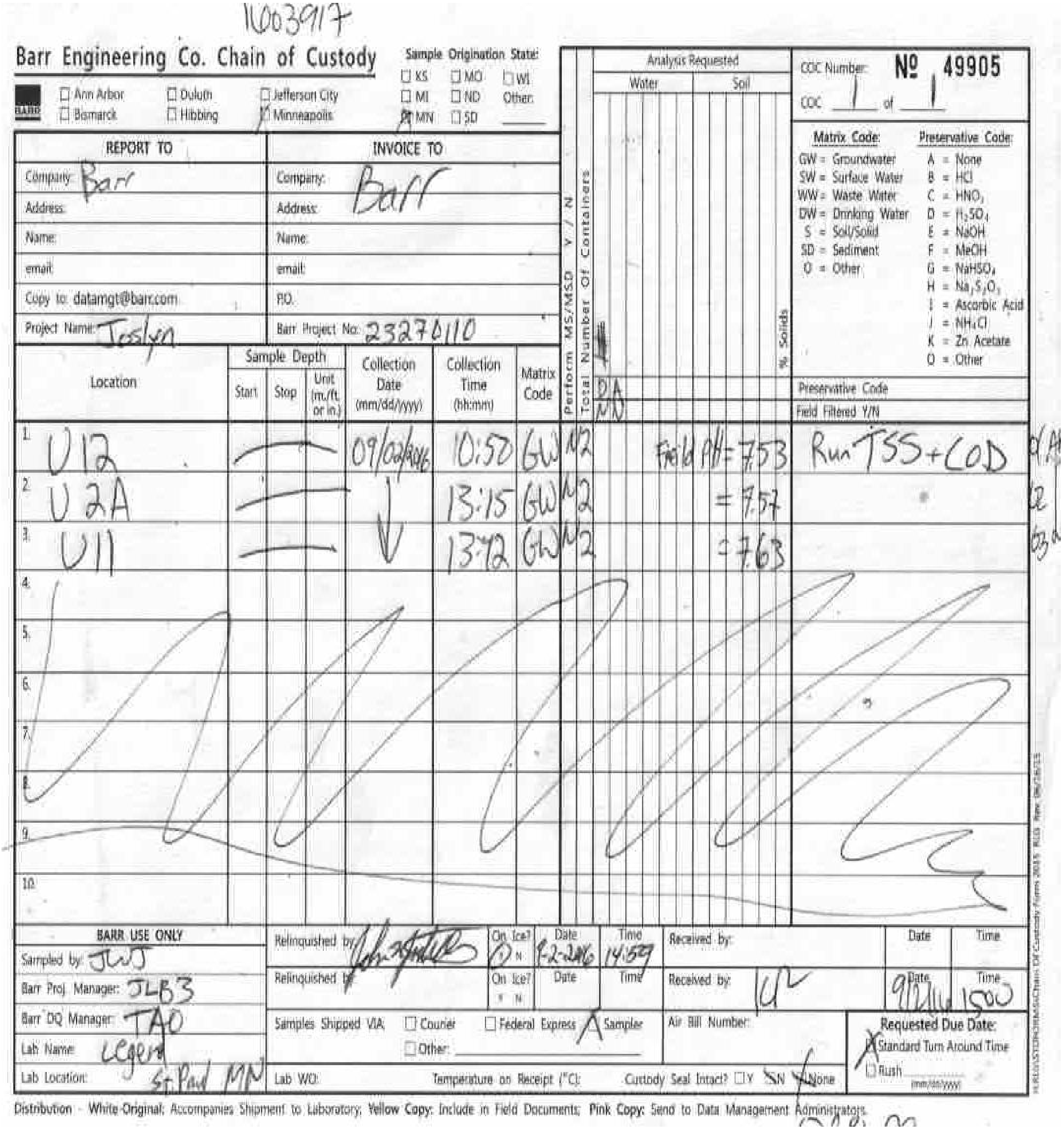
Work Order #: 1603917
Date Reported: 09/22/16

## WET CHEMISTRY - Quality Control
## Legend Technical Services, Inc.

| Analyte | Result | RL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | %RPD | %RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B6I0708 - General Prep** | | | | | | | | | | | |
| **Blank (B6I0708-BLK1)** | | | | | Prepared & Analyzed: 09/07/16 | | | | | | |
| Total Suspended Solids | < 4.0 | 4.0 | | mg/L | | | | | | | |
| **Duplicate (B6I0708-DUP1)** | **Source: 1603917-01** | | | | Prepared & Analyzed: 09/07/16 | | | | | | |
| Total Suspended Solids | 103000 | 1000 | | mg/L | | 91800 | | | 11.5 | 10 | Q11, R1 |
| **Reference (B6I0708-SRM1)** | | | | | Prepared & Analyzed: 09/07/16 | | | | | | |
| Total Suspended Solids | 89.0 | | | mg/L | 90.0 | | 98.9 | 82.3-111 | | | |
| **Batch B6I1403 - General Prep** | | | | | | | | | | | |
| **Blank (B6I1403-BLK1)** | | | | | Prepared & Analyzed: 09/14/16 | | | | | | |
| Chemical Oxygen Demand | < 100 | 100 | 23 | mg/L | | | | | | | |
| **LCS (B6I1403-BS1)** | | | | | Prepared & Analyzed: 09/14/16 | | | | | | |
| Chemical Oxygen Demand | 392 | 100 | 23 | mg/L | 400 | | 98.0 | 85-115 | | | |
| **LCS Dup (B6I1403-BSD1)** | | | | | Prepared & Analyzed: 09/14/16 | | | | | | |
| Chemical Oxygen Demand | 398 | 100 | 23 | mg/L | 400 | | 99.5 | 85-115 | 1.54 | 20 | |
| **Matrix Spike (B6I1403-MS1)** | **Source: 1604008-01** | | | | Prepared & Analyzed: 09/14/16 | | | | | | |
| Chemical Oxygen Demand | 2630 | 500 | 110 | mg/L | 2000 | 692 | 96.9 | 85-115 | | | |
| **Matrix Spike Dup (B6I1403-MSD1)** | **Source: 1604008-01** | | | | Prepared & Analyzed: 09/14/16 | | | | | | |
| Chemical Oxygen Demand | 2930 | 500 | 110 | mg/L | 2000 | 692 | 112 | 85-115 | 10.9 | 20 | |

## Notes and Definitions

| | |
|---|---|
| R1 | RPD/RSD exceeded the method acceptance limit.  See case narrative. |
| Q5 | Sample received with inadequate chemical preservation, but preserved by the laboratory. |
| Q11 | Sample is heterogeneous.  Sample homogeneity could not be readily achieved using routine laboratory practices. |
| < | Less than value listed |
| dry | Sample results reported on a dry weight basis |
| NA | Not applicable.  The %RPD is not calculated from values less than the reporting limit. |
| MDL | Method Detection Limit;  Equivalent to the method LOD (Limit of Detection) |
| RL | Reporting Limit |
| RPD | Relative Percent Difference |
| LCS | Laboratory Control Spike = Blank Spike (BS) = Laboratory Fortified Blank (LFB) |
| MS | Matrix Spike = Laboratory Fortified Matrix (LFM) |



16039 17

## Barr Engineering Co. Chain of Custody

☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MI ☒ MN ☐ MO ☐ ND ☐ SD ☐ WI Other: ____

COC Number: № 49905

COC 1 of 1

| REPORT TO | INVOICE TO |
|---|---|
| Company: Barr | Company: Barr |
| Address: | Address: |
| Name: | Name: |
| email: | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: Joslyn | Barr Project No: 23270110 |

Matrix Code:
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

Preservative Code:
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

Preservative Code: D A

Field Filtered Y/N: N N

| | Location | Sample Depth Start | Sample Depth Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | Analysis Requested (Water / Soil) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | U12 | — | — | | 09/02/2016 | 10:50 | GW | N | 2 | Field pH = 7.53 | Run TSS + COD |
| 2. | U2A | — | — | | ↓ | 13:15 | GW | N | 2 | = 7.57 | |
| 3. | U11 | — | — | | ↓ | 13:42 | GW | N | 2 | = 7.63 | |
| 4. | | | | | | | | | | | |
| 5. | | | | | | | | | | | |
| 6. | | | | | | | | | | | |
| 7. | | | | | | | | | | | |
| 8. | | | | | | | | | | | |
| 9. | | | | | | | | | | | |
| 10. | | | | | | | | | | | |

01 A
02
03 A

BARR USE ONLY
Sampled by: JWJ
Barr Proj. Manager: JLB3
Barr DQ Manager: TAO
Lab Name: Legend
Lab Location: St. Paul MN

| Relinquished by | On Ice? | Date | Time | Received by | Date | Time |
|---|---|---|---|---|---|---|
| | (Y) N | 9-2-2016 | 14:59 | | | |
| | Y N | | | KL | 9/2/16 | 1500 |

Samples Shipped VIA: ☐ Courier ☐ Federal Express ☒ Sampler ☐ Other: ____

Air Bill Number:

Requested Due Date: ☒ Standard Turn Around Time ☐ Rush ____ (mm/dd/yyyy)

Lab WO: Temperature on Receipt (°C): Custody Seal Intact? ☐ Y ☒ N ☒ None

Distribution - White-Original: Accompanies Shipment to Laboratory; Yellow Copy: Include in Field Documents; Pink Copy: Send to Data Management Administrators.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

LEGEND
Technical Services, Inc.
www.legend-group.com

88 Empire Drive
St Paul, MN  55103
Tel:  651-642-1150
Fax:  651-642-1239

January 30, 2017

# REVISION

Ms. Terri Olson
Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435

Work Order Number: 1604085
RE: 23270110

This is a revised report.  The details of the revision are listed in the case narrative on the following page.

Enclosed are the results of analyses for samples received by the laboratory on 09/15/16. If you have any questions concerning this report, please feel free to contact me.

Results are not blank corrected unless noted within the report. Additionally, all QC results meet requirements unless noted.

All samples will be retained by Legend Technical Services, Inc., unless consumed in the analysis, at ambient conditions for 30 days from the date of this report and then discarded unless other arrangements are made.   All samples were received in acceptable condition unless otherwise noted.

All test results and QC meet requirements of the 2003 NELAC standard.

MDH (NELAC) Accreditation #027-123-295

Prepared by,
LEGEND TECHNICAL SERVICES, INC

Bach Pham
Client Manager II
bpham@legend-group.com

| | | | | |
|---|---|---|---|---|
| Barr Engineering Co. | Project: | 23270110 | | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: | 23270110 .00 2016 100 | Work Order #: | 1604085 |
| Minneapolis, MN  55435 | Project Manager: | Ms. Terri Olson | Date Reported: | 01/30/17 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| U12 Jetting | 1604085-01 | Discharge | 09/14/16 12:05 | 09/15/16  15:45 |

**Shipping Container Information**

**Default Cooler** Temperature (°C):  0.5

Received on ice: Yes
Received on melt water: No
Custody seals: No

Temperature blank was present
Ambient: No

Received on ice pack: No
Acceptable (IH/ISO only): No

**Case Narrative:**

This report was revised on January 30, 2017 to correct the sample ID.  This report supersedes the report dated September 27, 2016.

Barr Engineering Co.
4300 MarketPointe Drive, Suite 200
Minneapolis, MN  55435

Project: 23270110
Project Number: 23270110 .00 2016 100
Project Manager: Ms. Terri Olson

Work Order #: 1604085
Date Reported: 01/30/17

## WET CHEMISTRY
## Legend Technical Services, Inc.

| Analyte | Result | RL | MDL | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **U12 Jetting (1604085-01) Discharge    Sampled: 09/14/16 12:05    Received: 09/15/16 15:45** | | | | | | | | | | |
| Chemical Oxygen Demand | <100 | 100 | 23 | mg/L | 1 | B6I1506 | 09/16/16 | 09/16/16 | SM 5220 D-97 | |
| **Total Suspended Solids** | **2400** | 4.0 | | mg/L | 1 | B6I1505 | 09/16/16 | 09/16/16 | SM 2540 D-97 | |

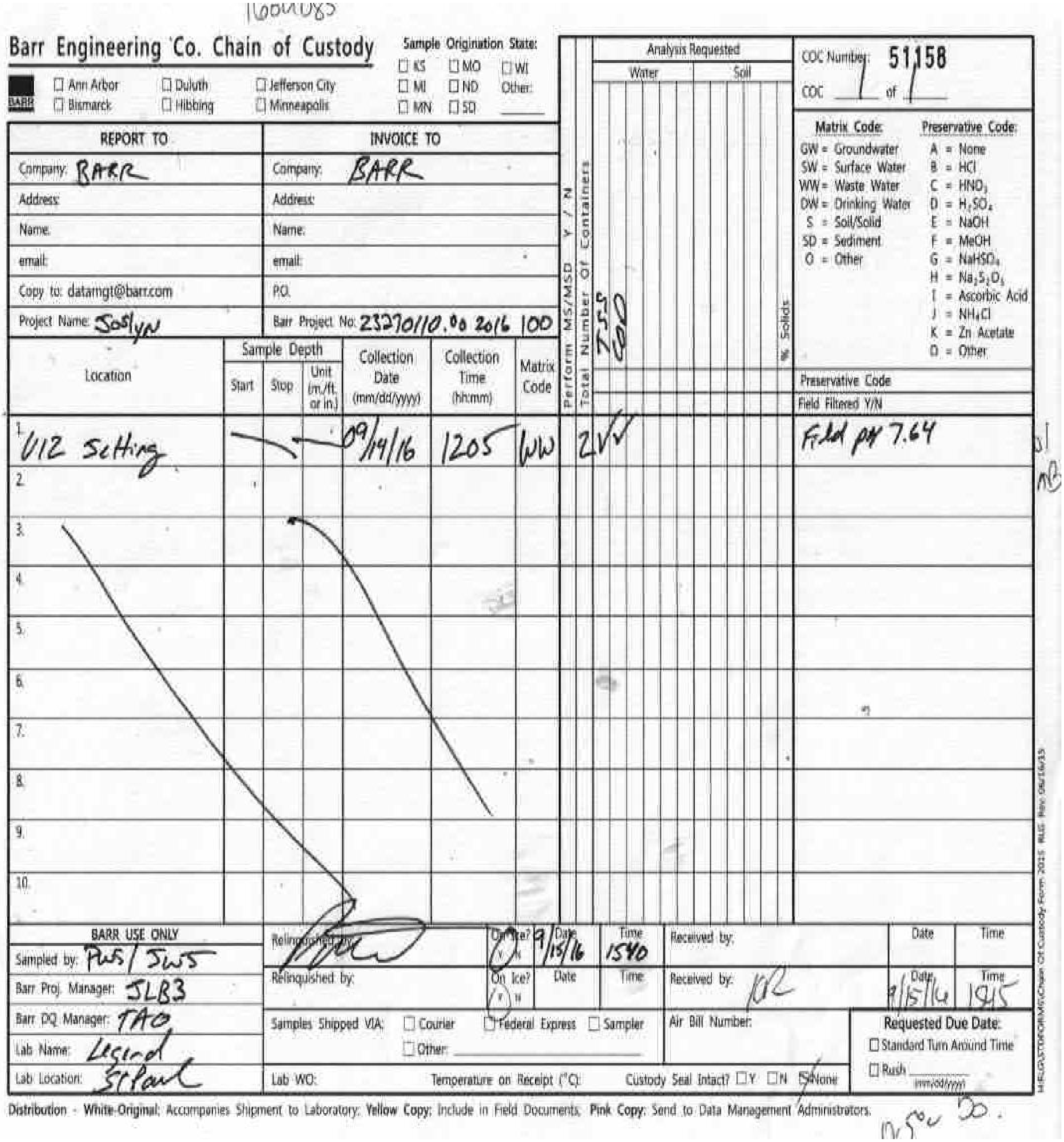
| | | | |
|---|---|---|---|
| Barr Engineering Co. | Project: 23270110 | | |
| 4300 MarketPointe Drive, Suite 200 | Project Number: 23270110 .00 2016 100 | Work Order #: | 1604085 |
| Minneapolis, MN 55435 | Project Manager: Ms. Terri Olson | Date Reported: | 01/30/17 |

## WET CHEMISTRY - Quality Control
## Legend Technical Services, Inc.

| Analyte | Result | RL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | %RPD | %RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch B6I1505 - General Prep** | | | | | | | | | | | |
| **Blank (B6I1505-BLK1)** | | | | | Prepared & Analyzed: 09/16/16 | | | | | | |
| Total Suspended Solids | < 4.0 | 4.0 | | mg/L | | | | | | | |
| **Duplicate (B6I1505-DUP1)** | **Source: 1604086-01** | | | | Prepared & Analyzed: 09/16/16 | | | | | | |
| Total Suspended Solids | 8.80 | 4.0 | | mg/L | | 8.80 | | | 0.00 | 10 | |
| **Reference (B6I1505-SRM1)** | | | | | Prepared & Analyzed: 09/16/16 | | | | | | |
| Total Suspended Solids | 84.0 | | | mg/L | 90.0 | | 93.3 | 82.3-111 | | | |
| **Batch B6I1506 - General Prep** | | | | | | | | | | | |
| **Blank (B6I1506-BLK1)** | | | | | Prepared & Analyzed: 09/16/16 | | | | | | |
| Chemical Oxygen Demand | < 100 | 100 | 23 | mg/L | | | | | | | |
| **LCS (B6I1506-BS1)** | | | | | Prepared & Analyzed: 09/16/16 | | | | | | |
| Chemical Oxygen Demand | 407 | 100 | 23 | mg/L | 400 | <100 | 102 | 85-115 | | | |
| **LCS Dup (B6I1506-BSD1)** | | | | | Prepared & Analyzed: 09/16/16 | | | | | | |
| Chemical Oxygen Demand | 406 | 100 | 23 | mg/L | 400 | <100 | 102 | 85-115 | 0.148 | 20 | |
| **Matrix Spike (B6I1506-MS1)** | **Source: 1604086-01** | | | | Prepared & Analyzed: 09/16/16 | | | | | | |
| Chemical Oxygen Demand | 452 | 100 | 23 | mg/L | 400 | <100 | 103 | 85-115 | | | |
| **Matrix Spike Dup (B6I1506-MSD1)** | **Source: 1604086-01** | | | | Prepared & Analyzed: 09/16/16 | | | | | | |
| Chemical Oxygen Demand | 455 | 100 | 23 | mg/L | 400 | <100 | 103 | 85-115 | 0.617 | 20 | |

## Notes and Definitions

| | |
|---|---|
| < | Less than value listed |
| dry | Sample results reported on a dry weight basis |
| NA | Not applicable. The %RPD is not calculated from values less than the reporting limit. |
| MDL | Method Detection Limit; Equivalent to the method LOD (Limit of Detection) |
| RL | Reporting Limit |
| RPD | Relative Percent Difference |
| LCS | Laboratory Control Spike = Blank Spike (BS) = Laboratory Fortified Blank (LFB) |
| MS | Matrix Spike = Laboratory Fortified Matrix (LFM) |



1600083

## Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☐ Minneapolis

Sample Origination State: ☐ KS ☐ MI ☐ MN ☐ MO ☐ ND ☐ SD ☐ WI Other: ______

COC Number: 51158
COC 1 of 1

| REPORT TO | INVOICE TO |
|---|---|
| Company: BARR | Company: BARR |
| Address: | Address: |
| Name: | Name: |
| email: | email: |
| Copy to: datamgt@barr.com | P.O. |
| Project Name: Soslyn | Barr Project No: 23270110.00 2016 100 |

Analysis Requested: Water: TSS, COD; Soil; % Solids

| Location | Sample Depth Start | Sample Depth Stop | Unit (m./ft. or in.) | Collection Date (mm/dd/yyyy) | Collection Time (hh:mm) | Matrix Code | Perform MS/MSD Y / N | Total Number Of Containers | TSS | COD | Preservative Code / Field Filtered Y/N |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. U12 Setting | — | — | — | 09/14/16 | 1205 | WW | | 2 | ✓ | ✓ | Field pH 7.64 |
| 2. | | | | | | | | | | | |
| 3. | | | | | | | | | | | |
| 4. | | | | | | | | | | | |
| 5. | | | | | | | | | | | |
| 6. | | | | | | | | | | | |
| 7. | | | | | | | | | | | |
| 8. | | | | | | | | | | | |
| 9. | | | | | | | | | | | |
| 10. | | | | | | | | | | | |

**Matrix Code:**
GW = Groundwater
SW = Surface Water
WW = Waste Water
DW = Drinking Water
S = Soil/Solid
SD = Sediment
O = Other

**Preservative Code:**
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
I = Ascorbic Acid
J = $NH_4Cl$
K = Zn Acetate
O = Other

**BARR USE ONLY**
Sampled by: PWS / SWS
Barr Proj. Manager: JLB3
Barr DQ Manager: TAO
Lab Name: Legend
Lab Location: St Paul

| Relinquished by: | On Ice? | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|---|
| | [✓ Y] N | 9/15/16 | 1540 | | | |
| | [✓ Y] N | | | KR | 9/15/16 | 1945 |

Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☐ Other: ______
Air Bill Number:
Requested Due Date: ☐ Standard Turn Around Time ☐ Rush ______ (mm/dd/yyyy)
Lab WO:
Temperature on Receipt (°C):
Custody Seal Intact? ☐ Y ☐ N ☒ None

**Distribution** - **White-Original**: Accompanies Shipment to Laboratory; **Yellow Copy**: Include in Field Documents; **Pink Copy**: Send to Data Management Administrators.

10.5°c DO.

H:\LGL\STDFORMS\Chain Of Custody Form 2015 RLG Rev 06/16/15