2017 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 2017. In addition, this report presents the data collected in 2017, describes the effectiveness of the response actions based on the 2017 data, and presents recommendations for 2018 for these three operable units, including a recommended 2018 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 action plans for a fifth Operable Unit are currently being developed:

- **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. This report does not address OU5.

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

1.2 2017 Updates

Remedial action plans for soil in the West Area of the site (OU5) are currently being developed. If the plan 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. In 2017, 4837 Azelia Avenue N. (Building 1) and 3900 Lake Breeze Avenue N. (Pond) were purchased by "MSP Indust Portfolio Own LLC". The property transactions did not alter any ownership or operational responsibilities with regard to the remedial actions 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 construction activities on the site in 2017.

1.2.2 2017 Maintenance and Repairs

The system generally operated as planned in 2017 with only temporary system-wide shut downs. The following repairs, changes and maintenance activities were performed on system components in 2017:

- Control panel repairs were completed on multiple occasions after weekly inspections indicated failing wire insulation and heated contact points.
- Oil/water vault ventilation fan was replaced in November.
- Discharge pipeline cleaning was conducted on wells U2A, U11 and U12 as needed.
- Monthly treatments with chlorine granules were performed 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 U5:**
    - A new pump end [10S05-9] and motor [0.5 horsepower (HP)] was installed in October.
- **Well U12:**
    - A new pump end [40S50-12] and motor (5 HP) was installed in January.
- **DNAPL (Dense Non-Aqueous Liquid) Pumpout System:**
    - DNAPL vault water level was measured and recorded monthly to monitor for water infiltration.

- The DNAPL recovery system (OU3) containment tank was replaced and improvements made to the subsurface concrete vault in 2017, after discovering late in 2015 that the tank needed to be replaced. The original DNAPL tank was cleaned, demolished, and removed. The work involved sealing pipe penetrations, the floor and walls of the concrete subsurface vault, installing concrete piers to set the tank above the floor, replacing the tank, vault cover and high level float switch, and regrading around the subsurface vault. The DNAPL collection system was restarted in August 2017. A letter summarizing the construction work was submitted to the MPCA on September 1, 2017 (Appendix E; Barr, 2017b).

1.2.3 2017 Groundwater Monitoring Program Updates

No significant changes have been made to the groundwater monitoring program since 2007. Groundwater monitoring in 2017 was conducted as recommended in the 2016 Annual Operations and Monitoring Report (Barr, 2017a). The monitoring plan for 2017 was approved via email correspondence on October 4, 2017, without comments. The MPCA approved the 2016 Annual Operations and Monitoring Report (Barr, 2017a) with minor comments agreeing with the report recommendations on January 30, 2018 (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).

At the time of this report preparation, the next Five-Year Review Report had not been finalized. While the Five-Year Reviews have modified the risk-based criteria or standards used to evaluate attainment of the remedial system goal, they have not resulted in significant 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 polycyclic aromatic hydrocarbons (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 has been used to evaluate Joslyn monitoring data since 2016. Similarly, some non-carcinogenic PAHs have both HRLs and HBVs, as shown in Table 2-1. The HBVs for acenapthene, flouranthene and pyrene are scheduled to be adopted as HRLs under a new rule by late spring to summer of 2018. 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 U.S. Environmental Protection Agency's (USEPA) "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. Hazard indices for non-cancer PAHs are calculated separately for each system effect.

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 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 2017. All data collected in 2017 is presented in this section.

The sampling and analysis procedures for Operable Units 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 the water quality analyses in 2017 in accordance with the QAPP. Appendix D contains a discussion of the quality assurance/quality control (QA/QC) evaluation of the 2017 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 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 a foam "pig" getting stuck in the well U2A water line during cleaning. 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 2017 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 publicly owned treatment works (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 2017 averaged 91 percent of the 2017 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 USEPA 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, 2016b). Analytical results are summarized in Table 3-5. The 2017 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 2017. 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 average PCP concentration has been below 500 µg/L, as shown in the 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
2017	258	330	3,000

Iron bacteria maintenance (pigging) was conducted on the discharge lines as needed for wells U2A, U11 and U12 in 2017. Samples of the iron bacteria residue from the maintenance were collected and analyzed 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 2017. 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 2017.

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 OU3.

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 and plans to replace the DNAPL tank and modify the subsurface concrete vault that houses the tank were submitted to the MPCA and approved in September 2016 (Barr, 2016c and MCPA, 2016a). The work was completed and the system was restarted in August 2017. The construction work is documented in a letter submitted to the MPCA (Barr, 2017b), which includes a letter summarizing the work, record drawings and photos (Appendix E).

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, 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 2017 (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. When the new tank was installed 2017, initial DNAPL recovery rates were low. Troubleshooting efforts since then indicated that longer cycle times were required to push the DNAPL through the line to the tank. Adjustments to the cycling period have shown improved DNAPL recovery. Currently the DNAPL recovery pump is activated for approximately 4 minutes every 36 hours, when turned on.

Water has been historically 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 included caulking the vault's joints periodically, along with more frequent vault inspections. Work completed in 2017 included several measures to reduce infiltration into the vault, including sealing cracks and pipe penetrations, application of a sealant across the floor and walls of the vault, and replacing and raising the vault cover (Appendix E; Barr, 2017b). In addition, the new DNAPL tank was placed on concrete piers to keep the tank above accumulated water in the vault. The vault and tank are regularly inspected to determine if there is any evidence that tank integrity has been compromised and to check for water in the vault. The inspections have indicated that the 2017 improvements have been effective at limiting water infiltration into the vault.

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 has not operated since 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. The DNAPL pumping system will continue to be monitored and adjusted to maximize DNAPL recovery while minimizing the intrusion of water.

3.3 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 2017, groundwater samples were collected and water levels were measured in accordance with the 2017 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 2017. Historical water elevations are in Appendix A.

The major annual sampling event was conducted in the fall of 2017. Samples were collected in October 2017. Due to a shipping error, some samples from the October event were not analyzed, so these wells were resampled in early December 2017.

Table 3-13 lists the analytical parameters for groundwater samples. PAHs and PCP were analyzed using USEPA Method SW846-8270 SIM. The 2017 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 2017.

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 USEPA Method 8270 SIM. This method applies mass spectrometry (MS) with selected ion monitoring (SIM) to increase the analytical sensitivity of standard USEPA Method 8270. Given these methods, the lowest reporting limit for SVOCs in water samples potentially achievable by ALS (the project analytical laboratory) using USEPA Method 8270 SIM is 0.0033 µg/L, for most target compounds; however, 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 2017, samples from all offsite groundwater monitoring wells in the monitoring program were analyzed for SVOCs at or near 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 reasons for these higher reporting limits is the presence of non-target and elevated target compounds requiring sample dilution to prevent damage to analytical instrumentation and to fall within the calibration range of the analytical method.

In 2017, reporting limits associated with non-detect results were all below groundwater ARARs and TBCs for the site with the exception of benzo(a)pyrene (at U5, W7 and W10) and PCP (at well W253) due to the presence of elevated target compounds requiring laboratory dilution of the samples (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 2017 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 2017, 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 OU4 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 for cancer and non-cancer risk. The hazard index is the sum of the ratios of the concentrations of each parameter divided by the risk-based criterion for that parameter. For non-carcinogenic PAHs, a separate hazard index is calculated for each system effect endpoint. The goal is a hazard index below 1. In accordance with the 2009 5-year review, Joslyn uses the USEPA (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 2017. Tables 4-1, 4-2, and 4-3 compare the water quality data and hazard indices to the criterion for groundwater samples collected in 2017 from the onsite upper sand, middle sand, and lower sand aquifers, respectively. The calculations of the cancer hazard indices are shown in Table 4-4. The calculations for the non-cancer chronic exposure hazard indices are shown in Table 4-5 The cancer hazard index for a sample from lower aquifer well W300SPN was slightly above 1.0 in 2012, but has been well below 1.0 since that time. 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. Overall, the 2017 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 2017 PCP concentration contours for OU1. Appendix A contains the historical water quality data for 1988 through 2017. 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. PCP was not detected and cancer and non-cancer hazard indices were all below 1.0 at wells U1A and U1 in 2017, 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, except for a cancer hazard index of 1.1 in 2016 and 2017, based on a PCP concentration near the reporting limit. Well W6N is a relatively new well. Samples from W6N contained 62-120 µg/L PCP from 1999 through 2002. PCP increased to 1,800 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, which decreased to values of 17 µg/L in the spring and 11 µg/L in the fall of 2017.

Well W7 samples exhibited the highest PCP concentration at the site in 2017. The PCP concentration in this well was 2,400 µg/L in the spring and 450 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 2017, the PCP concentration in the sample from well W10 was 100 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 2017, 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 4-6 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 2017, approximately 150 pounds of PCP were removed with the groundwater. An estimated 10,900 pounds of PCP have been removed since start-up of the pumpout system in 1989.

In 2017, approximately 35 pounds of total detectable monitored PAHs were removed with the groundwater, similar to recent years. In 2017, as well as in recent years, no measurable cPAHs were detected in the groundwater effluent. An estimated 3,600 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 2017 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 2017 water level measurements. In general, these show that groundwater flow directions and gradients were similar throughout 2017 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 2017 were 0.0012 for the W104/W126 well pair and ranged from about 0.0011 to 0.0014 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 starting in 2016.

The design pumping scheme for the Joslyn OU1 and OU2 systems was generally met throughout 2017 (Table 3-1). The actual pumping rates were very close to the design pumping rates in 2017, 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 similar to the average calculated rate for 2017. Routine discharge line cleaning and well treatment to reduce iron bacteria buildup were performed on several wells in 2017 to maintain design flow rates. Continued routine cleaning and treatment is planned for wells U2A, U4N, U11 and U12 in 2018. 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 2018 as needed if adequate flow rates cannot be achieved with routine maintenance and cleaning.

Capture of the groundwater plume was maintained in 2017. The 2017 refined steady-state groundwater flow model was used to delineate the average capture zone for the pumpout wells in 2017. Figure 4-8 illustrates modeled site capture during 2017 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 2017 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 2017 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 2017 and recommendations for 2018 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 2017 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 2012 results from lower aquifer well W300SPN were slightly above the hazard index of 1.0 due to carcinogenic PAH concentrations, the hazard index has since been below

1.0. The 2017 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 estimate 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 4-7 summarizes the 2017 results from the middle sand pumping performance evaluation.

The estimated gradients observed in 2017 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 estimated 2017 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 the majority of 2017 as plans for replacing the DNAPL tank were developed. DNAPL removal resumed after the new tank was installed and the system was turned on in late 2017. Table 4-8 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 4-8). 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 (mean sea level), 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, 2016b and Barr, 2016d). 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 as needed to further optimize recovery.

As discussed in Section 1.2.2 and 3.2, the DNAPL recovery pump was shut off in 2015 to address an observed compromise in the outer secondary containment wall of the double-walled DNAPL tank. No DNAPL was observed to have leaked into the interstitial space between the tank walls or into the underground concrete vault that houses the DNAPL tank. The DNAPL tank was emptied, the DNAPL recovery system shut off and the tank was replaced and improvements made to the concrete vault housing the tank. The system was restarted in August 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 2017

- Evaluations of the OU1 shallow aquifer pumpout system show that the system performed as intended in 2017. 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 and modeled capture of the groundwater plume in 2017.

- Middle sand remediation wells W253 and W255 (OU2) were effective at achieving remediation goals in 2017. 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 2017 water quality results from samples from the lower aquifer are similar to historical results, indicating that OU2 is effective.

- The DNAPL recovery system (OU3) containment tank was replaced and improvements made to the subsurface concrete vault in 2017, after discovering late in 2015 that the tank needed to be replaced. The work was completed and the system was restarted in August 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 2017. 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 25,500 pounds of PAHs have been removed, the majority in the DNAPL via OU3. An estimated 10,900 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.

5.2 Recommendations for 2018

It is recommended the program for 2018 be similar to the 2017 program with actions taken to improve system performance, conduct repairs and modifications to the monitoring system as described below.

5.2.1 2018 Water Monitoring Plan

- Conduct the 2018 monitoring in accordance with the updated 2016 QAPP (Barr, 2016b).
- The 2018 monitoring program will be the same as in 2017. The recommended 2018 monitoring program is described in Table 5-1.
- Use the 2004-2017 analytical parameter list in 2018, 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 2018 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 recovery from 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 2018 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)

- 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).

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 developed for these PAHs in 2015. The HBVs are scheduled to be adopted as HRLs under a new rule by late spring to summer of 2018. The HRLs as listed above, 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 2017 Rate[1]	**Recommended 2018 Design Rate**	**Recommended Long-Term Design Rate[3,4]**
Shallow Sand Unit Wells			
U1	0	0	0
U1A	0	0	0
U2A	20	22	22
U4N	17	16	16
U5	1	4	4
U6N	15	15	15
U7N	19	18	18
U11	20	22	22
U12	33	42	42
Shallow Sand Total[1]	125	139	139
Middle Sand Unit Wells			
W253	1	0-+5	0-+5
W255	6	0-+5	0-+5
Middle Sand Total	6[2]	5[2]	5[2]

1. Average 2017 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 2018 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
2017 Groundwater Pump-Out 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
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
02-Feb-17	None	6,753,190	9,525,760	9,797,700	3,922,560	3,394,060	8,460,940	None	1,955,650	68,268,500	4,010,130	3,691,900
21-Mar-17	None	6,753,190	783,380	927,850	3,985,790	4,431,020	9,728,760	None	3,390,390	71,236,700	4,066,150	4,069,830
03-Apr-17	None	6,753,190	1,123,620	1,165,350	4,003,620	4,717,700	78,450	None	3,773,120	71,982,500	4,169,910	4,069,910
21-Apr-17	None	6,753,190	1,604,880	1,587,250	4,027,420	5,116,040	564,420	None	4,144,120	73,070,900	4,169,910	4,240,510
26-May-17	None	6,753,190	2,520,940	2,452,980	4,077,140	5,892,040	1,514,640	None	5,248,680	75,031,600	4,169,910	4,574,850
28-Jun-17	None	6,753,190	3,266,520	3,240,460	4,123,280	6,576,150	2,352,210	None	6,224,330	76,932,700	4,169,910	4,869,540
31-Jul-17	None	6,753,190	4,332,380	4,217,990	4,171,270	7,319,630	3,267,730	None	7,217,220	78,622,200	4,169,910	5,190,350
31-Aug-17	None	6,753,190	5,018,600	4,924,370	4,206,950	7,875,430	3,950,650	None	7,904,990	79,660,000	4,169,910	5,429,690
04-Oct-17	None	6,753,190	6,352,260	5,968,890	4,222,360	8,751,010	5,026,790	None	9,076,850	81,752,600	4,459,810	5,484,830
03-Nov-17	None	6,753,190	7,154,440	6,634,080	4,222,360	9,343,680	5,757,150	None	9,829,640	82,930,000	4,460,360	5,740,440
04-Dec-17	None	6,753,190	8,214,420	7,488,760	4,326,460	85,890	6,673,640	None	728,440	84,651,700	4,460,360	6,066,240
05-Jan-18	None	6,753,190	9,078,540	8,160,070	4,421,640	457,510	7,485,130	None	1,436,070	85,912,900	4,460,360	6,355,920

Initial	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
Final	None	6,753,190	9,078,540	8,160,070	4,421,640	457,510	7,485,130	None	1,436,070	85,912,900	4,460,360	6,355,920
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	10,000,000	0	10,000,000	10,000,000	0	10,000,000	0	0	0
Period Volume, gallons	None	0	10,556,610	9,210,550	550,500	7,891,640	10,031,340	None	10,663,190	17,927,800	450,230	3,016,630
Days of Operation	NA	0	374	374	374	374	374	374	374	374	374	374
Calc. Avg. Flow, gpm	None	0	20	17	1	15	19	None	20	33	1	6
Design Pumping Rate	NA	0	22	16	4	15	18	NA	22	42	0±5	0±5
Performance	NA	NA	89%	100%	26%	98%	100%	NA	90%	79%	--	--

Pigging	12,165	gal
Pumping	70,298,490	gal
Total	70,310,655	gal
Total 2017 Design Rate	144.0	gpm
Total Calc. 2017 Rate	130.6	gpm
Design Performance	91%	

Table 3-2 Continued
2017 Groundwater Pump-Out 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	1,003,830	848,180	51,420	828,190	1,007,150	0	1,182,770	283,400	0	352,610
February	0	0	1,257,620	1,130,150	63,230	1,036,960	1,267,820	0	1,434,740	2,968,200	56,020	377,930
March	0	0	340,240	237,500	17,830	286,680	349,690	0	382,730	745,800	103,760	80
April	0	0	481,260	421,900	23,800	398,340	485,970	0	371,000	1,088,400	0	170,600
May	0	0	916,060	865,730	49,720	776,000	950,220	0	1,104,560	1,960,700	0	334,340
June	0	0	745,580	787,480	46,140	684,110	837,570	0	975,650	1,901,100	0	294,690
July	0	0	1,065,860	977,530	47,990	743,480	915,520	0	992,890	1,689,500	0	320,810
August	0	0	686,220	706,380	35,680	555,800	682,920	0	687,770	1,037,800	0	239,340
September	0	0	1,333,660	1,044,520	15,410	875,580	1,076,140	0	1,171,860	2,092,600	289,900	55,140
October	0	0	802,180	665,190	0	592,670	730,360	0	752,790	1,177,400	550	255,610
November	0	0	1,059,980	854,680	104,100	742,210	916,490	0	898,800	1,721,700	0	325,800
December	0	0	864,120	671,310	95,180	371,620	811,490	0	707,630	1,261,200	0	289,680

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	19	16	1	16	19	0	22	5	0	7
February	0	0	19	17	1	15	19	0	21	44	1	6
March	0	0	18	13	1	15	19	0	20	40	6	0
April	0	0	19	16	1	15	19	0	14	42	0	7
May	0	0	18	17	1	15	19	0	22	39	0	7
June	0	0	16	17	1	14	18	0	21	40	0	6
July	0	0	22	21	1	16	19	0	21	36	0	7
August	0	0	15	16	1	12	15	0	15	23	0	5
September	0	0	27	21	0	18	22	0	24	43	6	1
October	0	0	19	15	0	14	17	0	17	27	0	6
November	0	0	24	19	2	17	21	0	20	39	0	7
December	0	0	19	15	2	8	18	0	15	27	0	6

Table 3-3

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

Well No.	2017 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 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 pump end - 2017 New motor - 2017
U6N	15	18-32	16S07-8 (¾ HP)	New motor - 2015 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 New pump end in 2016
U12	42	60	60S50-9 (5 HP)	New motor - 2017 New pump end - 2017
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 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
2017 Water Quality Data
Pumpout System Effluent
Joslyn Manufacturing Supply Co.
Brooklyn Center, MN

	Location	EFF	EFF	EFF	EFF
	Date	3/21/2017	6/29/2017	9/12/2017	10/20/2017
Parameter	Units				
General Parameters					
Chemical Oxygen Demand	mg/l	**13.5**	**30.8**	**11.6**	**14.0**
Oil and Grease	mg/l	< 5.0	< 5.0	< 4.0	**5.0**
pH	pH units	**6.91**	**7.20**	**7.07**	**7.27 h**
Solids, total suspended	mg/l	< 5.0	< 5.0	< 5.0	< 5.0
SVOCs					
2-Methylnaphthalene	ug/l	< 10	< 9.9	< 10	< 9.9
Acenaphthene	ug/l	**30**	**51**	**29**	**40**
Acenaphthylene	ug/l	< 10	< 9.9	< 10	< 9.9
Anthracene	ug/l	< 10	< 9.9	< 10	< 9.9
Benz(a)anthracene	ug/l	< 10	< 9.9	< 10	< 9.9
Benzo(a)pyrene	ug/l	< 10	< 9.9	< 10	< 9.9
Benzo(b)fluoranthene	ug/l	< 10	< 9.9	< 10	< 9.9
Benzo(g,h,i)perylene	ug/l	< 10	< 9.9	< 10	< 9.9
Benzo(k)fluoranthene	ug/l	< 10	< 9.9	< 10	< 9.9
Chrysene	ug/l	< 10	< 9.9	< 10	< 9.9
Dibenz(a,h)anthracene	ug/l	< 10	< 9.9	< 10	< 9.9
Fluoranthene	ug/l	< 10	< 9.9	< 10	< 9.9
Fluorene	ug/l	< 10	**20**	< 10	**12**
Indeno(1,2,3-cd)pyrene	ug/l	< 10	< 9.9	< 10	< 9.9
Naphthalene	ug/l	< 10	**53**	< 10	< 9.9
Pentachlorophenol	ug/l	**250**	**210**	**330**	**240**
Phenanthrene	ug/l	< 10	**9.9**	< 10	< 9.9
Pyrene	ug/l	< 10	< 9.9	< 10	< 9.9

See Table 3-18 for data qualifiers and footnotes.

Table 3-6
2017 Water Quality Data
Iron Bacteria Residue Discharge to Sanitary Sewer
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

	Location	U2A	U2A	U2A	U2A	U2A	U11	U11	U11	U11	U11	U12	U12	U12	U12	U12
	Date	1/18/2017	3/28/2017	5/17/2017	8/25/2017	10/31/2017	1/18/2017	3/28/2017	5/17/2017	8/25/2017	10/31/2017	1/18/2017	3/28/2017	5/17/2017	8/25/2017	10/31/2017
Parameter	Units															
General Parameters																
Chemical Oxygen Demand	mg/l	**50**	**870**	**920**	**2040**	**362**	**3570**	**9700**	**8900**	**1740**	**16700**	**63**	**710**	**7190**	**1550**	**505**
pH	pH units	**7.72**	**6.87**	**7.12**	**7.48**	**6.89**	**7.66**	**6.88**	**6.80**	**7.40**	**6.63**	**7.38**	**6.98**	**6.95**	**7.41**	**6.94**
Solids, total suspended	mg/l	**10400**	**84700**	**38700**	**89700**	**60600**	**37900**	**140000**	**25800**	**44000**	**74900**	**193000**	**3600**	**98300**	**32800**	**117000**

See Table 3-18 for data qualifiers and footnotes.

Table 3-7
2017 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
27-Dec-16	6.50	3	11	14	1,990
02-Feb-17	6.50	3	11	14	1,990
21-Mar-17	6.50	3	11	14	1,990
21-Apr-17	6.50	3	11	14	1,990
26-May-17	6.50	3	11	14	1,990
28-Jun-17	NA	NA	NA	NA	NA
31-Jul-17	NA	NA	NA	NA	NA
31-Aug-17	NA	NA	NA	NA	NA
04-Oct-17	10.57	0	9	10	1,994
03-Nov-17	10.57	0	9	10	1,994
04-Dec-17	10.55	0	12	12	1,992
05-Jan-18	10.55	0	12	12	1,992

Notes:
Original DNAPL tank pumped out, cleaned and removed in June 2017.
New DNAPL tank installed and in operation in August 2017.
NA indicates not assessed.

Table 3-8
2017 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
27-Dec-16	850.98	4.22	2.72	785.32
02-Feb-17	850.59	4.01	2.51	785.11
21-Mar-17	850.41	4.14	2.64	785.24
21-Apr-17	850.76	4.16	2.66	785.26
26-May-17	851.68	4.14	2.64	785.24
28-Jun-17	851.29	4.17	2.67	785.27
31-Jul-17	850.74	4.19	2.69	785.29
31-Aug-17	851.14	4.17	2.67	785.27
04-Oct-17	851.00	3.94	2.44	785.04
03-Nov-17	850.83	4.41	2.91	785.51
04-Dec-17	850.59	4.44	2.94	785.54
05-Jan-18	850.23	4.46	2.96	785.56

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)

Table 3-9

2017 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)

2017 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 • Air/water interface • Oil/water interface • Bottom of well/sediment	 Monthly Monthly Monthly	None	Annual calculation
DNAPL Tank	Storage Tank • Air/water interface • Oil/water interface	 Monthly Monthly	None	 Monthly (calc.) Monthly (calc.)

Notes:

Sampling was conducted according to the recommended 2017 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
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
2017 Water Elevations
Upper Aquifer Wells & Twin Lake
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN
(elevations in ft, MSL)

Location	3/21/2017	6/27/2017	9/12/2017	10/11/2017
U1	848.89	849.44	849.27	849.44
U1A	--	--	--	849.43
U2A	--	--	--	838.27
U4N	--	--	--	844.45
U5	--	--	--	832.66
U6N	--	--	--	838.76
U7N	--	--	--	846.55
U8	--	--	--	850.30
U11	--	--	--	845.72
U12	--	--	--	841.67
W2N	--	--	--	850.64
W6N	850.31	850.35	850.49	849.82
W7	850.82	850.95	850.98	850.91
W10	--	--	--	842.89
W101	851.43	851.58	851.54	851.70
W104	852.06	851.64	851.36	852.23
W125N	--	--	--	848.75
W126	--	--	--	848.71
W127N	--	--	--	850.65
W129	851.96	851.80	851.98	851.36
W130	850.54	850.42	850.06	849.91
W132	850.11	850.11	849.92	850.42
W201	--	--	--	851.70
S-1A	848.70	849.12	849.11	849.13
S-2	--	--	--	849.16
S-3	--	--	--	843.53
TWINLK	851.98	851.91	851.73	851.58

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

Table 3-12
2017 Water Elevations
Lower Aquifer and Middle Sand Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN
(elevations in ft, MSL)

Location	2/2/2017	3/2/2017	3/21/2017	4/21/2017	5/26/2017	6/28/2017	7/31/2017	8/31/2017	10/4/2017	10/11/2017	11/3/2017	12/4/2017	1/5/2018
W251	850.59	850.41	850.41	850.76	851.68	851.29	850.74	851.14	851.00	850.67	850.83	850.59	850.23
W252N	--	--	--	--	--	--	--	--	--	851.33	--	--	--
W253 OFF	849.28	--	--	849.45	850.26	850.15	849.18	849.73	--	849.28	849.35	849.18	849.03
W253 ON	--	805.18	805.18	--	--	--	--	--	805.18	--	--	--	--
W254	--	--	--	--	--	--	--	--	--	849.56	--	--	--
W255	--	--	848.78	--	--	--	--	--	849.05	--	--	--	--
W255 OFF	--	848.78	--	--	--	--	--	--	--	--	--	--	--
W255 ON	821.81	--	--	806.49	806.49	806.49	806.49	806.49	--	806.49	806.49	806.49	806.49
W300SPN	848.49	848.41	848.41	848.61	849.41	848.73	848.21	848.80	848.68	848.71	848.58	848.40	848.16
W301	--	--	--	--	--	--	--	--	--	851.63	--	--	--
W328	849.44	849.52	849.52	849.77	850.54	849.90	849.40	850.02	849.82	849.95	849.78	849.45	849.25
S-3	--	--	--	--	--	--	--	--	--	843.53	--	--	--

-- 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	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

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*Co-elutes with benz(b)fluoranthene

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

Table 3-14
2017 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		3/21/2017	6/28/2017	9/12/2017	10/13/2017	10/20/2017	10/20/2017	10/13/2017		10/20/2017	10/20/2017	12/04/2017	10/20/2017	10/20/2017
Sample Type		N	N	N	N	N	N	N	FD	N	N	N	N	N
Parameter	Units													
Carcinogenic PAHs														
Benz(a)anthracene	ug/l	< 0.0034	< 0.0034	**0.0044**	< 0.0034	< 0.033	**0.025**	< 0.0034	< 0.0034	< 0.017	< 0.017	< 0.33	**9.2**	**0.13**
Benzo(b)fluoranthene	ug/l	< 0.0034 c	< 0.0034 c	**0.0050 c**	< 0.0034 c	< 0.033	< 0.017	< 0.0034 c	< 0.0034 c	< 0.017	< 0.017	< 0.33 c	**10**	**0.047**
Benzo(k)fluoranthene	ug/l	< 0.0034	< 0.0034	**0.0049**	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017	< 0.33	**2.7**	**0.018**
Benzo(a)pyrene	ug/l	< 0.0034	< 0.0034	**0.0058 b**	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017	< 0.33	**6.5**	**0.029**
Chrysene	ug/l	< 0.0034	< 0.0034	**0.0037**	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017	< 0.33	**5.3**	**0.043**
Dibenz(a,h)anthracene	ug/l	< 0.0034	< 0.0034	**0.0062 b**	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	**0.056**	< 0.33	**0.89**	< 0.017
Indeno(1,2,3-cd)pyrene	ug/l	< 0.0034	< 0.0034	**0.0073 b**	**0.0040**	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017	< 0.33	**3.0**	**0.024**
Non-Carcinogenic PAHs														
2-Methylnaphthalene	ug/l	< 0.0034	< 0.0034	< 0.0033	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	**0.56**	< 0.33	**0.33**	**1.5**
Acenaphthene	ug/l	< 0.0034	< 0.0034	< 0.0033	**0.0055**	**15**	**65**	**0.20**	**0.21**	**2.2**	**37**	**110**	**35**	**86**
Acenaphthylene	ug/l	< 0.0034	< 0.0034	< 0.0033	**0.0037**	**0.96**	**0.74**	**0.0085**	**0.0081**	**0.031**	**0.38**	**3.8**	**0.52**	**0.55**
Anthracene	ug/l	**0.016**	< 0.0034	**0.015**	**0.017**	**0.46**	**0.66**	**0.034**	**0.036**	**0.098**	**0.54**	**0.98**	**3.1**	**1.1**
Benzo(g,h,i)perylene	ug/l	< 0.0034	< 0.0034	**0.0081 b**	**0.0047**	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017	< 0.33	**2.8**	**0.019**
Fluoranthene	ug/l	< 0.0034	< 0.0034	**0.0054**	< 0.0034	**3.3**	**4.5**	**0.0070**	**0.0076**	**0.20**	**0.98**	**19**	**28**	**9.7**
Fluorene	ug/l	**0.0064**	**0.0074 ***	**0.010 ***	**0.0076**	**0.34**	**26**	**0.0062**	**0.0065**	**0.17**	**9.1**	**8.4**	**16**	**22**
Naphthalene	ug/l	**0.0050**	**0.0042**	**0.0054 ***	**0.0050**	**2.4**	**1.0**	**0.011**	**0.014**	**0.084**	**0.37**	**2.1**	**0.70**	**22**
Phenanthrene	ug/l	< 0.0034	**0.018**	< 0.0033	< 0.0034	**0.081**	**0.46**	< 0.0034	< 0.0034	**0.034**	**3.7**	< 0.33	**18**	**14**
Pyrene	ug/l	**0.0080**	**0.011**	**0.012**	**0.0093**	**1.2**	**2.4**	**0.016**	**0.016**	**0.10**	**0.42**	**10**	**21**	**5.3**
Pentachlorophenol	ug/l	< 0.30	< 0.30	< 0.29	< 0.30	**570**	**5.5**	< 0.30	< 0.30	**120**	**120**	**210**	**940**	**52**

See Table 3-18 for data qualifiers and footnotes.

Table 3-14
2017 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		6/28/2017	10/12/2017	6/28/2017	10/18/2017	10/12/2017	12/04/2017	10/11/2017	10/12/2017		10/11/2017	10/11/2017	10/11/2017
Sample Type		N	N	N	N	N	N	N	N	FD	N	N	N
Parameter	Units												
Carcinogenic PAHs													
Benz(a)anthracene	ug/l	< 0.0034	< 0.0033	< 0.34	< 0.065	< 0.34	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Benzo(b)fluoranthene	ug/l	< 0.0034 c	< 0.0033 c	**0.0093 c***	< 0.065 c	< 0.34 c	< 0.017 c	< 0.0034 c	< 0.0034 c	< 0.0034 c	< 0.0034 c	< 0.0034 c	< 0.0034 c
Benzo(k)fluoranthene	ug/l	< 0.0034	< 0.0033	< 0.0034	< 0.065	< 0.34	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Benzo(a)pyrene	ug/l	< 0.0034	< 0.0033	< 0.0034	< 0.065	< 0.34	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Chrysene	ug/l	< 0.0034	< 0.0033	< 0.34	< 0.065	< 0.34	**0.029**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Dibenz(a,h)anthracene	ug/l	< 0.0034	< 0.0033	< 0.0034	< 0.065	< 0.34	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Indeno(1,2,3-cd)pyrene	ug/l	< 0.0034	< 0.0033	**0.0035**	< 0.065	< 0.34	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Non-Carcinogenic PAHs													
2-Methylnaphthalene	ug/l	< 0.0034	< 0.0033	**0.028 ***	< 0.065	< 0.34	**0.013**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Acenaphthene	ug/l	< 0.0034	< 0.0033	< 0.34	< 0.065	**42**	**0.011**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0052**	< 0.0034
Acenaphthylene	ug/l	**0.0046**	**0.0043**	< 0.34	< 0.065	**0.89**	**0.028**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Anthracene	ug/l	**0.10**	**0.078**	**0.34**	**0.24**	**0.70**	**2.7**	**0.0038**	**0.015**	**0.015**	**0.043**	**0.016**	**0.016**
Benzo(g,h,i)perylene	ug/l	< 0.0034	< 0.0033	< 0.0034	< 0.065	< 0.34	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Fluoranthene	ug/l	< 0.0034	< 0.0033	< 0.34	< 0.065	< 0.34	**0.013**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Fluorene	ug/l	**0.022**	**0.020**	**3.0**	**1.5**	**19**	**0.024**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0090**	**0.011**
Naphthalene	ug/l	**0.019 ***	**0.039 ***	**0.28 ***	**0.47**	**8.8**	**0.047**	**0.0060 b**	**0.0067 b**	**0.0084 b**	**0.0088 b**	**0.0080 b**	**0.0075 b**
Phenanthrene	ug/l	< 0.0034	< 0.0033	**1.8**	**0.78**	**3.9**	**0.012**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Pyrene	ug/l	< 0.0034	< 0.0033	< 0.34	< 0.065	< 0.34	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0035**	< 0.0034
Pentachlorophenol	ug/l	**17**	**11**	**2400**	**450**	**100**	**0.39**	< 0.30	< 0.30	< 0.30	**0.33**	< 0.30	< 0.30

See Table 3-18 for data qualifiers and footnotes.

Table 3-15
2017 Water Quality Data
Organic Compounds
Middle Sand Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

Location		W252N	W253	W254	W255
Date		10/18/2017	10/20/2017	10/18/2017	10/20/2017
Parameter	Units				
SVOCs					
2-Methylnaphthalene	ug/l	< 0.0033	< 0.017	< 0.0034	**93**
Acenaphthene	ug/l	< 0.0033	**8.2**	< 0.0034	**220**
Acenaphthylene	ug/l	< 0.0033	**0.058 ***	< 0.0034	**4.2**
Anthracene	ug/l	**0.0044**	**0.032**	**0.0042**	**8.5**
Benz(a)anthracene	ug/l	< 0.0033	< 0.017	< 0.0034	**17**
Benzo(a)pyrene	ug/l	< 0.0033	< 0.017	< 0.0034	**8.2**
Benzo(b)fluoranthene	ug/l	< 0.0033 c	< 0.017	< 0.0034 c	**13**
Benzo(g,h,i)perylene	ug/l	< 0.0033	< 0.017	< 0.0034	**2.8**
Benzo(k)fluoranthene	ug/l	< 0.0033	< 0.017	< 0.0034	**2.8**
Chrysene	ug/l	< 0.0033	< 0.017	< 0.0034	**7.7**
Dibenz(a,h)anthracene	ug/l	< 0.0033	< 0.017	< 0.0034	**0.92**
Fluoranthene	ug/l	**0.0043**	< 0.017	< 0.0034	**70**
Fluorene	ug/l	**0.0056**	**0.43**	< 0.0034	**110**
Indeno(1,2,3-cd)pyrene	ug/l	< 0.0033	< 0.017	< 0.0034	**3.5**
Naphthalene	ug/l	**0.065**	**0.077**	< 0.0034	**2900**
Pentachlorophenol	ug/l	< 0.29	< 1.5	< 0.30	**8.9**
Phenanthrene	ug/l	**0.0082**	**0.040**	< 0.0034	**150**
Pyrene	ug/l	**0.0047**	< 0.017	< 0.0034	**48**

See Table 3-18 for data qualifiers and footnotes.

Table 3-16
2017 Water Quality Data
Organic Compounds
Lower Aquifer Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

Location		W300SPN	W301	W328	S-3
Date		10/13/2017	12/04/2017	12/04/2017	10/11/2017
Parameter	Units				
SVOCs					
2-Methylnaphthalene	ug/l	< 0.0034	**0.012**	**0.011**	< 0.0033
Acenaphthene	ug/l	< 0.0034	**0.0034**	< 0.0033	< 0.0033
Acenaphthylene	ug/l	< 0.0034	< 0.0033	< 0.0033	< 0.0033
Anthracene	ug/l	< 0.0034	**0.0058**	**0.0071**	**0.013**
Benz(a)anthracene	ug/l	**0.0042**	**0.0095**	< 0.0033	< 0.0033
Benzo(a)pyrene	ug/l	**0.0081**	< 0.0033	< 0.0033	< 0.0033
Benzo(b)fluoranthene	ug/l	**0.0070 c**	**0.014 c**	< 0.0033 c	< 0.0033 c
Benzo(g,h,i)perylene	ug/l	**0.015**	**0.0052**	< 0.0033	< 0.0033
Benzo(k)fluoranthene	ug/l	**0.0073**	< 0.0033	< 0.0033	< 0.0033
Chrysene	ug/l	**0.0038**	**0.013**	< 0.0033	**0.0034**
Dibenz(a,h)anthracene	ug/l	**0.0087**	< 0.0033	< 0.0033	< 0.0033
Fluoranthene	ug/l	**0.0040**	**0.022**	**0.0044**	**0.0041**
Fluorene	ug/l	< 0.0034	< 0.0033	< 0.0033	< 0.0033
Indeno(1,2,3-cd)pyrene	ug/l	**0.011**	< 0.0033	< 0.0033	< 0.0033
Naphthalene	ug/l	< 0.0034	**0.024**	**0.012**	**0.022 b**
Pentachlorophenol	ug/l	< 0.30	< 0.29	< 0.29	< 0.29
Phenanthrene	ug/l	< 0.0034	**0.017**	**0.0079**	**0.0053**
Pyrene	ug/l	< 0.0034	**0.019**	**0.0047**	**0.0089**

See Table 3-18 for data qualifiers and footnotes.

Table 3-17
2017 Water Quality Data
Field Data - All Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

	Parameter	Dissolved oxygen	pH	Redox (oxidation potential)	Specific conductance @ 25 °C	Temperature	Turbidity
	Units	mg/l	pH units	mV	umhos/cm	deg C	NTU
Location	Date						
U1	3/21/2017	1.39	7.21	-141.1	1220	12.95	--
U1	6/28/2017	0.21	7.99	-33.9	1071	12.39	11.7
U1	10/13/2017	0.90	7.13	-159.1	1057	13.30	2.18
U11	10/20/2017	2.87	7.00	-59.1	900	9.19	3.07
U12	10/20/2017	2.47	7.21	-61.3	800	9.13	1.11
U1A	10/13/2017	0.64	7.22	-160.4	1087	13.01	7.77
U2A	10/20/2017	2.07	6.97	-57.3	857	9.10	1.37
U4N	10/20/2017	1.80	6.77	-39.4	817	9.00	0.97
U5	12/04/2017	1.32	7.51	-87.3	847	9.07	3.11
U6N	10/20/2017	2.51	6.81	-66.3	651	9.30	2.11
U7N	10/20/2017	2.13	7.07	-47.1	847	9.07	4.01
S-1A	10/11/2017	0.80	7.45	-174.9	1110	13.00	1.55
S-2	10/11/2017	0.75	8.01	-125.4	1045	12.94	2.00
S-3	10/11/2017	0.78	8.47	-195.1	714	11.30	200
W10	10/12/2017	1.00	7.00	-282.1	911	11.15	141
W104	12/04/2017	2.46	7.97	-101.4	763	11.00	49.7
W127N	10/11/2017	2.71	7.43	-6.7	808	14.75	0.61
W130	10/12/2017	2.21	7.04	-112.3	1286	13.37	0.86
W132	10/11/2017	3.41	7.17	3.4	1311	15.74	0.87
W252N	10/18/2017	0.41	7.90	-217.1	520	15.68	4.09
W253	10/20/2017	1.83	7.17	-49.3	601	9.21	4.47
W254	10/18/2017	0.35	7.40	-192.3	701	11.43	5.00
W255	10/20/2017	1.47	7.09	-51.4	747	9.37	1.51
W300SPN	10/13/2017	0.67	7.47	-187.3	690	10.74	11.9
W301	12/04/2017	4.07	7.67	-67.3	831	9.00	16.7
W328	12/04/2017	0.94	8.03	-174.3	664	12.01	7.11
W6N	6/28/2017	1.90	7.55	34.7	887	10.30	1.51
W6N	10/12/2017	2.19	6.98	-7.8	815	12.54	0.83
W7	6/28/2017	0.30	8.00	-117.4	989	10.02	27.7
W7	10/18/2017	1.17	6.37	-154.2	1127	11.69	3.19

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. Concentrations identified as potential false positive are excluded from calculations.
c	Coeluting compound.
h	EPA recommended sample preservation, extraction or analysis holding time was exceeded.

Table 4-1
2017 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
		Date	3/21/2017	6/28/2017	9/12/2017	10/13/2017	10/20/2017	10/20/2017	10/13/2017		10/20/2017	10/20/2017
		Sample Type	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	< 0.0034	< 0.0034	0.0044	< 0.0034	< 0.033	0.025	< 0.0034	< 0.0034	< 0.017	< 0.017
Benzo(b)fluoranthene	ug/l	NA	< 0.0034 c	< 0.0034 c	0.0050 c	< 0.0034 c	< 0.033	< 0.017	< 0.0034 c	< 0.0034 c	< 0.017	< 0.017
Benzo(k)fluoranthene	ug/l	NA	< 0.0034	< 0.0034	0.0049	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017
Benzo(a)pyrene	ug/l	**0.06**[2]	< 0.0034	< 0.0034	0.0058 b	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017
Chrysene	ug/l	NA	< 0.0034	< 0.0034	0.0037	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017
Dibenz(a,h)anthracene	ug/l	NA	< 0.0034	< 0.0034	0.0062 b	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	0.056
Indeno(1,2,3-cd)pyrene	ug/l	NA	< 0.0034	< 0.0034	0.0073 b	0.0040	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017
Pentachlorophenol	ug/l	**0.3**[1]	< 0.30	< 0.30	< 0.29	< 0.30	**570**	**5.5**	< 0.30	< 0.30	**120**	**120**
BaP Equivalent[3]		**0.06**[2]	ND a	ND a	0.0037 a	0.00040 a	ND	0.0025	ND a	ND a	ND	0.0056
Cancer Hazard Index[4]		**1**	ND a	ND a	0.062 a	0.0067 a	**1900**	**18**	ND a	ND a	**400**	**400**
Non-Carcinogenic PAHs												
2-Methylnaphthalene	ug/l		< 0.0034	< 0.0034	< 0.0033	< 0.0034	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	0.56
Acenaphthene	ug/l	400[1]	< 0.0034	< 0.0034	< 0.0033	0.0055	15	65	0.20	0.21	2.2	37
Acenaphthylene	ug/l		< 0.0034	< 0.0034	< 0.0033	0.0037	0.96	0.74	0.0085	0.0081	0.031	0.38
Anthracene	ug/l	2000[1]	0.016	< 0.0034	0.015	0.017	0.46	0.66	0.034	0.036	0.098	0.54
Benzo(g,h,i)perylene	ug/l		< 0.0034	< 0.0034	0.0081 b	0.0047	< 0.033	< 0.017	< 0.0034	< 0.0034	< 0.017	< 0.017
Fluoranthene	ug/l	300[1]	< 0.0034	< 0.0034	0.0054	< 0.0034	3.3	4.5	0.0070	0.0076	0.20	0.98
Fluorene	ug/l	300[1]	0.0064	0.0074 *	0.010 *	0.0076	0.34	26	0.0062	0.0065	0.17	9.1
Naphthalene	ug/l	70[1]	0.0050	0.0042	0.0054 *	0.0050	2.4	1.0	0.011	0.014	0.084	0.37
Phenanthrene	ug/l		< 0.0034	0.018	< 0.0033	< 0.0034	0.081	0.46	< 0.0034	< 0.0034	0.034	3.7
Pyrene	ug/l	200[1]	0.0080	0.011	0.012	0.0093	1.2	2.4	0.016	0.016	0.10	0.42
Non-Cancer Hazard Index None[5]	ug/l	1	0.0000080	0	0.0000075	0.0000085	0.00023	0.00033	0.000017	0.000018	0.000049	0.00027
Non-Cancer Hazard Index Liver System[5]	ug/l	**1**	0	0	0.000018	0.000014	**81**	0.96	0.00052	0.00055	**17**	**17**
Non-Cancer Hazard Index Kidney System[5]	ug/l	1	0.000040	0.000055	0.000078	0.000047	0.017	0.027	0.00010	0.00011	0.0012	0.0054
Non-Cancer Hazard Index Blood System[5]	ug/l	1	0.000021	0.000025	0.000033	0.000025	0.0011	0.087	0.000021	0.000022	0.00057	0.030
Non-Cancer Hazard Index Nervous System[5]	ug/l	1	0.000071	0.000060	0.000077	0.000071	0.034	0.014	0.00016	0.00020	0.0012	0.005
Non-Cancer Hazard Index Spleen System[5]	ug/l	1	0.000071	0.000060	0.000077	0.000071	0.034	0.014	0.00016	0.00020	0.0012	0.005
Non-Cancer Hazard Index Developmental E[5]	ug/l	**1**	0	0	0	0	**81**	0.79	0	0	**17**	**17**
Non-Cancer Hazard Index Immune System[5]	ug/l	**1**	0	0	0	0	**81**	0.79	0	0	**17**	**17**
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l	**1**	0	0	0	0	**81**	0.79	0	0	**17**	**17**
Non-Cancer Hazard Index Thyroid E[5]	ug/l	**1**	0	0	0	0	**81**	0.79	0	0	**17**	**17**

See Table 3-18 for data qualifiers and footnotes.

Table 4-1
2017 Water Quality Data
Comparison to ARARs and TBCs
Upper Aquifer Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

		Location	U5	U6N	U7N	W6N	W6N	W7	W7	W10
		Date	12/04/2017	10/20/2017	10/20/2017	6/28/2017	10/12/2017	6/28/2017	10/18/2017	10/12/2017
		Sample Type	N	N	N	N	N	N	N	N
Parameter	Units	Response Action Objective								
Exceedance Key		**Bold**								
Carcinogenic PAHs										
Benz(a)anthracene	ug/l	NA	< 0.33	9.2	0.13	< 0.0034	< 0.0033	< 0.34	< 0.065	< 0.34
Benzo(b)fluoranthene	ug/l	NA	< 0.33 c	10	0.047	< 0.0034 c	< 0.0033 c	0.0093 c*	< 0.065 c	< 0.34 c
Benzo(k)fluoranthene	ug/l	NA	< 0.33	2.7	0.018	< 0.0034	< 0.0033	< 0.0034	< 0.065	< 0.34
Benzo(a)pyrene	ug/l	**0.06**[2]	< 0.33	**6.5**	0.029	< 0.0034	< 0.0033	< 0.0034	< 0.065	< 0.34
Chrysene	ug/l	NA	< 0.33	5.3	0.043	< 0.0034	< 0.0033	< 0.34	< 0.065	< 0.34
Dibenz(a,h)anthracene	ug/l	NA	< 0.33	0.89	< 0.017	< 0.0034	< 0.0033	< 0.0034	< 0.065	< 0.34
Indeno(1,2,3-cd)pyrene	ug/l	NA	< 0.33	3.0	0.024	< 0.0034	< 0.0033	0.0035	< 0.065	< 0.34
Pentachlorophenol	ug/l	**0.3**[1]	**210**	**940**	**52**	**17**	**11**	**2400**	**450**	**100**
BaP Equivalent[3]		**0.06**[2]	ND a	**3.8**	0.029	ND a	ND a	0.0013 a	ND a	ND a
Cancer Hazard Index[4]		**1**	**700 a**	**3200**	**170**	**57 a**	**37 a**	**8000**	**1500 a**	**330 a**
Non-Carcinogenic PAHs										
2-Methylnaphthalene	ug/l		< 0.33	0.33	1.5	< 0.0034	< 0.0033	0.028 *	< 0.065	< 0.34
Acenaphthene	ug/l	400[1]	110	35	86	< 0.0034	< 0.0033	< 0.34	< 0.065	42
Acenaphthylene	ug/l		3.8	0.52	0.55	0.0046	0.0043	< 0.34	< 0.065	0.89
Anthracene	ug/l	2000[1]	0.98	3.1	1.1	0.10	0.078	0.34	0.24	0.70
Benzo(g,h,i)perylene	ug/l		< 0.33	2.8	0.019	< 0.0034	< 0.0033	< 0.0034	< 0.065	< 0.34
Fluoranthene	ug/l	300[1]	19	28	9.7	< 0.0034	< 0.0033	< 0.34	< 0.065	< 0.34
Fluorene	ug/l	300[1]	8.4	16	22	0.022	0.020	3.0	1.5	19
Naphthalene	ug/l	70[1]	2.1	0.70	22	0.019 *	0.039 *	0.28 *	0.47	8.8
Phenanthrene	ug/l		< 0.33	18	14	< 0.0034	< 0.0033	1.8	0.78	3.9
Pyrene	ug/l	200[1]	10	21	5.3	< 0.0034	< 0.0033	< 0.34	< 0.065	< 0.34
Non-Cancer Hazard Index None[5]	ug/l	1	0.00049	0.0016	0.00055	0.000050	0.000039	0.00017	0.00012	0.00035
Non-Cancer Hazard Index Liver System[5]	ug/l	**1**	**30**	**134**	**7.68**	**2.4**	**1.6**	**343**	**64**	**14**
Non-Cancer Hazard Index Kidney System[5]	ug/l	1	0.11	0.20	0.059	0	0	0	0	0
Non-Cancer Hazard Index Blood System[5]	ug/l	1	0.028	0.053	0.073	0.000073	0.000067	0.010	0.0050	0.063
Non-Cancer Hazard Index Nervous System[5]	ug/l	1	0.030	0.010	0.31	0.00027	0.00056	0.0040	0.0067	0.13
Non-Cancer Hazard Index Spleen System[5]	ug/l	1	0.030	0.010	0.31	0.00027	0.00056	0.0040	0.0067	0.13
Non-Cancer Hazard Index Developmental E[5]	ug/l	**1**	**30**	**134**	**7.4**	**2.4**	**1.6**	**343**	**64**	**14**
Non-Cancer Hazard Index Immune System[5]	ug/l	**1**	**30**	**134**	**7.4**	**2.4**	**1.6**	**343**	**64**	**14**
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l	**1**	**30**	**134**	**7.4**	**2.4**	**1.6**	**343**	**64**	**14**
Non-Cancer Hazard Index Thyroid E[5]	ug/l	**1**	**30**	**134**	**7.4**	**2.4**	**1.6**	**343**	**64**	**14**

See Table 3-18 for data qualifiers and footnotes.

Table 4-1
2017 Water Quality Data
Comparison to ARARs and TBCs
Upper Aquifer Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

		Location	W104	W127N	W130		W132	S-1A	S-2
		Date	12/04/2017	10/11/2017	10/12/2017		10/11/2017	10/11/2017	10/11/2017
		Sample Type	N	N	N	FD	N	N	N
Parameter	Units	Response Action Objective							
Exceedance Key		**Bold**							
Carcinogenic PAHs									
Benz(a)anthracene	ug/l	NA	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Benzo(b)fluoranthene	ug/l	NA	< 0.017 c	< 0.0034 c	< 0.0034 c	< 0.0034 c	< 0.0034 c	< 0.0034 c	< 0.0034 c
Benzo(k)fluoranthene	ug/l	NA	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Benzo(a)pyrene	ug/l	**0.06**[2]	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Chrysene	ug/l	NA	0.029	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Dibenz(a,h)anthracene	ug/l	NA	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Indeno(1,2,3-cd)pyrene	ug/l	NA	< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Pentachlorophenol	ug/l	**0.3**[1]	**0.39**	< 0.30	< 0.30	< 0.30	**0.33**	< 0.30	< 0.30
BaP Equivalent[3]		**0.06**[2]	0.0029 a	ND a	ND a	ND a	ND a	ND a	ND a
Cancer Hazard Index[4]		**1**	**1.3 a**	ND a	ND a	ND a	**1.1 a**	ND a	ND a
Non-Carcinogenic PAHs									
2-Methylnaphthalene	ug/l		0.013	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Acenaphthene	ug/l	400[1]	0.011	< 0.0034	< 0.0034	< 0.0034	< 0.0034	0.0052	< 0.0034
Acenaphthylene	ug/l		0.028	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Anthracene	ug/l	2000[1]	2.7	0.0038	0.015	0.015	0.043	0.016	0.016
Benzo(g,h,i)perylene	ug/l		< 0.017	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Fluoranthene	ug/l	300[1]	0.013	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Fluorene	ug/l	300[1]	0.024	< 0.0034	< 0.0034	< 0.0034	< 0.0034	0.0090	0.011
Naphthalene	ug/l	70[1]	0.047	0.0060 b	0.0067 b	0.0084 b	0.0088 b	0.0080 b	0.0075 b
Phenanthrene	ug/l		0.012	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Pyrene	ug/l	200[1]	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	0.0035	< 0.0034
Non-Cancer Hazard Index None[5]	ug/l	1	0.0014	0.0000019	0.0000075	0.0000075	0.000022	0.0000080	0.0000080
Non-Cancer Hazard Index Liver System[5]	ug/l	**1**	0.056	0	0	0	0.047	0.000013	0
Non-Cancer Hazard Index Kidney System[5]	ug/l	1	0.000043	0	0	0	0	0.0000175	0
Non-Cancer Hazard Index Blood System[5]	ug/l	1	0.000080	0	0	0	0	0.0000300	0.000037
Non-Cancer Hazard Index Nervous System[5]	ug/l	1	0.00067	0.000086	0.000096	0.00012	0.00013	0.00011	0.00011
Non-Cancer Hazard Index Spleen System[5]	ug/l	1	0.00067	0.000086	0.000096	0.00012	0.00013	0.00011	0.00011
Non-Cancer Hazard Index Developmental E[5]	ug/l	**1**	0.056	0	0	0	0.047	0	0
Non-Cancer Hazard Index Immune System[5]	ug/l	**1**	0.056	0	0	0	0.047	0	0
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l	**1**	0.056	0	0	0	0.047	0	0
Non-Cancer Hazard Index Thyroid E[5]	ug/l	**1**	0.056	0	0	0	0.047	0	0

See Table 3-18 for data qualifiers and footnotes.

Table 4-2
2017 Water Quality Data
Comparison to ARARs and TBCs
Middle Sand Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

		Location	W252N	W253	W254	W255
		Date	10/18/2017	10/20/2017	10/18/2017	10/20/2017
Parameter	Units	Response Action Objective				
Exceedance Key		**Bold**				
Carcinogenic PAHs						
Benz(a)anthracene	ug/l	NA	< 0.0033	< 0.017	< 0.0034	17
Benzo(b)fluoranthene	ug/l	NA	< 0.0033 c	< 0.017	< 0.0034 c	13
Benzo(k)fluoranthene	ug/l	NA	< 0.0033	< 0.017	< 0.0034	2.8
Benzo(a)pyrene	ug/l	**0.06**[2]	< 0.0033	< 0.017	< 0.0034	**8.2**
Chrysene	ug/l	NA	< 0.0033	< 0.017	< 0.0034	7.7
Dibenz(a,h)anthracene	ug/l	NA	< 0.0033	< 0.017	< 0.0034	0.92
Indeno(1,2,3-cd)pyrene	ug/l	NA	< 0.0033	< 0.017	< 0.0034	3.5
Pentachlorophenol	ug/l	**0.3**[1]	< 0.29	< 1.5	< 0.30	**8.9**
BaP Equivalent[3]	ug/l	**0.06**[2]	ND a	ND a	ND a	**5.3**
Cancer Hazard Index[4]		1	ND a	ND a	ND a	**120**
Non-Carcinogenic PAHs						
2-Methylnaphthalene	ug/l		< 0.0033	< 0.017	< 0.0034	93
Acenaphthene	ug/l	400[1]	< 0.0033	8.2	< 0.0034	220
Acenaphthylene	ug/l		< 0.0033	0.058 *	< 0.0034	4.2
Anthracene	ug/l	2000[1]	0.0044	0.032	0.0042	8.5
Benzo(g,h,i)perylene	ug/l		< 0.0033	< 0.017	< 0.0034	2.8
Fluoranthene	ug/l	300[1]	0.0043	< 0.017	< 0.0034	70
Fluorene	ug/l	300[1]	0.0056	0.43	< 0.0034	110
Naphthalene	ug/l	**70**[1]	0.065	0.077	< 0.0034	**2900**
Phenanthrene	ug/l		0.0082	0.040	< 0.0034	150
Pyrene	ug/l	200[1]	0.0047	< 0.017	< 0.0034	48
Non-Cancer Hazard Index None[5]	ug/l	1	0.0000022	0.000016	0.0000021	0.0043
Non-Cancer Hazard Index Liver System[5]	ug/l	**1**	0.000014	0.021	0	**2.1**
Non-Cancer Hazard Index Kidney System[5]	ug/l	1	0.000038	0	0	0.47
Non-Cancer Hazard Index Blood System[5]	ug/l	1	0.000019	0.0014	0	0.37
Non-Cancer Hazard Index Nervous System[5]	ug/l	**1**	0.00093	0.0011	0	**41**
Non-Cancer Hazard Index Spleen System[5]	ug/l	**1**	0.00093	0.0011	0	**41**
Non-Cancer Hazard Index Developmental E[5]	ug/l	**1**	0	0	0	**1.3**
Non-Cancer Hazard Index Immune System[5]	ug/l	**1**	0	0	0	**1.3**
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l	**1**	0	0	0	**1.3**
Non-Cancer Hazard Index Thyroid E[5]	ug/l	**1**	0	0	0	**1.3**

See Table 3-18 for data qualifiers and footnotes.

Table 4-3
2017 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	10/13/2017	12/04/2017	12/04/2017	10/11/2017
Parameter	Units	Response Action Objective				
Exceedance Key		**Bold**				
Carcinogenic PAHs						
Benz(a)anthracene	ug/l	NA	0.0042	0.0095	< 0.0033	< 0.0033
Benzo(b)fluoranthene	ug/l	NA	0.0070 c	0.014 c	< 0.0033 c	< 0.0033 c
Benzo(k)fluoranthene	ug/l	NA	0.0073	< 0.0033	< 0.0033	< 0.0033
Benzo(a)pyrene	ug/l	0.06[2]	0.0081	< 0.0033	< 0.0033	< 0.0033
Chrysene	ug/l	NA	0.0038	0.013	< 0.0033	0.0034
Dibenz(a,h)anthracene	ug/l	NA	0.0087	< 0.0033	< 0.0033	< 0.0033
Indeno(1,2,3-cd)pyrene	ug/l	NA	0.011	< 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]	0.0050 a	0.0037 a	ND a	0.00034 a
Cancer Hazard Index[4]		1	0.084 a	0.061 a	ND a	0.0057 a
Non-Carcinogenic PAHs						
2-Methylnaphthalene	ug/l		< 0.0034	0.012	0.011	< 0.0033
Acenaphthene	ug/l	400[1]	< 0.0034	0.0034	< 0.0033	< 0.0033
Acenaphthylene	ug/l		< 0.0034	< 0.0033	< 0.0033	< 0.0033
Anthracene	ug/l	2000[1]	< 0.0034	0.0058	0.0071	0.013
Benzo(g,h,i)perylene	ug/l		0.015	0.0052	< 0.0033	< 0.0033
Fluoranthene	ug/l	300[1]	0.0040	0.022	0.0044	0.0041
Fluorene	ug/l	300[1]	< 0.0034	< 0.0033	< 0.0033	< 0.0033
Naphthalene	ug/l	70[1]	< 0.0034	0.024	0.012	0.022 b
Phenanthrene	ug/l		< 0.0034	0.017	0.0079	0.0053
Pyrene	ug/l	200[1]	< 0.0034	0.019	0.0047	0.0089
Non-Cancer Hazard Index None[5]	ug/l	1	0	0.0000029	0.0000036	0.0000065
Non-Cancer Hazard Index Liver System[5]	ug/l	1	0.000013	0.000082	0.000015	0.000014
Non-Cancer Hazard Index Kidney System[5]	ug/l	1	0.000013	0.00017	0.000038	0.000058
Non-Cancer Hazard Index Blood System[5]	ug/l	1	0	0	0	0
Non-Cancer Hazard Index Nervous System[5]	ug/l	1	0	0.00034	0.00017	0.00031
Non-Cancer Hazard Index Spleen System[5]	ug/l	1	0	0.00034	0.00017	0.00031
Non-Cancer Hazard Index Developmental E[5]	ug/l	1	0	0	0	0
Non-Cancer Hazard Index Immune System[5]	ug/l	1	0	0	0	0
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l	1	0	0	0	0
Non-Cancer Hazard Index Thyroid E[5]	ug/l	1	0	0	0	0

See Table 3-18 for data qualifiers and footnotes.

Table 4-4
2017 Cancer Hazard Index Calculation
All Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

Location		S-1A	S-2	S-3	U1	U1	U1	U1	U11	U12	U1A		U2A	U4N
Date		10/11/2017	10/11/2017	10/11/2017	3/21/2017	6/28/2017	9/12/2017	10/13/2017	10/20/2017	10/20/2017	10/13/2017		10/20/2017	10/20/2017
Sample Type		N	N	N	N	N	N	N	N	N	N	FD	N	N
Parameter	Units													
Carcinogenic PAH Concentrations														
Benz(a)anthracene	ug/l	0	0	0	0	0	**0.0044**	0	0	**0.025**	0	0	0	0
Benzo(b)fluoranthene	ug/l	0	0	0	0	0	**0.0050**	0	0	0	0	0	0	0
Benzo(k)fluoranthene	ug/l	0	0	0	0	0	**0.0049**	0	0	0	0	0	0	0
Benzo(a)pyrene	ug/l	0	0	0	0	0	**0.0058**	0	0	0	0	0	0	0
Chrysene	ug/l	0	0	**0.0034**	0	0	**0.0037**	0	0	0	0	0	0	0
Dibenz(a,h)anthracene	ug/l	0	0	0	0	0	**0.0062**	0	0	0	0	0	0	**0.056**
Indeno(1,2,3-cd)pyrene	ug/l	0	0	0	0	0	**0.0073**	**0.0040**	0	0	0	0	0	0
Calculated BaP Equivalents														
Benz(a)anthracene	ug/l	0	0	0	0	0	0.00044	0	0	0.0025	0	0	0	0
Benzo(b)fluoranthene	ug/l	0	0	0	0	0	0.0005	0	0	0	0	0	0	0
Benzo(k)fluoranthene	ug/l	0	0	0	0	0	0.00049	0	0	0	0	0	0	0
Benzo(a)pyrene	ug/l	0	0	0	0	0	0.00058	0	0	0	0	0	0	0
Chrysene	ug/l	0	0	0.00034	0	0	0.00037	0	0	0	0	0	0	0
Dibenz(a,h)anthracene	ug/l	0	0	0	0	0	0.00062	0	0	0	0	0	0	0.0056
Indeno(1,2,3-cd)pyrene	ug/l	0	0	0	0	0	0.00073	0.0004	0	0	0	0	0	0
BaP Equivalent[3]	ug/l	0	0	0.00034	0	0	0.00373	0.0004	0	0.0025	0	0	0	0.0056
Pentachlorophenol	ug/l	0	0	0	0	0	0	0	**570**	**5.5**	0	0	**120**	**120**
Cancer Hazard Index[4]		0	0	0.0057	0	0	0.062	0.0067	1900	18	0	0	400	400

See Table 3-18 for data qualifiers and footnotes.

Table 4-4
2017 Cancer Hazard Index Calculation
All Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

Location		U5	U6N	U7N	W10	W104	W127N	W130		W132	W252N	W253	W254	W255
Date		12/04/2017	10/20/2017	10/20/2017	10/12/2017	12/04/2017	10/11/2017	10/12/2017		10/11/2017	10/18/2017	10/20/2017	10/18/2017	10/20/2017
Sample Type		N	N	N	N	N	N	N	FD	N	N	N	N	N
Parameter	Units													
Carcinogenic PAH Concentrations														
Benz(a)anthracene	ug/l	0	**9.2**	**0.13**	0	0	0	0	0	0	0	0	0	**17**
Benzo(b)fluoranthene	ug/l	0	**10**	**0.047**	0	0	0	0	0	0	0	0	0	**13**
Benzo(k)fluoranthene	ug/l	0	**2.7**	**0.018**	0	0	0	0	0	0	0	0	0	**2.8**
Benzo(a)pyrene	ug/l	0	**6.5**	**0.029**	0	0	0	0	0	0	0	0	0	**8.2**
Chrysene	ug/l	0	**5.3**	**0.043**	0	**0.029**	0	0	0	0	0	0	0	**7.7**
Dibenz(a,h)anthracene	ug/l	0	**0.89**	0	0	0	0	0	0	0	0	0	0	**0.92**
Indeno(1,2,3-cd)pyrene	ug/l	0	**3.0**	**0.024**	0	0	0	0	0	0	0	0	0	**3.5**
Calculated BaP Equivalents														
Benz(a)anthracene	ug/l	0	0.92	0.013	0	0	0	0	0	0	0	0	0	1.7
Benzo(b)fluoranthene	ug/l	0	1	0.0047	0	0	0	0	0	0	0	0	0	1.3
Benzo(k)fluoranthene	ug/l	0	0.27	0.0018	0	0	0	0	0	0	0	0	0	0.28
Benzo(a)pyrene	ug/l	0	0.65	0.0029	0	0	0	0	0	0	0	0	0	0.82
Chrysene	ug/l	0	0.53	0.0043	0	0.0029	0	0	0	0	0	0	0	0.77
Dibenz(a,h)anthracene	ug/l	0	0.089	0	0	0	0	0	0	0	0	0	0	0.092
Indeno(1,2,3-cd)pyrene	ug/l	0	0.3	0.0024	0	0	0	0	0	0	0	0	0	0.35
BaP Equivalent[3]	ug/l	0	3.759	0.0291	0	0.0029	0	0	0	0	0	0	0	5.312
Pentachlorophenol	ug/l	**210**	**940**	**52**	**100**	**0.39**	0	0	0	**0.33**	0	0	0	**8.9**
Cancer Hazard Index[4]		700	3196	174	333	1.3	0	0	0	1.1	0	0	0	118

See Table 3-18 for data qualifiers and footnotes.

Table 4-4
2017 Cancer Hazard Index Calculation
All Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

Location		W300SPN	W301	W328	W6N	W6N	W7	W7
Date		10/13/2017	12/04/2017	12/04/2017	6/28/2017	10/12/2017	6/28/2017	10/18/2017
Sample Type		N	N	N	N	N	N	N
Parameter	Units							
Carcinogenic PAH Concentrations								
Benz(a)anthracene	ug/l	**0.0042**	**0.0095**	0	0	0	0	0
Benzo(b)fluoranthene	ug/l	**0.0070**	**0.014**	0	0	0	**0.0093**	0
Benzo(k)fluoranthene	ug/l	**0.0073**	0	0	0	0	0	0
Benzo(a)pyrene	ug/l	**0.0081**	0	0	0	0	0	0
Chrysene	ug/l	**0.0038**	**0.013**	0	0	0	0	0
Dibenz(a,h)anthracene	ug/l	**0.0087**	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene	ug/l	**0.011**	0	0	0	0	**0.0035**	0
Calculated BaP Equivalents								
Benz(a)anthracene	ug/l	0.00042	0.00095	0	0	0	0	0
Benzo(b)fluoranthene	ug/l	0.0007	0.0014	0	0	0	0.00093	0
Benzo(k)fluoranthene	ug/l	0.00073	0	0	0	0	0	0
Benzo(a)pyrene	ug/l	0.00081	0	0	0	0	0	0
Chrysene	ug/l	0.00038	0.0013	0	0	0	0	0
Dibenz(a,h)anthracene	ug/l	0.00087	0	0	0	0	0	0
Indeno(1,2,3-cd)pyrene	ug/l	0.0011	0	0	0	0	0.00035	0
BaP Equivalent[3]	ug/l	0.00501	0.00365	0	0	0	0.00128	0
Pentachlorophenol	ug/l	0	0	0	**17**	**11**	**2400**	**450**
Cancer Hazard Index[4]		0.084	0.061	0	57	37	8000	1500

See Table 3-18 for data qualifiers and footnotes.

Table 4-5
2017 Chronic Non-Cancer Hazard Index Calculation
All Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

			Location	S-1A	S-2	S-3	U1	U1	U1	U1
			Date	10/11/2017	10/11/2017	10/11/2017	3/21/2017	6/28/2017	9/12/2017	10/13/2017
			Sample Type	N	N	N	N	N	N	N
Parameter	Units	Chronic HRL/HBV	Health Endpoint							
Non-Carcinogenic PAHs										
2-Methylnaphthalene	ug/l			0	0	0	0	0	0	0
Acenaphthene	ug/l	400	Liver	**0.0052**	0	0	0	0	0	**0.0055**
Acenaphthylene	ug/l			0	0	0	0	0	0	**0.0037**
Anthracene	ug/l	2000	None	**0.016**	**0.016**	**0.013**	**0.016**	0	**0.015**	**0.017**
Benzo(g,h,i)perylene	ug/l			0	0	0	0	0	**0.0081**	**0.0047**
Fluoranthene	ug/l	300	Liver; Kidney	0	0	**0.0041**	0	0	**0.0054**	0
Fluorene	ug/l	300	Blood	**0.0090**	**0.011**	0	**0.0064**	**0.0074**	**0.010**	**0.0076**
Naphthalene	ug/l	70	Nervous; Spleen	**0.0080**	**0.0075**	**0.022**	**0.0050**	**0.0042**	**0.0054**	**0.0050**
Phenanthrene	ug/l			0	0	**0.0053**	0	**0.018**	0	0
Pyrene	ug/l	200	Kidney	**0.0035**	0	**0.0089**	**0.0080**	**0.011**	**0.012**	**0.0093**
Pentachlorophenol	ug/l	7	Developmental E, Liver, Immune, Male Reproduction, Thyroid E	0	0	0	0	0	0	0
Non-Cancer Hazard Index None[5]	ug/l			**0.0000080**	**0.0000080**	**0.0000065**	**0.0000080**	**0**	**0.0000075**	**0.0000085**
Non-Cancer Hazard Index Liver System[5]	ug/l			**0.000013**	**0**	**0.000014**	**0**	**0**	**0.000018**	**0.000014**
Acenaphthene	ug/l			**0.000013**	**0**	**0**	**0**	**0**	**0**	**0.000014**
Fluoranthene	ug/l			**0**	**0**	**0.000014**	**0**	**0**	**0.000018**	**0**
Pentachlorophenol	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**
Non-Cancer Hazard Index Kidney System[5]	ug/l			**0.000018**	**0**	**0.000058**	**0.000040**	**0.000055**	**0.000078**	**0.000047**
Fluoranthene	ug/l			**0**	**0**	**0.000014**	**0**	**0**	**0.000018**	**0**
Pyrene	ug/l			**0.000018**	**0**	**0.000045**	**0.000040**	**0.000055**	**0.000060**	**0.000047**
Non-Cancer Hazard Index Blood System[5]	ug/l			**0.000030**	**0.000037**	**0**	**0.000021**	**0.000025**	**0.000033**	**0.000025**
Fluorene	ug/l			**0.000030**	**0.000037**	**0**	**0.000021**	**0.000025**	**0.000033**	**0.000025**
Non-Cancer Hazard Index Nervous System[5]	ug/l			**0.00011**	**0.00011**	**0.00031**	**0.000071**	**0.000060**	**0.000077**	**0.000071**
Naphthalene	ug/l			**0.00011**	**0.00011**	**0.00031**	**0.000071**	**0.000060**	**0.000077**	**0.000071**
Non-Cancer Hazard Index Spleen System[5]	ug/l			**0.00011**	**0.00011**	**0.00031**	**0.000071**	**0.000060**	**0.000077**	**0.000071**
Naphthalene	ug/l			**0.00011**	**0.00011**	**0.00031**	**0.000071**	**0.000060**	**0.000077**	**0.000071**
Non-Cancer Hazard Index Developmental E[5]	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pentachlorophenol	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**
Non-Cancer Hazard Index Immune System[5]	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pentachlorophenol	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pentachlorophenol	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**
Non-Cancer Hazard Index Thyroid E[5]	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pentachlorophenol	ug/l			**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table 4-5
2017 Chronic Non-Cancer Hazard Index Calculation
All Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

		U11 10/20/2017 N	U12 10/20/2017 N	U1A 10/13/2017 N	U1A 10/13/2017 FD	U2A 10/20/2017 N	U4N 10/20/2017 N	U5 12/04/2017 N	U6N 10/20/2017 N	U7N 10/20/2017 N
Parameter	Units									
Non-Carcinogenic PAHs										
2-Methylnaphthalene	ug/l	0	0	0	0	0	0.56	0	0.33	1.5
Acenaphthene	ug/l	15	65	0.20	0.21	2.2	37	110	35	86
Acenaphthylene	ug/l	0.96	0.74	0.0085	0.0081	0.031	0.38	3.8	0.52	0.55
Anthracene	ug/l	0.46	0.66	0.034	0.036	0.098	0.54	0.98	3.1	1.1
Benzo(g,h,i)perylene	ug/l	0	0	0	0	0	0	0	2.8	0.019
Fluoranthene	ug/l	3.3	4.5	0.0070	0.0076	0.20	0.98	19	28	9.7
Fluorene	ug/l	0.34	26	0.0062	0.0065	0.17	9.1	8.4	16	22
Naphthalene	ug/l	2.4	1.0	0.011	0.014	0.084	0.37	2.1	0.70	22
Phenanthrene	ug/l	0.081	0.46	0	0	0.034	3.7	0	18	14
Pyrene	ug/l	1.2	2.4	0.016	0.016	0.10	0.42	10	21	5.3
Pentachlorophenol	ug/l	570	5.5	0	0	120	120	210	940	52
Non-Cancer Hazard Index None[5]	ug/l	0.00023	0.00033	0.000017	0.000018	0.000049	0.00027	0.00049	0.0016	0.00055
Non-Cancer Hazard Index Liver System[5]	ug/l	81	1.0	0.00052	0.00055	17	17	30	134	7.7
Acenaphthene	ug/l	0.038	0.16	0.00050	0.00053	0.0055	0.093	0.28	0.088	0.22
Fluoranthene	ug/l	0.011	0.015	0.000023	0.000025	0.00067	0.0033	0.063	0.093	0.032
Pentachlorophenol	ug/l	81	0.79	0	0	17	17	30	134	7
Non-Cancer Hazard Index Kidney System[5]	ug/l	0.017	0.027	0.00010	0.00011	0.0012	0.0054	0.11	0.20	0.059
Fluoranthene	ug/l	0.011	0.015	0.000023	0.000025	0.00067	0.0033	0.063	0.093	0.032
Pyrene	ug/l	0.0060	0.012	0.000080	0.000080	0.00050	0.0021	0.050	0.11	0.027
Non-Cancer Hazard Index Blood System[5]	ug/l	0.0011	0.087	0.000021	0.000022	0.00057	0.030	0.028	0.053	0.073
Fluorene	ug/l	0.0011	0.087	0.000021	0.000022	0.00057	0.030	0.028	0.053	0.073
Non-Cancer Hazard Index Nervous System[5]	ug/l	0.034	0.014	0.00016	0.00020	0.0012	0.0053	0.030	0.010	0.31
Naphthalene	ug/l	0.034	0.014	0.00016	0.00020	0.0012	0.0053	0.030	0.010	0.31
Non-Cancer Hazard Index Spleen System[5]	ug/l	0.034	0.014	0.00016	0.00020	0.0012	0.0053	0.030	0.010	0.31
Naphthalene	ug/l	0.034	0.014	0.00016	0.00020	0.0012	0.0053	0.030	0.010	0.31
Non-Cancer Hazard Index Developmental E[5]	ug/l	81	0.79	0	0	17	17	30	134	7.4
Pentachlorophenol	ug/l	81	0.79	0	0	17	17	30	134	7.4
Non-Cancer Hazard Index Immune System[5]	ug/l	81	0.79	0	0	17	17	30	134	7.4
Pentachlorophenol	ug/l	81	0.79	0	0	17	17	30	134	7.4
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l	81	0.79	0	0	17	17	30	134	7.4
Pentachlorophenol	ug/l	81	0.79	0	0	17	17	30	134	7.4
Non-Cancer Hazard Index Thyroid E[5]	ug/l	81	0.79	0	0	17	17	30	134	7.4
Pentachlorophenol	ug/l	81	0.79	0	0	17	17	30	134	7.4

Table 4-5
2017 Chronic Non-Cancer Hazard Index Calculation
All Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

		W10 10/12/2017 N	W104 12/04/2017 N	W127N 10/11/2017 N	W130 10/12/2017 N	W130 10/12/2017 FD	W132 10/11/2017 N	W252N 10/18/2017 N	W253 10/20/2017 N	W254 10/18/2017 N
Parameter	Units									
Non-Carcinogenic PAHs										
2-Methylnaphthalene	ug/l	0	**0.013**	0	0	0	0	0	0	0
Acenaphthene	ug/l	**42**	**0.011**	0	0	0	0	0	**8.2**	0
Acenaphthylene	ug/l	**0.89**	**0.028**	0	0	0	0	0	**0.058**	0
Anthracene	ug/l	**0.70**	**2.7**	**0.0038**	**0.015**	**0.015**	**0.043**	**0.0044**	**0.032**	**0.0042**
Benzo(g,h,i)perylene	ug/l	0	0	0	0	0	0	0	0	0
Fluoranthene	ug/l	0	**0.013**	0	0	0	0	**0.0043**	0	0
Fluorene	ug/l	**19**	**0.024**	0	0	0	0	**0.0056**	**0.43**	0
Naphthalene	ug/l	**8.8**	**0.047**	**0.0060**	**0.0067**	**0.0084**	**0.0088**	**0.065**	**0.077**	0
Phenanthrene	ug/l	**3.9**	**0.012**	0	0	0	0	**0.0082**	**0.040**	0
Pyrene	ug/l	0	0	0	0	0	0	**0.0047**	0	0
Pentachlorophenol	ug/l	**100**	**0.39**	0	0	0	**0.33**	0	0	0
Non-Cancer Hazard Index None[5]	ug/l	**0.00035**	**0.0014**	**0.0000019**	**0.0000075**	**0.0000075**	**0.000022**	**0.0000022**	**0.000016**	**0.0000021**
Non-Cancer Hazard Index Liver System[5]	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0.000014**	**0.021**	**0**
Acenaphthene	ug/l	**0.11**	**0.000028**	**0**	**0**	**0**	**0**	**0**	**0.021**	**0**
Fluoranthene	ug/l	**0**	**0.000043**	**0**	**0**	**0**	**0**	**0.000014**	**0**	**0**
Pentachlorophenol	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**
Non-Cancer Hazard Index Kidney System[5]	ug/l	**0**	**0.000043**	**0**	**0**	**0**	**0**	**0.000038**	**0**	**0**
Fluoranthene	ug/l	**0**	**0.000043**	**0**	**0**	**0**	**0**	**0.000014**	**0**	**0**
Pyrene	ug/l	**0**	**0**	**0**	**0**	**0**	**0**	**0.000024**	**0**	**0**
Non-Cancer Hazard Index Blood System[5]	ug/l	**0.063**	**0.000080**	**0**	**0**	**0**	**0**	**0.000019**	**0.0014**	**0**
Fluorene	ug/l	**0.063**	**0.000080**	**0**	**0**	**0**	**0**	**0.000019**	**0.0014**	**0**
Non-Cancer Hazard Index Nervous System[5]	ug/l	**0.13**	**0.00067**	**0.000086**	**0.000096**	**0.00012**	**0.00013**	**0.00093**	**0.0011**	**0**
Naphthalene	ug/l	**0.13**	**0.00067**	**0.000086**	**0.000096**	**0.00012**	**0.00013**	**0.00093**	**0.0011**	**0**
Non-Cancer Hazard Index Spleen System[5]	ug/l	**0.13**	**0.00067**	**0.000086**	**0.000096**	**0.00012**	**0.00013**	**0.00093**	**0.0011**	**0**
Naphthalene	ug/l	**0.13**	**0.00067**	**0.000086**	**0.000096**	**0.00012**	**0.00013**	**0.00093**	**0.0011**	**0**
Non-Cancer Hazard Index Developmental E[5]	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**
Pentachlorophenol	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**
Non-Cancer Hazard Index Immune System[5]	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**
Pentachlorophenol	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**
Pentachlorophenol	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**
Non-Cancer Hazard Index Thyroid E[5]	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**
Pentachlorophenol	ug/l	**14**	**0.056**	**0**	**0**	**0**	**0.047**	**0**	**0**	**0**

Table 4-5
2017 Chronic Non-Cancer Hazard Index Calculation
All Wells
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

		W255 10/20/2017 N	W300SPN 10/13/2017 N	W301 12/04/2017 N	W328 12/04/2017 N	W6N 6/28/2017 N	W6N 10/12/2017 N	W7 6/28/2017 N	W7 10/18/2017 N
Parameter	Units								
Non-Carcinogenic PAHs									
2-Methylnaphthalene	ug/l	**93**	0	**0.012**	**0.011**	0	0	**0.028**	0
Acenaphthene	ug/l	**220**	0	**0.0034**	0	0	0	0	0
Acenaphthylene	ug/l	**4.2**	0	0	0	**0.0046**	**0.0043**	0	0
Anthracene	ug/l	**8.5**	0	**0.0058**	**0.0071**	**0.10**	**0.078**	**0.34**	**0.24**
Benzo(g,h,i)perylene	ug/l	**2.8**	**0.015**	**0.0052**	0	0	0	0	0
Fluoranthene	ug/l	**70**	**0.0040**	**0.022**	**0.0044**	0	0	0	0
Fluorene	ug/l	**110**	0	0	0	**0.022**	**0.020**	**3.0**	**1.5**
Naphthalene	ug/l	**2900**	0	**0.024**	**0.012**	**0.019**	**0.039**	**0.28**	**0.47**
Phenanthrene	ug/l	**150**	0	**0.017**	**0.0079**	0	0	**1.8**	**0.78**
Pyrene	ug/l	**48**	0	**0.019**	**0.0047**	0	0	0	0
Pentachlorophenol	ug/l	**8.9**	0	0	0	**17**	**11**	**2400**	**450**
Non-Cancer Hazard Index None[5]	ug/l	**0.0043**	**0**	**0.0000029**	**0.0000036**	**0.000050**	**0.000039**	**0.00017**	**0.00012**
Non-Cancer Hazard Index Liver System[5]	ug/l	**2.1**	**0.000013**	**0.000082**	**0.000015**	**2.4**	**1.6**	**343**	**64**
Acenaphthene	ug/l	**0.55**	**0**	**0.0000085**	**0**	**0**	**0**	**0**	**0**
Fluoranthene	ug/l	**0.23**	**0.000013**	**0.000073**	**0.000015**	**0**	**0**	**0**	**0**
Pentachlorophenol	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**
Non-Cancer Hazard Index Kidney System[5]	ug/l	**0.47**	**0.000013**	**0.00017**	**0.000038**	**0**	**0**	**0**	**0**
Fluoranthene	ug/l	**0.23**	**0.000013**	**0.000073**	**0.000015**	**0**	**0**	**0**	**0**
Pyrene	ug/l	**0.24**	**0**	**0.00010**	**0.000024**	**0**	**0**	**0**	**0**
Non-Cancer Hazard Index Blood System[5]	ug/l	**0.37**	**0**	**0**	**0**	**0.000073**	**0.000067**	**0.010**	**0.0050**
Fluorene	ug/l	**0.37**	**0**	**0**	**0**	**0.000073**	**0.000067**	**0.010**	**0.0050**
Non-Cancer Hazard Index Nervous System[5]	ug/l	**41**	**0**	**0.00034**	**0.00017**	**0.00027**	**0.00056**	**0.0040**	**0.0067**
Naphthalene	ug/l	**41**	**0**	**0.00034**	**0.00017**	**0.00027**	**0.00056**	**0.0040**	**0.0067**
Non-Cancer Hazard Index Spleen System[5]	ug/l	**41**	**0**	**0.00034**	**0.00017**	**0.00027**	**0.00056**	**0.0040**	**0.0067**
Naphthalene	ug/l	**41**	**0**	**0.00034**	**0.00017**	**0.00027**	**0.00056**	**0.0040**	**0.0067**
Non-Cancer Hazard Index Developmental E[5]	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**
Pentachlorophenol	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**
Non-Cancer Hazard Index Immune System[5]	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**
Pentachlorophenol	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**
Non-Cancer Hazard Index Male Reproduction System[5]	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**
Pentachlorophenol	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**
Non-Cancer Hazard Index Thyroid E[5]	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**
Pentachlorophenol	ug/l	**1.3**	**0**	**0**	**0**	**2.4**	**1.6**	**343**	**64**

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 = compare this value to the BaP criteria		0.000

4 Hazard Index Calculation =

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

5 A noncancer health risk index is determined for each group of two or more chemicals that have a common health endpoint and common duration period using the following equation:

$$\text{Noncancer health risk index}_{\text{duration}} = C_1/\text{nHRL}_{1\text{duration}} + C_2/\text{nHRL}_{2\text{duration}} + \ldots + C_N/\text{nHRL}_{N\text{duration}}$$

Where:

A. C_N represents the concentration expressed as ug/L of the first through Nth chemical. In the case of a chemical that has been detected but cannot be quantified, C_N is determined by standard statistical procedures.

B. $\text{nHRL}_{N\text{duration}}$ represents the duration specific acute, short-term, subchronic, or chronic noncancer health risk limit expressed as ug/L for the first through Nth chemical, as specified in part 4717.7860.

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

Table 4-6
2017 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 2017	17,614,530	ND	0.00	30	4.4	250	37
2nd Quarter 2017	16,670,920	ND	0.00	134	18.6	210	29
3rd Quarter 2017	19,340,300	ND	0.00	29	4.7	330	53
4th Quarter 2017	16,672,740	ND	0.00	52	7.2	240	33
Total 2017	70,298,490		0.00		35		153
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	2,085,978,635		33		3,563		10,875

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.

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P:\Mpls\23 MN\27\2327110\WorkFiles\annual reports\2017 Annual Report\Tables\Table 4-6 2017 pumpout removal.xls removal

Table 4-7
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 Well 300SPN	Projected Lower Aquifer Potentiometric level below Well 253	Well 255	Actual Well 328
12/27/2016	848.86	849.28	849.46	850.05
2/2/2017	848.49	848.82	848.97	849.44
3/21/2017	848.41	848.80	848.97	849.52
4/21/2017	848.61	849.02	849.19	849.77
5/26/2017	849.41	849.81	849.98	850.54
6/28/2017	847.73	848.49	848.82	849.90
7/31/2017	848.21	848.63	848.81	849.40
8/31/2017	848.80	849.23	849.41	850.02
10/4/2017	848.68	849.08	849.25	849.82
11/3/2017	848.58	849.00	849.18	849.78
12/4/2017	848.40	848.77	848.93	849.45
1/5/2018	849.16	849.19	849.21	849.25

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
12/27/2016	849.73	849.28	--	--	-0.45	
2/2/2017	848.78	848.82	--	--	0.04	Upward Gradient
3/21/2017	--	--	848.97	848.78	0.18	Upward Gradient
4/21/2017	849.45	849.02	--	--	-0.43	
5/26/2017	850.26	849.81	--	--	-0.45	
6/28/2017	850.15	848.49	--	--	-1.66	
7/31/2017	849.18	848.63	--	--	-0.55	
8/31/2017	849.73	849.23	--	--	-0.50	
10/4/2017	--	--	849.25	849.05	0.20	Upward Gradient
11/3/2017	849.35	849.00	--	--	-0.35	
12/4/2017	849.18	848.77	--	--	-0.41	
1/5/2018	849.03	849.19	--	--	0.16	Upward Gradient

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 4-8
2017 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.)
2017	12	109	20,600	2	171,300	16	170	0.02
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	16,722	152,195		2,636		21,917		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 27, 2016 and Janaury 5, 2018 (Table 3-7).
6) *Volume DNAPL removed in 2012 was corrected in the 2016 report from 780 to 569.

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P:\Mpls\23 MN\27\2327110\WorkFiles\annual reports\2017 Annual Report\Tables\Table 4-8 DNAPL recovery 2017.xls

Table 5-1

Recommended 2018 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 2018 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 • Air/water interface • Oil/water interface • Bottom of well/sediment	 Monthly Monthly Monthly	None	Annual calculation
DNAPL Tank	Storage Tank • Air/water interface • Oil/water interface	 Monthly Monthly	None	Monthly (calc.) Monthly (calc.)

Notes:

The Recommended 2018 Monitoring Program is the same as the 2017 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

2018 Maintenance Schedule
Joslyn Manufacturing & Supply Co.
Brooklyn Center, Minnesota

Weekly and Ongoing Maintenance:

- Monitor air quality in water treatment vault using a four gas air monitoring instrument.
- 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)

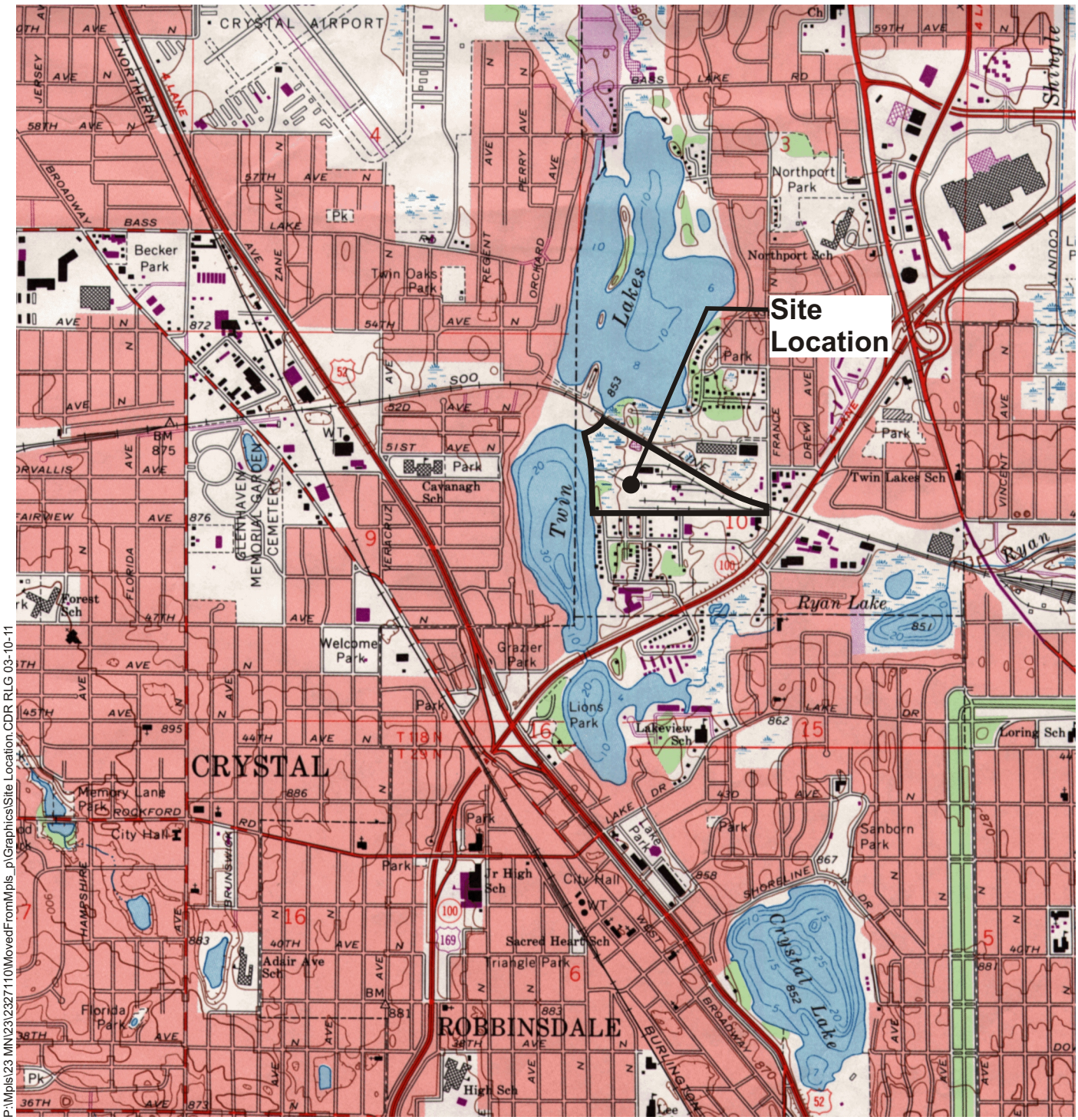
Annual Maintenance:

- 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.

Figures



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

Figure 1-1

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

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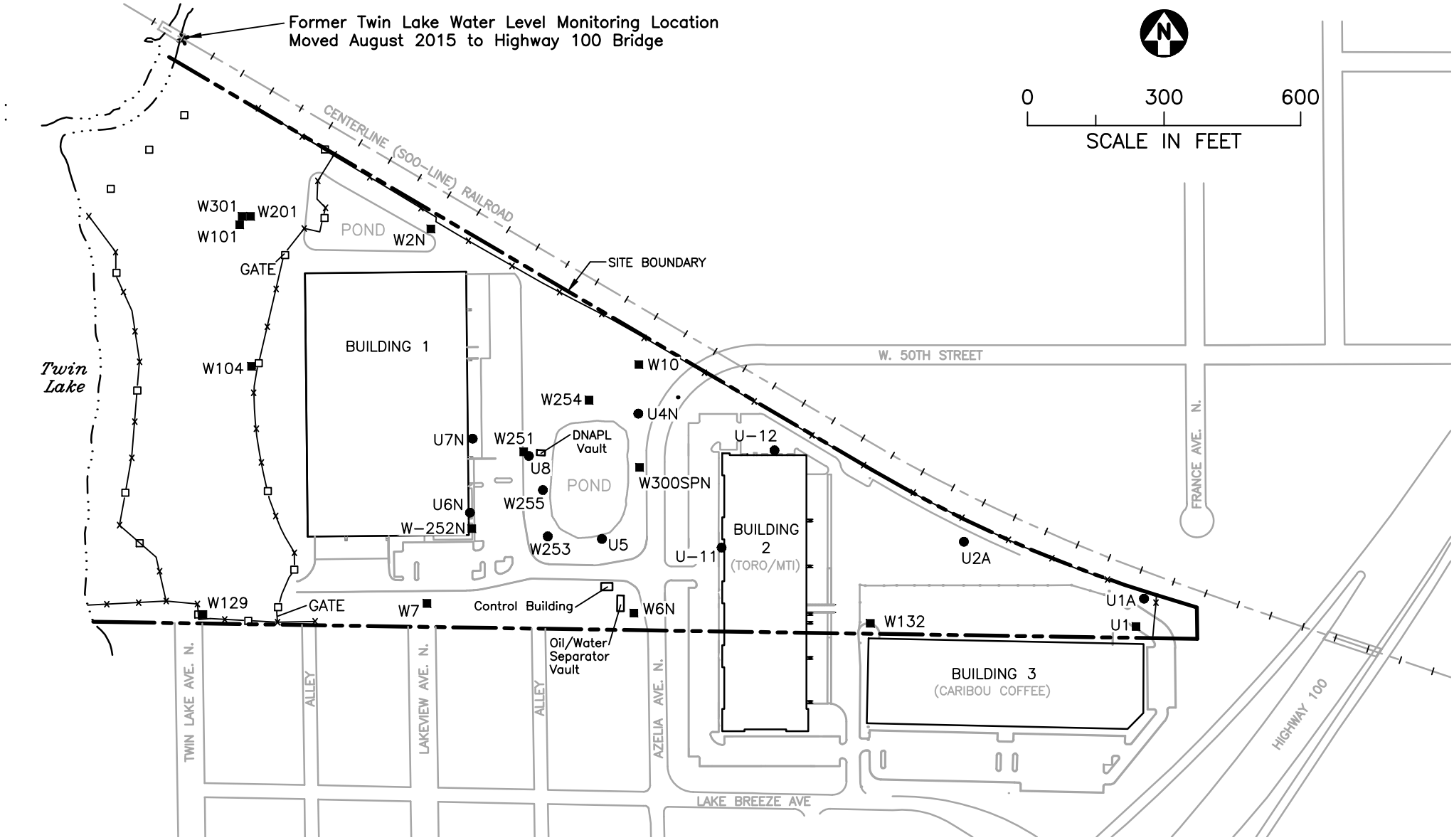


Figure 1-2

2017
ON-SITE MONITORING NETWORK
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

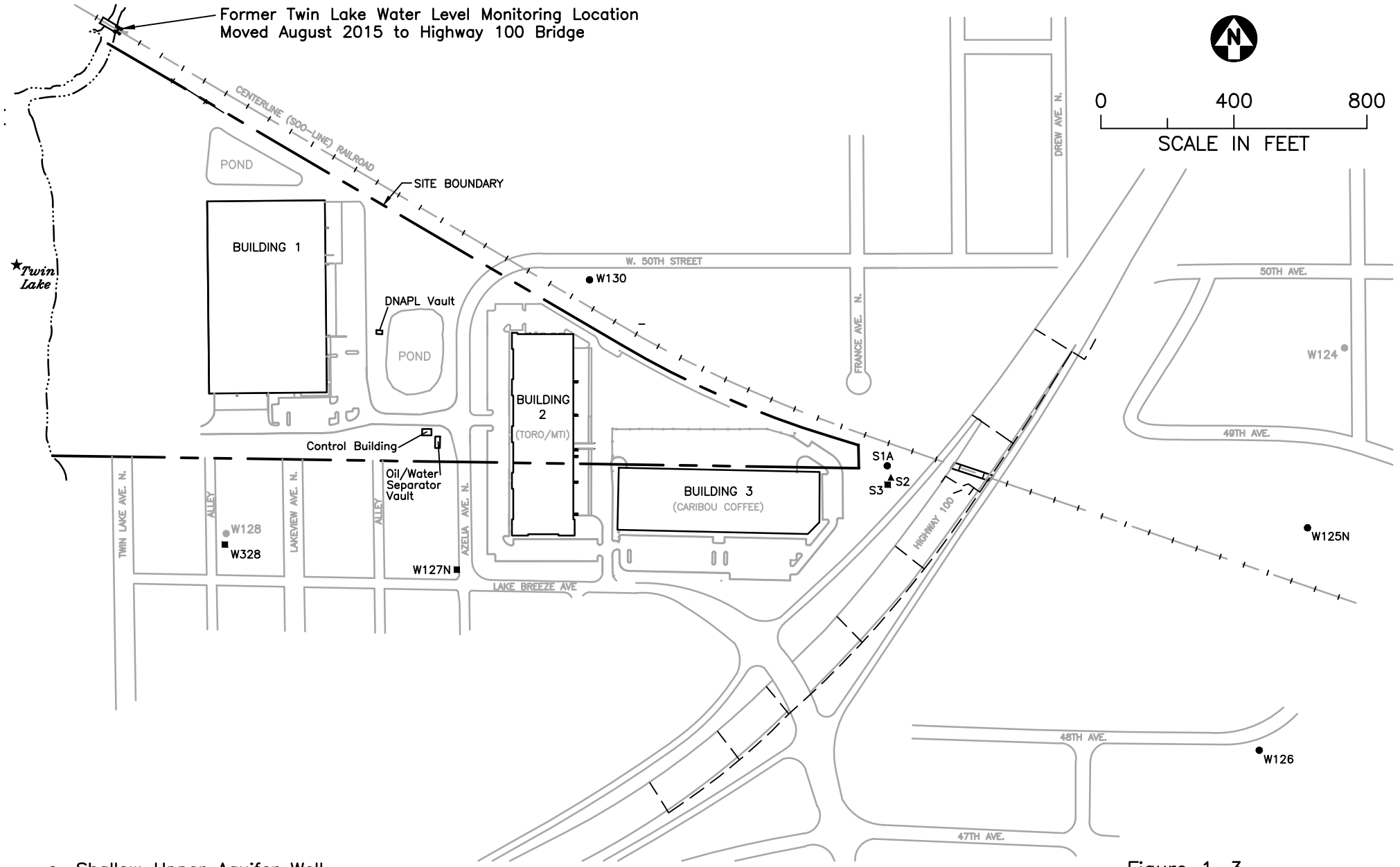
Security Fence/Posted Signs

Site Boundary

Pump-Out Well

Monitoring Well

RLG M:\AdeptWork\RLG\2327011000_AR Figure 1-3.dwg Plot at 0 04/05/2018 17:26:24



- Shallow Upper Aquifer Well
- Mid-Depth Upper Aquifer Well
- Lower Aquifer Well
- Surface Water

Figure 1-3

2017
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

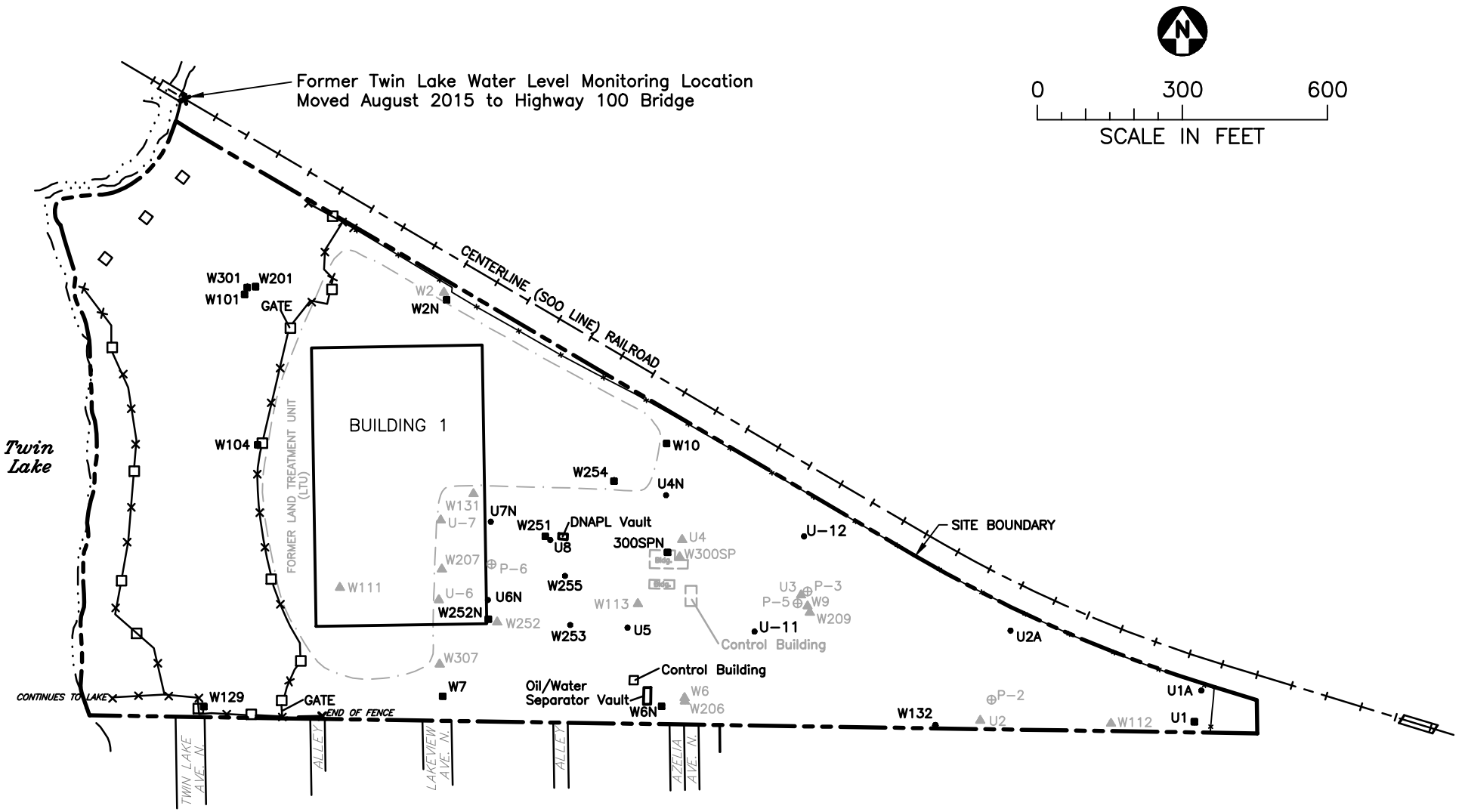


Figure 1-4

2017
HISTORICAL ON-SITE MONITORING NETWORK
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

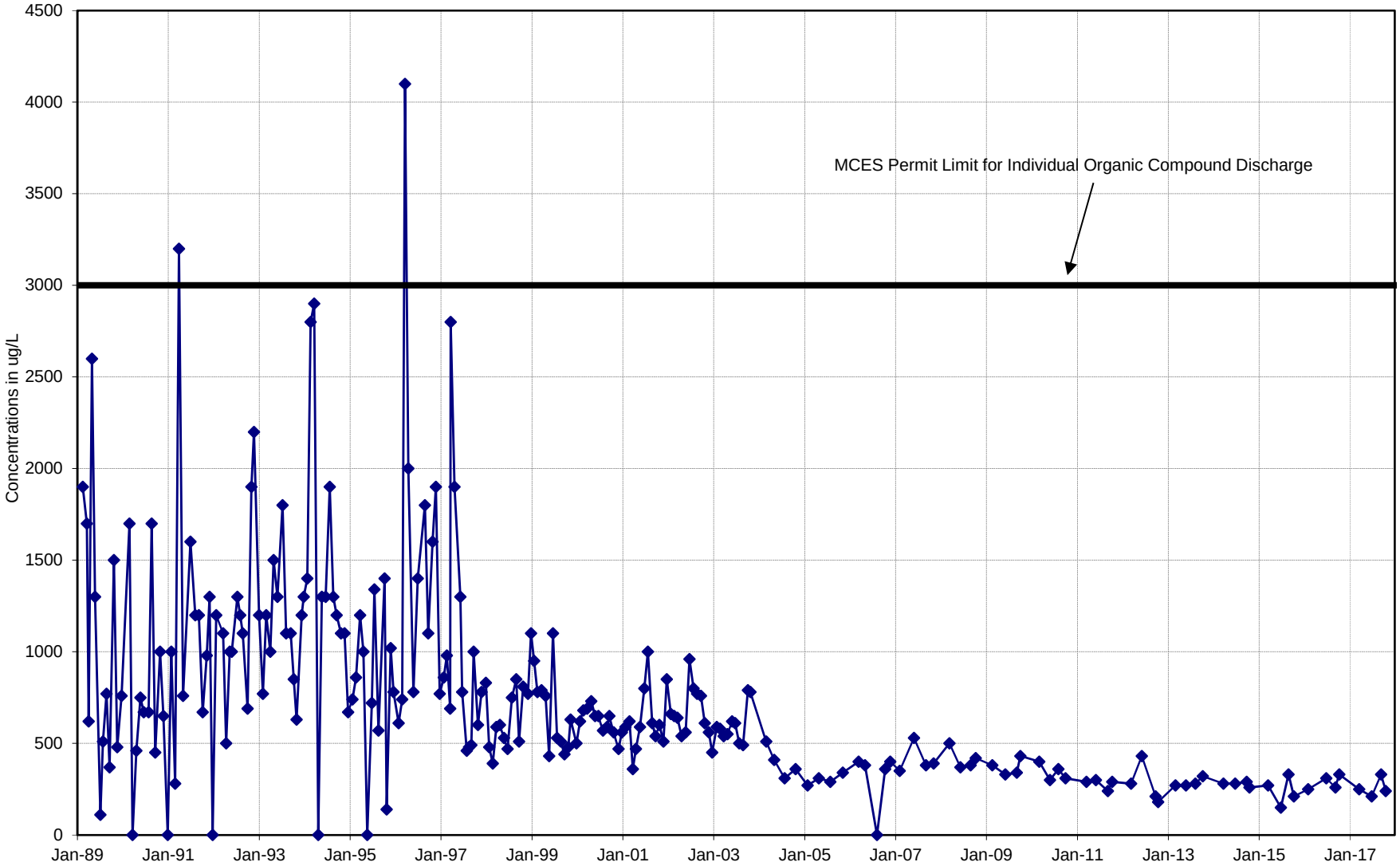


Figure 3-1
PCP in Tank Effluent

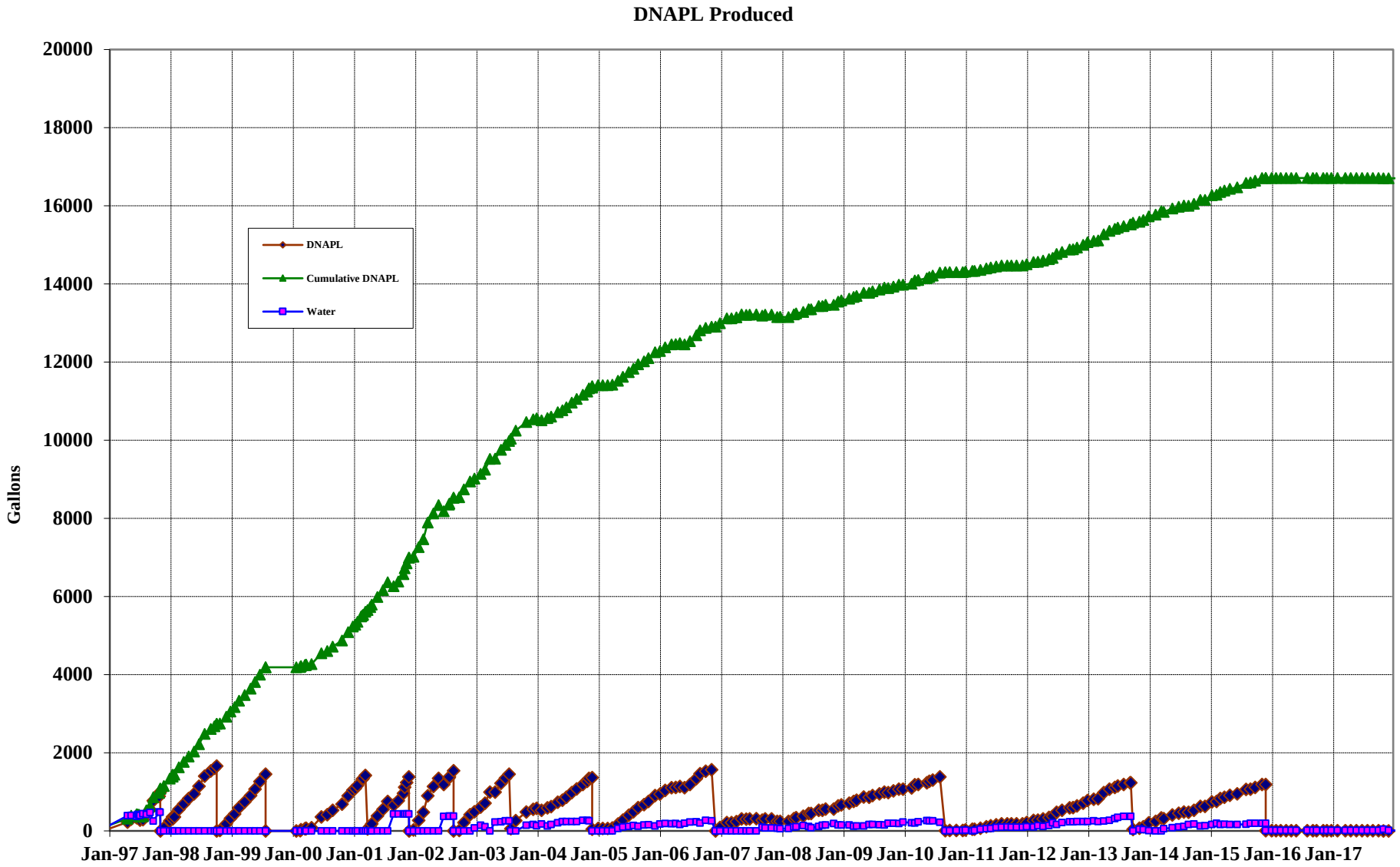


Figure 3-2
Historical DNAPL Storage Tank Volumes

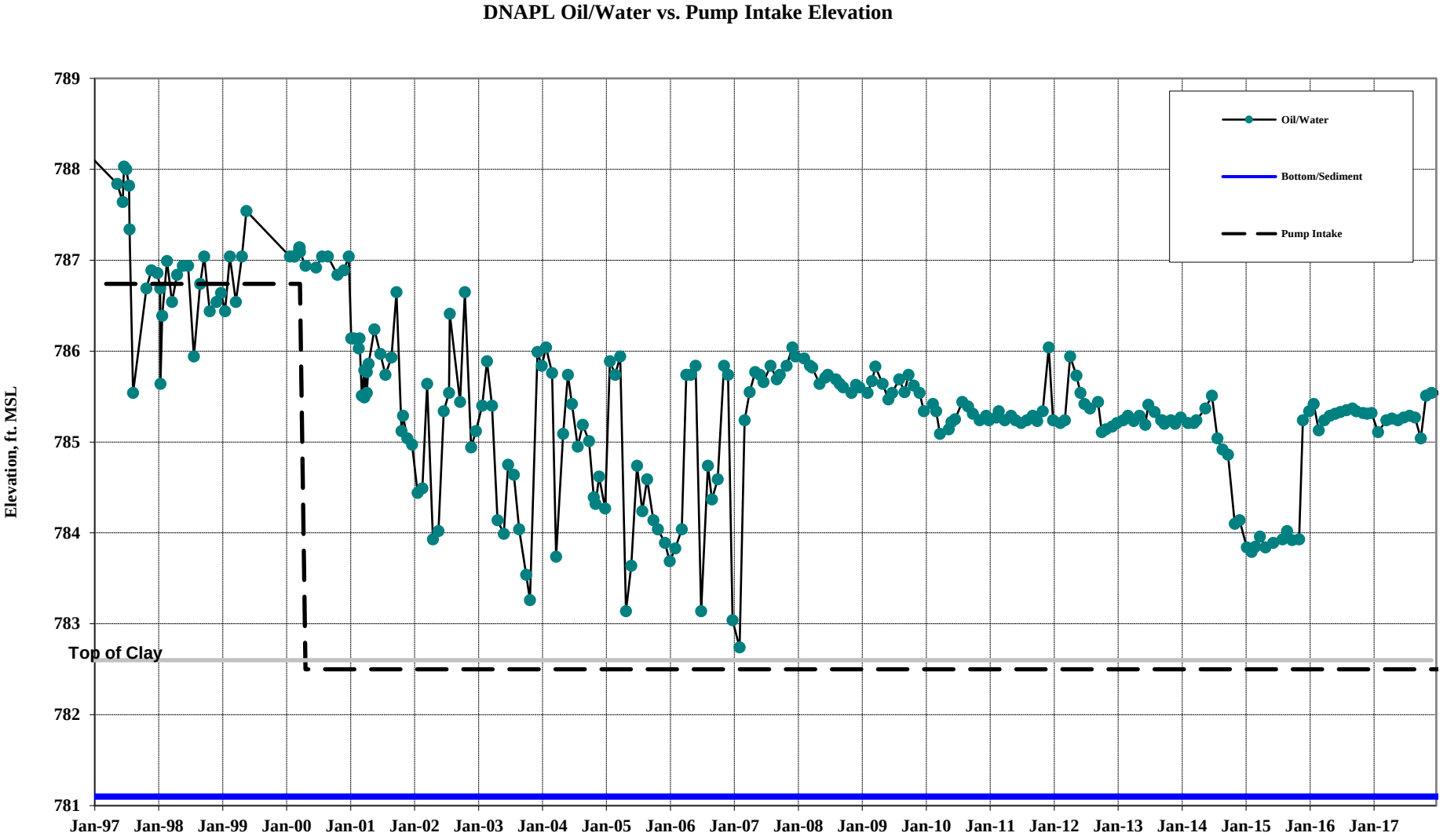


Figure 3-3
Historical DNAPL Thickness
W251 Recovery Well

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

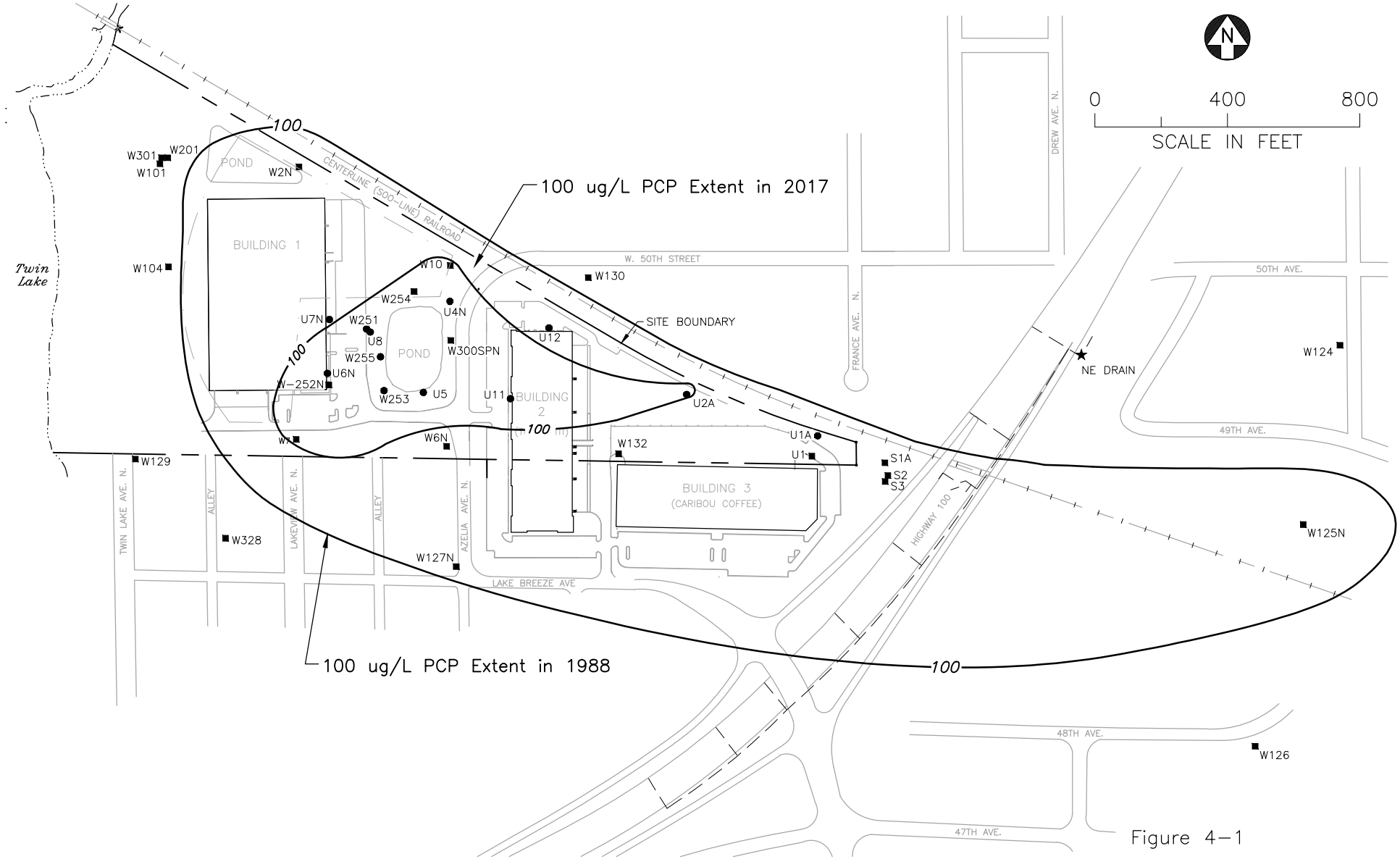
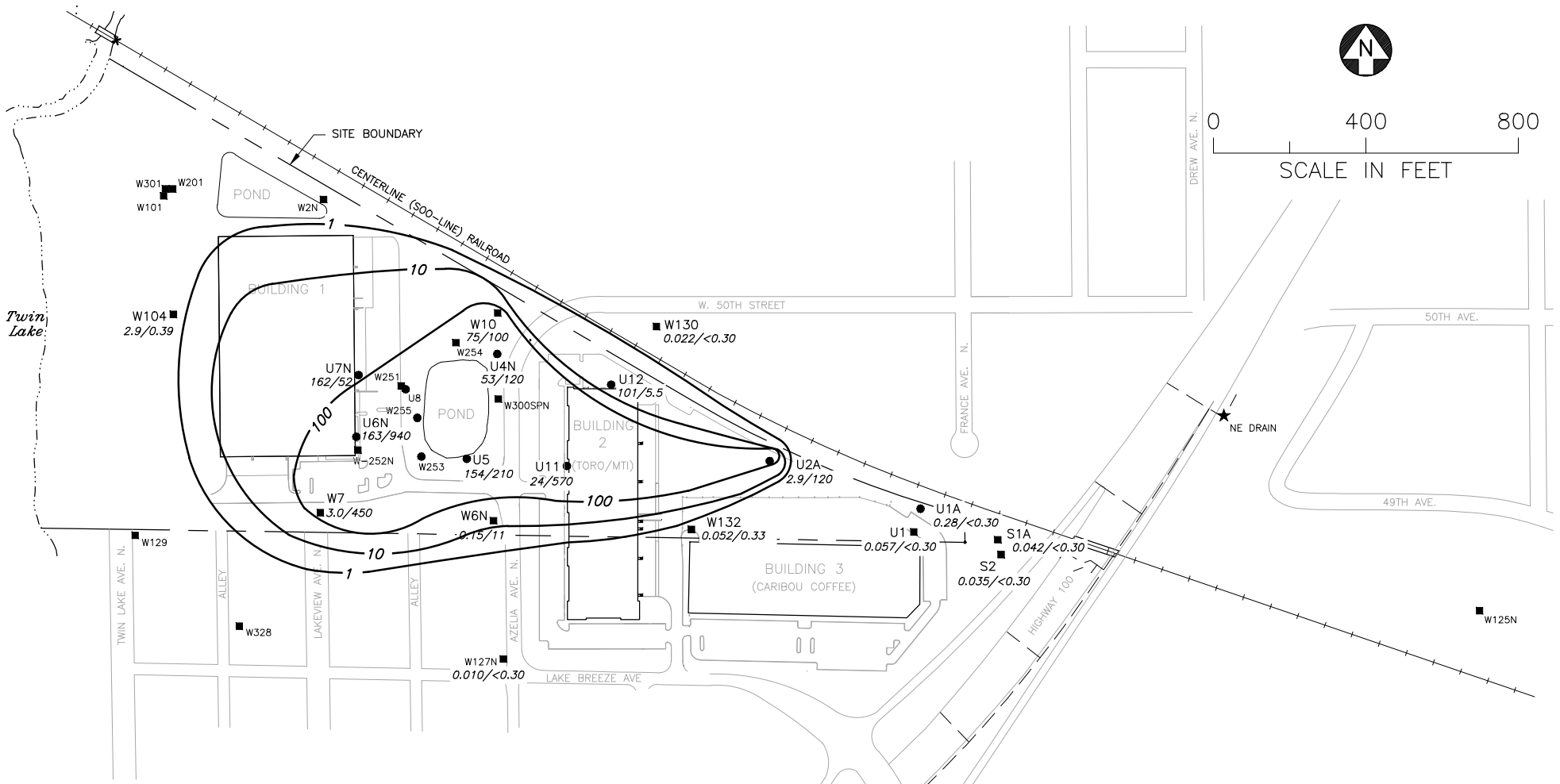


Figure 4-1

DECREASE IN EXTENT OF PCP PLUME
1988 TO 2017
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

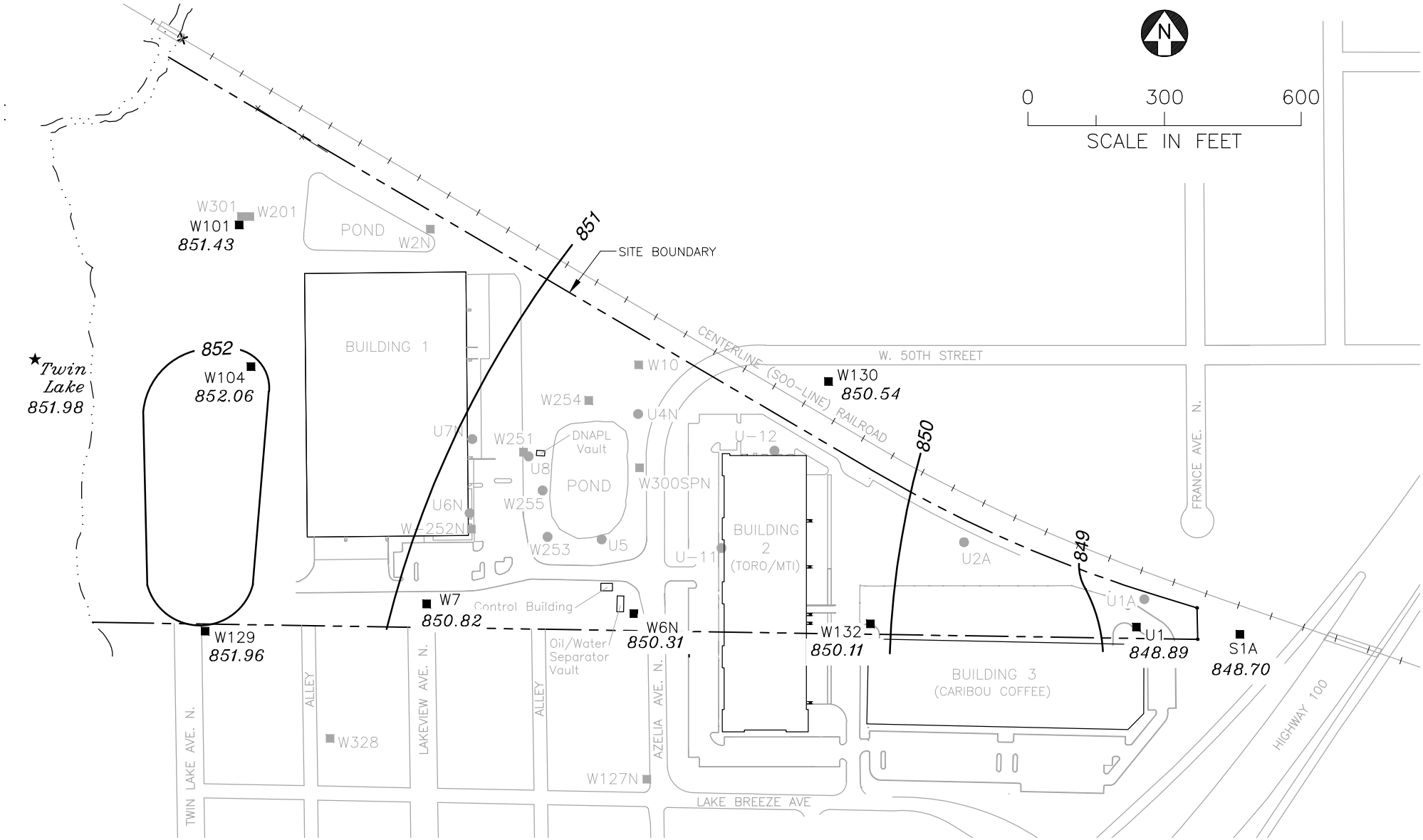


- Pump-Out Well
- Monitoring Well
- 10 — Pentachlorophenol Contour
- 212/16 — Total PAH/Hetercycles (ug/L) / Pentachlorophenol (ug/L)
- ND — Not Detected

NOTE: Results from October 2017

Figure 4-2

2017
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)

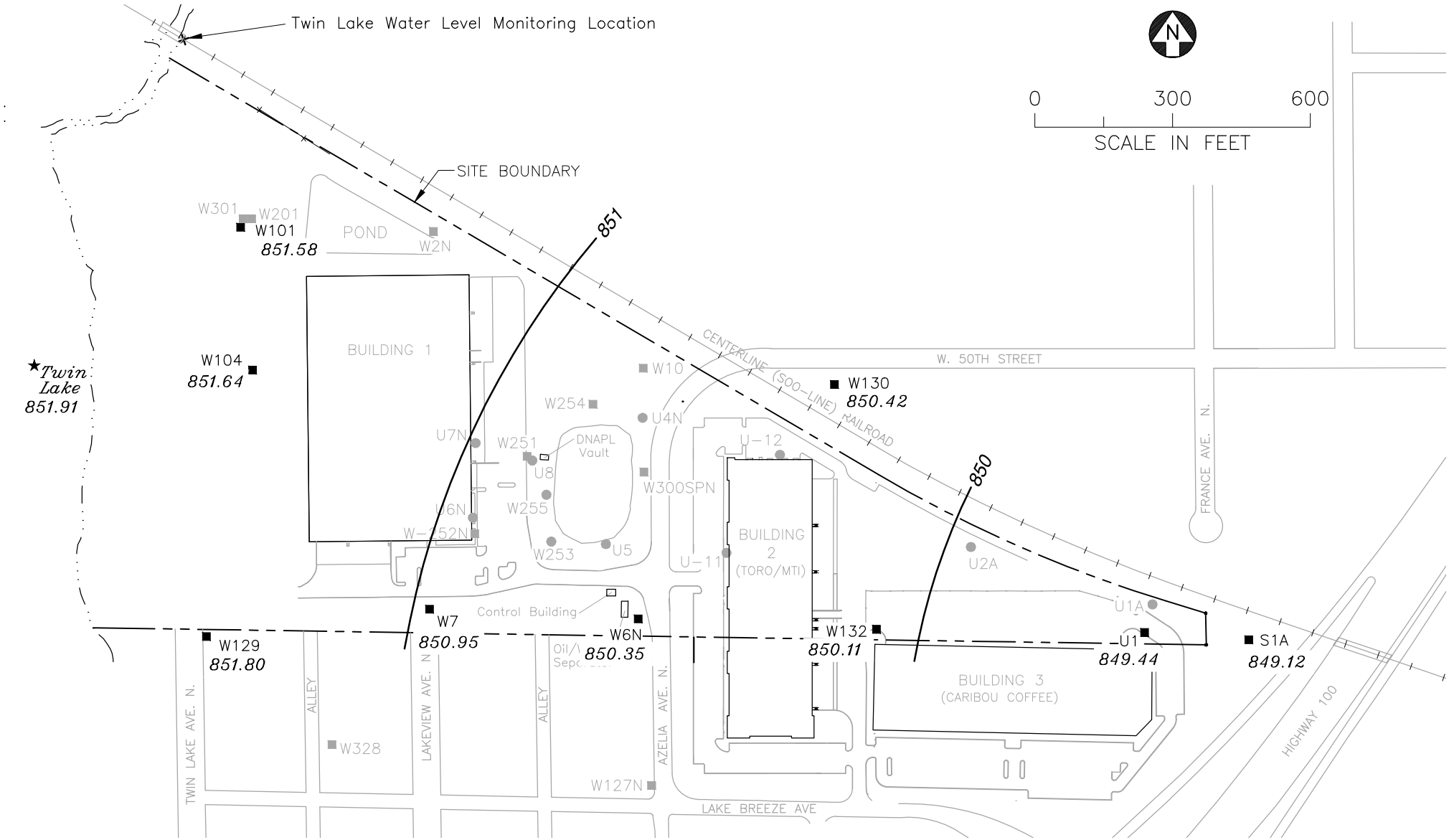
850.82 Water Elevation (Feet, MSL)

★ Twin Lake Water Level taken from Hwy 100 Bridge

Figure 4-3

WATER TABLE MAP
March 21, 2017
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

RLG M:\AdeptWork\RLG\2327011000_AR Figure 4-4.dwg Plot at 0 03/26/2018 16:43:03



● Pump-Out Well

■ Monitoring Well

850 Groundwater Contour (Feet, MSL)

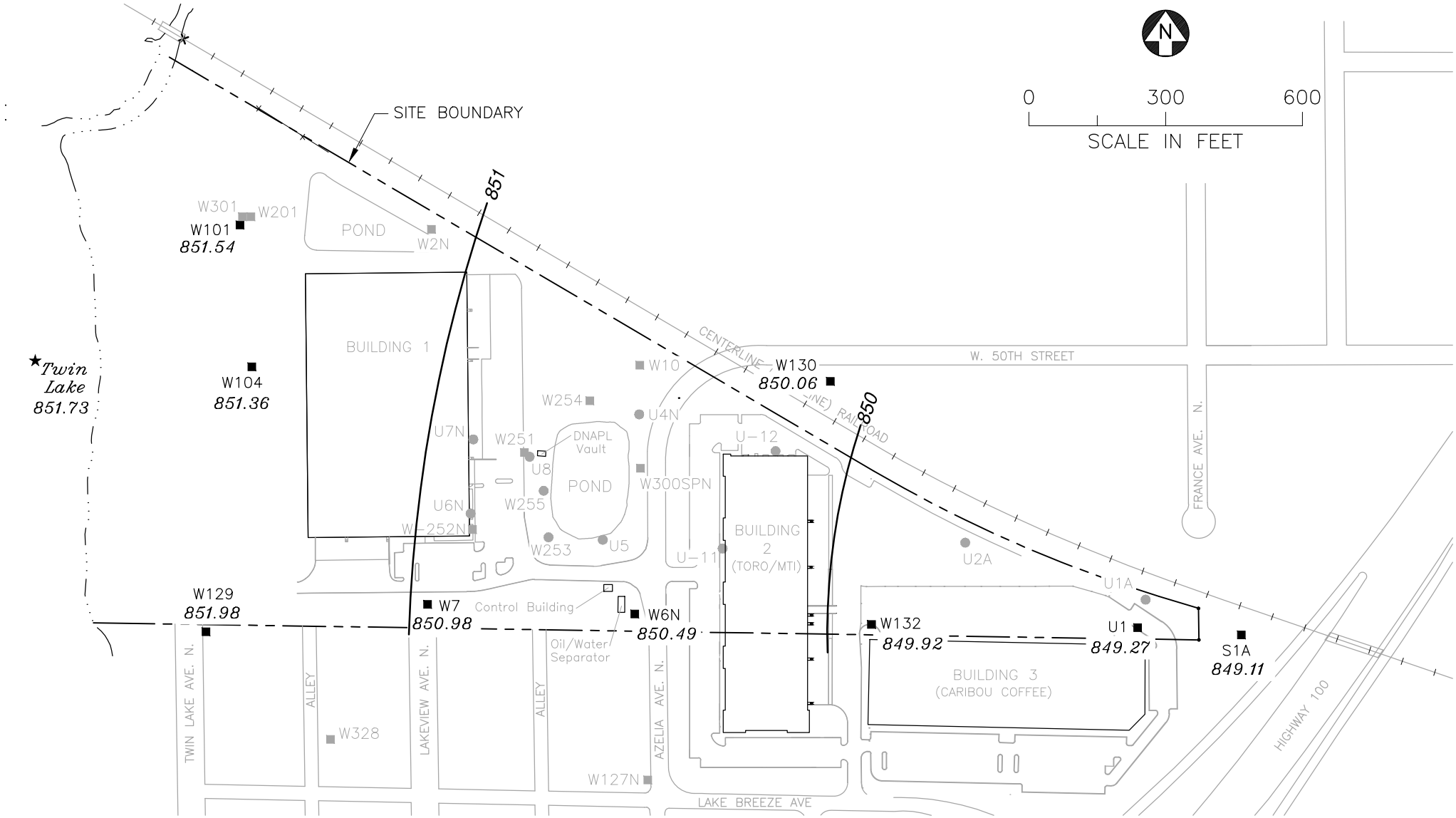
850.95 Water Elevation (Feet, MSL)

★ Twin Lake Water Level taken from Hwy 100 Bridge

Figure 4-4

WATER TABLE MAP
June 27, 2017
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

RLG M:\AdeptWork\RLG\2327011000_AR Figure 4-5.dwg Plot at 0 03/26/2018 17:01:28

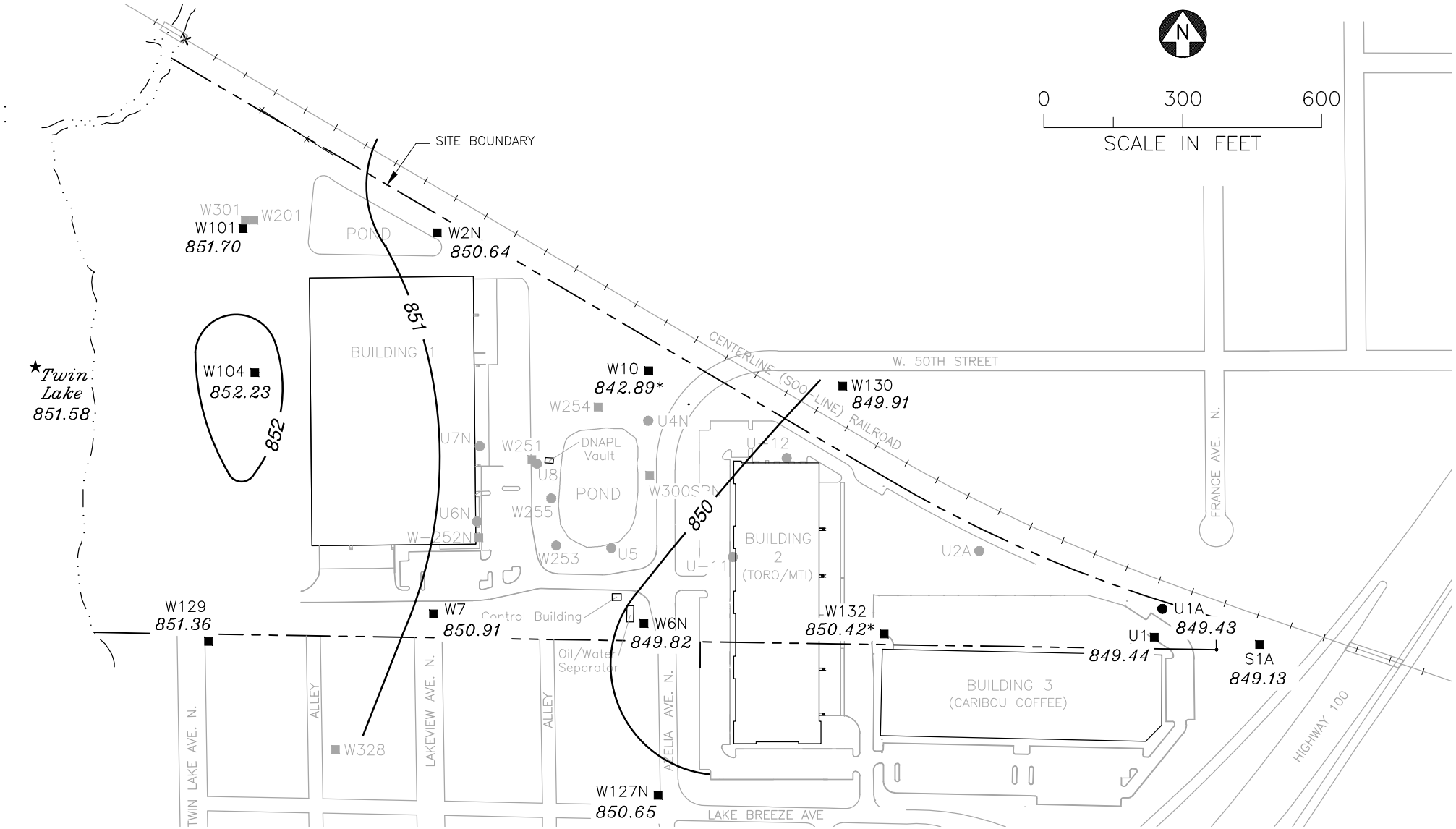


- Pump-Out Well
- Monitoring Well
- 849 — Groundwater Contour (Feet, MSL)
- 850.49 — Water Elevation (Feet, MSL)
- ★ — Twin Lake Water Level taken from Hwy 100 Bridge

Figure 4-5

WATER TABLE MAP
September 12, 2017
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

RLG M:\AdeptWork\RLG\2327011000_AR Figure 4-6.dwg Plot at 0 04/19/2018 15:00:43



● Pump-Out Well

■ Monitoring Well

849 Groundwater Contour (Feet, MSL)

851.36 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 11, 2017
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

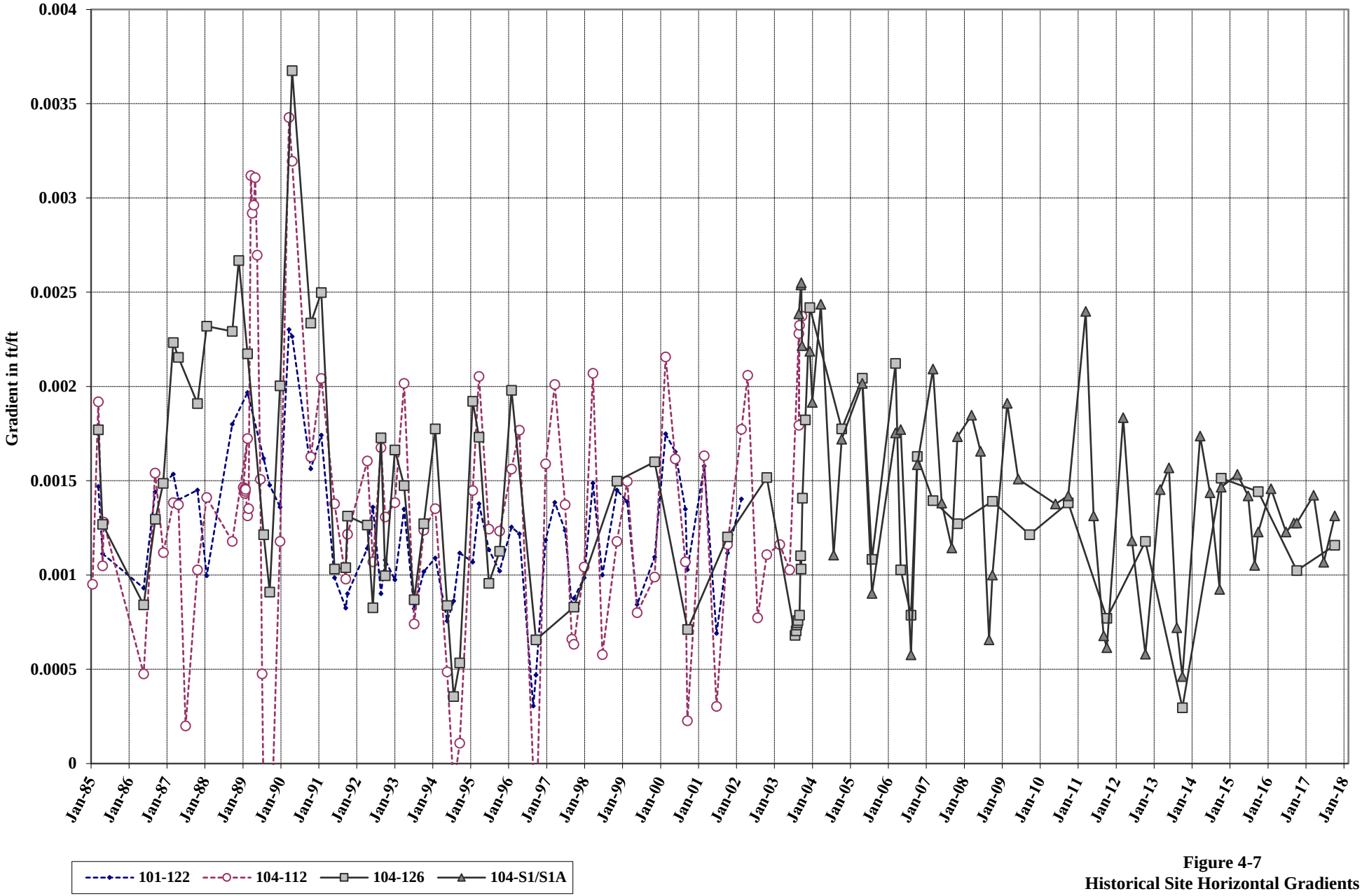
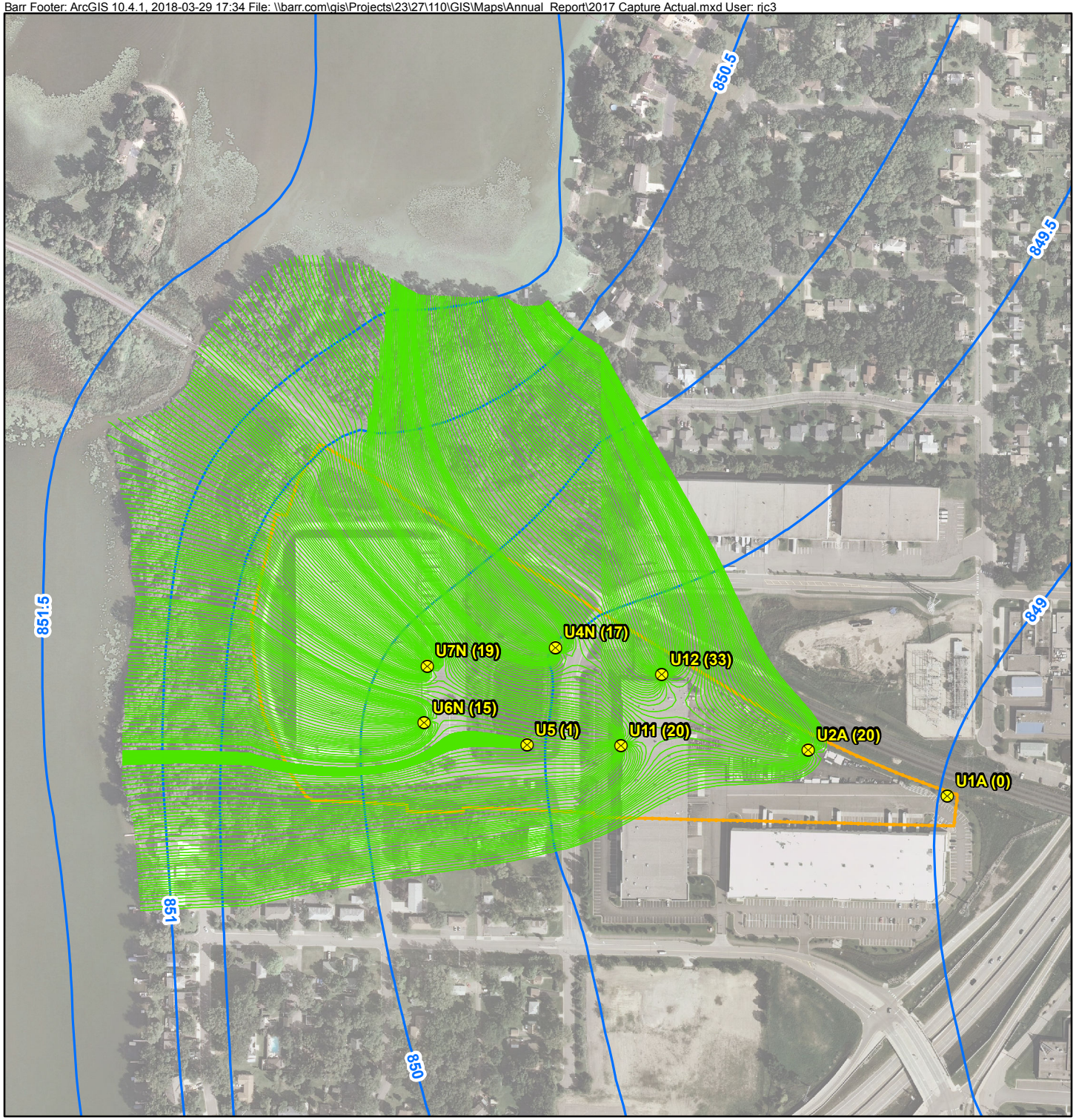


Figure 4-7
Historical Site Horizontal Gradients



Extraction Well with Pumping Rate (gpm)

Particle Trace

Piezometric Surface Elevation (contour interval = 0.5 ft)

Site Boundary

Imagery: Aerials Express, 2009

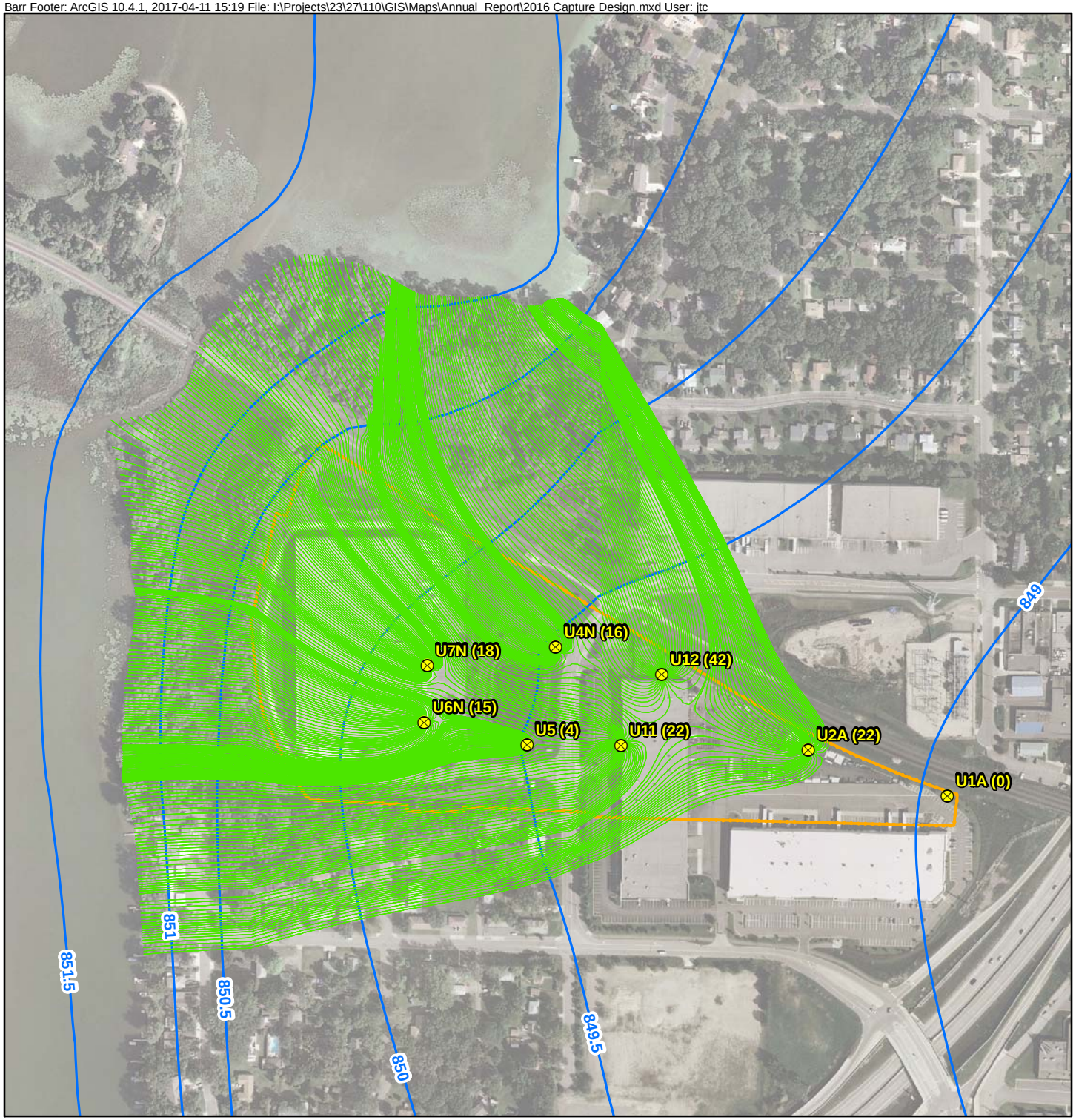
N

Feet
400 0 400

Meters
100 0 100

Figure 4-8

SIMULATED PIEZOMETRIC SURFACE AND CAPTURE ZONE FOR 2017 AVERAGE REPORTED PUMPING RATES
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN



Extraction Well with Pumping Rate (gpm)

Particle Trace

Piezometric Surface Elevation (contour interval = 0.5 ft)

Site Boundary

Imagery: Aerials Express, 2009

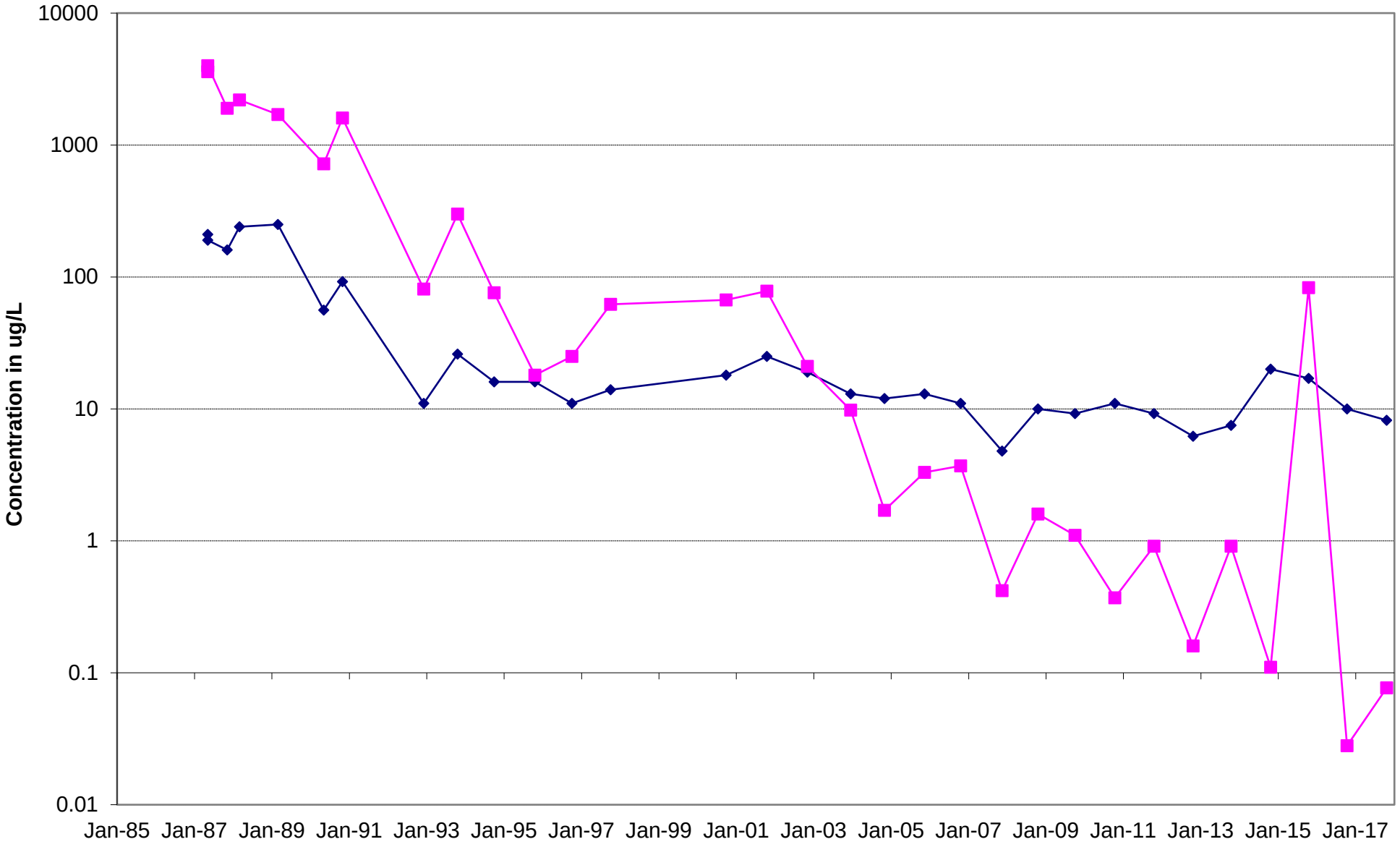
N

Feet
400 0 400

Meters
100 0 100

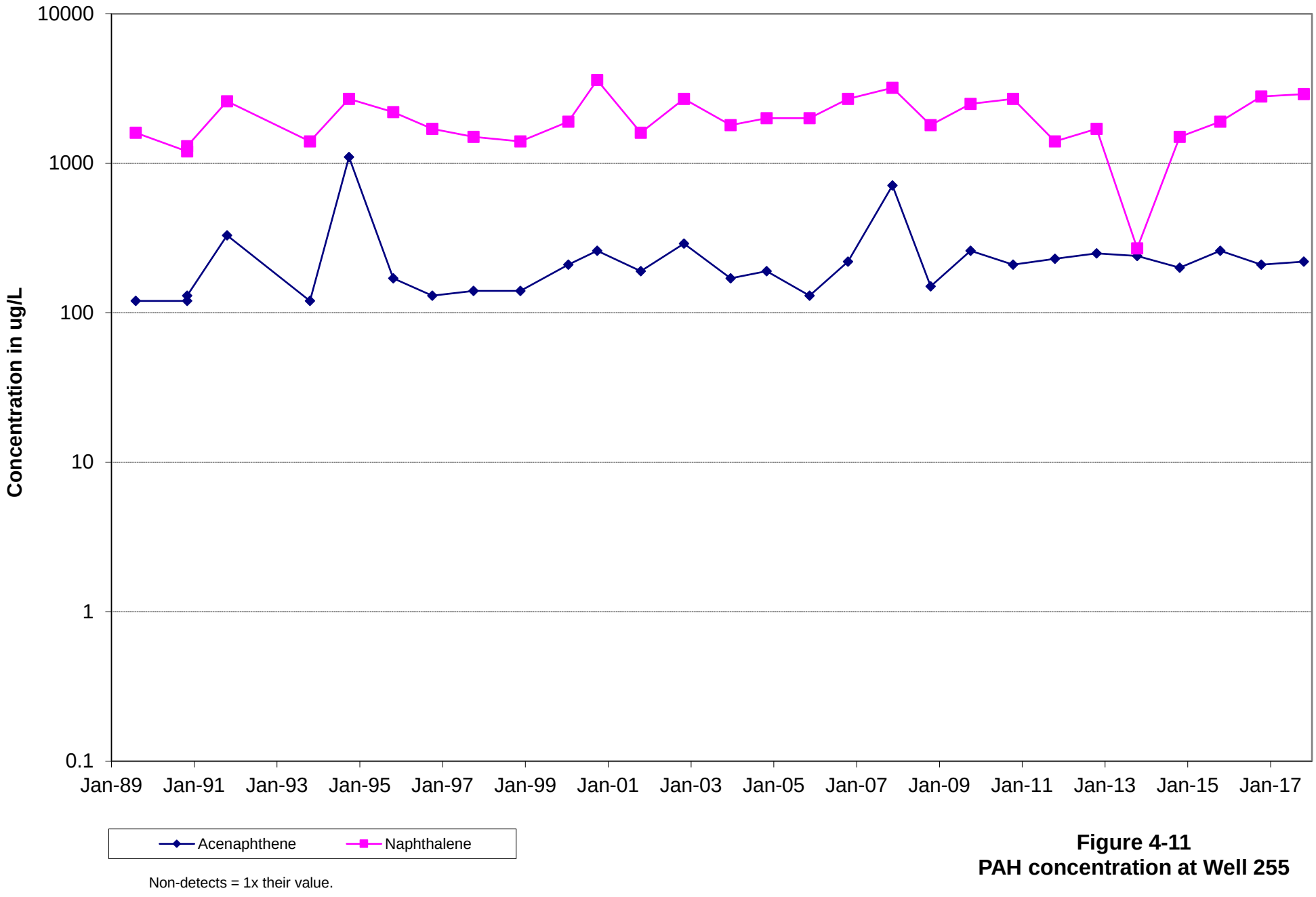
Figure 4-9

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

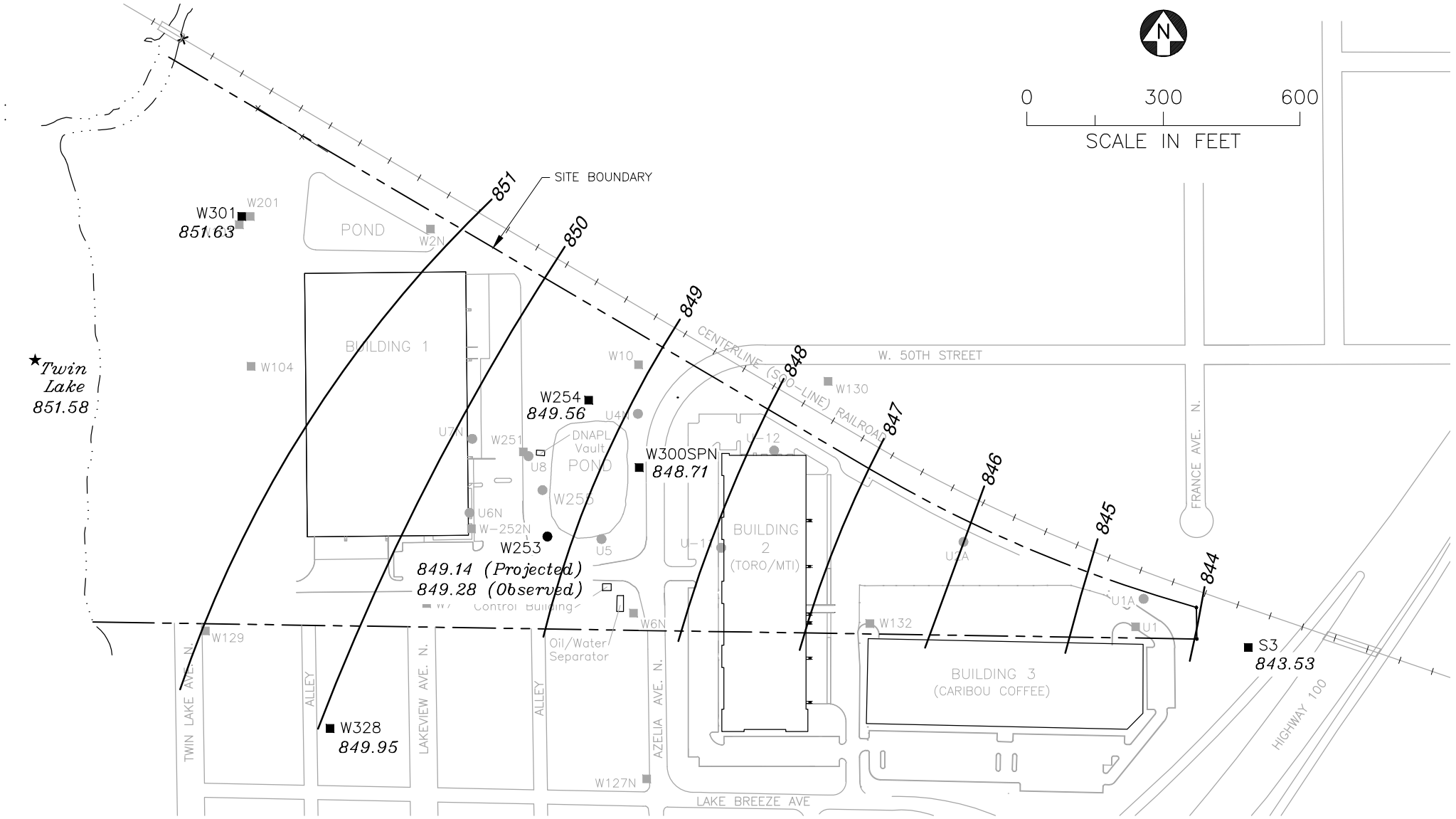


Non-detects = 1x their value.

Figure 4-11
PAH concentration at Well 255

P:\Mpls\23 MN\27\2327110\WorkFiles\DATA MGMT\2017 Annual Report Tables and Figures\Joslyn_2017 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)

849.95 Potentiometric Level (Feet, MSL)

★ Twin Lake Water Level taken from Hwy 100 Bridge

849.14 Projected – Potentiometric Level in Lower Aquifer Value used for Contouring

849.28 Observed – Potentiometric Level in Upper Aquifer

Figure 4-12

LOWER AQUIFER
POTENTIOMETRIC SURFACE
October, 2017
Joslyn Manufacturing & Supply Co.
Brooklyn Center, MN

Appendices

Appendix A

Historical Groundwater Levels and Water Quality Data

Appendix A

Tables

Table A-1
1984 - 2017 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
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	--	--	--	--

Table A-1
1984 - 2017 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
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/20/1991	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/16/1991	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/6/1992	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/4/1992	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/30/1992	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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

Table A-1
1984 - 2017 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
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	--	--	--	--	--	--	--	--	--
4/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	852.57	--	--	--	--	--	--	--	--	--
7/1/1998	--	--	--	--	--	--	--	--	--	--	--	--	--	852.07	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--
9/6/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	852.09	--	--	--	--	--	--	--	--	--
9/26/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	849.22	--	849.45	--	849.86	--	836.48	--
9/27/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	848.79	--	849.08	--	--	--	--	--	--
9/28/2000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/6/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	851.69	--	--	--	--	--	--	--	--	--
7/3/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	851.74	--	--	--	--	--	--	--	--	--
10/16/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	851.60	--	847.77	--	848.28	--	846.58	--	836.85	--
10/17/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/19/2001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	849.08	--	--	--	--	--	--	--	--
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	--
3/26/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	834.16	--
4/8/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/29/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	851.99	--	--	--	--	--	--	--	834.34	--
5/15/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/30/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	835.71	--
6/30/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	836.12	--
7/1/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/2/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	852.34	--	--	--	--	--	--	--	831.30	--
8/30/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	831.26	--
9/30/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	831.29	--
10/28/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	851.71	849.95	848.30	--	852.12	--	--	849.81	832.71	--
12/3/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	832.59	--
12/30/2002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	849.02	832.78	--
2/4/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	848.92	831.18	--
3/3/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	851.77	--	--	--	--	--	--	848.71	831.12	--
4/1/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	848.64	832.26	--
5/2/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	848.65	832.14	--

Table A-1
1984 - 2017 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
6/7/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	852.04	--	--	--	--	--	--	849.39	831.29	--
7/2/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	850.01	831.24	--
8/4/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	848.74	831.15	--
9/2/2003	--	--	--	--	--	--	--	--	--	--	844.16	--	--	--	--	--	--	--	--	--	--	--	--
9/3/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	850.97	--	--	--	--	--	--	846.60	831.33	--
9/4/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/9/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/22/2003	--	--	--	--	--	--	--	--	--	--	842.39	--	--	--	--	842.46	--	837.21	--	--	844.83	832.45	--
9/25/2003	--	--	--	--	--	--	--	--	--	--	842.37	--	--	--	--	--	--	--	--	--	--	--	--
9/27/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/2/2003	--	--	--	--	--	--	--	--	--	--	843.19	--	--	--	--	--	--	--	--	--	--	--	--
10/6/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/13/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	844.87	832.49	--
11/3/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	845.95	831.54	--
12/16/2003	--	--	--	--	--	--	--	--	--	--	845.37	--	--	850.47	845.75	839.87	--	841.27	--	--	845.75	833.36	--
1/9/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	850.52	--	--	--	--	--	--	845.95	--	--
2/3/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	832.81	--
3/9/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	831.35	--
4/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	851.07	--	--	--	--	--	--	846.60	833.47	--
5/10/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	833.63	--
6/7/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	833.31	--
6/30/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	832.35	--
8/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	851.47	--	--	--	--	--	--	847.91	834.41	--
8/31/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	832.37	--
10/6/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	833.01	--
10/18/2004	--	--	--	--	--	--	--	--	--	--	847.47	--	--	851.42	850.25	839.07	--	849.87	--	--	848.65	849.31	--
11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	836.36	--
12/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	841.21	--
1/5/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	833.21	--
2/2/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	851.47	--	--	--	--	--	--	--	848.81	--
3/3/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	832.81	--
4/1/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	832.88	--
5/4/2005	--	--	--	--	--	--	--	--	--	--	847.72	--	--	851.52	--	--	--	--	--	--	--	834.51	--
6/3/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	834.40	--
7/7/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	834.11	--
8/5/2005	--	--	--	--	--	--	--	--	--	--	847.92	--	--	851.47	--	--	--	--	--	--	--	832.81	--
9/1/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	833.51	--
10/7/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	853.17	--	--	--	--	--	--	--	834.76	--
10/21/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	852.07	--	--	--	--	--	--	--	--	--
11/2/2005	--	--	--	--	--	--	--	--	--	--	--	--	--	851.87	--	--	--	--	--	--	--	834.48	--
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	--

Table A-1
1984 - 2017 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
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	--
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table A-1
1984 - 2017 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
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--	848.50	--	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	--
3/21/2017	--	--	--	--	--	--	--	--	--	--	--	848.70	--	851.98	848.89	--	--	--	--	--	--	--	--
6/27/2017	--	--	--	--	--	--	--	--	--	--	--	849.12	--	842.52	844.90	--	--	--	--	--	--	--	--
6/28/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	849.44	--	--	--	--	--	--	--	--
10/11/2017	--	--	--	--	--	--	--	--	--	--	--	849.13	849.16	842.52	849.44	849.43	--	838.27	--	--	844.45	832.66	--

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

Table A-1
1984 - 2017 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
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

Table A-1
1984 - 2017 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
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
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

Table A-1
1984 - 2017 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
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
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	--	--	--
5/30/2002	--	--	--	--	847.96	849.20	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
6/30/2002	--	--	--	--	851.19	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
7/1/2002	--	--	--	--	--	852.22	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
8/2/2002	--	--	--	--	848.82	850.05	--	--	--	849.80	851.29	--	--		852.16	852.12	--	850.69	--	--	--	--	--
8/30/2002	--	--	--	--	847.82	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
9/30/2002	--	--	--	--	847.91	848.92	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
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
12/3/2002	--	--	--	--	847.47	848.32	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
12/30/2002	--	--	--	--	847.22	848.11	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
2/4/2003	--	--	--	--	847.12	848.22	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
3/3/2003	--	--	--	--	846.77	847.82	--	--	--	848.91	849.53	--	--		850.78	850.65	--	848.50	--	--	--	--	--
4/1/2003	--	--	--	--	847.24	847.72	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
5/2/2003	--	--	--	--	846.71	848.41	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--

Table A-1
1984 - 2017 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
6/7/2003	--	--	--	--	847.42	--	--	--	--	850.21	850.80	--	--		851.93	851.97	--	850.07	--	--	--	--	850.14
7/2/2003	--	--	--	--	847.83	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
8/4/2003	--	--	--	--	846.52	848.92	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
9/2/2003	--	--	--	--	--	--	--	--	--	847.24	--	--	--	848.69	--	848.99	--	844.77	--	--	--	--	--
9/3/2003	--	--	--	--	843.07	--	--	--	--	847.08	848.33	--	--		849.22	847.94	--	844.62	--	--	--	--	--
9/4/2003	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	844.50	--	--	--	--	--
9/9/2003	--	--	--	--	--	--	--	--	--	846.19	--	--	--	846.80	--	847.34	--	843.04	--	--	--	--	--
9/22/2003	846.80	--	--	--	840.00	842.54	847.27	--	--	845.25	847.30	--	--	845.93	850.71	847.58	--	--	--	--	--	--	--
9/25/2003	--	--	--	--	--	--	--	--	--	--	--	--	--	845.92	--	847.59	--	--	--	--	--	--	--
9/27/2003	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
10/2/2003	--	--	--	--	--	--	--	--	--	845.01	--	--	--	845.31	--	847.62	--	843.23	--	--	--	--	--
10/6/2003	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	843.93	--	--	--	--	--
10/13/2003	--	--	--	--	840.47	843.57	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
11/3/2003	--	--	--	--	842.72	845.22	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
12/16/2003	846.27	--	847.67	847.45	842.52	845.27	847.99	--	--	846.60	847.53	--	--	846.72	850.87	849.73	--	--	--	--	--	--	--
1/9/2004	--	--	--	--	842.97	845.45	--	--	--	846.75	847.58	--	--		850.32	849.73	--	--	--	--	--	--	--
2/3/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
3/9/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
4/1/2004	--	--	--	--	844.82	846.29	--	--	--	847.42	848.29	--	--		851.66	851.53	--	--	--	--	--	--	--
5/10/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
6/7/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
6/30/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
8/2/2004	--	--	--	--	846.37	--	--	--	--	848.83	849.47	--	--		850.89	849.53	--	--	--	--	--	--	--
8/31/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
10/6/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
10/18/2004	849.67	--	849.27	849.06	848.18	849.17	849.44	--	--	848.41	849.12	--	--	848.64	851.53	850.73	--	--	--	--	--	--	--
11/2/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
12/1/2004	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
1/5/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
2/2/2005	--	--	--	--	845.36	846.37	--	--	--	847.88	848.52	--	--		850.93	850.46	--	--	--	--	--	--	--
3/3/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
4/1/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
5/4/2005	--	--	--	--	846.05	846.80	--	--	--	848.60	849.33	--	--		851.55	851.68	--	--	--	--	--	--	--
6/3/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
7/7/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
8/5/2005	--	--	--	--	846.02	846.72	--	--	--	848.61	849.23	--	--		851.01	849.25	--	--	--	--	--	--	--
9/1/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
10/7/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		852.87	853.13	--	--	--	--	--	--	--
10/21/2005	--	--	--	--	--	--	--	--	--	849.50	--	--	--		851.87	852.22	--	--	--	--	--	--	--
11/2/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		851.80	852.03	--	--	--	--	--	--	--
11/7/2005	848.02	--	849.35	850.00	846.82	847.72	850.48	--	--	849.48	850.13	--	--	849.60	--	--	--	--	--	--	--	--	--
12/12/2005	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
1/9/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
2/10/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
3/1/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
3/19/2006	--	--	--	--	846.05	847.33	--	--	--	848.74	849.42	--	--		851.94	851.95	--	--	--	--	--	--	--
4/14/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
5/9/2006	--	--	--	--	847.32	848.42	--	--	--	850.01	850.97	--	--		852.67	853.10	--	--	--	--	--	--	--
6/5/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
7/7/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--

Table A-1
1984 - 2017 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
8/15/2006	--	--	--	--	846.22	846.97	--	--	--	848.90	849.52	--	--		851.13	848.83	--	--	--	--	--	--	--
9/6/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
10/9/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--
11/14/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
12/7/2006	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
1/2/2007	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
2/12/2007	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
3/12/2007	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
3/15/2007	--	--	--	--	846.52	846.22	--	--	--	848.40	849.27	--	--		851.72	851.86	--	--	--	--	--	--	--
4/10/2007	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
5/11/2007	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
6/8/2007	--	--	--	--	--	--	--	--	--	849.29	849.82	--	--		851.32	851.13	--	--	--	--	--	--	--
6/28/2007	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
8/7/2007	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--
9/12/2007	--	--	--	--	--	--	--	--	--	848.40	849.09	--	--		851.22	849.62	--	--	--	--	--	--	--
11/6/2007	846.52	--	849.66	850.25	846.37	847.52	850.70	--	--	849.88	850.39	--	--	849.87	851.52	852.11	--	--	--	--	--	--	--
3/19/2008	--	--	--	--	--	--	--	--	--	848.40	849.05	--	--		851.58	851.33	--	--	--	--	--	--	--
6/14/2008	--	--	--	--	--	--	--	--	--	850.00	850.72	--	--		851.97	852.23	--	--	--	--	--	--	--
9/4/2008	--	--	--	--	--	--	--	--	--	848.61	849.23	--	--		850.89	848.80	--	--	--	--	--	--	--
10/6/2008	845.90	--	848.62	849.20	848.62	846.57	849.59	--	--	848.50	849.20	--	--	848.62	851.28	849.38	--	--	--	--	--	--	--
2/25/2009	846.47	--	--	--	--	--	--	--	--	--	848.33	--	--		851.09	850.63	--	--	--	--	--	--	--
6/11/2009	846.54	--	--	--	--	--	--	--	--	--	848.32	--	--		851.16	849.88	--	--	--	--	--	--	--
9/29/2009	843.57	--	847.17	848.05	845.42	844.52	848.71	--	--	847.15	848.23	--	--	847.47	851.32	847.93	--	--	--	--	--	--	--
3/9/2010	--	--	--	--	--	--	--	--	--	846.90	847.60	--	--		851.82	850.66	--	--	--	--	--	--	--
6/4/2010	--	--	--	--	--	--	--	--	--	847.80	848.40	--	--		851.22	850.28	--	--	--	--	--	--	--
8/9/2010	--	--	--	--	--	--	--	--	--	848.39	849.00	--	--		851.35	849.53	--	--	--	--	--	--	--
10/5/2010	843.77	--	848.42	849.53	847.27	846.22	849.99	--	--	849.34	849.64	--	--	849.18	851.32	851.56	--	--	--	--	--	--	--
3/22/2011	--	--	--	--	--	--	--	--	--	848.90	849.68	--	--		852.40	853.44	--	--	--	--	--	--	--
6/6/2011	--	--	--	--	--	--	--	--	--	850.52	851.14	--	--		851.77	852.13	--	--	--	--	--	--	--
9/11/2011	--	--	--	--	--	--	--	--	--	849.95	850.52	--	--		851.05	850.48	--	--	--	--	--	--	--
10/11/2011	843.27	--	848.57	849.82	847.24	843.67	850.19	--	--	849.25	849.85	--	--	850.22	850.92	849.83	--	--	--	--	--	--	--
3/16/2012	--	--	--	--	--	--	--	--	--	848.50	849.23	--	--		851.68	851.76	--	--	--	--	--	--	--
6/9/2012	--	--	--	--	--	--	--	--	--	850.15	850.78	--	--		851.42	851.62	--	--	--	--	--	--	--
8/7/2012	--	--	--	--	--	--	--	--	--	849.54	--	--	--	849.93	--	--	--	--	--	--	--	--	--
8/13/2012	--	--	--	--	--	--	--	--	--	849.14	--	--	--	849.89	--	--	--	--	--	--	--	--	--
8/14/2012	--	--	--	--	--	--	--	--	--	849.01	--	--	--	849.88	--	--	--	--	--	--	--	--	--
8/15/2012	--	--	--	--	--	--	--	--	--	848.92	--	--	--	849.89	--	--	--	--	--	--	--	--	--
8/17/2012	--	--	--	--	--	--	--	--	--	848.73	--	--	--	849.88	--	--	--	--	--	--	--	--	--
8/20/2012	--	--	--	--	--	--	--	--	--	848.29	--	--	--	849.87	--	--	--	--	--	--	--	--	--
8/21/2012	--	--	--	--	--	--	--	--	--	848.28	--	--	--	849.83	--	--	--	--	--	--	--	--	--
8/22/2012	--	--	--	--	--	--	--	--	--	848.51	--	--	--	849.81	--	--	--	--	--	--	--	--	--
8/23/2012	--	--	--	--	--	--	--	--	--	848.69	--	--	--	849.80	--	--	--	--	--	--	--	--	--
8/24/2012	--	--	--	--	--	--	--	--	--	848.80	--	--	--	849.82	--	--	--	--	--	--	--	--	--
9/27/2012	--	--	--	--	--	--	--	--	--	848.44	848.98	--	--		849.82	848.55	--	--	--	--	--	--	--
10/15/2012	839.72	--	847.32	848.63	848.12	843.92	849.11	--	--	848.20	848.73	--	--	849.27	851.51	848.88	--	--	--	--	--	--	--
1/3/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/8/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/7/2013	--	--	--	--	--	--	--	--	--	847.23	847.88	--	--	--	850.61	849.91	--	--	--	--	--	--	--
4/9/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table A-1
1984 - 2017 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
5/13/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/30/2013	--	--	--	--	--	--	--	--	--	849.60	850.32	--	--	--	851.77	852.08	--	--	--	--	--	--	--
8/6/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/14/2013	--	--	--	--	--	--	--	--	--	849.55	850.13	--	--	--	851.13	850.33	--	--	--	--	--	--	--
9/13/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/1/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/7/2013	838.62	--	847.67	849.25	846.77	845.32	849.76	--	--	848.57	849.23	--	--	849.57	851.52	848.95	--	--	--	--	--	--	--
11/8/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	851.40	--	--	--	--	--	--	--
9/12/2016	--	--	--	--	--	--	--	--	--	850.53	850.93	--	--	--	851.59	852.14	--	--	--	--	--	--	--
10/10/2016	841.32	--	848.02	850.80	846.42	842.32	851.19	--	--	850.59	848.12	--	--	848.35	851.65	852.23	--	--	--	--	--	--	--
3/21/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	851.43	852.06	--	--	--	--	--	--	--
6/27/2017	--	--	--	--	--	--	--	--	--	850.35	850.95	--	--	--	851.58	851.64	--	--	--	--	--	--	--
6/28/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/11/2017	838.76	--	846.55	850.30	--	--	--	--	--	--	--	--	--	842.89	851.70	852.23	--	--	--	--	--	--	--

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

Table A-1
1984 - 2017 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
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

Table A-1
1984 - 2017 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
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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

Table A-1
1984 - 2017 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
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	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table A-1
1984 - 2017 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
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table A-1
1984 - 2017 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
8/15/2006	--	--	--	--	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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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

Table A-1
1984 - 2017 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
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
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	--	850.20	--	--	--
10/10/2016	--	--	848.93	--	849.64	--	850.77	--	852.16	850.69	--	850.31	--	851.84	--
3/21/2017	--	--	--	--	--	--	--	--	851.96	850.54	--	850.11	--	--	--
6/27/2017	--	--	--	--	--	--	--	--	851.80	850.42	--	850.11	--	--	--
6/28/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/11/2017	--	--	848.75	--	848.71	--	850.65	--	851.36	849.91	--	850.42	--	851.70	--

Table A-2
1984 - 2017 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	--	--
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	--	--	--	--	--	--	--	--	--

Table A-2
1984 - 2017 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
6/23/1997	--	--	--	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
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

Table A-2
1984 - 2017 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
6/7/2004	--	--	--	--	--	--	--	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
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

Table A-2
1984 - 2017 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
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
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

Table A-2
1984 - 2017 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
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
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
2/2/2017	--	--	--	850.59	--	--	--	849.28	--	--	--	--	821.81
3/2/2017	--	--	--	850.41	--	--	--	--	805.18	--	--	848.78	--
3/21/2017	--	--	--	850.41	--	--	805.18	--	--	--	848.78	--	--
4/21/2017	--	--	--	850.76	--	--	--	849.45	--	--	--	--	806.49
5/26/2017	--	--	--	851.68	--	--	--	850.26	--	--	--	--	806.49
6/28/2017	--	--	--	851.29	--	--	850.15	--	--	--	806.49	--	--
7/31/2017	--	--	--	850.74	--	--	849.18	--	--	--	806.49	--	--
8/31/2017	--	--	--	851.14	--	--	849.73	--	--	--	806.49	--	--
10/4/2017	--	--	--	851.00	--	--	805.18	--	--	--	849.05	--	--
10/11/2017	--	--	--	850.67	--	851.33	849.28	--	--	849.56	806.49	--	--
11/3/2017	--	--	--	850.83	--	--	849.35	--	--	--	806.49	--	--
12/4/2017	--	--	--	850.59	--	--	849.18	--	--	--	806.49	--	--
1/5/2018	--	--	--	850.23	--	--	849.03	--	--	--	806.49	--	--

-- Not measured

See Table 3-18 for data qualifiers and footnotes.

Table A-3
1984-2017 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	--	--	--	--
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

Table A-3
1984-2017 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
12/15/2001	--	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
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

Table A-3
1984-2017 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
12/10/2007	--	--	--	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
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

Table A-3
1984-2017 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
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	--	--	--	--	848.80
2/29/2016	--	--	--	847.59	--	--	--	--	848.70
4/1/2016	--	--	--	847.81	--	--	--	--	848.93
5/2/2016	--	--	--	848.06	--	--	--	--	849.22
6/1/2016	--	--	--	847.79	--	--	--	--	848.90
7/1/2016	--	--	--	847.16	--	--	--	--	848.35
8/5/2016	--	--	--	848.24	--	--	--	--	849.40
9/8/2016	--	--	--	848.90	--	--	--	--	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
2/2/2017	--	--	--	848.49	--	--	--	--	849.44
3/2/2017	--	--	--	848.41	--	--	--	--	849.52
3/21/2017	--	--	--	848.41	--	--	--	--	849.52
4/21/2017	--	--	--	848.61	--	--	--	--	849.77
5/26/2017	--	--	--	849.41	--	--	--	--	850.54
6/28/2017	--	--	--	848.73	--	--	--	--	849.90
7/31/2017	--	--	--	848.21	--	--	--	--	849.40
8/31/2017	--	--	--	848.80	--	--	--	--	850.02
10/4/2017	--	--	--	848.68	--	--	--	--	849.82
10/11/2017	843.53	--	--	854.71	851.63	--	--	--	849.95
11/3/2017	--	--	--	848.58	--	--	--	--	849.78
12/4/2017	--	--	--	848.40	--	--	--	--	849.45

Table A-3
1984-2017 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
1/5/2018	--	--	--	848.16	--	--	--	--	849.25

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

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U1	7/07/1988	N	< 10	**32**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	--
U1	12/29/1988	N	< 10	**20**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	2/27/1989	N	--	--	--	--	--	--	--	--	--	--	--
U1	8/03/1989	N	< 10	**28**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	5/04/1990	N	--	--	--	--	--	--	--	--	--	--	--
U1	10/30/1990	N	< 10	**27**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	10/17/1991	N	< 10	**21**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	10/14/1992	N	< 10 < 10	**19** **19**	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10
U1	10/20/1993	N	< 10	**13**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	10/14/1994	N	< 10	**17**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	12/08/1995	N	< 0.96	**16**	< 0.96	< 0.96	< 0.96	< 0.96	< 0.96	< 0.96	< 0.96	< 0.96	< 0.96
U1	10/02/1996	N	< 30 2 j	**10 j*** **19**	< 30 * 6 j	< 30 < 10	< 30 < 10	< 30 < 10	< 30 < 10	< 30 < 10	< 30 < 10	< 30 < 10	< 30 < 10
U1	10/03/1997	N	< 10	**1 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	11/19/1998	N	--	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	11/19/1999	N	< 0.1	**0.38**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
U1	9/27/2000	N	< 0.1	**1.5**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
U1	9/27/2000	FD	< 0.1	**1.6**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
U1	10/19/2001	N	**0.0087**	**2.6**	**0.045**	**0.044**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	11/01/2002	N	< 0.0034	**0.20**	< 0.0034	**0.011**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	12/21/2003	N	**0.030 b**	**0.59**	**0.016**	**0.027**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	10/29/2004	N	< 0.0035	**0.22**	**0.014**	**0.049**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
U1	11/10/2005	N	**0.0087**	**0.22**	**0.015**	**0.039**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	10/21/2006	N	**0.010**	**0.23**	**0.014**	**0.040**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	9/16/2007	N	**0.0047**	**0.22**	**0.0082 b**	**0.027**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	11/09/2007	N	< 0.0034	**0.15**	< 0.0068	**0.027**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	3/19/2008	N	< 0.0034	**0.098**	< 0.0034	**0.014**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	6/14/2008	N	< 0.0033	**0.13**	< 0.0044	**0.020**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	9/04/2008	N	< 0.0033	**0.13**	< 0.0033	**0.014**	< 0.0033 *	< 0.0033	< 0.0033 *	< 0.0033 *	< 0.0033 *	< 0.0033 *	< 0.0033
U1	10/10/2008	N	**0.0037**	**0.050**	< 0.0034	**0.020**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	2/25/2009	N	< 0.0033	**0.12**	< 0.0033	**0.012**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	6/10/2009	N	**0.0040**	**0.12**	**0.0075**	**0.050**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	9/09/2009	N	**0.0049**	**0.17**	**0.0055**	**0.037**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	10/05/2009	N	**0.0036 b**	**0.18**	**0.0052 b**	**0.031**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	10/05/2009	FD	**0.0039 b**	**0.18**	**0.0059 b**	**0.035**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	3/09/2010	N	**0.0065**	**0.27**	**0.0084**	**0.048**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U1	6/04/2010	N	**0.0057 b**	**0.25**	**0.0061**	**0.036**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	8/09/2010	N	**0.0039**	**0.24**	**0.0051**	**0.029**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	10/05/2010	N	< 0.0033	**0.19**	**0.0046**	**0.023**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	3/22/2011	N	< 0.0034	**0.17**	**0.0061**	**0.027**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	6/06/2011	N	< 0.0034	**0.071**	**0.0040**	**0.015**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	9/11/2011	N	< 0.0034	**0.014**	< 0.0034	**0.013**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	10/15/2011	N	< 0.0033	**0.024**	< 0.0033	**0.012**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	10/15/2011	FD	< 0.0034	**0.022**	< 0.0034	**0.013**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	3/16/2012	N	< 0.0037	< 0.0037	< 0.0037	**0.011**	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037
U1	6/09/2012	N	< 0.0036	**0.0094**	< 0.0036	**0.013**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
U1	9/27/2012	N	< 0.0034	**1.0**	**0.0080**	**0.043**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	10/17/2012	N	< 0.0033 h	**0.012 h**	**0.0035 h**	**0.024 h**	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h
U1	3/07/2013	N	**0.0049**	**0.028**	**0.0055**	**0.030**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	5/30/2013	N	< 0.0033	**0.023**	**0.0042**	**0.026**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	8/14/2013	N	< 0.0033	**0.021**	**0.0044**	**0.023**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	10/08/2013	N	< 0.0035	**0.023**	**0.0050**	**0.031**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
U1	3/27/2014	N	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
U1	6/30/2014	N	**0.0045**	**0.023**	**0.0055**	**0.034**	< 0.0033	< 0.0033	< 0.0033 BQX	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	9/30/2014	N	< 0.0034	**0.020**	**0.0052**	**0.021**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	10/16/2014	N	< 0.0034	**0.018**	**0.0043**	**0.019**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	3/20/2015	N	< 0.0037	**0.015**	**0.0044**	**0.019**	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037
U1	6/30/2015	N	< 0.0033 h	**0.0060 h**	**0.0039 h**	**0.021 h**	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h
U1	9/01/2015	N	< 0.0034	**0.0086**	< 0.0034	**0.019**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	10/07/2015	N	< 0.0034	**0.012**	< 0.0034	**0.018**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	2/04/2016	N	< 0.0033	**0.0047**	< 0.0033	**0.011**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	6/30/2016	N	< 0.0034 h	< 0.0034 h	< 0.0034 h	**0.020 h**	< 0.0034 h	< 0.0034 h	< 0.0034 ch	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h
U1	9/12/2016	N	< 0.0033	**0.0040**	< 0.0033	**0.011**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1	10/18/2016	N	**0.0038**	**0.0096**	**0.0049**	**0.030**	< 0.0035	< 0.0035	< 0.0035 c	< 0.0035	< 0.0035	< 0.0035	< 0.0035
U1	3/21/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.016**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	6/28/2017	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1	9/12/2017	N	< 0.0033	< 0.0033	< 0.0033	**0.015**	**0.0044**	**0.0058 b**	**0.0050 c**	**0.0081 b**	**0.0049**	**0.0037**	**0.0062 b**
U1	10/13/2017	N	< 0.0034	**0.0055**	**0.0037**	**0.017**	< 0.0034	< 0.0034	< 0.0034 c	**0.0047**	< 0.0034	< 0.0034	< 0.0034
U1A	10/01/1997	N	< 10	**11**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1A	11/18/1998	N	< 10	**6 j**	< 10	< 10	< 10	< 10	< 10	--	< 10	< 10	< 10
U1A	12/10/1999	N	< 0.1	**5.1**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
U1A	9/26/2000	N	< 0.1	**5.4**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U1A	10/16/2001	N	**0.0092**	**5.1**	**0.056**	**0.088**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1A	11/01/2002	N	< 0.10	**3.5**	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
U1A	12/16/2003	N	< 0.020	**0.94**	**0.031**	**0.038**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
U1A	10/29/2004	N	**9.9**	**110**	**2.1**	**2.4**	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17
U1A	2/10/2005	N	< 0.0034	**0.61**	**0.016**	**0.057**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	2/10/2005	FD	< 0.017	**2.5**	**0.069**	**0.26**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U1A	11/12/2005	N	**0.0046**	**0.25**	< 0.015	**0.057**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	10/18/2006	N	< 0.0034	**0.18**	**0.0075**	**0.045**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	10/02/2009	N	**0.0060**	**1.5**	**0.016**	**0.087**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	10/12/2010	N	< 0.0033	**0.083**	**0.0079**	**0.058**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1A	10/16/2011	N	< 0.0033	**1.4**	**0.011**	**0.052**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1A	3/16/2012	N	< 0.0033	**1.1**	**0.0080**	**0.049**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1A	6/09/2012	N	< 0.0033	**1.3**	**0.011**	**0.036**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1A	9/27/2012	N	< 0.0034	**0.015**	< 0.0034	**0.020**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	10/18/2012	N	**0.0037**	**0.97**	**0.013**	**0.057**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	10/08/2013	N	**0.0045 b**	**1.5**	**0.018**	**0.069**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	10/16/2014	N	**0.0052**	**1.4**	**0.023**	**0.067**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1A	10/07/2015	N	< 0.0034	**0.78**	**0.012**	**0.039**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	10/18/2016	N	**0.0044**	**0.35**	**0.012**	**0.062**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U1A	10/13/2017	N	< 0.0034	**0.20**	**0.0085**	**0.034**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U1A	10/13/2017	FD	< 0.0034	**0.21**	**0.0081**	**0.036**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U2	7/07/1988	N	< 10	**42**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	--
U2	12/29/1988	N	< 10	**77**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	2/27/1989	N	--	--	--	--	--	--	--	--	--	--	--
U2	8/03/1989	N	< 10	**67**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	5/04/1990	N	--	--	--	--	--	--	--	--	--	--	--
U2	6/22/1990	N	--	--	--	--	--	--	--	--	--	--	--
U2	10/30/1990	N	< 10	**46**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	10/17/1991	N	< 10	**19**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	12/03/1992	N	< 20	**7 j***	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
U2	10/18/1993	N	< 10	**12**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	9/28/1994	N	< 10	**13**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	10/18/1995	N	< 30	**6 j**	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
U2	10/02/1996	N	< 10	**2 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	10/03/1997	N	< 10	**2 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	11/19/1998	N	--	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U2	11/19/1999	N	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
U2	9/27/2000	N	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
U2A	10/01/1997	N	< 10	**11**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2A	11/18/1998	N	< 10	**6 j**	< 10	< 10	< 10	< 10	< 10	--	< 10	< 10	< 10
U2A	11/19/1999	N	**0.9 j**	**10**	< 10	**0.3 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2A	11/19/1999	FD	**1 j**	**11**	< 10	**0.3 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2A	12/10/1999	N	< 10	**12**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2A	9/26/2000	N	< 9.6	**11**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U2A	10/16/2001	N	< 9.6	**12**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U2A	11/01/2002	N	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U2A	12/16/2003	N	< 9.9	**10**	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9
U2A	10/29/2004	N	**0.38**	**9.5**	**0.086**	**0.16**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
U2A	11/12/2005	N	**0.36**	**8.0**	**0.13**	**0.19**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034
U2A	10/18/2006	N	**0.14**	**6.8**	**0.061**	**0.14**	< 0.0066	< 0.0066	< 0.0066	< 0.0066	< 0.0066	< 0.0066	< 0.0066
U2A	11/13/2007	N	**0.082 b**	**4.7**	**0.049**	**0.13**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U2A	10/16/2008	N	**0.095**	**5.3**	**0.035**	**0.12**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U2A	10/13/2010	N	**0.0052**	**7.3**	< 0.029	**0.076**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U2A	10/16/2011	N	**0.0082 b**	**4.9**	**0.026**	**0.083**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U2A	10/18/2012	N	**0.0096**	**3.3**	**0.028**	< 0.11	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
U2A	10/11/2013	N	**0.017**	**3.8**	**0.032**	**0.14**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
U2A	10/21/2014	N	**0.012**	**3.0**	**0.037**	**0.10**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U2A	10/14/2015	N	< 0.017	**2.6**	**0.057**	**0.053**	< 0.017	< 0.017	< 0.017 c	< 0.017	< 0.017	< 0.017	< 0.017
U2A	10/11/2016	N	< 0.034	**0.76**	**0.063**	**0.11**	**0.036**	**0.035**	**0.035 c**	**0.041**	**0.034**	**0.042**	**0.036**
U2A	10/20/2017	N	< 0.017	**2.2**	**0.031**	**0.098**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U3	7/06/1988	N	**31**	**59**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	--
U3	12/29/1988	N	< 10 < 10	**60** **73**	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10
U3	2/27/1989	N	--	--	--	--	--	--	--	--	--	--	--
U3	8/03/1989	N	**10**	**69**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U3	5/04/1990	N	--	--	--	--	--	--	--	--	--	--	--
U3	10/30/1990	N	**2 j**	**90**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U3	10/17/1991	N	< 30	**51**	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
U3	10/14/1992	N	< 25	**71**	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25
U3	10/18/1993	N	< 100	**33 j**	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
U3	9/29/1994	N	**5 j**	**71**	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
U3	10/18/1995	N	< 100	**56 j**	< 100	< 100	< 100	**17 j**	**12 j**	< 100	**16 j**	< 100	**25 j**

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U3	10/02/1996	N	< 10	**36 ***	< 10 *	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U3	10/01/1997	N	**3 j**	**56**	**1 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U3	11/18/1998	N	**2 j**	**43**	< 10	< 10	< 10	< 10	< 10	--	< 10	< 10	< 10
U3	11/19/1999	N	**2 j**	**83**	**2 j**	**1 j**	< 10	< 10	< 10	**0.6 j**	< 10	< 10	< 10
U3	12/10/1999	N	< 10	**69**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U4	7/06/1988	N	< 10	**45**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	--
U4	12/29/1988	N	< 10 pp	**81**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U4	2/27/1989	N	--	--	--	--	--	--	--	--	--	--	--
U4	8/03/1989	N	< 50 pp	**94**	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
U4	5/04/1990	N	--	--	--	--	--	--	--	--	--	--	--
U4	10/30/1990	N	**15**	**71**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U4	10/17/1991	N	< 75	**93**	< 75	< 75	< 75	< 75	< 75	< 75	< 75	< 75	< 75
U4	9/17/1992	N	**16 j**	**110**	< 60	< 60	< 60	< 60	< 60	< 60	< 60	< 60	< 60
U4	10/14/1992	N	**25 j**	**120**	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
U4	10/27/1992	N	**22**	**160**	**2 j**	**2 j**	**1 j**	< 6	< 6	< 6	< 6	< 6	< 6
U4	10/18/1993	N	**21 j**	**95**	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
U4	9/28/1994	N	**43 j**	**140**	< 80	< 80	< 80	< 80	< 80	< 80	< 80	< 80	< 80
U4	10/18/1995	N	**26 j**	**120 j**	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250
U4	10/02/1996	N	**38**	**120**	**2 j**	**2 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U4	10/01/1997	N	**22**	**75**	**2 j**	**2 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U4	11/18/1998	N	**30**	**110**	**2 j**	**2 j**	< 10	< 10	< 10	--	< 10	< 10	< 10
U4	1/14/2000	N	< 10	**85**	**1 j**	**2 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U4	9/26/2000	N	**15**	**94**	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
U4	10/16/2001	N	**54**	**130**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U4	5/15/2002	N	**0.023 b**	**0.094**	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
U4N	11/01/2002	N	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U4N	12/16/2003	N	< 9.6	**17**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U4N	10/29/2004	N	**1.9**	**17**	**0.14**	**0.33**	**0.0086**	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086
U4N	11/12/2005	N	**2.3**	**23**	**0.28**	**0.50**	**0.058**	**0.087**	**0.085**	**0.060**	**0.061**	**0.066**	< 0.017
U4N	10/18/2006	N	**3.9**	**49**	**0.49**	**0.52**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U4N	11/13/2007	N	**1.2**	**29**	**0.31**	**0.47**	< 0.032	< 0.032	< 0.032	< 0.032	< 0.032	< 0.032	< 0.032
U4N	10/16/2008	N	**1.4**	**33**	**0.31**	**0.52**	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068
U4N	10/02/2009	N	**2.5**	**36**	**0.33**	**0.39**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
U4N	10/12/2010	N	**1.1**	**31**	**0.24**	**0.45**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U4N	10/16/2011	N	**1.5**	**31**	**0.26**	**0.48**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U4N	10/18/2012	N	< 0.017	**24**	**0.35**	**0.44**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U4N	10/11/2013	N	**3.9**	**43**	**0.43**	**0.79**	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033
U4N	10/21/2014	N	**2.5**	**28**	**0.15**	**0.40**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.020**	< 0.0034
U4N	10/14/2015	N	**2.7**	**33**	**0.61**	**0.52**	< 0.017	< 0.017	< 0.017 c	< 0.017	< 0.017	< 0.017	< 0.017
U4N	10/11/2016	N	**2.2**	**33**	**0.35**	**0.63**	< 0.033	< 0.033	< 0.033 c	< 0.033	< 0.033	< 0.033	< 0.033
U4N	10/20/2017	N	**0.56**	**37**	**0.38**	**0.54**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	**0.056**
U5	7/07/1988	N	**220**	**150**	< 10	< 10 pp	< 10	< 10	< 10	< 10	< 10	< 10	--
U5	12/29/1988	N	**160**	**170**	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
U5	2/27/1989	N	--	--	--	--	--	--	--	--	--	--	--
U5	8/03/1989	N	**78**	**130**	< 10	< 10 pp	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U5	6/22/1990	N	--	--	--	--	--	--	--	--	--	--	--
U5	10/30/1990	N	**57**	**220**	< 20	**6 j**	< 20	< 20	< 20	< 20	< 20	< 20	< 20
U5	12/03/1992	N	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70
U5	10/18/1993	N	< 10	**91**	**2 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U5	9/28/1994	N	**13 j**	**210**	< 40	**5 j**	< 40	< 40	< 40	< 40	< 40	< 40	< 40
U5	10/18/1995	N	< 400	**110 j**	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400	< 400
U5	10/01/1997	N	**28**	**170**	**2 j**	**6 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U5	11/18/1998	N	**15**	**220**	**3 j**	**6 j**	< 10	< 10	< 10	--	< 10	< 10	< 10
U5	11/19/1999	N	**22**	**270**	**3 j**	**7 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U5	9/26/2000	N	**38**	**270**	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5	< 9.5
U5	10/16/2001	N	**37**	**160**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U5	11/01/2002	N	< 9.6	**87**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U5	12/16/2003	N	< 10	**210**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U5	10/29/2004	N	**0.021 b**	**66**	**3.9**	**0.79**	**0.079**	**0.078**	**0.14**	**0.047**	**0.059**	**0.046**	**0.021**
U5	11/12/2005	N	< 0.034	**18**	**5.0**	**1.8**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	**0.10**	< 0.034
U5	10/18/2006	N	**9.5**	**170**	**1.7**	**4.0**	**0.089**	< 0.017	< 0.017	< 0.017	< 0.017	**0.073**	< 0.017
U5	11/13/2007	N	< 0.032	**37**	**6.1**	**1.0**	**0.12**	**0.088**	**0.15**	**0.044**	**0.059**	**0.089**	< 0.032
U5	10/16/2008	N	**0.39**	**160**	**1.7**	**2.9**	**0.16**	**0.043**	**0.073**	**0.024**	**0.026**	**0.071**	< 0.017
U5	10/02/2009	N	**0.27**	**170**	**1.6**	**4.1**	**0.13**	**0.0084**	**0.015**	**0.0048**	**0.0057**	**0.031**	< 0.0033
U5	10/12/2010	N	**0.53**	**230**	**1.9**	**4.7**	**0.14**	**0.014**	**0.022**	**0.0054**	**0.0075**	**0.098**	< 0.0033
U5	10/16/2011	N	**0.033 b**	**76**	**2.2**	**0.82**	**0.064**	**0.023**	**0.043**	< 0.017	< 0.017	**0.078**	< 0.017
U5	10/18/2012	N	**1.5**	**170**	**1.5**	**2.7**	**0.12**	< 0.018	< 0.018	< 0.018	< 0.018	**0.038**	< 0.018
U5	10/11/2013	N	**0.96**	**170**	**1.8**	**4.1**	**0.24**	< 0.034	**0.046**	< 0.034	< 0.034	**0.10**	< 0.034
U5	10/21/2014	N	**0.84**	**170**	**1.4**	**3.0**	**0.18**	**0.027**	**0.039**	**0.014**	**0.013**	**0.11**	**0.0041**
U5	10/14/2015	N	**0.38**	**160**	**1.8**	**2.8**	**0.14**	< 0.033	< 0.033 c	< 0.033	< 0.033	**0.10**	< 0.033
U5	10/11/2016	N	**0.32**	**120**	**1.3**	**2.2**	**0.14**	< 0.033	< 0.033 c	< 0.033	< 0.033	**0.052**	< 0.033
U5	12/04/2017	N	< 0.33	**110**	**3.8**	**0.98**	< 0.33	< 0.33	< 0.33 c	< 0.33	< 0.33	< 0.33	< 0.33

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U6	7/06/1988	N	**58**	**26**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	--
U6	12/29/1988	N	< 10 pp	**17**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U6	2/27/1989	N	--	--	--	--	--	--	--	--	--	--	--
U6	8/03/1989	N	**21**	**30**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U6	6/22/1990	N	--	--	--	--	--	--	--	--	--	--	--
U6	10/30/1990	N	**43**	**36**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U6	10/17/1991	N	**22 j**	**30 j**	< 75	< 75	< 75	< 75	< 75	< 75	< 75	< 75	< 75
U6	9/17/1992	N	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250
U6	10/14/1992	N	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
U6	10/27/1992	N	**47**	**31**	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
U6	10/18/1993	N	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250
U6	9/28/1994	N	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380	< 380
U6	10/18/1995	N	< 1400	< 1400	< 1400	< 1400	< 1400	< 1400	< 1400	< 1400	< 1400	< 1400	< 1400
U6	10/02/1996	N	**54 j**	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
U6	10/01/1997	N	**88**	**16**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U6	11/18/1998	N	**37**	**16**	**1 j**	< 10	< 10	< 10	< 10	--	< 10	< 10	< 10
U6N	1/14/2000	N	**94**	**240**	**3 j**	**12**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U6N	9/26/2000	N	**42**	**98**	< 9.6	**11**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U6N	10/16/2001	N	**27**	**89**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U6N	11/01/2002	N	**34**	**91**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U6N	12/16/2003	N	**33**	**80**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U6N	10/29/2004	N	**0.033**	**41**	**0.63**	**0.64**	**0.018**	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086	< 0.0086
U6N	2/10/2005	N	**85**	**310**	**0.54**	**16**	**0.28**	**0.033**	**0.062**	**0.0087**	**0.018**	**0.082**	< 0.0034
U6N	11/12/2005	N	**22**	**49**	**0.74**	**3.6**	**0.29**	**0.039**	**0.040**	< 0.034	**0.059**	**0.18**	< 0.034
U6N	10/18/2006	N	**18**	**56**	**0.58**	**2.6**	**0.45**	**0.13**	**0.17**	**0.049**	**0.14**	**0.27**	< 0.033
U6N	11/13/2007	N	**1.6**	**48**	**0.60**	**2.3**	**0.64**	**0.36**	**0.59**	**0.14**	**0.20**	**0.40**	**0.045**
U6N	10/16/2008	N	**16**	**65**	**0.62**	**2.4**	**0.39**	**0.053**	**0.097**	< 0.034	< 0.034	**0.097**	< 0.034
U6N	10/02/2009	N	**4.1**	**47**	**0.57**	**2.1**	**0.43**	**0.059**	**0.13**	< 0.033	**0.033**	**0.089**	< 0.033
U6N	10/12/2010	N	**13**	**53**	**0.97**	**3.7**	**5.8**	**4.5**	**5.6**	**1.5**	**2.7**	**3.1**	**0.48**
U6N	10/16/2011	N	**7.8**	**34**	**0.64**	**3.6**	**11**	**7.6**	**13**	**3.5**	**4.6**	**5.8**	**1.3**
U6N	10/18/2012	N	**0.025**	**40**	**0.47**	**1.2**	**0.74**	**0.32**	**0.45**	**0.11**	**0.17**	**0.25**	**0.036**
U6N	10/11/2013	N	**0.48**	**44**	**0.58**	**2.0**	**0.57**	**0.076**	**0.15**	< 0.033	**0.047**	**0.13**	< 0.033
U6N	10/21/2014	N	< 0.065	**28**	**0.47**	**1.3**	**2.8**	**1.9**	**2.9**	**0.80**	**1.0**	**1.5**	**0.27**
U6N	10/14/2015	N	**5.1**	**29**	**0.54**	**1.7**	**3.6**	**2.6**	**4.2 c**	**1.1**	**1.5**	**2.8**	**0.28**
U6N	10/11/2016	N	**8.2**	**28**	**0.44**	**1.4**	**0.47**	**0.13**	**0.25 c**	**0.057**	**0.083**	**0.14**	< 0.033
U6N	10/20/2017	N	**0.33**	**35**	**0.52**	**3.1**	**9.2**	**6.5**	**10**	**2.8**	**2.7**	**5.3**	**0.89**

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U7	7/06/1988	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	--
U7	12/29/1988	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U7	2/27/1989	N	--	--	--	--	--	--	--	--	--	--	--
U7	8/03/1989	N	< 10	**69**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U7	5/04/1990	N	--	--	--	--	--	--	--	--	--	--	--
U7	10/30/1990	N	< 10	**81**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U7	10/17/1991	N	< 10	**57**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U7	12/03/1992	N	< 20	**12 j***	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
U7	10/18/1993	N	< 20	**12 j**	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
U7	9/28/1994	N	< 15 < 10	**21** **24**	< 15 < 10	< 15 < 10	< 15 < 10	< 15 < 10	< 15 < 10	< 15 < 10	< 15 < 10	< 15 < 10	< 15 < 10
U7	10/18/1995	N	< 70	**22 j**	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70
U7	10/02/1996	N	< 50	**13 j***	< 50 *	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
U7	10/01/1997	N	< 10	**25**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U7	11/18/1998	N	< 120	**18 j**	< 120	< 120	< 120	< 120	< 120	--	< 120	< 120	< 120
U7N	1/14/2000	N	**7 j**	**38**	**0.7 j**	**2 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U7N	9/26/2000	N	**17**	**110**	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
U7N	10/16/2001	N	**14**	**110**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U7N	11/01/2002	N	< 9.7	**110**	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
U7N	12/16/2003	N	< 9.9	**88**	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9	< 9.9
U7N	10/29/2004	N	**4.1**	**80**	**0.59**	**1.4**	**0.037**	< 0.0086	< 0.0086	< 0.0086	< 0.0086	**0.013**	< 0.0086
U7N	11/12/2005	N	**6.3**	**85**	**0.90**	**1.9**	**0.070**	**0.030**	**0.030**	< 0.017	**0.026**	**0.054**	< 0.017
U7N	10/18/2006	N	**5.4**	**91**	**0.58**	**1.5**	**0.053**	< 0.017	< 0.017	< 0.017	< 0.017	**0.032**	< 0.017
U7N	11/13/2007	N	**3.1**	**79**	**0.50**	**0.98**	**0.049**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U7N	10/16/2008	N	**3.8**	**75**	**0.46**	**1.2**	**0.065**	< 0.0067	< 0.0067	< 0.0067	< 0.0067	**0.016**	< 0.0067
U7N	10/02/2009	N	**3.5**	**100**	**0.48**	**1.1**	**0.071**	< 0.0033	**0.0034**	< 0.0033	< 0.0033	**0.014**	< 0.0033
U7N	10/12/2010	N	**4.4**	**87**	**0.56**	**1.1**	**0.086**	< 0.017	< 0.017	< 0.017	< 0.017	**0.019**	< 0.017
U7N	10/16/2011	N	**3.1**	**62**	**0.54**	**1.9**	**0.11**	< 0.017	< 0.017	< 0.017	< 0.017	**0.033**	< 0.017
U7N	10/18/2012	N	**2.0**	**74**	**0.38**	**0.83**	**0.061**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.010**	< 0.0034
U7N	10/11/2013	N	**2.6**	**95**	**0.68**	**1.7**	**0.11**	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033
U7N	10/21/2014	N	**3.0**	**75**	**0.43**	**0.75**	**0.090**	< 0.0033	**0.0045 c**	< 0.0033	< 0.0033 c	**0.030**	< 0.0033
U7N	10/14/2015	N	**3.0**	**96**	**1.0**	**1.5**	**0.10**	< 0.033	< 0.033 c	< 0.033	< 0.033	< 0.033	< 0.033
U7N	10/11/2016	N	**1.9**	**69**	**0.60**	**1.0**	**0.075**	< 0.033	< 0.033 c	< 0.033	< 0.033	< 0.033	< 0.033
U7N	10/20/2017	N	**1.5**	**86**	**0.55**	**1.1**	**0.13**	**0.029**	**0.047**	**0.019**	**0.018**	**0.043**	< 0.017
U8	12/29/1988	N	< 10	**140**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U8	2/27/1989	N	--	--	--	--	--	--	--	--	--	--	--

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U8	8/03/1989	N	**65**	**150**	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
U8	12/03/1992	N	**110 ***	**280 ***	< 40	**62 ***	**91 ***	**33 j***	**45 ***	< 40	**32 j***	**54 c***	< 40
U8	10/18/1993	N	**33 j**	**69**	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
U8	9/28/1994	N	**380**	**740**	< 150	**140 j**	**200**	**89 j**	**110 j**	**29 j**	**82 j**	**180 c**	< 150
U8	10/20/1995	N	**130 j**	**280**	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250
U8	10/02/1996	N	**140 j**	**210**	< 150	**17 j**	< 150	< 150	< 150	< 150	< 150	< 150	< 150
U8	10/01/1997	N	**730**	**710**	**16**	**100 j**	**110**	**55**	**61**	**21**	**49**	**87 c**	**11**
U8	2/02/2000	N	**710**	**860**	**14**	**170**	**160**	**74**	**120**	**27**	**39**	**110**	< 10
U8	9/26/2000	N	**690**	**930**	**17**	**210**	**250**	**83**	**100**	**25**	**72**	**200**	**11**
U8	10/16/2001	N	**140**	**360**	< 9.6	**19**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U8	12/22/2003	N	**160**	**250**	**5.7**	**27**	**36**	**18**	**24**	**5.1**	**16**	**20**	< 3.4
U11	10/18/2001	N	< 10	**130**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U11	11/01/2002	N	**22**	**120**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U11	11/01/2002	FD	**23**	**120**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U11	12/16/2003	N	**63**	**150**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
U11	10/29/2004	N	**0.0035 b**	**0.023**	**0.0079**	**0.043**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
U11	2/10/2005	N	**66**	**530**	**1.5**	**1.3**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
U11	11/12/2005	N	**14**	**120**	**2.2**	**2.1**	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17
U11	10/18/2006	N	**6.9**	**75**	**1.3**	**1.2**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034
U11	11/13/2007	N	**6.7**	**90**	**1.3**	**1.2**	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033
U11	11/13/2007	FD	**6.4**	**87**	**1.3**	**1.3**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034
U11	10/16/2008	N	**5.2**	**88**	**1.7**	**1.5**	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033
U11	10/16/2008	FD	**4.1**	**78**	**1.4**	**1.4**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U11	10/02/2009	N	**11**	**94**	**1.8**	**1.6**	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033
U11	10/12/2010	N	**18**	**87**	**2.3**	**2.1**	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17
U11	10/12/2010	FD	**18**	**100**	**2.3**	**2.0**	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17
U11	10/16/2011	N	**6.8**	**86**	**1.5**	**1.6**	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033
U11	10/18/2012	N	**0.030 ***	**17 ***	**0.62 ***	**0.65 ***	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U11	10/11/2013	N	**11**	**95**	**1.7**	**1.7**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034
U11	10/21/2014	N	**7.2**	**76**	**1.9**	**1.4**	< 0.065	< 0.017	< 0.017	< 0.017	< 0.017	< 0.065	< 0.017
U11	10/14/2015	N	**11**	**110**	**2.6**	**1.6**	< 0.033	< 0.033	< 0.033 c	< 0.033	< 0.033	< 0.033	< 0.033
U11	10/11/2016	N	**5.6**	**79**	**1.6**	**1.4**	< 0.033	< 0.033	< 0.033 c	< 0.033	< 0.033	< 0.033	< 0.033
U11	10/11/2016	FD	**4.7**	**76**	**1.5**	**1.2**	< 0.033	< 0.033	< 0.033 c	< 0.033	< 0.033	< 0.033	< 0.033
U11	10/20/2017	N	< 0.033	**15**	**0.96**	**0.46**	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033	< 0.033
U12	10/16/2001	N	< 9.7	**61**	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7	< 9.7
U12	11/01/2002	N	< 9.6	**54**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
U12	12/16/2003	N	< 10	**68**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U12	10/29/2004	N	**18**	**63**	**0.79**	**3.5**	**0.23**	**0.019**	**0.036**	< 0.017	< 0.017	**0.071**	< 0.017
U12	11/12/2005	N	< 0.068	**76**	**1.2**	**1.2**	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068
U12	10/21/2006	N	**0.030**	**54**	**0.75**	**0.64**	**0.020**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.014**	< 0.0034
U12	11/13/2007	N	< 0.017	**50**	**0.79**	**0.55**	**0.018**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
U12	10/16/2008	N	< 0.036	**65**	**1.1**	**0.70**	< 0.036	< 0.036	< 0.036	< 0.036	< 0.036	< 0.036	< 0.036
U12	10/02/2009	N	**0.013**	**43**	**0.59**	**0.57**	**0.23**	**0.074**	**0.11**	**0.032**	**0.089**	**0.33**	**0.019**
U12	10/12/2010	N	**0.018**	**62**	**0.65**	**0.62**	**0.019**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	**0.0064**	< 0.0033
U12	10/16/2011	N	< 0.018	**34**	**0.70**	**0.57**	**0.019**	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018
U12	10/18/2012	N	**0.0095**	**43**	**0.42**	**0.47**	**0.018**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	**0.011**	< 0.0033
U12	10/11/2013	N	**0.012**	**53**	**0.59**	**0.64**	**0.024**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	**0.014 ***	< 0.0035
U12	10/21/2014	N	**0.012**	**48**	**0.62**	**0.57**	**0.020**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.017	< 0.0033
U12	10/14/2015	N	< 0.017	**48**	**0.83**	**0.60**	**0.023**	< 0.017	< 0.017 c	< 0.017	< 0.017	< 0.017	< 0.017
U12	10/11/2016	N	< 0.033	**56**	**0.86**	**0.67**	< 0.033	< 0.033	< 0.033 c	< 0.033	< 0.033	< 0.033	< 0.033
U12	10/20/2017	N	< 0.017	**65**	**0.74**	**0.66**	**0.025**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
W6	12/27/1984	N	**4.2**	**0.95**	**1.7**	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.28
W6	3/27/1985	N	**19**	**1.1**	< 0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.70
W6	5/16/1985	N	**0.58**	**0.11**	< 0.010	**0.034**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	**0.030 c**	< 0.014
W6	6/04/1986	N	**0.013**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W6	7/29/1987	N	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
W6	10/06/1988	N	**6.6**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W6	12/12/1988	N	**15**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W6	6/22/1990	N	--	--	--	--	--	--	--	--	--	--	--
W6	10/30/1990	N	**4 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W6	10/17/1991	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W6	10/13/1992	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W6	10/19/1993	N	< 0.00600	< 0.00600	< 0.00600	< 0.00600	< 0.00600	< 0.00600	< 0.00600	< 0.00600	< 0.00600	< 0.0120	< 0.00600
W6	9/30/1994	N	**0.007 b**	< 0.003	< 0.003	**0.010**	< 0.003	< 0.003	**0.004**	< 0.003	**0.005**	**0.009 c**	< 0.003
W6	10/20/1995	N	**0.012**	**0.012**	< 0.003	**0.038**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.006 c**	< 0.003
W6	10/03/1996	N	**0.003 b**	**0.004**	< 0.003	**0.012**	**0.012**	**0.015**	**0.016**	**0.010**	**0.011**	**0.028 c**	< 0.003
W6	10/06/1997	N	**0.019**	**0.19 e**	**0.010**	**0.011**	**0.006**	**0.004**	**0.012**	**0.004**	**0.008**	**0.017 c**	< 0.003
W6	11/21/1998	N	< 0.003	**0.003**	< 0.003	**0.13 e**	**0.026**	**0.032**	**0.037**	--	**0.034**	**0.085 c**	< 0.003
W6N	11/17/1999	N	**0.016 b**	**0.008**	**0.008**	**0.061**	**0.050 b**	**0.066**	**0.086 b**	**0.057**	**0.084 b**	**0.090 b**	**0.013**
W6N	9/28/2000	N	**0.007 b**	**0.004**	< 0.003	**0.032**	**0.003 b**	**0.003**	**0.006**	**0.003**	**0.004**	**0.007 b**	< 0.003
W6N	10/16/2001	N	**0.0034**	**0.0087**	< 0.0033	**0.035**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W6N	10/29/2002	N	**0.0036 b**	**0.0043**	**0.0039**	**0.011**	**0.0038**	**0.0035**	**0.0038**	< 0.0034	< 0.0034	**0.0034**	< 0.0034

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Historical Water Quality Data
Joslyn Manufacturing and Supply Company
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		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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W6N	12/17/2003	N	**0.029 b**	**0.40**	**0.026**	**0.094**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0046**	< 0.0034
W6N	12/17/2003	FD	**0.027 b**	**0.46**	**0.032**	**0.11**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0064**	< 0.0034
W6N	10/19/2004	N	**0.0041**	< 0.014	**0.0036**	**0.075**	< 0.0034	< 0.0034	**0.0035**	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/21/2005	N	< 0.0034	< 0.0034	**0.0069**	**0.074**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	11/08/2005	N	< 0.0034	< 0.0034	**0.0043**	**0.039**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/18/2006	N	< 0.0034	< 0.0034	< 0.0034	**0.071**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/18/2006	FD	< 0.0033	< 0.0033	< 0.0033	**0.067**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W6N	11/07/2007	N	< 0.0034	**0.0038**	**0.0037**	< 0.069	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/09/2008	N	**0.0045**	< 0.0036	**0.0056**	< 0.071	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0041	< 0.0036
W6N	9/29/2009	N	**0.010 b**	**0.021**	**0.013**	**0.14**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W6N	6/04/2010	N	**0.0061 b**	**0.0044**	**0.0060**	**0.083**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	6/04/2010	FD	**0.0054 b**	< 0.0034	**0.0070**	**0.080**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/05/2010	N	**0.0068**	**0.0077**	**0.0091**	< 0.12	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W6N	6/06/2011	N	**0.0098**	**0.0088**	**0.0096**	< 0.17	< 0.0047	< 0.0034	**0.0037**	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/14/2011	N	< 0.0033	**0.051**	< 0.0033	**0.047**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W6N	6/09/2012	N	< 0.036	< 0.036	< 0.036	**0.12 ***	< 0.036	< 0.036	< 0.036	< 0.036	< 0.036	< 0.036	< 0.036
W6N	8/07/2012	N	**0.0038 b**	**0.0057**	**0.0055**	**0.064**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	8/24/2012	N	**0.0068**	**0.011**	**0.0079**	< 0.11	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/18/2012	N	**0.0050**	**0.031**	**0.0075**	< 0.11	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	5/30/2013	N	**0.020 ***	**0.025**	**0.017 ***	< 0.26	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/10/2013	N	**0.0042**	**0.0070**	**0.0075**	**0.13**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	6/30/2014	N	**0.011**	**0.0056 ***	**0.013**	**0.17**	< 0.0033	< 0.0033	< 0.0033 BQX	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W6N	10/16/2014	N	**0.0046**	**0.0045 ***	**0.0083**	**0.096**	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037	< 0.0037
W6N	7/15/2015	N	**0.014 ***	**0.0053 ***	**0.014**	**0.14**	**0.023**	**0.011**	**0.017**	**0.0038**	**0.0091**	**0.028**	< 0.0034
W6N	10/07/2015	N	**0.0075 b**	**0.011**	**0.022**	**0.16 ***	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/07/2015	FD	**0.0068 b***	**0.013**	**0.014**	**0.11 ***	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	6/30/2016	N	< 0.017 h	< 0.017 h	< 0.017 h	**0.16 h**	< 0.017 h	< 0.017 h	< 0.017 ch	< 0.017 h	< 0.017 h	< 0.017 h	< 0.017 h
W6N	10/14/2016	N	< 0.0033	< 0.0033	**0.0065**	**0.14**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W6N	6/28/2017	N	< 0.0034	< 0.0034	**0.0046**	**0.10**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W6N	10/12/2017	N	< 0.0033	< 0.0033	**0.0043**	**0.078**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W7	12/25/1984	N	**0.055**	< 0.013	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010 c	< 0.014
W7	12/27/1984	N	**0.060**	< 0.013	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W7	3/27/1985	N	**22**	**0.17**	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.070
W7	5/16/1985	N	**3.2**	**0.058**	< 0.010	**0.027**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W7	6/03/1986	N	**0.80**	**0.066**	< 0.0020	**0.022**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	**0.0091 c**	< 0.0028
W7	8/06/1987	N	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50

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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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W7	10/06/1988	N	**9.7**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W7	10/17/2012	N	< 0.034 h	**0.11 h**	< 0.034 h	**0.29 h**	**0.035 h**	< 0.034 h	< 0.034 h	< 0.034 h	< 0.034 h	< 0.034 h	< 0.034 h
W7	5/30/2013	N	**0.032**	**0.20**	< 0.030	< 0.50	**0.0052 ***	< 0.0034	**0.013 ***	< 0.0034	< 0.0034	**0.0079 ***	< 0.0034
W7	10/10/2013	N	< 0.034	**0.28**	**0.043 ***	**0.50**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034
W7	6/30/2014	N	**0.027**	**0.065 ***	**0.027 ***	**0.28 ***	< 0.017	< 0.017	< 0.017 BQX	< 0.017	< 0.017	< 0.017	< 0.017
W7	10/17/2014	N	**0.038**	**0.12**	**0.032**	**0.47**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
W7	10/17/2014	FD	**0.028**	**0.078**	**0.025**	**0.39**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
W7	7/15/2015	N	**0.021 ***	**0.12**	**0.035 ***	**0.43**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
W7	10/07/2015	N	**0.036 ***	**0.11**	**0.052 ***	**0.24**	**0.0044**	< 0.0033	**0.0048**	< 0.0033	< 0.0033	**0.012**	< 0.0033
W7	6/30/2016	N	**0.019 h**	**0.062 h**	**0.025 h**	**0.55 h**	< 0.017 h	< 0.017 h	< 0.017 ch	< 0.017 h	< 0.017 h	< 0.017 h	< 0.017 h
W7	10/19/2016	N	< 0.067	**0.13 ***	< 0.067	**0.48**	< 0.067	< 0.067	< 0.067 c	< 0.067	< 0.067	< 0.067	< 0.067
W7	6/28/2017	N	**0.028 ***	< 0.34	< 0.34	**0.34**	< 0.34	< 0.0034	**0.0093 c***	< 0.0034	< 0.0034	< 0.34	< 0.0034
W7	10/18/2017	N	< 0.065	< 0.065	< 0.065	**0.24**	< 0.065	< 0.065	< 0.065 c	< 0.065	< 0.065	< 0.065	< 0.065
W10	12/11/1984	N	< 0.080	**2.8**	< 0.040	**0.055**	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.056
W10	3/28/1985	N	< 0.10	**5.9**	< 0.050	**0.13**	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.070
W10	5/16/1985	N	**0.040**	**7.1**	**0.077**	**0.10**	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.035
W10	12/13/1985	N	**5.5** **2.9**	**3.6** **3.3**	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.5 < 0.5	< 0.7 < 0.7
W10	3/20/1986	N	**0.017**	**1.4**	< 0.0020	**0.032**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W10	6/03/1986	N	**0.046**	**4.5**	< 0.0080	**0.290**	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0112
W10	9/25/1986	N	< 1.0	**3.7**	< 0.5	**0.3**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.7
W10	12/11/1986	N	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9
W10	3/19/1987	N	< 0.6	**5.0**	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
W10	5/06/1987	N	< 0.5	**1.4**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
W10	7/30/1987	N	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
W10	11/05/1987	N	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
W10	2/29/1988	N	< 6.0 < 6.0	**3.4** **4.5 pp**	< 6.0 < 6.0	< 6.0 < 6.0	< 6.0 < 6.0	< 6.0 < 6.0	< 6.0 < 6.0	< 6.0 < 6.0	< 6.0 < 6.0	< 6.0 < 6.0	< 6.0 < 6.0
W10	10/06/1988	N	< 6.0	**6.9**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W10	12/12/1988	N	< 10 < 10	**23** **18**	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10
W10	2/28/1989	N	--	--	--	--	--	--	--	--	--	--	--
W10	8/04/1989	N	< 10	**22**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W10	5/02/1990	N	--	--	--	--	--	--	--	--	--	--	--
W10	10/30/1990	N	< 10	**42**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W10	10/17/1991	N	< 10	**20**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W10	10/13/1992	N	< 10	**51**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

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Joslyn Manufacturing and Supply Company
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		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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W10	10/19/1993	N	< 10 < 10	**26** **8 j**	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10
W10	9/30/1994	N	< 10	**38**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W10	10/20/1995	N	< 1.2	**14**	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
W10	10/03/1996	N	< 1.8 < 1.8	**34** **31**	< 1.8 < 1.8	< 1.8 < 1.8	< 1.8 < 1.8	< 1.8 < 1.8	< 1.8 < 1.8	< 1.8 < 1.8	< 1.8 < 1.8	< 1.8 < 1.8	< 1.8 < 1.8
W10	10/06/1997	N	**0.18 e**	**28**	**0.47 e**	**0.14 e**	**0.004**	< 0.003	< 0.003	< 0.003	< 0.003	**0.006 c**	< 0.003
W10	11/21/1998	N	< 0.003	**31**	< 0.003	**0.21 e**	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W10	11/18/1999	N	**0.016 jb**	**18**	**0.070**	**0.23 b**	**0.008**	**0.006**	**0.015**	**0.006**	**0.010**	**0.023**	< 0.003
W10	9/28/2000	N	**0.024 b**	**22**	**0.086**	**0.24**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.009 b**	< 0.003
W10	10/18/2001	N	**0.3**	**19**	**0.15**	**1.2**	**0.11**	**0.034**	**0.067**	**0.012**	**0.023**	**0.13**	**0.0042**
W10	10/29/2002	N	**0.051 b**	**2.7**	**0.027**	**0.25**	**0.074**	**0.034**	**0.043**	**0.017**	**0.030**	**0.074**	**0.0051**
W10	12/21/2003	N	**0.11**	**11**	**0.12**	**0.56**	**0.059**	**0.0073**	**0.010**	< 0.0034	**0.0081**	**0.069**	< 0.0034
W10	10/21/2004	N	**0.13**	**15**	**0.16**	**0.57**	**0.02**	**0.0068**	**0.02**	**0.0046**	< 0.0034	**0.025**	< 0.0034
W10	11/09/2005	N	**0.55**	**11**	**0.18**	**0.82**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	**0.023**	< 0.017
W10	10/20/2006	N	**0.43**	**12**	**0.22**	**0.64**	**0.017**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	**0.021**	< 0.0036
W10	11/07/2007	N	**0.18**	**12**	**0.24**	**0.56**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034
W10	10/14/2008	N	**0.30**	**12**	**0.17**	**0.62**	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018
W10	9/29/2009	N	**0.067**	**5.7**	**0.093**	**0.61**	**0.014**	**0.0075**	**0.013**	**0.0039**	**0.0050**	**0.015**	< 0.0033
W10	10/06/2010	N	**0.49**	**31**	**0.67**	**0.53**	**0.0098**	**0.0037**	**0.012 ***	< 0.0033	< 0.0033 *	**0.0088**	< 0.0033
W10	10/14/2011	N	**0.12**	**28**	**0.76**	**0.58**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
W10	10/18/2012	N	**0.28**	**50**	**0.70**	**0.81**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
W10	10/10/2013	N	**0.82**	**40**	**0.66**	**1.1**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034
W10	10/17/2014	N	**0.26**	**30**	**0.44**	**0.70**	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018
W10	10/07/2015	N	**0.15**	**36**	**0.58**	**0.56**	**0.058**	**0.011**	**0.020**	**0.0037**	**0.016**	**0.096**	< 0.0033
W10	10/19/2016	N	**0.13**	**35**	**0.73**	**0.93**	< 0.034	< 0.034	< 0.034 c	< 0.034	< 0.034	< 0.034	< 0.034
W10	10/12/2017	N	< 0.34	**42**	**0.89**	**0.70**	< 0.34	< 0.34	< 0.34 c	< 0.34	< 0.34	< 0.34	< 0.34
W104	1/24/1985	N	**0.61**	**0.036**	< 0.010	**0.011**	**0.017**	**0.014**	**0.069 c**	< 0.010	ND c	**0.029 c**	< 0.014
W104	5/16/1985	N	**0.030**	< 0.0065	< 0.0050	**0.0088**	**0.0058**	< 0.0050	**0.019 c**	< 0.0050	ND c	**0.012 c**	< 0.0070
W104	6/04/1986	N	**0.028**	**0.0089**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W104	7/29/1987	N	**0.0023**	**0.0036**	< 0.001	**0.023**	**0.018**	**0.010**	**0.032 c**	**0.0053**	**0.032 c**	**0.018 c**	< 0.0014
W104	10/05/1988	N	< 0.0020	< 0.0013	< 0.0010	**0.0057**	**0.0024**	**0.0018**	**0.0052 c**	< 0.0010	ND c	**0.0042 c**	< 0.0014
W104	12/09/1988	N	**0.0049**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W104	8/04/1989	N	**0.0052**	**0.0052**	< 0.0010	**0.013**	**0.011**	**0.0073**	**0.014 c**	< 0.0010	**0.014 c**	**0.015 c**	< 0.0014
W104	5/02/1990	N	< 0.0040	< 0.0026	< 0.0020	**0.019**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	**0.0052 c**	< 0.0028
W104	10/31/1990	N	**0.0047 b**	**0.0023 b**	< 0.0010	**0.0098**	< 0.0010	< 0.0010	**0.0034 c**	**0.0013**	**0.0034 c**	**0.0033 c**	< 0.0014
W104	10/17/1991	N	< 0.0030	< 0.0030	< 0.0030	**0.011**	< 0.0030	< 0.0030	**0.0074 c**	< 0.0030	**0.0074 c**	< 0.0060	< 0.0030

Table A-4
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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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W104	10/14/1992	N	**0.0065 b**	< 0.0030	< 0.0030	**0.010**	< 0.0030	< 0.0030	**0.0035**	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W104	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	**0.00976**	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W104	9/30/1994	N	**0.011 b**	**0.006**	< 0.006	**0.016**	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
W104	10/20/1995	N	< 0.012	< 0.012	< 0.012	**0.018**	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012
W104	10/03/1996	N	**0.008 b**	**0.005**	< 0.003	**0.022**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W104	10/06/1997	N	< 0.003	< 0.003	< 0.003	**0.012**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W104	11/21/1998	N	**0.005 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W104	11/17/1999	N	**0.007 b**	< 0.003	< 0.003	**0.17**	< 0.003	< 0.003	**0.004 b**	< 0.003	< 0.003	**0.005 b**	< 0.003
W104	9/27/2000	N	**0.007 b**	**0.003**	< 0.003	**0.36**	**0.011**	**0.006**	**0.011 b**	**0.006 b**	**0.007**	**0.017 b**	< 0.003
W104	10/17/2001	N	**0.01 b**	< 0.0034	**0.0044**	**0.67**	**0.0059**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W104	10/29/2002	N	**0.0053 b**	< 0.0034	**0.0057**	< 0.0034	**0.0060**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0059**	< 0.0034
W104	12/18/2003	N	**0.017 b**	< 0.0034	< 0.0034	**0.34**	**0.0037**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0037**	< 0.0034
W104	10/20/2004	N	**0.0051 b**	< 0.0034	**0.0087**	**1.3**	**0.0092**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.0034	< 0.034
W104	11/09/2005	N	**0.018**	**0.0053**	**0.019**	**3.4**	< 0.0034	< 0.017	< 0.017	< 0.017	< 0.017	**0.020**	< 0.017
W104	10/19/2006	N	**0.019 b**	< 0.0072	**0.018**	**2.5**	< 0.0072	< 0.0072	< 0.0072	< 0.0072	< 0.0072	**0.016**	< 0.0072
W104	11/07/2007	N	**0.019**	**0.013**	**0.025**	**3.5**	**0.025**	< 0.0068	< 0.0068	< 0.0068	< 0.0068	**0.012**	< 0.0068
W104	10/09/2008	N	**0.014**	**0.0074**	**0.018**	**2.9**	< 0.018	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.018	< 0.0036
W104	9/29/2009	N	**0.013 b**	**0.0082**	**0.016**	**1.5**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.016	< 0.0033
W104	10/07/2010	N	**0.013**	**0.0063**	**0.020**	**1.4**	**0.029**	**0.040**	**0.070 ***	**0.027**	< 0.0036 *	**0.026**	< 0.0036
W104	10/15/2011	N	**0.024 b**	**0.0054**	**0.032**	**5.0**	**0.24**	**0.11**	**0.24**	**0.064**	**0.10**	**0.16**	**0.021**
W104	10/19/2012	N	**0.024 h**	**0.014 h**	**0.044 h**	**3.4 h**	**0.063 h**	< 0.0071 h	**0.051 h**	**0.023 h**	**0.028 h**	**0.049 h**	**0.018 h**
W104	10/10/2013	N	**0.013**	**0.0098**	**0.030**	**2.7**	**0.030**	**0.0075**	**0.015**	< 0.0070	**0.018**	**0.0099**	< 0.0070
W104	10/17/2014	N	< 0.018	< 0.018	**0.029**	**3.5**	**0.044**	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018
W104	10/08/2015	N	< 0.0034	< 0.0034	**0.0035**	**0.59**	**0.013**	**0.0088**	**0.019**	**0.0065**	**0.0068**	**0.010**	< 0.0034
W104	10/20/2016	N	**0.0054**	< 0.0037	**0.013**	**1.9**	< 0.0037	< 0.0037	< 0.0037 c	< 0.0037	< 0.0037	**0.018**	< 0.0037
W104	12/04/2017	N	**0.013**	**0.011**	**0.028**	**2.7**	< 0.0034	< 0.017	< 0.017 c	< 0.017	< 0.017	**0.029**	< 0.017
W111	1/24/1985	N	**1400**	< 1.3	< 1.0	**7.0**	**1.8**	< 1.0	< 1.0	< 1.0	< 1.0	**3.0 c**	< 1.4
W111	5/22/1985	N	**670**	**39**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
W111	6/04/1986	N	**500**	**42**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.4
W111	7/30/1987	N	**370**	**64**	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
W111	10/06/1988	N	**150**	**52**	< 30.0	< 30.0	< 30.0	< 30.0	< 30.0	< 30.0	< 30.0	< 30.0	< 30.0
W112	1/28/1985	N	**0.30**	**16**	**0.25**	**0.18**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
W112	5/16/1985	N	< 1.0	**7.0**	**1.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
W112	12/13/1985	N	**0.3**	**20**	**0.9**	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 0.5	< 0.5	< 0.7
W112	3/20/1986	N	< 0.032	**24**	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.022
W112	6/04/1986	N	< 2.0	**25**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.4

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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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W112	9/25/1986	N	< 2.0	**35**	**1.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.4
W112	12/11/1986	N	< 2.9	**75**	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9	< 2.9
W112	3/19/1987	N	< 0.6	**60**	**1.8**	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
W112	5/06/1987	N	< 10	**56**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W112	7/30/1987	N	< 50	**77**	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
W112	11/05/1987	N	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
W112	2/29/1988	N	< 6.0	**39**	< 6.0 pp	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W112	10/06/1988	N	< 6.0	**28**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W112	12/12/1988	N	< 10	**26**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W112	2/28/1989	N	--	--	--	--	--	--	--	--	--	--	--
W112	8/04/1989	N	< 10 < 10	**12** **< 10 pp**	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10
W112	5/03/1990	N	--	--	--	--	--	--	--	--	--	--	--
W112	10/30/1990	N	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10
W112	10/17/1991	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W112	10/13/1992	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W112	10/19/1993	N	**0.00473**	**0.00377**	< 0.00300	< 0.00300	< 0.00300	< 0.00300	**0.00401**	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W112	9/30/1994	N	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018
W112	10/20/1995	N	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
W112	10/03/1996	N	< 0.006	< 0.006	< 0.006	**0.066**	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
W112	10/06/1997	N	**0.029**	**0.009**	< 0.003	**0.034**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W112	11/21/1998	N	**0.004 b**	< 0.003	< 0.003	**0.037**	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W112	11/21/1998	FD	< 0.003	< 0.003	< 0.003	**0.053**	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W112	11/17/1999	N	**0.009 b**	< 0.003	< 0.003	**0.019**	**0.006 b**	**0.003**	**0.006 b**	**0.004**	**0.005 b**	**0.008 b**	< 0.003
W112	9/27/2000	N	< 0.003	< 0.003	< 0.003	**0.008**	< 0.003	< 0.003	**0.003 b**	< 0.003	< 0.003	**0.006 b**	< 0.003
W112	10/19/2001	N	< 0.0033	**0.0046**	< 0.0033	**0.01**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W112	10/29/2002	N	**0.0059 b**	**0.0046**	**0.0042**	**0.0039**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W112	9/04/2003	N	--	< 0.51	< 1.0	< 0.051	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
W112	9/15/2003	N	--	< 0.51	< 1.0	< 0.051	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
W112	10/01/2003	N	--	--	--	--	--	--	--	--	--	--	--
W112	10/08/2003	N	--	--	--	--	--	--	--	--	--	--	--
W113	3/28/1985	N	**850**	**500**	< 10	**95**	**58**	**20**	**50 c**	< 10	ND c	**63 c**	< 14
W113	5/22/1985	N	**8900**	**6600**	< 200	**2700**	**2000**	**800**	**1500 c**	< 200	ND c	**1500 c**	< 200
W113	6/04/1986	N	**2900**	**2600**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.4
W113	12/07/1987	N	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
W121	3/27/1985	N	**0.012**	**0.012**	< 0.0010	**0.0016**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014

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		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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W121	3/28/1985	N	< 0.010	< 0.0065	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0070
W121	5/06/1985	N	**0.0058**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	12/13/1985	N	**0.0098**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	3/18/1986	N	**0.0027**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	6/02/1986	N	**0.0093**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	9/23/1986	N	**0.0031**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	12/10/1986	N	**0.0071**	**0.0034**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0011 c**	< 0.0014
W121	3/18/1987	N	**0.0080**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	5/05/1987	N	**0.0040**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	7/28/1987	N	**0.0026**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W121	11/03/1987	N	**0.0051**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W121	2/22/1988	N	**0.0084**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W121	10/04/1988	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	12/09/1988	N	**0.022**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	8/03/1989	N	< 0.0020 0.0024	< 0.0013 < 0.0013	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0014 < 0.0014
W121	5/01/1990	N	**0.0027 s** **0.0026 s**	< 0.0013 < 0.0013	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0014 < 0.0014
W121	10/30/1990	N	**0.0038**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W121	10/17/1991	N	**0.0049**	< 0.0030	< 0.0030	**0.0039**	**0.0072**	**0.0066**	< 0.0060	**0.0091**	< 0.0060	**0.0063 c**	**0.0093**
W121	10/13/1992	N	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W121	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W121	9/29/1994	N	**0.004 b**	< 0.003	< 0.003	< 0.003	**0.005**	**0.006**	**0.006**	**0.005**	**0.005**	**0.006 c**	< 0.003
W121	10/20/1995	N	**0.018**	**0.078**	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012
W121	10/03/1996	N	**0.015 b** **0.022 b**	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006
W121	10/06/1997	N	**0.006**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W121	11/19/1998	N	**0.004**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W121	11/17/1999	N	**0.007 b**	< 0.003	< 0.003	**0.006**	**0.006 b**	< 0.003	**0.006 b**	< 0.003	**0.005 b**	**0.008 b**	< 0.003
W121	11/17/1999	FD	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W121	9/28/2000	N	**0.003 b**	< 0.003	< 0.003	**0.003**	< 0.003	< 0.003	**0.003**	< 0.003	< 0.003	**0.005 b**	< 0.003
W121	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W121	5/15/2002	N	**0.0055 b**	**0.0035 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W122	3/26/1985	N	< 0.050	**2.3**	**0.048**	**0.064**	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.035
W122	5/06/1985	N	< 0.020	**2.1**	< 0.010	**0.069**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W122	12/13/1985	N	**0.024**	**0.68**	< 0.0050	**0.022**	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0070
W122	3/18/1986	N	**0.014**	**0.26**	< 0.0020	**0.013**	< 0.0020	< 0.0020	< 0.0020	< 0.0010	< 0.0020	< 0.0020	< 0.0028

Table A-4
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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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W122	6/02/1986	N	**0.0057**	**0.370**	< 0.0010	**0.045**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W122	9/23/1986	N	**0.0045**	**0.17**	**0.010**	**0.016**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W122	12/10/1986	N	**0.019**	**0.14**	< 0.0025	**0.064**	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0035
W122	3/19/1987	N	< 0.0020	**0.0140**	< 0.0010	< 0.0010	**0.0019**	< 0.0010	**0.0022 c**	< 0.0010	**0.0022 c**	**0.0024 c**	< 0.0014
W122	5/06/1987	N	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
W122	7/29/1987	N	< 10	**18**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W122	11/04/1987	N	< 6 < 6	**14** **12**	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6
W122	2/25/1988	N	< 6.0	**19.2**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W122	10/06/1988	N	< 6.0	**9.8**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W122	12/12/1988	N	< 6.0	< 6.0 pp	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W122	2/28/1989	N	< 6 < 6	< 6 pp < 6 pp	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6
W122	8/03/1989	N	< 0.080	**5.1**	< 0.040	**0.22**	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.056
W122	5/01/1990	N	< 0.080	**1.7**	**0.046**	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.056
W122	6/22/1990	N	--	--	--	--	--	--	--	--	--	--	--
W122	10/31/1990	N	< 0.10	**2.6**	< 0.052	**0.072**	< 0.052	< 0.052	< 0.052	< 0.052	< 0.052	< 0.052	< 0.073
W122	10/17/1991	N	< 0.030	**0.22**	< 0.030	< 0.030	< 0.030	< 0.030	< 0.060	< 0.030	< 0.060	< 0.060	< 0.030
W122	10/13/1992	N	**0.0035**	**0.12**	**0.0038**	**0.012**	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W122	10/19/1993	N	**0.00402**	**0.00428**	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W122	9/29/1994	N	**0.004 b**	< 0.003	< 0.003	**0.006**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W122	10/19/1995	N	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
W122	10/03/1996	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W122	10/06/1997	N	**0.006**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W122	11/20/1998	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W122	11/17/1999	N	**0.013 b**	**0.003**	< 0.003	**0.017**	**0.005 b**	< 0.003	**0.004 b**	< 0.003	**0.004 b**	**0.008 b**	< 0.003
W122	9/28/2000	N	**0.003 b**	< 0.003	< 0.003	**0.010**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.004 b**	< 0.003
W122	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	**0.0092**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W122	4/08/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.0053**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W123	3/26/1985	N	< 0.020 < 0.020	< 0.013 < 0.013	< 0.010 < 0.010	< 0.010 < 0.010	< 0.010 < 0.010	< 0.010 < 0.010	< 0.010 < 0.010	< 0.010 < 0.010	< 0.010 < 0.010	< 0.010 < 0.010	< 0.014 < 0.014
W123	5/07/1985	N	**0.024**	< 0.0065	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0070
W123	3/18/1986	N	**0.0071**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W123	6/03/1986	N	**0.0077**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W123	9/24/1986	N	< 0.0040	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W123	12/11/1986	N	**0.011**	< 0.0065	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0070
W123	3/18/1987	N	**0.0086**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014

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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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W123	5/05/1987	N	**0.0071**	< 0.0033	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0035
W123	7/29/1987	N	**0.0032** **0.0089**	< 0.0013 < 0.0013	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.0014 < 0.0014
W123	11/04/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
W123	2/23/1988	N	**0.032**	**0.0023**	< 0.001	< 0.001	< 0.001	< 0.001	**0.0012 c**	< 0.001	ND c	< 0.001	< 0.0014
W123	10/05/1988	N	**0.0079**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W123	12/12/1988	N	< 0.020	**0.30**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W123	2/28/1989	N	< 0.0040	**0.14**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W123	8/03/1989	N	< 0.020 < 0.040	< 0.013 0.031	< 0.010 < 0.020	< 0.010 < 0.020	< 0.010 < 0.020	< 0.010 < 0.020	< 0.010 < 0.020	< 0.010 < 0.020	< 0.010 < 0.020	< 0.010 < 0.020	< 0.014 < 0.028
W123	6/22/1990	N	**0.0031**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W123	10/30/1990	N	**0.0042**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W123	10/17/1991	N	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030	< 0.0060	< 0.0060	< 0.0030
W123	10/13/1992	N	**0.0034**	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W123	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W123	9/29/1994	N	**0.004 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W123	10/19/1995	N	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
W123	10/03/1996	N	**0.004 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W123	10/06/1997	N	**0.012**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W123	11/21/1998	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W123	11/17/1999	N	**0.009 b**	< 0.003	< 0.003	**0.008**	**0.005 b**	< 0.003	**0.004 b**	< 0.003	**0.004 b**	**0.006 b**	< 0.003
W123	9/28/2000	N	**0.003 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W123	10/17/2001	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W123	10/17/2001	FD	**0.0043 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W123	10/29/2002	N	< 0.0034	< 0.0034	**0.0039**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W123	6/07/2003	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W124	3/26/1985	N	**0.014**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	5/06/1985	N	**0.0081**	< 0.0013	< 0.0010	**0.0050**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	12/13/1985	N	**0.036**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W124	3/18/1986	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	6/02/1986	N	**0.012**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	9/23/1986	N	**0.0072**	**0.0016**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	12/10/1986	N	**0.027**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	3/18/1987	N	**0.018**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	5/05/1987	N	**0.0029**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	8/06/1987	N	**0.0029**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W124	11/03/1987	N	**0.0038**	< 0.0013	< 0.001	**0.001**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014

Table A-4
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		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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W124	2/23/1988	N	**0.0095**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W124	10/04/1988	N	**0.0042**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	8/03/1989	N	**0.0023**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	6/22/1990	N	--	--	--	--	--	--	--	--	--	--	--
W124	10/30/1990	N	**0.0027**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W124	10/17/1991	N	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030	< 0.0060	< 0.0060	< 0.0030
W124	11/08/2005	N	< 0.0034	< 0.0034	**0.0035**	**0.0069**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W125	3/26/1985	N	< 0.020	< 0.013	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W125	5/06/1985	N	**0.017**	< 0.0013	< 0.0010	**0.0017**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W125	12/13/1985	N	**0.053**	**0.0037**	**0.0049**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W125	3/18/1986	N	**0.0075** **< 0.0020**	< 0.0013 0.0063	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0020 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0014 < 0.0014
W125	6/02/1986	N	**0.0065**	< 0.0013	< 0.0010	**0.0024**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W125	9/24/1986	N	**0.0068**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W125	12/10/1986	N	**0.028**	< 0.0033	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0035
W125	3/18/1987	N	**0.0038**	< 0.0013	< 0.0010	**0.0010**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W125	5/05/1987	N	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
W125	7/28/1987	N	< 0.002	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W125	11/04/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
W125	2/25/1988	N	**0.009**	< 0.0013	< 0.001	< 0.001	**0.018**	**0.0012**	**0.0039 c**	**0.0012**	ND c	**0.0023 c**	**0.041**
W125	10/04/1988	N	< 0.0080 < 0.0080	< 0.0052 < 0.0052	< 0.0040 < 0.0040	< 0.0040 < 0.0040	< 0.0040 < 0.0040	< 0.0040 < 0.0040	< 0.0040 < 0.0040	< 0.0040 < 0.0040	< 0.0040 < 0.0040	< 0.0040 < 0.0040	< 0.0056 < 0.0056
W125	12/12/1988	N	< 0.020	< 0.013	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W125	2/28/1989	N	**0.020** **< 0.0080**	< 0.0044 < 0.0052	< 0.0034 < 0.0040	< 0.0034 < 0.0040	< 0.0034 < 0.0040	< 0.0034 < 0.0040	< 0.0034 < 0.0040	< 0.0034 < 0.0040	< 0.0034 < 0.0040	< 0.0034 < 0.0040	< 0.0048 < 0.0056
W125	8/03/1989	N	< 0.0040 < 0.0020	< 0.0026 < 0.0013	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0028 < 0.0014
W125	6/22/1990	N	**0.0047** **< 0.0040**	**0.0029** **< 0.0026**	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0028 < 0.0028
W125	10/30/1990	N	**0.0057** **0.0048**	**0.0038** **< 0.0026**	< 0.0020 < 0.0020	< 0.0020 0.0027	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0028 < 0.0028
W125	10/17/1991	N	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.024	< 0.012	< 0.024	< 0.024	< 0.012
W125	10/13/1992	N	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W125	10/19/1993	N	**0.00345**	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W125	9/29/1994	N	**0.003 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W125	10/19/1995	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W125	10/03/1996	N	**0.022 b**	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
W125	10/06/1997	N	**0.005**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W125	11/20/1998	N	**0.004**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003

Table A-4
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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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W125	11/17/1999	N	**0.004 b**	< 0.003	< 0.003	**0.012**	**0.006 b**	< 0.003	**0.004 b**	< 0.003	**0.005 b**	**0.008 b**	< 0.003
W125	9/27/2000	N	**0.003 b**	< 0.003	< 0.003	**0.042**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.005 b**	< 0.003
W125	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	**0.021**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W125	10/30/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.013**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W126	3/27/1985	N	**0.014**	< 0.0013	< 0.0010	**0.025**	**0.0018**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0036 c**	< 0.0014
W126	3/28/1985	N	**0.023**	< 0.0026	< 0.0020	< 0.0020	**0.012**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W126	5/07/1985	N	**0.041**	< 0.0013	< 0.0010	**0.0013**	< 0.0019	< 0.0010	**0.0047 c**	< 0.0010	ND c	**0.0010 c**	< 0.0014
W126	12/13/1985	N	**0.052**	**0.0014**	**0.0011**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W126	3/18/1986	N	**0.0079**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0010	< 0.0020	< 0.0020	< 0.0028
W126	6/02/1986	N	**0.0022**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W126	9/23/1986	N	**0.0068**	< 0.0013	< 0.0010	**0.0012**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W126	12/10/1986	N	**0.014**	< 0.0013	< 0.0010	< 0.0010	**0.0022**	**0.0031**	**0.0047 c**	**0.0024**	ND c	**0.0037 c**	< 0.0014
W126	3/18/1987	N	**0.0071**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W126	5/05/1987	N	**0.0082**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W126	7/28/1987	N	**0.0032**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W126	11/03/1987	N	**0.0057**	< 0.0013	< 0.001	**0.001**	**0.0031**	**0.0031**	**0.010 c**	**0.0041**	**0.010 c**	**0.0044 c**	< 0.0014
W126	2/22/1988	N	**0.024**	< 0.0013	< 0.001	< 0.001	< 0.001	**0.0019**	**0.0059 c**	**0.003**	ND c	< 0.001	< 0.0014
W126	10/04/1988	N	**0.0042**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W126	12/09/1988	N	**0.018**	< 0.0013	**0.0016**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W126	8/04/1989	N	**0.0023**	< 0.0013	< 0.0010	< 0.0010	**0.0051**	**0.0048**	**0.011 c**	**0.0052**	**0.011 c**	**0.0064 c**	< 0.0014
W126	5/01/1990	N	**0.012 s**	< 0.0013	< 0.0010	< 0.0010	**0.0039**	**0.0072**	**0.013 c**	**0.0063**	**0.013 c**	**0.0069 c**	< 0.0014
W126	10/31/1990	N	**0.0045 b**	**0.010 b**	**0.0032**	**0.022**	**0.014**	**0.0095**	**0.036 c**	**0.0091**	**0.036 c**	**0.031 c**	**0.0037**
W126	10/17/1991	N	< 0.0030	< 0.0030	< 0.0030	< 0.0030	**0.018**	**0.044**	**0.054 c**	**0.038**	**0.054 c**	**0.026 c**	< 0.0030
W126	10/13/1992	N	**0.0030**	< 0.0030	< 0.0030	< 0.0030	**0.017**	**0.029**	**0.047**	**0.035**	**0.032**	**0.025 c**	**0.0043**
W126	10/19/1993	N	< 0.00600	< 0.00600	< 0.00600	**0.00659**	**0.0436**	**0.0670**	**0.0676**	**0.0788**	**0.0635**	**0.0577 c**	**0.0189**
W126	9/29/1994	N	**0.007 b**	< 0.003	< 0.003	< 0.003	**0.012**	**0.015**	**0.020**	**0.016**	**0.013**	**0.016 c**	**0.005**
W126	10/20/1995	N	< 0.024 < 0.012	**0.025** **0.036**	< 0.024 < 0.012	< 0.024 < 0.012	**0.032** **0.029**	**0.050** **0.043**	**0.068** **0.059**	**0.078** **0.060**	**0.051** **0.035**	**0.052 c** **0.044 c**	< 0.024 < 0.012
W126	10/03/1996	N	**0.006 b**	< 0.006	< 0.006	**0.010**	**0.060**	**0.087**	**0.10**	**0.10**	**0.082**	**0.098 c**	**0.030**
W126	10/06/1997	N	**0.003**	< 0.003	< 0.003	< 0.003	**0.008**	**0.013**	**0.016**	**0.018**	**0.013**	**0.013 c**	**0.005**
W126	11/20/1998	N	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	**0.026**	< 0.006	--	< 0.006	**0.022 c**	< 0.006
W126	11/17/1999	N	**0.005 b**	< 0.003	< 0.003	**0.007**	**0.010 b**	**0.017**	**0.021 b**	**0.023**	**0.021 b**	**0.016 b**	**0.004**
W126	9/28/2000	N	**0.007 b**	**0.003**	< 0.003	**0.010**	**0.016**	**0.019**	**0.026**	**0.022**	**0.019**	**0.025 b**	**0.004**
W126	10/18/2001	N	**0.0089 b**	< 0.0034	< 0.0034	**0.0097**	< 0.0034	< 0.0034	**0.0059**	**0.0038**	< 0.0034	**0.0036**	< 0.0034
W126	10/31/2002	N	**0.0061 b**	< 0.0034	< 0.0034	**0.0037**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W126	12/18/2003	N	**0.0046 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W126	10/20/2004	N	**0.0054 b**	< 0.0034	< 0.0034	**0.027**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W126	11/09/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.017**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W127	3/18/1986	N	**0.052**	**0.035**	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0010	< 0.0040	< 0.0040	< 0.0056
W127	6/03/1986	N	**0.160**	**0.490**	< 0.0080	**0.027**	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0112
W127	9/25/1986	N	**0.0086**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W127	12/11/1986	N	**0.025** **0.026**	< 0.0033 0.0013	< 0.0025 < 0.0010	< 0.0025 < 0.0010	< 0.0025 < 0.0010	< 0.0025 < 0.0010	< 0.0025 < 0.0010	< 0.0025 < 0.0010	< 0.0025 < 0.0010	< 0.0025 < 0.0010	< 0.0035 < 0.0017
W127	3/19/1987	N	**0.0062**	< 0.0033	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0035
W127	5/06/1987	N	**0.0036**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W127	7/29/1987	N	< 0.002	< 0.0013	< 0.001	< 0.001	**0.0028**	< 0.001	< 0.001	< 0.001	< 0.001	**0.0047 c**	< 0.0014
W127	11/04/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
W127	2/22/1988	N	**0.026**	**0.0025**	**0.0014**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W127	10/04/1988	N	**0.012** **0.0049**	< 0.0026 < 0.0013	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0020 < 0.0010	< 0.0028 < 0.0014
W127	12/09/1988	N	**0.021**	< 0.0052	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0056
W127	8/04/1989	N	**0.0054**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W127	6/22/1990	N	**0.0029**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W127	10/30/1990	N	**0.0039**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0018 c**	< 0.0014
W127	10/17/1991	N	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0060 < 0.0060	**0.019** **< 0.0030**	< 0.0060 < 0.0060	< 0.0060 < 0.0060	< 0.0030 < 0.0030
W127	10/13/1992	N	**0.0061**	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W127	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W127	9/29/1994	N	**0.005 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W127	10/19/1995	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W127	10/03/1996	N	**0.007 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W127	10/03/1997	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W127	11/20/1998	N	**0.004**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W127	11/17/1999	N	**0.005 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W127	9/28/2000	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W127	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W127	10/29/2002	N	**0.0037 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W127	9/04/2003	N	--	< 0.53	< 1.1	< 0.053	< 0.053	< 0.053	< 0.11	< 0.11	< 0.053	< 0.053	< 0.11
W127	9/15/2003	N	--	< 0.50	< 1.0	< 0.050	< 0.050	< 0.050	< 0.10	< 0.10	< 0.050	< 0.050	< 0.10
W127	9/27/2003	N	--	< 0.55	< 1.1	< 0.055	< 0.055	< 0.055	< 0.11	< 0.11	< 0.055	< 0.055	< 0.11
W127	10/01/2003	N	--	--	--	--	--	--	--	--	--	--	--
W127	10/08/2003	N	--	--	--	--	--	--	--	--	--	--	--
W127	10/13/2003	N	--	--	--	--	--	--	--	--	--	--	--

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W127	11/05/2003	N	--	< 0.51	< 1.0	< 0.051	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
W127	11/14/2003	N	--	< 0.53 < 0.53	< 1.1 < 1.1	< 0.053 < 0.053	< 0.053 < 0.053	< 0.053 < 0.053	< 0.11 < 0.11	< 0.11 < 0.11	< 0.053 < 0.053	< 0.053 < 0.053	< 0.11 < 0.11
W127	12/17/2003	N	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
W127N	12/17/2003	N	**0.0036 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W127N	10/19/2004	N	**0.0037 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W127N	11/08/2005	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W127N	10/19/2006	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W127N	8/07/2012	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W127N	8/17/2012	N	--	--	--	--	--	--	--	--	--	--	--
W127N	8/24/2012	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W127N	10/09/2013	N	< 0.0038	< 0.0038	< 0.0038	< 0.0038	< 0.0038	< 0.0038	< 0.0038	< 0.0038	< 0.0038	< 0.0038	< 0.0038
W127N	10/14/2014	N	< 0.0034	< 0.0034	< 0.0034	**0.0041**	**0.0061**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0092**	< 0.0034
W127N	10/06/2015	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W127N	10/18/2016	N	< 0.0033	**0.0053**	< 0.0033	**0.0047**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W127N	10/11/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.0038**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W128	3/21/1986	N	**0.0096**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W128	6/02/1986	N	**0.0021** **0.0030**	< 0.0013 < 0.0013	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0014 < 0.0014
W128	9/24/1986	N	**0.016**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W128	12/11/1986	N	**0.024**	**0.0022**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W128	3/19/1987	N	**0.010**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W128	5/06/1987	N	**0.0063**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W128	7/29/1987	N	**0.0024**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W128	11/03/1987	N	**0.0097**	< 0.0013	< 0.001	**0.0014**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W128	2/23/1988	N	**0.021** **0.012**	**0.0017 s** **0.0024**	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.0014 < 0.0014
W128	10/04/1988	N	**0.0036**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W128	6/22/1990	N	--	--	--	--	--	--	--	--	--	--	--
W128	10/18/1995	N	**0.004**	< 0.003	< 0.003	**0.009**	**0.025**	**0.016**	**0.021**	**0.009**	**0.015**	**0.029 c**	< 0.003
W128	10/03/1996	N	< 0.003	< 0.003	< 0.003	**0.004**	**0.004**	< 0.003	< 0.003	< 0.003	< 0.003	**0.004 c**	< 0.003
W128	10/02/1997	N	**0.012 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W128	11/20/1998	N	**0.005**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W128	11/17/1999	N	**0.010 b**	< 0.003	< 0.003	**0.012**	**0.019 b**	**0.022**	**0.023 b**	**0.010**	**0.023 b**	**0.043 b**	**0.004**
W128	9/28/2000	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.005**	< 0.003	< 0.003	**0.006 b**	< 0.003
W128	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W128	10/29/2002	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W128	12/17/2003	N	< 2 0.0035 b	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034
W128	10/20/2004	N	< 0.0034	< 0.013	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W128	10/21/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.0040**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W128	11/08/2005	N	**0.0035**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W128	10/19/2006	N	< 0.0033	< 0.0033	< 0.0033	**0.0035**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W129	3/18/1986	N	**0.53**	**0.38**	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0010	< 0.0040	< 0.0040	< 0.0056
W129	6/03/1986	N	**0.0065**	< 0.0013	< 0.0010	**0.0025**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W129	9/25/1986	N	**0.78**	**0.11**	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.0080	< 0.011
W129	12/11/1986	N	**15**	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
W129	3/19/1987	N	< 0.0050 0.021	< 0.0033 < 0.0065	**0.044** **0.0066**	< 0.0025 < 0.0050	< 0.0025 < 0.0050	< 0.0025 < 0.0050	< 0.0025 < 0.0050	< 0.0025 < 0.0050	< 0.0025 < 0.0050	< 0.0025 < 0.0050	< 0.0035 < 0.0070
W129	5/06/1987	N	**18**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
W129	7/29/1987	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W129	11/04/1987	N	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
W129	2/25/1988	N	**0.039**	< 0.0026	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0028
W129	10/03/1988	N	**0.0048**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W129	12/12/1988	N	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W129	8/04/1989	N	**0.0040**	**0.0092**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W129	5/02/1990	N	< 0.0040	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W129	10/30/1990	N	**0.0057**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0018 c**	< 0.0010	**0.0018 c**	**0.0016 c**	< 0.0014
W129	10/17/1991	N	**0.0084**	< 0.0030	< 0.0030	**0.0043**	< 0.0030	< 0.0030	< 0.0060	< 0.0030	< 0.0060	< 0.0060	< 0.0030
W129	10/13/1992	N	**0.015**	**0.0056**	< 0.0030	**0.017**	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W129	10/19/1993	N	< 0.0360	< 0.0360	< 0.0360	< 0.0360	< 0.0360	< 0.0360	< 0.0360	< 0.0360	< 0.0360	< 0.0720	< 0.0360
W129	9/29/1994	N	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24
W129	10/19/1995	N	< 0.18	< 0.18	< 0.18	< 0.18	< 0.18	< 0.18	< 0.18	< 0.18	< 0.18	< 0.18	< 0.18
W129	10/03/1996	N	**0.009 b**	**0.009**	< 0.003	**0.008**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.005 c**	< 0.003
W129	10/03/1997	N	**0.34 e**	**0.13 e**	**0.027**	**0.004**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W129	11/20/1998	N	**0.20**	**0.024**	< 0.003	**0.008**	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W129	11/17/1999	N	**0.013 b**	**0.056**	< 0.003	**0.030**	< 0.003	**0.020**	**0.005 b**	< 0.003	< 0.003	**0.007 b**	< 0.003
W129	9/27/2000	N	**0.006 b**	**0.028**	< 0.003	**0.086**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.003 b**	< 0.003
W129	10/17/2001	N	**0.018 b**	**0.1**	< 0.0034	**0.18**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W129	10/29/2002	N	**0.054 b**	**0.029**	**0.0078**	**0.045**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W129	12/18/2003	N	**0.012 b**	**0.0097**	**0.0051**	**0.080**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W129	10/20/2004	N	**0.012 b**	**0.015**	**0.011**	**0.54**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W129	10/21/2005	N	**0.018**	< 0.0068	**0.035**	**1.5 ***	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068	< 0.0068 *
W129	11/09/2005	N	**0.017**	**0.056**	< 0.029	**0.46**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W129	10/19/2006	N	**0.10 b**	**0.046**	< 0.030	**0.44**	< 0.0071	< 0.0071	< 0.0071	< 0.0071	< 0.0071	< 0.0071	< 0.0071
W130	5/01/1990	N	**0.013 s** **0.0048 s**	**0.0027** **0.0019**	< 0.0010 < 0.0010	**0.0019** **< 0.0010**	**0.0023** **< 0.0010**	**0.0027** **< 0.0010**	**0.0054 c** **< 0.0010**	< 0.0010 < 0.0010	**0.0054 c** **< 0.0010**	**0.0036 c** **< 0.0010**	< 0.0014 < 0.0014
W130	10/31/1990	N	**0.0056 b**	**0.0019 b**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W130	10/17/1991	N	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030	< 0.0060	< 0.0060	< 0.0030
W130	10/13/1992	N	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W130	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W130	9/29/1994	N	**0.004 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W130	10/19/1995	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W130	10/03/1996	N	**0.004 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W130	10/06/1997	N	**0.012**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W130	11/20/1998	N	**0.003**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W130	11/17/1999	N	**0.008 b**	< 0.003	< 0.003	**0.005**	**0.004 b**	< 0.003	**0.004 b**	< 0.003	**0.003 b**	**0.006 b**	< 0.003
W130	9/28/2000	N	**0.003 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.003 b**	< 0.003
W130	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W130	10/30/2002	N	**0.0043 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W130	12/17/2003	N	< 2 0.0048 b	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034
W130	10/19/2004	N	< 0.0034	< 0.0046	< 0.0034	**0.013**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W130	11/09/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.0074**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W130	10/19/2006	N	**0.0052 b**	< 0.0036	< 0.0036	**0.011**	< 0.0036	< 0.0036 *	< 0.0036 *	< 0.0036 *	< 0.0036 *	< 0.0036	< 0.0036 *
W130	11/07/2007	N	< 0.0034	< 0.0034	< 0.0034	**0.0050**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W130	10/09/2008	N	< 0.0033 < 0.0034	< 0.0033 < 0.0034	< 0.0033 < 0.0034	**0.0059** **0.0054**	< 0.0033 < 0.0034	< 0.0033 < 0.0034	< 0.0033 < 0.0034	< 0.0033 < 0.0034	< 0.0033 < 0.0034	< 0.0033 < 0.0034	< 0.0033 < 0.0034
W130	9/29/2009	N	< 0.0034	< 0.0034	< 0.0034	**0.0088**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W130	10/05/2010	N	**0.0037**	< 0.0033	< 0.0033	**0.0087**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W130	10/11/2011	N	< 0.0036	< 0.0036	< 0.0036	**0.0050**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
W130	10/16/2012	N	< 0.0034 h	< 0.0034 h	< 0.0034 h	**0.0075 h**	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h
W130	10/09/2013	N	**0.0043**	**0.022**	< 0.0043	**0.013**	**0.035**	**0.018**	**0.027**	**0.0085**	**0.015**	**0.037**	< 0.0043
W130	10/15/2014	N	< 0.0033	< 0.0033	< 0.0033	**0.0078**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W130	10/15/2014	FD	< 0.0034	< 0.0034	< 0.0034	**0.0080**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W130	10/07/2015	N	< 0.0035	**0.0063**	< 0.0035	**0.0059**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
W130	10/14/2016	N	< 0.0034	< 0.0034	< 0.0034	**0.013**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W130	10/12/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.015**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W130	10/12/2017	FD	< 0.0034	< 0.0034	< 0.0034	**0.015**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W131	5/02/1990	N	< 0.080	**0.81**	< 0.040	**0.24**	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	< 0.056
W131	10/31/1990	N	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W131	10/17/1991	N	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.060	< 0.030	< 0.060	< 0.060	< 0.030
W131	10/14/1992	N	< 60	< 60	< 60	< 60	< 60	< 60	< 60	< 60	< 60	< 60	< 60
W131	10/19/1993	N	< 0.420	< 0.420	< 0.420	< 0.420	< 0.420	< 0.420	< 0.420	< 0.420	< 0.420	< 0.840	< 0.420
W131	11/07/1994	N	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54
W131	10/19/1995	N	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60
W131	10/03/1996	N	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
W131	10/06/1997	N	**5.4** **4.1**	**4.5** **4.2 e**	**0.010** **0.007**	< 0.003 < 0.003	< 0.003 < 0.003	< 0.003 < 0.003	< 0.003 < 0.003	**0.003** **< 0.003**	< 0.003 < 0.003	< 0.003 < 0.003	< 0.003 < 0.003
W131	11/21/1998	N	**0.005 b**	**0.014**	**0.018**	**0.13 e**	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W132	12/17/2003	N	< 2 0.0055 b	< 2 < 0.0034	< 2 < 0.0034	< 2 0.0038	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034
W132	10/19/2004	N	**0.0065 b**	< 0.0034	< 0.0034	**0.074**	**0.0084**	**0.0085**	**0.019**	**0.011**	**0.012**	**0.015**	**0.0034**
W132	11/08/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.024**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W132	10/19/2006	N	< 0.0036	< 0.0036	< 0.0036	**0.088**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
W132	11/07/2007	N	< 0.0034	< 0.0034	< 0.0034	**0.034**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W132	11/07/2007	FD	< 0.0034	< 0.0034	< 0.0034	**0.044**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W132	10/09/2008	N	< 0.0034	< 0.0034	< 0.0034	**0.011**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W132	9/29/2009	N	< 0.0033	< 0.0033	< 0.0033	**0.015**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W132	10/05/2010	N	< 0.0033	< 0.0033	< 0.0033	**0.032**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W132	10/11/2011	N	< 0.0033	< 0.0033	< 0.0033	**0.044**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W132	8/07/2012	N	< 0.0033	< 0.0033	< 0.0033	**0.039**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W132	8/24/2012	N	< 0.0033	< 0.0033	< 0.0033	**0.041**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W132	10/16/2012	N	**0.0049 bh**	< 0.0034 h	< 0.0034 h	**0.050 h**	< 0.0034 h	**0.0042 h**	**0.0064 h**	**0.0035 h**	< 0.0034 h	**0.0050 h**	< 0.0034 h
W132	10/10/2013	N	< 0.0035	< 0.0035	< 0.0035	**0.084**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
W132	10/14/2014	N	**0.0042**	< 0.0034	< 0.0034	**0.048**	**0.0084**	**0.0062**	**0.014**	**0.0059**	**0.0051**	**0.0093**	< 0.0034

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W132	10/07/2015	N	< 0.0033	**0.013**	< 0.0033	**0.029**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W132	10/14/2016	N	< 0.0034	< 0.0034	< 0.0034	**0.055**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W132	10/14/2016	FD	< 0.0033	< 0.0033	< 0.0033	**0.054**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W132	10/11/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.043**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-1	7/14/2003	N	--	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
S-1	8/01/2003	N	--	< 0.53	< 1.1	**0.12**	< 0.053	< 0.053	< 0.11	< 0.11	< 0.053	< 0.053	< 0.11
S-1	9/04/2003	N	--	< 0.54	< 1.1	**0.091**	< 0.054	< 0.054	< 0.11	< 0.11	< 0.054	< 0.054	< 0.11
S-1	9/15/2003	N	--	< 0.55	< 1.1	< 0.055	< 0.055	< 0.055	< 0.11	< 0.11	< 0.055	< 0.055	< 0.11
S-1	9/22/2003	N	--	< 0.53	< 1.1	< 0.053	< 0.053	< 0.053	< 0.11	< 0.11	**0.053**	< 0.053	< 0.11
S-1	9/27/2003	N	--	< 0.51	< 1.0	< 0.051	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
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	< 1.0	< 0.051	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
S-1	10/30/2003	N	--	< 0.52	< 1.0	< 0.052	< 0.052	< 0.052	< 0.10	< 0.10	< 0.052	< 0.052	< 0.10
S-1	11/05/2003	N	--	< 0.050	< 1.0	< 0.050	< 0.050	< 0.050	< 0.10	< 0.10	< 0.050	< 0.050	< 0.10
S-1	11/14/2003	N	--	< 0.50	< 1.0	**0.17**	< 0.050	< 0.050	< 0.10	< 0.10	< 0.050	< 0.050	< 0.10
S-1	12/04/2003	N	--	< 0.54	< 1.1	**0.16**	< 0.054	< 0.054	< 0.11	< 0.11	< 0.054	< 0.054	< 0.11
S-1	12/18/2003	N	**0.0061 b**	**0.057**	**0.011**	**0.031**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-1	1/21/2004	N	--	< 0.52	< 1.0	**0.12**	< 0.052	< 0.052	< 0.10	< 0.10	< 0.052	< 0.052	< 0.10
S-1	2/26/2004	N	--	< 0.52	< 1.0	**0.11**	< 0.052	< 0.052	< 0.10	< 0.10	< 0.052	< 0.052	< 0.10
S-1	3/31/2004	N	--	< 0.52	< 1.0	< 0.052	< 0.052	< 0.052	< 0.10	< 0.10	< 0.052	< 0.052	< 0.10
S-1	4/13/2004	N	--	< 0.52	< 1.0	**0.12**	< 0.052	< 0.052	< 0.10	< 0.10	< 0.052	< 0.052	< 0.10
S-1	5/04/2004	N	--	< 0.53	< 1.1	**0.11**	< 0.053	< 0.053	< 0.11	< 0.11	< 0.053	< 0.053	< 0.11
S-1	6/04/2004	N	--	< 0.51	< 1.0	**0.094**	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
S-1	7/19/2004	N	--	< 0.51	< 1.0	**0.15**	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
S-1	8/02/2004	N	--	< 0.50	< 1.0	**0.14**	< 0.050	< 0.050	< 0.10	< 0.10	< 0.050	< 0.050	< 0.10
S-1	9/01/2004	N	--	< 0.51	< 1.0	**0.13**	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
S-1	10/01/2004	N	--	< 0.53	< 1.1	**0.11**	< 0.053	< 0.053	< 0.11	< 0.11	< 0.053	< 0.053	< 0.11
S-1	10/19/2004	N	**0.0042 b**	**0.014**	**0.0068**	**0.037**	< 0.0034	**0.0035**	**0.0039**	< 0.0034	< 0.0034	**0.0004**	< 0.0034
S-1	11/05/2004	N	--	< 0.51	< 1.0	< 0.051	< 0.051	< 0.051	< 0.10	< 0.10	< 0.051	< 0.051	< 0.10
S-1	12/21/2004	N	--	< 0.52	< 1.0	**0.095**	< 0.052	< 0.052	< 0.10	< 0.10	< 0.052	< 0.052	< 0.10
S-1	11/09/2005	N	**0.0039**	**0.013**	< 0.011	**0.047**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-1	10/20/2006	N	**0.0044 b**	**0.013**	**0.0081**	**0.033**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-1	11/09/2007	N	< 0.0034	**0.0070**	< 0.0042	**0.018**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034

Table A-4
1984-2017 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	Dibenz(a,h) anthracene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
S-1	10/14/2008	N	< 0.0034	**0.011**	< 0.0034	**0.025**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-1A	6/04/2010	N	**0.0053 b**	**0.044**	**0.0056**	**0.036**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-1A	10/05/2010	N	< 0.0034	**0.018**	< 0.0043	**0.030**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-1A	10/11/2011	N	**0.0037**	**0.020**	**0.0038**	**0.022**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
S-1A	10/11/2011	FD	< 0.0033	**0.019**	**0.0038**	**0.020**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-1A	10/16/2012	N	< 0.0035 h	**0.012 h**	< 0.0035 h	**0.023 h**	< 0.0035 h	< 0.0035 h	< 0.0035 h	< 0.0035 h	< 0.0035 h	< 0.0035 h	< 0.0035 h
S-1A	10/08/2013	N	< 0.0034	**0.013**	**0.0053**	**0.034**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-1A	10/15/2014	N	< 0.0034	**0.0077**	**0.0035**	**0.023**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-1A	10/06/2015	N	< 0.0033	**0.0057**	< 0.0033	**0.019**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-1A	10/13/2016	N	< 0.0033	**0.0066**	**0.0049**	**0.024**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-1A	10/11/2017	N	< 0.0034	**0.0052**	< 0.0034	**0.016**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-2	3/01/2006	N	**0.0034**	**0.019**	**0.0088**	**0.043**	**0.0035**	**0.0025 j**	**0.0036**	**0.0022 j**	**0.0024 j**	**0.0037**	< 0.00098
S-2	3/01/2006	FD	**0.0034**	**0.019**	**0.0095**	**0.045**	**0.0044**	**0.0034 j**	**0.0044**	**0.0027 j**	**0.0030 j**	**0.0050**	< 0.00098
S-2	10/21/2006	N	**0.0057**	**0.011**	< 0.0073	**0.040**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-2	11/08/2007	N	< 0.0034	**0.0075**	< 0.0055	**0.023**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-2	10/14/2008	N	< 0.0033	**0.0053**	< 0.0041	**0.027**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-2	9/30/2009	N	< 0.0033	**0.0066**	< 0.0033	**0.023**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-2	10/05/2010	N	< 0.0034	**0.0063**	< 0.0034	**0.022**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-2	10/11/2011	N	**0.0035**	**0.0057**	< 0.0033	**0.017**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-2	10/16/2012	N	< 0.41 h	< 0.021 h	**0.58 h**	**0.039 h**	**0.021 h**	**0.013 h**	**0.014 h**	**0.0072 h**	**0.021 h**	**0.018 h**	< 0.0042 h
S-2	10/08/2013	N	< 0.0034	**0.0060**	**0.0043**	**0.028**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-2	10/08/2013	FD	< 0.0035	**0.0096**	**0.0046**	**0.027**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
S-2	10/15/2014	N	< 0.0034	**0.0039**	< 0.0034	**0.020**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-2	10/06/2015	N	< 0.0033	**0.0040**	< 0.0033	**0.015**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-2	10/13/2016	N	< 0.0033	**0.0038**	**0.0036**	**0.020**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-2	10/11/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.016**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034

See Table 3-18 for data qualifiers and footnotes.

Table A-4
1984-2017 Upper 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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U1	7/07/1988	N	< 10	< 10 pp	< 10	< 10	< 50 pp	< 10	< 10
U1	12/29/1988	N	< 10	< 10 pp	< 10	< 10	< 5	< 10	< 10
U1	2/27/1989	N	--	--	--	--	**20**	--	--
U1	8/03/1989	N	< 10	**10**	< 10	< 10	**430**	< 10 pp	< 10
U1	5/04/1990	N	--	--	--	--	**430**	--	--
U1	10/30/1990	N	< 10	**9 j**	< 10	< 10	**28**	**3 j**	< 10
U1	10/17/1991	N	< 10	**9 j**	< 10	< 10	**24**	**3 j**	< 10
U1	10/14/1992	N	< 10 < 10	**8 j** **7 j**	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10
U1	10/20/1993	N	< 10	**4 j**	< 10	< 10	< 10	< 10	< 10
U1	10/14/1994	N	< 10	**6 j**	< 10	< 10	< 10	< 10	< 10
U1	12/08/1995	N	< 0.96	**4.4**	< 0.96	< 0.96	**55**	< 0.96	< 0.96
U1	10/02/1996	N	< 30 < 10	**4 j*** **5 j**	< 30 < 10	< 30 * 3 j	**120** **130**	< 30 < 10	< 30 < 10
U1	10/03/1997	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U1	11/19/1998	N	< 10	< 10	< 10	< 10	< 10	--	< 10
U1	11/19/1999	N	< 0.1	< 0.1	< 0.1	< 0.1	< 3.0	< 0.1	< 0.1
U1	9/27/2000	N	< 0.1	< 0.1	< 0.1	< 0.1	< 3	< 0.1	< 0.1
U1	9/27/2000	FD	< 0.1	**0.15**	< 0.1	< 0.1	< 3	< 0.1	< 0.1
U1	10/19/2001	N	**0.05 b**	**0.35**	< 0.0033	**0.064**	< 3	**0.015 b**	**0.02**
U1	11/01/2002	N	**0.016**	< 0.0034	< 0.0034	**0.0053 b***	< 3.0	< 0.0034	**0.015**
U1	12/21/2003	N	**0.041**	**0.017**	< 0.0034	**0.042 b**	< 3.0	**0.0088**	**0.023**
U1	10/29/2004	N	**0.029**	< 0.0035	< 0.0035	**0.0091 b**	< 2.0 *	**0.0039**	**0.013**
U1	11/10/2005	N	**0.038**	**0.011**	< 0.0034	**0.023 b**	< 3.0	**0.0077**	**0.020**
U1	10/21/2006	N	**0.028**	**0.0077**	< 0.0034	**0.025 b**	< 3.0	**0.0083**	**0.021**
U1	9/16/2007	N	**0.021**	< 0.0033	< 0.0033	**0.016**	< 2.9	**0.0082**	**0.013**
U1	11/09/2007	N	**0.018**	< 0.015	< 0.0034	**0.015 b**	< 1.0	**0.0063 b**	**0.013**
U1	3/19/2008	N	**0.018**	< 0.0034	< 0.0034	**0.0058**	< 1.0	< 0.0034	**0.018**
U1	6/14/2008	N	**0.014**	< 0.0033	< 0.0033	**0.021**	< 0.95	< 0.0033	**0.014**
U1	9/04/2008	N	**0.011 ***	< 0.0033 *	< 0.0033	**0.014**	< 0.97	< 0.0033 *	**0.011 ***
U1	10/10/2008	N	**0.011**	< 0.0034	< 0.0034	**0.011**	< 1.0	< 0.0034	**0.010**
U1	2/25/2009	N	**0.0088**	< 0.0092	< 0.0033	**0.0075**	< 0.96	< 0.0033	**0.012**
U1	6/10/2009	N	**0.011**	< 0.013	< 0.0034	**0.025**	< 0.99	< 0.0034	**0.015**
U1	9/09/2009	N	**0.015**	< 0.015	< 0.0034	**0.014**	< 0.98	< 0.0034	**0.016**
U1	10/05/2009	N	**0.016**	< 0.015	< 0.0033	**0.013 b**	< 0.96	< 0.0046	**0.013**
U1	10/05/2009	FD	**0.018**	< 0.016	< 0.0034	**0.017 b**	< 1.0	< 0.0034	**0.014**
U1	3/09/2010	N	**0.016**	< 0.018	< 0.0034	**0.098**	< 0.98	< 0.0034	**0.022**

Table A-4
1984-2017 Upper 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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U1	6/04/2010	N	**0.014**	< 0.015	< 0.0034	**0.013 b**	< 1.0	< 0.0034	**0.018**
U1	8/09/2010	N	**0.015**	< 0.011	< 0.0033	**0.023 b**	< 0.97	< 0.0041	**0.013**
U1	10/05/2010	N	**0.015**	< 0.014	< 0.0033	**0.025 b**	< 0.96	**0.0042**	**0.015**
U1	3/22/2011	N	**0.016**	< 0.015	< 0.0034	**0.013**	< 1.0	**0.0052**	**0.016**
U1	6/06/2011	N	**0.015**	< 0.012	< 0.0034	**0.0056**	< 1.0	< 0.0044	**0.014**
U1	9/11/2011	N	**0.021**	< 0.0095	< 0.0034	**0.0075**	< 0.98	**0.0059**	**0.016**
U1	10/15/2011	N	**0.0096**	< 0.0087	< 0.0033	**0.035 b**	< 0.97	< 0.0033	**0.0099**
U1	10/15/2011	FD	**0.0090**	< 0.011	< 0.0034	**0.050 b**	< 1.0	< 0.0034	**0.010**
U1	3/16/2012	N	**0.0054**	< 0.0085	< 0.0037	**0.025**	< 1.1	< 0.0037	**0.013**
U1	6/09/2012	N	**0.014**	**0.011 ***	< 0.0036	**0.024**	< 1.1	< 0.0036	**0.015**
U1	9/27/2012	N	**0.040**	< 0.011	< 0.0034	**0.039**	< 1.0	**0.0042 ***	**0.020**
U1	10/17/2012	N	**0.011 h**	< 0.013 h	< 0.0033 h	**0.020 bh**	< 0.95 h	< 0.0033 h	**0.013 h**
U1	3/07/2013	N	**0.010**	**0.012 ***	< 0.0034	**0.056**	< 0.99	**0.0041**	**0.015**
U1	5/30/2013	N	**0.011**	< 0.012	< 0.0033	**0.0091**	< 0.95	**0.0037 ***	**0.013**
U1	8/14/2013	N	**0.011**	< 0.013	< 0.0033	**0.015**	< 0.97	**0.0050**	**0.014**
U1	10/08/2013	N	**0.011**	< 0.013	< 0.0035	**0.037 b**	< 1.1	**0.0054 ***	**0.015**
U1	3/27/2014	N	< 11	< 11	< 11	< 11	< 27	< 11	< 11
U1	6/30/2014	N	**0.015**	< 0.013	< 0.0033	**0.032**	< 0.97	**0.0041 ***	**0.013**
U1	9/30/2014	N	**0.0097**	< 0.011	< 0.0034	**0.012**	< 0.99	**0.0063**	**0.015**
U1	10/16/2014	N	**0.0083**	**0.0088 ***	< 0.0034	**0.010**	< 1.0	< 0.0034	**0.014**
U1	3/20/2015	N	**0.0063**	**0.0072 ***	< 0.0037	**0.0099**	< 1.1	**0.0046**	**0.011**
U1	6/30/2015	N	**0.0051 h**	< 0.0088 h	< 0.0033 h	**0.0040 h**	< 0.96 h	< 0.0033 h	**0.013 h**
U1	9/01/2015	N	**0.0054**	**0.0095 ***	< 0.0034	**0.0060**	< 1.0	< 0.0034	**0.0096**
U1	10/07/2015	N	**0.0068**	**0.0094 ***	< 0.0034	**0.0052 b**	< 1.0	< 0.0034	**0.013**
U1	2/04/2016	N	**0.0040**	**0.0061**	< 0.0033	**0.0082**	< 0.29	< 0.0033	**0.0078**
U1	6/30/2016	N	**0.0051 h**	**0.0075 h***	< 0.0034 h	**0.0077 bh**	< 0.20 h	< 0.0034 h	**0.0085 h**
U1	9/12/2016	N	**0.0053**	**0.0067**	< 0.0033	**0.0050**	< 0.29	< 0.0033	**0.0085**
U1	10/18/2016	N	**0.0067**	**0.015 ***	< 0.0035	**0.0097**	< 0.31	**0.0045**	**0.013**
U1	3/21/2017	N	< 0.0034	**0.0064**	< 0.0034	**0.0050**	< 0.30	< 0.0034	**0.0080**
U1	6/28/2017	N	< 0.0034	**0.0074 ***	< 0.0034	**0.0042**	< 0.30	**0.018**	**0.011**
U1	9/12/2017	N	**0.0054**	**0.010 ***	**0.0073 b**	**0.0054 ***	< 0.29	< 0.0033	**0.012**
U1	10/13/2017	N	< 0.0034	**0.0076**	**0.0040**	**0.0050**	< 0.30	< 0.0034	**0.0093**
U1A	10/01/1997	N	< 10	**2 j**	< 10	< 10	**18 j**	< 10	< 10
U1A	11/18/1998	N	< 10	**1 j**	< 10	< 10	< 10	< 10	< 10
U1A	12/10/1999	N	< 0.1	**0.5**	< 0.1	< 0.1	**2.5**	< 0.1	< 0.1
U1A	9/26/2000	N	< 0.1	**0.46**	< 0.1	< 0.1	**4.2**	< 0.1	< 0.1

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Joslyn Manufacturing and Supply Company
Brooklyn Center, MN

		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U1A	10/16/2001	N	**0.075**	**0.2**	< 0.0033	**0.029 b**	< 3	**0.013 b**	**0.029**
U1A	11/01/2002	N	< 0.10	< 0.10	< 0.10	< 0.10 *	< 3.0	< 0.10	< 0.10
U1A	12/16/2003	N	**0.044**	< 0.020	< 0.020	**0.027 b**	< 0.96 *	< 0.020	< 0.020
U1A	10/29/2004	N	**3.9**	**53**	< 0.17	**240**	**750 j***	**57**	**1.6**
U1A	2/10/2005	N	**0.037**	**0.016**	< 0.0034	**0.022 b**	< 3.0	< 0.0034	**0.014**
U1A	2/10/2005	FD	**0.15**	< 0.017	< 0.017	**0.072 b**	< 15	**0.030 b**	**0.062**
U1A	11/12/2005	N	**0.049**	**0.0049**	< 0.0034	**0.014 b**	< 3.0	< 0.0062	**0.020**
U1A	10/18/2006	N	**0.030**	< 0.0034	< 0.0034	**0.0067**	< 3.0	**0.0047**	**0.014**
U1A	10/02/2009	N	**0.060**	**0.015**	< 0.0034	**0.025**	< 1.0	**0.011**	**0.021**
U1A	10/12/2010	N	**0.030**	**0.026 ***	< 0.0033	**0.12**	**2.4**	**0.0064**	**0.014**
U1A	10/16/2011	N	**0.045**	< 0.012	< 0.0033	**0.066 b**	**1.4**	< 0.0065	**0.018**
U1A	3/16/2012	N	**0.044**	< 0.010	< 0.0033	**0.042**	< 0.97	**0.0047 ***	**0.022**
U1A	6/09/2012	N	**0.043**	**0.012 ***	< 0.0033	**0.024**	< 0.95	< 0.0050	**0.021**
U1A	9/27/2012	N	**0.0078**	< 0.012	< 0.0034	**0.028**	< 0.98	< 0.0034	**0.012**
U1A	10/18/2012	N	**0.035**	**0.014**	< 0.0034	**0.029**	< 1.0	< 0.0064	**0.021**
U1A	10/08/2013	N	**0.026**	< 0.015	< 0.0034	**0.073 b**	< 0.99	**0.0054 ***	**0.028**
U1A	10/16/2014	N	**0.018**	**0.011**	< 0.0033	**0.019**	< 0.95	**0.0080 ***	**0.024**
U1A	10/07/2015	N	**0.0097**	**0.011 ***	< 0.0034	**0.011 b**	< 0.99	**0.0044 b***	**0.022**
U1A	10/18/2016	N	< 0.012	**0.0087**	< 0.0033	**0.013**	< 0.29	**0.0071**	**0.021**
U1A	10/13/2017	N	**0.0070**	**0.0062**	< 0.0034	**0.011**	< 0.30	< 0.0034	**0.016**
U1A	10/13/2017	FD	**0.0076**	**0.0065**	< 0.0034	**0.014**	< 0.30	< 0.0034	**0.016**
U2	7/07/1988	N	< 10	**16**	< 10	**20**	**360**	**12**	< 10
U2	12/29/1988	N	< 10	**24**	< 10	**33**	**480**	**18**	< 10
U2	2/27/1989	N	--	--	--	--	**1600**	--	--
U2	8/03/1989	N	< 10	**29**	< 10	**45**	**7300**	**18**	< 10
U2	5/04/1990	N	--	--	--	--	**1700**	--	--
U2	6/22/1990	N	--	--	--	--	**1400**	--	--
U2	10/30/1990	N	< 10	**23**	< 10	**24**	**520**	**16**	< 10
U2	10/17/1991	N	< 10	**11**	< 10	< 10	**290**	**3 j**	< 10
U2	12/03/1992	N	< 20	**6 j***	< 20	< 20	**330**	< 20	< 20
U2	10/18/1993	N	< 10	**7 j**	< 10	< 10	**270**	< 10	< 10
U2	9/28/1994	N	< 10	**6 j**	< 10	< 10	**170**	**1 j**	< 10
U2	10/18/1995	N	< 30	< 30	< 30	< 30	**240 h***	< 30	< 30
U2	10/02/1996	N	< 10	**1 j**	< 10	**2 j**	**5 j**	< 10	< 10
U2	10/03/1997	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10
U2	11/19/1998	N	< 10	< 10	< 10	< 10	< 10	--	< 10

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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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U2	11/19/1999	N	< 0.1	< 0.1	< 0.1	< 0.1	< 3.0	< 0.1	< 0.1
U2	9/27/2000	N	< 0.1	< 0.1	< 0.1	< 0.1	< 3	< 0.1	< 0.1
U2A	10/01/1997	N	< 10	**2 j**	< 10	**4 j**	**230**	< 10	< 10
U2A	11/18/1998	N	< 10	**2 j**	< 10	**1 j**	**370**	< 10	< 10
U2A	11/19/1999	N	**1 j**	**4 j**	< 10	**5 j**	**570**	**0.4 j**	**0.5 j**
U2A	11/19/1999	FD	**0.8 j**	**5 j**	< 10	**5 j**	**600**	**0.4 j**	**0.5 j**
U2A	12/10/1999	N	< 10	< 10	< 10	< 10	**520**	< 10	< 10
U2A	9/26/2000	N	< 9.6	< 9.6	< 9.6	< 9.6	**150**	< 9.6	< 9.6
U2A	10/16/2001	N	< 9.6	< 9.6	< 9.6	< 9.6	**460**	< 9.6	< 9.6
U2A	11/01/2002	N	< 9.6	< 9.6	< 9.6	< 9.6 *	**390**	< 9.6	< 9.6
U2A	12/16/2003	N	< 9.9	< 9.9	< 9.9	< 9.9	**220**	< 9.9	< 9.9
U2A	10/29/2004	N	**0.29**	**1.6**	< 0.0035	**1.5**	**130 ***	**0.019**	**0.14**
U2A	11/12/2005	N	**0.33**	**1.6**	< 0.034	**1.9**	**160**	**0.061**	**0.20**
U2A	10/18/2006	N	**0.29**	**1.1**	< 0.0066	**1.5**	**230**	**0.039**	**0.16**
U2A	11/13/2007	N	**0.28**	**0.51**	< 0.017	**0.99 b**	**240**	**0.025**	**0.12**
U2A	10/16/2008	N	**0.29**	**0.32**	< 0.0033	**0.62**	**200**	**0.039**	**0.13**
U2A	10/13/2010	N	**0.26**	< 0.026	< 0.0034	**0.047 b**	< 0.99	< 0.011	**0.12**
U2A	10/16/2011	N	**0.22**	**0.078**	< 0.0033	**0.16 b**	**140**	< 0.028	**0.11**
U2A	10/18/2012	N	**0.18**	**0.13**	< 0.0035	**0.13**	**190**	< 0.019	**0.11**
U2A	10/11/2013	N	**0.26**	**0.21**	< 0.0036	**0.39**	**190**	**0.031**	**0.16**
U2A	10/21/2014	N	**0.18**	**0.16**	< 0.0034	**0.18**	**100**	**0.026**	**0.10**
U2A	10/14/2015	N	**0.16**	**0.097**	< 0.017	**0.19**	**190**	< 0.017	**0.11**
U2A	10/11/2016	N	**0.084**	**0.050**	**0.035**	**0.066**	**46**	**0.046**	**0.10**
U2A	10/20/2017	N	**0.20**	**0.17**	< 0.017	**0.084**	**120**	**0.034**	**0.10**
U3	7/06/1988	N	< 10	**27**	< 10	**44**	**790**	**15**	< 10
U3	12/29/1988	N	< 10 < 10	**25** **35**	< 10 < 10	< 10 < 10	< 10 < 10	**15** **21**	< 10 < 10
U3	2/27/1989	N	--	--	--	--	**1100**	--	--
U3	8/03/1989	N	< 10	**28**	< 10	**210**	**410**	**27**	< 10
U3	5/04/1990	N	--	--	--	--	**220**	--	--
U3	10/30/1990	N	**3 j**	**37**	< 10	**170**	**440**	**35**	< 10
U3	10/17/1991	N	< 30	**24 j**	< 30	**76**	**670**	**19 j**	< 30
U3	10/14/1992	N	< 25	**31**	< 25	**190**	**580**	**26**	< 25
U3	10/18/1993	N	< 100	< 100	< 100	**140**	**460**	< 100	< 100
U3	9/29/1994	N	**7 j**	**31**	< 15	**150**	**140**	**25**	**5 j**
U3	10/18/1995	N	< 100	**26 j**	**22 j**	**99 j**	**250 jh**	**19 j**	< 100

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Joslyn Manufacturing and Supply Company
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		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U3	10/02/1996	N	**3 j**	**22 ***	< 10	**13 ***	**770 h**	**19**	**2 j**
U3	10/01/1997	N	**3 j**	**29**	< 10	**160**	**450**	**20**	**1 j**
U3	11/18/1998	N	**3 j**	**21**	< 10	**57**	**660**	**17**	**2 j**
U3	11/19/1999	N	**5 j**	**38**	< 10	**120**	**680**	**27**	**3 j**
U3	12/10/1999	N	< 10	**18**	< 10	< 10	**720**	< 10	< 10
U4	7/06/1988	N	< 10	< 10	< 10	**17**	**270**	< 10	< 10
U4	12/29/1988	N	< 10	**43**	< 10	**100**	**620**	**21**	< 10
U4	2/27/1989	N	--	--	--	--	**1600**	--	--
U4	8/03/1989	N	< 50	< 50 pp	< 50	**200**	**6400**	< 50	< 50
U4	5/04/1990	N	--	--	--	--	**1800**	--	--
U4	10/30/1990	N	< 10	**33**	< 10	**170**	**2200**	**23**	< 10
U4	10/17/1991	N	< 75	**45 j**	< 75	**240**	**3500**	< 75	< 75
U4	9/17/1992	N	**22 j**	**56 j**	< 60	**130**	**1100**	**66**	**18 j**
U4	10/14/1992	N	< 30	**59**	< 30	**310**	**1400**	**50**	< 30
U4	10/27/1992	N	**4 j**	**110**	< 6	**180**	**1600**	**81**	**2 j**
U4	10/18/1993	N	< 50	**48 j**	< 50	**300**	**480**	**39 j**	< 50
U4	9/28/1994	N	< 80	**65 j**	< 80	**600**	**1300**	**63 j**	< 80
U4	10/18/1995	N	< 250	**61 j**	< 250	**190 j**	**490 jh**	**58 j**	< 250
U4	10/02/1996	N	**3 j**	**52**	< 10	**430**	**400**	**60**	**1 j**
U4	10/01/1997	N	**2 j**	**44**	< 10	**180**	**330**	**42**	< 10
U4	11/18/1998	N	**3 j**	**54**	< 10	**340**	**520**	**53**	**1 j**
U4	1/14/2000	N	**3 j**	**49**	< 10	< 10	**420**	**28**	**1 j**
U4	9/26/2000	N	< 12	**52**	< 12	**110**	**300**	**43**	< 12
U4	10/16/2001	N	< 9.6	**72**	< 9.6	**360**	**1200**	**61**	< 9.6
U4	5/15/2002	N	< 0.011	**0.044**	< 0.011	**0.24 b**	**0.65**	**0.037 b**	< 0.011
U4N	11/01/2002	N	< 9.6	< 9.6	< 9.6	< 9.6 *	**330**	< 9.6	< 9.6
U4N	12/16/2003	N	< 9.6	< 9.6	< 9.6	**39**	**210**	< 9.6	< 9.6
U4N	10/29/2004	N	**0.022**	**4.0**	< 0.0086	**29**	**180 ***	**1.3**	**0.02**
U4N	11/12/2005	N	**0.075**	**8.1**	**0.070**	**38**	**130**	**3.1**	**0.091**
U4N	10/18/2006	N	**0.27**	**20**	< 0.017	**96**	**160**	**6.5**	**0.12**
U4N	11/13/2007	N	**0.23**	**9.0**	< 0.032	**31**	**160**	**4.2**	**0.098**
U4N	10/16/2008	N	**0.26**	**11**	< 0.0068	**60**	**160**	**5.3**	**0.13**
U4N	10/02/2009	N	**0.30**	**16**	< 0.0033	**84**	**230**	**5.1**	**0.13**
U4N	10/12/2010	N	**0.37**	**8.4**	< 0.017	**47**	**160**	**4.3**	**0.16**
U4N	10/16/2011	N	**0.40**	**8.5**	< 0.017	**59**	**170**	**4.1**	**0.17**
U4N	10/18/2012	N	**0.43**	**6.1**	< 0.017	**0.053 ***	**140**	**0.87**	**0.22**

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Brooklyn Center, MN

		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U4N	10/11/2013	N	**0.70**	**12**	< 0.033	**110**	**220**	**5.8**	**0.32**
U4N	10/21/2014	N	**0.38**	**8.5**	< 0.0034	**80**	**110**	**3.9**	**0.16**
U4N	10/14/2015	N	**0.68**	**9.3**	< 0.017	**56**	**150**	**4.6**	**0.28**
U4N	10/11/2016	N	**0.81**	**9.1**	< 0.033	**47**	**110**	**4.4**	**0.29**
U4N	10/20/2017	N	**0.98**	**9.1**	< 0.017	**0.37**	**120**	**3.7**	**0.42**
U5	7/07/1988	N	< 10	**79**	< 10	**690**	**3400**	**76**	< 10
U5	12/29/1988	N	< 100	< 100 pp	< 100	**440**	**1400**	< 100 pp	< 100
U5	2/27/1989	N	--	--	--	--	**50000**	--	--
U5	8/03/1989	N	< 10 pp	**66**	< 10	**220**	**12000**	**47**	< 10
U5	6/22/1990	N	--	--	--	--	**810**	--	--
U5	10/30/1990	N	**11 j**	**120**	< 20	**360**	**350**	**82**	**5 j**
U5	12/03/1992	N	< 70	< 70	< 70	< 70	**1300**	< 70	< 70
U5	10/18/1993	N	**36**	**32**	< 10	< 10	**35**	**3 j**	**15**
U5	9/28/1994	N	**15 j**	**100**	< 40	**150**	**850**	**31 j**	**8 j**
U5	10/18/1995	N	< 400	**57 j**	< 400	**75 j**	**1400 h**	**50 j**	< 400
U5	10/01/1997	N	**12**	**86**	< 10	**140**	**390**	**65**	**6 j**
U5	11/18/1998	N	**14**	**110**	< 10	**99 j**	**530**	**56**	**8 j**
U5	11/19/1999	N	**18**	**110**	< 10	**100**	**950**	**40**	**9 j**
U5	9/26/2000	N	**18**	**110**	< 9.5	**240**	**1500**	**46**	**10**
U5	10/16/2001	N	**15**	**86**	< 9.6	**140**	**1200**	**38**	< 9.6
U5	11/01/2002	N	< 9.6	< 9.6	< 9.6	< 9.6 *	**1500**	< 9.6	< 9.6
U5	12/16/2003	N	**19**	**110**	< 10	**48**	**220**	**50**	**11**
U5	10/29/2004	N	**5.5**	**0.88**	**0.048**	**0.2**	**190 ***	**0.11**	**1.6**
U5	11/12/2005	N	**0.46**	**0.22**	< 0.034	< 1.5	**510**	**0.11**	**0.27**
U5	10/18/2006	N	**16**	**83**	< 0.017	**93**	**910**	**26**	**8.5**
U5	11/13/2007	N	**4.6**	**0.56**	**0.047**	**0.96 b**	**650**	< 0.032	**3.3**
U5	10/16/2008	N	**17**	**61**	**0.026**	**0.51**	**540**	**6.9**	**9.7**
U5	10/02/2009	N	**16**	**100**	**0.0051**	**7.0**	**27**	**26**	**8.3**
U5	10/12/2010	N	**21**	**120**	**0.0063**	**15**	**93**	**21**	**11**
U5	10/16/2011	N	**8.2**	**1.0**	< 0.017	**0.77**	**230**	**0.064**	**3.9**
U5	10/18/2012	N	**22**	**81**	< 0.018	**15**	**110**	**20**	**8.4**
U5	10/11/2013	N	**27**	**87**	< 0.034	**4.2**	**200**	**17**	**13**
U5	10/21/2014	N	**21**	**81**	**0.018**	**8.8**	**34**	**14**	**12**
U5	10/14/2015	N	**19**	**61**	< 0.033	**2.2**	**8.2**	**5.2**	**11**
U5	10/11/2016	N	**18**	**57**	< 0.033	**2.1**	**16**	**2.8**	**8.1**
U5	12/04/2017	N	**19**	**8.4**	< 0.33	**2.1**	**210**	< 0.33	**10**

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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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U6	7/06/1988	N	< 10	< 10	< 10	**15**	**3000**	< 10	< 10
U6	12/29/1988	N	< 10	< 10 pp	< 10	< 10 pp	**1100**	< 10 pp	< 10
U6	2/27/1989	N	--	--	--	--	**5000**	--	--
U6	8/03/1989	N	< 10	< 10 pp	< 10	**22**	**17000**	< 10	< 10
U6	6/22/1990	N	--	--	--	--	**5100**	--	--
U6	10/30/1990	N	< 10	**9 j**	< 10	**42**	**6100**	**5 j**	< 10
U6	10/17/1991	N	< 75	< 75	< 75	**35 j**	**5200**	< 75	< 75
U6	9/17/1992	N	< 250	< 250	< 250	< 250	**4300**	< 250	< 250
U6	10/14/1992	N	< 320	< 320	< 320	< 320	**5700**	< 320	< 320
U6	10/27/1992	N	< 6	**8**	< 6	**26**	**6800**	**4 j**	< 6
U6	10/18/1993	N	< 250	< 250	< 250	**76 j**	**3500**	< 250	< 250
U6	9/28/1994	N	< 380	< 380	< 380	< 380	**3500**	< 380	< 380
U6	10/18/1995	N	< 1400	< 1400	< 1400	< 1400	**4000 h**	< 1400	< 1400
U6	10/02/1996	N	< 500	< 500	< 500	< 500	**2800**	< 500	< 500
U6	10/01/1997	N	< 10	**5 j**	< 10	**46**	**4300**	**5 j**	< 10
U6	11/18/1998	N	< 10	< 10	< 10	**24**	**3600**	**4 j**	< 10
U6N	1/14/2000	N	**16**	**130**	< 10	**1100**	**1600**	**150**	**10 j**
U6N	9/26/2000	N	**17**	**73**	< 9.6	**400**	**2400**	**90**	< 9.6
U6N	10/16/2001	N	**14**	**53**	< 9.6	**140**	**1400**	**62**	< 9.6
U6N	11/01/2002	N	**14**	**53**	< 9.6	**290 ***	**1200**	**59**	< 9.6
U6N	12/16/2003	N	**11**	**47**	< 9.6	**190**	**2000**	**48**	< 9.6
U6N	10/29/2004	N	**3.4**	**17**	< 0.0086	**3.7**	**55 ***	**0.024**	**1.7**
U6N	2/10/2005	N	**67**	**170**	**0.0096**	**730**	**3700**	**160**	**33**
U6N	11/12/2005	N	**12**	**27**	< 0.034	**170**	**590**	**24**	**8.3**
U6N	10/18/2006	N	**11**	**32**	**0.048**	**150**	**1500**	**28**	**7.1**
U6N	11/13/2007	N	**9.9**	**27**	**0.14**	**6.2**	**1300**	**18**	**5.7**
U6N	10/16/2008	N	**13**	**38**	< 0.034	**150**	**1400**	**33**	**7.7**
U6N	10/02/2009	N	**11**	**31**	< 0.033	**17**	**900**	**16**	**6.3**
U6N	10/12/2010	N	**26**	**29**	**1.7**	**100**	**870**	**31**	**18**
U6N	10/16/2011	N	**27**	**22**	**2.4**	**70**	**890**	**23**	**17**
U6N	10/18/2012	N	**9.6**	**21**	**0.12**	**0.073 ***	**1100**	**7.6**	**7.0**
U6N	10/11/2013	N	**13**	**25**	< 0.033	**0.99**	**1100**	**12**	**8.8**
U6N	10/21/2014	N	**13**	**14**	**0.98**	**0.78**	**260**	**6.8**	**12**
U6N	10/14/2015	N	**18**	**15**	**1.3**	**18**	**1400**	**11**	**12**
U6N	10/11/2016	N	**10**	**16**	**0.055**	**25**	**650**	**13**	**5.2**
U6N	10/20/2017	N	**28**	**16**	**3.0**	**0.70**	**940**	**18**	**21**

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Joslyn Manufacturing and Supply Company
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Parameter			Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U7	7/06/1988	N	< 10	< 10	< 10	< 10	**380**	< 10	< 10
U7	12/29/1988	N	< 10	< 10	< 10	< 10	**44**	< 10	< 10
U7	2/27/1989	N	--	--	--	--	**180**	--	--
U7	8/03/1989	N	< 10 pp	< 10 pp	< 10	**97**	**100**	< 10 pp	< 10 pp
U7	5/04/1990	N	--	--	--	--	**270**	--	--
U7	10/30/1990	N	**7 j**	**15**	< 10	**94**	**130**	**3 j**	**4 j**
U7	10/17/1991	N	**7 j**	**14**	< 10	**7 j**	**180**	**2 j**	**4 j**
U7	12/03/1992	N	< 20	< 20	< 20	**5 j***	**520**	< 20	< 20
U7	10/18/1993	N	< 20	< 20	< 20	**5 j**	**240**	< 20	< 20
U7	9/28/1994	N	**2 j** **2 j**	**2 j** **2 j**	< 15 < 10	**6 j** **6 j**	**480 h** **430 h**	**2 j** **3 j**	< 15 1 j
U7	10/18/1995	N	< 70	< 70	< 70	**32 j**	**310 jh**	< 70	< 70
U7	10/02/1996	N	< 50	< 50 *	< 50	**13 j**	**280**	< 50	< 50
U7	10/01/1997	N	**2 j**	**3 j**	< 10	**30**	**320**	**3 j**	**1 j**
U7	11/18/1998	N	< 120	< 120	< 120	**19 j**	**880**	< 120	< 120
U7N	1/14/2000	N	**2 j**	**21**	< 10	**41**	**740**	**4 j**	**0.9 j**
U7N	9/26/2000	N	**13**	**51**	< 9.7	**120**	**130**	**38**	< 9.7
U7N	10/16/2001	N	**12**	**47**	< 9.6	**120**	**87**	**36**	< 9.6
U7N	11/01/2002	N	**12**	**44**	< 9.7	**110 ***	**75**	**29**	< 9.7
U7N	12/16/2003	N	< 9.9	**30**	< 9.9	**85**	**83**	**23**	< 9.9
U7N	10/29/2004	N	**7.8**	**23**	< 0.0086	**32**	**49 ***	**12**	**4.3**
U7N	11/12/2005	N	**10**	**28**	< 0.017	**78**	**40**	**13**	**7.4**
U7N	10/18/2006	N	**9.6**	**28**	< 0.017	**65**	**47**	**14**	**5.4**
U7N	11/13/2007	N	**7.3**	**23**	< 0.017	**41**	**45**	**9.5**	**4.0**
U7N	10/16/2008	N	**10**	**24**	< 0.0067	**44**	**38**	**13**	**5.7**
U7N	10/02/2009	N	**11**	**35**	< 0.0033	**42**	**61**	**11**	**5.4**
U7N	10/12/2010	N	**12**	**30**	< 0.017	**65**	**34**	**15**	**5.9**
U7N	10/16/2011	N	**9.0**	**20**	< 0.017	**32**	**24**	**11**	**6.6**
U7N	10/18/2012	N	**10**	**22**	< 0.0034	**21**	**34**	**12**	**5.5**
U7N	10/11/2013	N	**12**	**29**	< 0.033	**37**	**82**	**16**	**7.0**
U7N	10/21/2014	N	**7.0**	**23**	< 0.0033	**41**	**44**	**12**	**5.8**
U7N	10/14/2015	N	**13**	**23**	< 0.033	**41**	**56**	**18**	**7.3**
U7N	10/11/2016	N	**9.6**	**20**	< 0.033	**32**	**53**	**13**	**4.2**
U7N	10/20/2017	N	**9.7**	**22**	**0.024**	**22**	**52**	**14**	**5.3**
U8	12/29/1988	N	< 10	**60**	< 10	**45**	< 10	< 10 pp	< 10
U8	2/27/1989	N	--	--	--	--	< 17	--	--

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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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U8	8/03/1989	N	< 50 pp	**80**	< 50	**650**	**60**	**77**	< 50 pp
U8	12/03/1992	N	**460 ***	**260 ***	< 40	**480 ***	**160**	**770 ***	**300 ***
U8	10/18/1993	N	< 50	**42 j**	< 50	**320**	**38 j**	**66**	< 50
U8	9/28/1994	N	**840**	**620**	**28 j**	**1500**	< 150	**1700**	**670**
U8	10/20/1995	N	**54 j**	**150 j**	< 250	**1100**	**34 j**	**240 j**	**31 j**
U8	10/02/1996	N	**59 j**	**140 j**	< 150	**720**	**25 j**	**240**	**38 j**
U8	10/01/1997	N	**550**	**500**	**21**	**3000**	**50**	**1100**	**400**
U8	2/02/2000	N	**760**	**650**	**27**	**6000**	**67**	**1300**	**520**
U8	9/26/2000	N	**920**	**800**	**26**	**4100**	**58**	**2300**	**670**
U8	10/16/2001	N	**60**	**150**	< 9.6	**1300**	< 48	**170**	**39**
U8	12/22/2003	N	**150**	**180**	**6.1**	**1800**	**33**	**290**	**100**
U11	10/18/2001	N	< 10	**68**	< 10	**20**	**940**	**52**	< 10
U11	11/01/2002	N	< 9.6	**60**	< 9.6	**480 ***	**1600**	**63**	< 9.6
U11	11/01/2002	FD	< 9.6	**62**	< 9.6	**570**	**1800**	**66**	< 9.6
U11	12/16/2003	N	< 9.6	**81**	< 9.6	**730**	**2100**	**81**	< 9.6
U11	10/29/2004	N	**0.021**	< 0.0035	< 0.0035	**0.0077 b**	< 2 *	**0.0048**	**0.0098**
U11	2/10/2005	N	**2.4**	**270**	< 0.0034	**2000**	**4400**	**250**	**1.4**
U11	11/12/2005	N	**3.3**	**52**	< 0.17	**510**	**1200**	**50**	**1.6**
U11	10/18/2006	N	**2.7**	**38**	< 0.034	**200**	**870**	**35**	**1.1**
U11	11/13/2007	N	**2.6**	**44**	< 0.033	**230**	**1100**	**31**	**1.0**
U11	11/13/2007	FD	**2.7**	**45**	< 0.034	**170**	**1100**	**34**	**1.1**
U11	10/16/2008	N	**3.1**	**46**	< 0.033	**290**	**720**	**39**	**1.4**
U11	10/16/2008	FD	**2.7**	**41**	< 0.017	**260**	**890**	**35**	**1.3**
U11	10/02/2009	N	**3.6**	**56**	< 0.033	**400**	**810**	**39**	**1.3**
U11	10/12/2010	N	**3.3**	**47**	< 0.17	**320**	**730**	**38**	**1.4**
U11	10/12/2010	FD	**3.2**	**47**	< 0.17	**370**	**800**	**37**	**1.4**
U11	10/16/2011	N	**3.4**	**44**	< 0.033	**200**	**760**	**35**	**1.5**
U11	10/18/2012	N	**2.0 ***	**1.6**	< 0.017	**0.63 ***	**650**	< 0.060	**1.1 ***
U11	10/11/2013	N	**4.1**	**53**	< 0.034	**100**	**760**	**39**	**1.8**
U11	10/21/2014	N	**2.8**	**35**	< 0.017	**160**	**260**	**20**	**1.5**
U11	10/14/2015	N	**3.7**	**46**	< 0.033	**140**	**1200**	**30**	**1.6**
U11	10/11/2016	N	**3.5**	**38**	< 0.033	**60 ***	**480**	**23**	**1.2**
U11	10/11/2016	FD	**3.4**	**37**	< 0.033	**43 ***	**570**	**20**	**1.2**
U11	10/20/2017	N	**3.3**	**0.34**	< 0.033	**2.4**	**570**	**0.081**	**1.2**
U12	10/16/2001	N	< 9.7	**25**	< 9.7	< 9.7	**400**	< 9.7	< 9.7
U12	11/01/2002	N	< 9.6	**22**	< 9.6	**14 ***	**110**	**10**	< 9.6

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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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
U12	12/16/2003	N	< 10	**28**	< 10	**25**	**70**	**12**	< 10
U12	10/29/2004	N	**12**	**35**	< 0.017	**110**	**480 j***	**35**	**6.5**
U12	11/12/2005	N	**4.1**	**27**	< 0.068	**9.0**	< 60	**9.9**	**2.6**
U12	10/21/2006	N	**3.3**	**25**	< 0.0034	**28**	**71**	**11**	**1.8**
U12	11/13/2007	N	**2.9**	**24**	< 0.017	**10**	**78**	**11**	**1.6**
U12	10/16/2008	N	**4.0**	**32**	< 0.036	**18**	**60**	**15**	**2.4**
U12	10/02/2009	N	**3.9**	**24**	**0.034**	**1.0**	**36**	**6.5**	**1.4**
U12	10/12/2010	N	**4.2**	**30**	< 0.0033	**1.3**	**22**	**4.8**	**2.3**
U12	10/16/2011	N	**4.2**	**17**	< 0.018	**1.2**	**13**	**3.1**	**2.2**
U12	10/18/2012	N	**4.9**	**22**	< 0.0033	**0.93**	**17**	**1.2**	**2.6**
U12	10/11/2013	N	**4.7**	**19**	< 0.0035	**1.5**	**16**	**1.3**	**2.5**
U12	10/21/2014	N	**2.9**	**23**	< 0.0033	**0.61**	**6.9**	**0.41**	**2.1**
U12	10/14/2015	N	**4.3**	**17**	< 0.017	**0.48**	**10**	**0.38**	**2.5**
U12	10/11/2016	N	**4.5**	**23**	< 0.033	**2.9**	**12**	**0.65**	**1.9**
U12	10/20/2017	N	**4.5**	**26**	< 0.017	**1.0**	**5.5**	**0.46**	**2.4**
W6	12/27/1984	N	< 0.20	**2.2**	< 0.34	**2.3**	**12000**	< 0.20	< 0.20
W6	3/27/1985	N	< 0.50	< 0.70	< 0.85	**32**	**4200**	< 0.50	< 0.50
W6	5/16/1985	N	**0.030**	**0.029**	< 0.017	**0.97**	**2100**	**0.013**	**0.023**
W6	6/04/1986	N	**0.0049**	< 0.0028	< 0.0034	**0.034 s**	**290**	**0.0054**	**0.0046**
W6	7/29/1987	N	< 50	< 50	< 50	< 50	**4900**	< 50	< 50
W6	10/06/1988	N	< 6.0	< 6.0	< 6.0	**29**	**25000**	< 6.0	< 6.0
W6	12/12/1988	N	< 10	< 10	< 10	**31**	**24000**	< 10	< 10
W6	6/22/1990	N	--	--	--	--	**5400**	--	--
W6	10/30/1990	N	< 10	< 10	< 10	**5 j**	**6200**	< 10	< 10
W6	10/17/1991	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W6	10/13/1992	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W6	10/19/1993	N	< 0.00600	< 0.00600	< 0.00600	**0.00847 b**	< 6	< 0.00600	**0.00653**
W6	9/30/1994	N	**0.011**	< 0.003	< 0.003	**0.011 b**	**3**	**0.011**	**0.009**
W6	10/20/1995	N	**0.009**	**0.006**	< 0.003	**0.046 b**	**2 j**	**0.010**	**0.008**
W6	10/03/1996	N	**0.053**	< 0.003	**0.007**	**0.011 b**	**230**	**0.012 b**	**0.12 e**
W6	10/06/1997	N	**0.027**	**0.14 e**	**0.005**	**0.12 e**	**170**	**0.016 b**	**0.019**
W6	11/21/1998	N	**0.063**	**0.089 e**	**0.019**	**0.018 b**	**35**	**0.032 b**	**0.066**
W6N	11/17/1999	N	**0.11 b**	**0.011**	**0.057**	**0.029 b**	**74**	**0.055 b**	**0.13 b**
W6N	9/28/2000	N	**0.008 b**	< 0.003	**0.003**	**0.014 b**	**68**	**0.009 b**	**0.007**
W6N	10/16/2001	N	< 0.0033	**0.014**	< 0.0033	**0.024 b**	**120**	**0.011 b**	< 0.0033
W6N	10/29/2002	N	**0.0091**	**0.014**	**0.0042**	**0.0092 b**	**62**	**0.0064 b**	**0.0057**

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Joslyn Manufacturing and Supply Company
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		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W6N	12/17/2003	N	< 0.034	**0.19**	< 0.0034	**0.10 b**	**1800**	**0.091**	< 0.0034
W6N	12/17/2003	FD	< 0.034	**0.22**	< 0.0034	**0.11 b**	**1800**	**0.098**	< 0.0034
W6N	10/19/2004	N	**0.0066**	< 0.0034	< 0.0034	**0.0066**	**3.6**	**0.0086**	**0.0056**
W6N	10/21/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.014 b**	**12**	< 0.0034	< 0.0034
W6N	11/08/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.0069 b**	**9.9**	< 0.0034	< 0.0034
W6N	10/18/2006	N	< 0.0034	< 0.0034	< 0.0034	**0.0076**	**7.6**	< 0.0034	< 0.0034
W6N	10/18/2006	FD	< 0.0033	< 0.0033	< 0.0033	**0.0056**	**9.0**	< 0.0033	< 0.0033
W6N	11/07/2007	N	< 0.0034	**0.0037**	< 0.0034	**0.023**	**120**	< 0.0071	< 0.0034
W6N	10/09/2008	N	< 0.0036	< 0.0036	< 0.0036	**0.012**	**46**	< 0.0036	< 0.0036
W6N	9/29/2009	N	< 0.0033	**0.18**	< 0.0033	**0.073 b**	**530**	< 0.012	< 0.0033
W6N	6/04/2010	N	< 0.0034	**0.035**	< 0.0034	**0.013 b**	**60**	< 0.013	< 0.0034
W6N	6/04/2010	FD	< 0.0034	**0.030**	< 0.0034	**0.012 b**	**61**	< 0.011	< 0.0034
W6N	10/05/2010	N	< 0.0033	**0.068**	< 0.0033	**0.031 b**	**170**	< 0.013	< 0.0033
W6N	6/06/2011	N	**0.014**	**0.099**	< 0.0034	**0.048**	**460**	< 0.0034	**0.011**
W6N	10/14/2011	N	< 0.0033	**0.048**	< 0.0033	**0.067**	**45**	**0.0061**	< 0.0033
W6N	6/09/2012	N	< 0.036	**0.081**	< 0.036	**0.14 ***	**240**	< 0.036	< 0.036
W6N	8/07/2012	N	< 0.0034	**0.047**	< 0.0034	**0.051 b**	**100**	< 0.0034	< 0.0034
W6N	8/24/2012	N	< 0.0034	**0.088**	< 0.0034	**0.038**	**130**	< 0.0097	< 0.0034
W6N	10/18/2012	N	< 0.0034	**0.085**	< 0.0034	**0.073**	**140**	< 0.0074	< 0.0034
W6N	5/30/2013	N	**0.022 ***	**0.23**	< 0.0034	**0.16**	**830**	< 0.025	< 0.0034
W6N	10/10/2013	N	< 0.0034	**0.14**	< 0.0034	**0.16**	**120**	**0.013 ***	< 0.0034
W6N	6/30/2014	N	**0.0097**	**0.12**	< 0.0033	**0.043**	**230**	< 0.0033	< 0.0033
W6N	10/16/2014	N	< 0.0037	**0.12**	< 0.0037	**0.032**	**98**	**0.010 ***	< 0.0037
W6N	7/15/2015	N	< 0.0034	**0.11**	**0.0045**	**0.052 ***	**190**	**0.032**	< 0.0034
W6N	10/07/2015	N	**0.0046**	**0.13**	< 0.0034	**0.053 b**	**400**	**0.0062 b**	< 0.0034
W6N	10/07/2015	FD	**0.0040**	**0.14**	< 0.0034	**0.045 b**	**410**	**0.0059 b**	< 0.0034
W6N	6/30/2016	N	< 0.017 h	**0.12 h**	< 0.017 h	**0.020 bh**	**200**	< 0.017 h	< 0.017 h
W6N	10/14/2016	N	< 0.0033	**0.064**	< 0.0033	**0.020**	**49**	< 0.0033	< 0.0033
W6N	6/28/2017	N	< 0.0034	**0.022**	< 0.0034	**0.019 ***	**17**	< 0.0034	< 0.0034
W6N	10/12/2017	N	< 0.0033	**0.020**	< 0.0033	**0.039 ***	**11**	< 0.0033	< 0.0033
W7	12/25/1984	N	< 0.010	< 0.014	< 0.017	**0.036**	**28**	< 0.010	< 0.010
W7	12/27/1984	N	< 0.010	< 0.014	< 0.017	**0.051**	**16**	< 0.010	< 0.010
W7	3/27/1985	N	< 0.050	**0.12**	< 0.0085	**16**	**1000**	**0.16**	< 0.050
W7	5/16/1985	N	**0.022**	**0.10**	< 0.017	**0.80**	**69**	**0.044**	**0.022**
W7	6/03/1986	N	**0.012**	< 0.0028	< 0.0034	**2.1**	**110**	< 0.0020	**0.0099**
W7	8/06/1987	N	< 50	< 50	< 50	< 50	**7400**	< 50	< 50

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1984-2017 Upper 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W7	10/06/1988	N	< 6.0	< 6.0	< 6.0	**7.7**	**1100**	< 6.0	< 6.0
W7	10/17/2012	N	< 0.034 h	**0.52 h**	< 0.034 h	**0.20 bh**	**1300 h**	**0.22 h**	**0.051 h**
W7	5/30/2013	N	**0.11 ***	**1.6**	< 0.0034	**0.45**	**1100**	< 0.54	**0.029 ***
W7	10/10/2013	N	< 0.034	**2.1**	< 0.034	**0.65**	**3300**	**0.46 ***	**0.038 ***
W7	6/30/2014	N	**0.019**	**1.2**	< 0.017	**0.21**	**740**	**0.45 ***	**0.029**
W7	10/17/2014	N	**0.042**	**1.8**	< 0.017	**0.75 ***	**1300 ***	**0.67**	**0.041**
W7	10/17/2014	FD	**0.031**	**1.4**	< 0.017	**0.54 ***	**910 ***	**0.53**	**0.040**
W7	7/15/2015	N	**0.047**	**1.9**	< 0.017	**0.67**	**1400**	**1.1**	**0.044**
W7	10/07/2015	N	< 0.033	**1.5**	< 0.0033	**0.54**	**1900**	**1.2**	**0.013**
W7	6/30/2016	N	**0.034 h**	**1.5 h**	< 0.017 h	**0.44 h**	**840**	**0.95 h**	**0.029 h**
W7	10/19/2016	N	< 0.067	**1.6**	< 0.067	**0.58**	**1200**	**0.91**	< 0.067
W7	6/28/2017	N	< 0.34	**3.0**	**0.0035**	**0.28 ***	**2400**	**1.8**	< 0.34
W7	10/18/2017	N	< 0.065	**1.5**	< 0.065	**0.47**	**450**	**0.78**	< 0.065
W10	12/11/1984	N	< 0.040	**0.54**	< 0.068	**16**	< 5 pp	**0.25**	< 0.040
W10	3/28/1985	N	**0.062**	**0.78**	< 0.085	**13**	**3 pp**	**0.082**	< 0.050
W10	5/16/1985	N	**0.097**	**4.4**	< 0.043	**14**	**2.2 pp**	**3.3**	**0.033**
W10	12/13/1985	N	< 0.5 < 0.5	**1.3** **0.8**	< 0.9 < 0.9	**15** **14**	< 5 < 5	**4.8** **2.2**	< 0.5 < 0.5
W10	3/20/1986	N	**0.019**	**0.43**	< 0.0034	**10**	< 5	**0.32**	**0.065**
W10	6/03/1986	N	**0.110**	**1.4**	< 0.0136	**6.5**	**140**	**2.7**	**0.035**
W10	9/25/1986	N	< 0.5	< 0.7	< 0.9	**8.7**	**3600**	**3.0**	< 0.5
W10	12/11/1986	N	< 2.9	< 2.9	< 2.9	**17**	**4800**	**4**	< 2.9
W10	3/19/1987	N	< 0.6	< 0.6	< 0.6	< 0.6	**420**	**1.9**	< 0.6
W10	5/06/1987	N	< 0.5	**0.6**	< 0.5	**9.1**	**2250**	**0.6**	< 0.5
W10	7/30/1987	N	< 50	< 50	< 50	< 50	**7300**	< 50	< 50
W10	11/05/1987	N	< 150	< 150	< 150	< 150	**5900**	< 150	< 150
W10	2/29/1988	N	< 6.0 < 6.0	< 6.0 pp 2.7 pp	< 6.0 < 6.0	< 6.0 < 6.0	**7900** **11000**	< 6.0 pp 3.2 pp	< 6.0 < 6.0
W10	10/06/1988	N	< 6.0	< 6.0	< 6.0	**10**	**210**	< 6.0	< 6.0
W10	12/12/1988	N	< 10 < 10	**13** **< 10 pp**	< 10 < 10	**22** **21**	**590** **630**	< 10 < 10 pp	< 10 < 10
W10	2/28/1989	N	--	--	--	--	**130**	--	--
W10	8/04/1989	N	< 10	**11**	< 10	**42**	< 5	< 10 pp	< 10
W10	5/02/1990	N	--	--	--	--	< 6	--	--
W10	10/30/1990	N	< 10	**5 j**	< 10	**180**	< 10	**6 j**	< 10
W10	10/17/1991	N	< 10	**10**	< 10	< 10	< 10	**9 j**	< 10
W10	10/13/1992	N	< 10	**32**	< 10	**26**	< 10	**19**	< 10

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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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W10	10/19/1993	N	< 10 < 10	**9 j** **6 j**	< 10 < 10	**65** **8 j**	< 10 < 10	**2 j** **< 10**	< 10 < 10
W10	9/30/1994	N	< 10	**7 j**	< 10	**13**	< 10	**1 j**	< 10
W10	10/20/1995	N	< 1.2	**5.9**	< 1.2	**18 b**	< 3	**2.2**	< 1.2
W10	10/03/1996	N	< 1.8 < 1.8	**10** **8.4**	< 1.8 < 1.8	**19 b** **20 b**	< 3 < 3	**4.1 b** **2.6 b**	< 1.8 < 1.8
W10	10/06/1997	N	**0.064**	**5.0**	< 0.003	**7.8**	**6**	**1.3 e**	**0.025**
W10	11/21/1998	N	**0.056**	**2.7**	< 0.003	**0.16 e**	< 3	**0.37 e**	**0.015**
W10	11/18/1999	N	**0.075**	**1.5**	**0.007**	**0.053 jb**	< 3	**0.15 b**	**0.041**
W10	9/28/2000	N	**0.026 b**	**3.0**	< 0.003	**0.20 b**	**82**	**0.16**	**0.012**
W10	10/18/2001	N	**1.6**	**7.2**	**0.014**	**16**	**130**	**3.1**	**0.93**
W10	10/29/2002	N	**0.45**	**0.94**	**0.023**	**1.6**	**13**	**0.48**	**0.27**
W10	12/21/2003	N	**0.91**	**3.1**	< 0.0034	**3.0**	**94**	**2.7**	**0.69**
W10	10/21/2004	N	**0.3**	**4.6**	**0.0047**	**30**	**180 ***	**1.8**	**0.18**
W10	11/09/2005	N	**0.24**	**4.4**	< 0.017	**30**	**65**	**2.0**	**0.15**
W10	10/20/2006	N	**0.20**	**5.0**	< 0.0036	**9.2**	**10**	**2.0**	**0.19**
W10	11/07/2007	N	**0.23**	**5.2**	< 0.034	**91**	**47**	**1.8**	**0.12**
W10	10/14/2008	N	**0.20**	**4.7**	< 0.018	**7.6**	< 5.2	**1.7**	**0.11**
W10	9/29/2009	N	**0.22**	**3.1**	**0.0043**	**1.7**	**31**	**0.28**	**0.11**
W10	10/06/2010	N	**0.22**	**13**	< 0.0033	**12**	**58**	**1.9**	**0.12**
W10	10/14/2011	N	**0.27**	**13**	< 0.017	**7.9**	**56**	**2.7**	**0.14**
W10	10/18/2012	N	**0.26**	**20**	< 0.017	**23**	**440**	**2.5**	**0.13**
W10	10/10/2013	N	**0.30**	**16**	< 0.034	**42**	**990**	**3.0**	**0.22**
W10	10/17/2014	N	**0.20**	**13**	< 0.018	**19**	**170**	**2.3**	**0.12**
W10	10/07/2015	N	**0.20**	**15**	**0.0044**	**15**	**350**	**2.7**	**0.11**
W10	10/19/2016	N	**0.30**	**14**	< 0.034	**12**	**200**	**3.4**	**0.12**
W10	10/12/2017	N	< 0.34	**19**	< 0.34	**8.8**	**100**	**3.9**	< 0.34
W104	1/24/1985	N	**0.064**	**0.070**	< 0.017	**0.22**	< 5	**0.16**	**0.081**
W104	5/16/1985	N	**0.025**	**0.0076**	< 0.0085	**0.036**	**3 pp**	**0.022**	**0.024**
W104	6/04/1986	N	< 0.0020	< 0.0028	< 0.0034	**0.220**	< 5	< 0.0020	< 0.0020
W104	7/29/1987	N	**0.032**	**0.0021**	**0.0069**	**0.0034**	**9.6 s**	**0.014**	**0.026**
W104	10/05/1988	N	**0.0073**	< 0.0014	< 0.0017	**0.0038**	< 6	**0.0034**	**0.0085**
W104	12/09/1988	N	< 0.0020	< 0.0028	< 0.0034	**0.0075 s**	< 5	< 0.0020	< 0.0020
W104	8/04/1989	N	**0.033**	**0.0041**	**0.0048**	**0.0084**	< 5	**0.025**	**0.035**
W104	5/02/1990	N	**0.0073**	< 0.0028	< 0.0034	**0.0048 s**	**4 j**	**0.0039 s**	**0.0071**
W104	10/31/1990	N	**0.0070**	< 0.0014	< 0.0017	**0.0063 b**	< 6	**0.0055 b**	**0.0046**
W104	10/17/1991	N	< 0.0030	< 0.0030	< 0.0030	< 0.0040	**2 j**	< 0.0030	< 0.0030

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Joslyn Manufacturing and Supply Company
Brooklyn Center, MN

Parameter			Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W104	10/14/1992	N	**0.0053**	< 0.0030	**0.0034**	**0.0088 b**	< 6	**0.0057**	**0.0053**
W104	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	**0.00976 b**	< 6	< 0.00300	**0.00442**
W104	9/30/1994	N	**0.007**	< 0.006	< 0.006	**0.014 b**	< 3	**0.011**	< 0.006
W104	10/20/1995	N	< 0.012	< 0.012	< 0.012	**0.019 b**	< 3	< 0.012	< 0.012
W104	10/03/1996	N	**0.005 b**	**0.004**	< 0.003	**0.009 b**	< 3	**0.012 b**	**0.006 b**
W104	10/06/1997	N	**0.007**	< 0.003	< 0.003	**0.008 b**	< 3	**0.010 b**	**0.006**
W104	11/21/1998	N	< 0.003	< 0.003	< 0.003	**0.008 b**	< 3	< 0.003	< 0.003
W104	11/17/1999	N	**0.008 b**	< 0.003	< 0.003	**0.003 b**	< 3	**0.007 b**	**0.007 b**
W104	9/27/2000	N	**0.028 b**	**0.007**	**0.005 b**	**0.011 b**	< 3	**0.023 b**	**0.023**
W104	10/17/2001	N	< 0.0034	**0.0042**	< 0.0034	**0.014 b**	< 3	**0.0058 b**	< 0.0034
W104	10/29/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.0096 b**	< 3.0	**0.36**	< 0.0034
W104	12/18/2003	N	< 0.0034	< 0.0034	< 0.0034	**0.020 b**	< 3.0	**0.0097 b**	**0.0043**
W104	10/20/2004	N	**0.0059**	**0.0075**	< 0.034	< 0.012	< 2	**0.0077**	< 0.0034
W104	11/09/2005	N	**0.026**	**0.013**	< 0.017	**0.034 b**	< 3.0	**0.0068**	**0.0063**
W104	10/19/2006	N	**0.012**	< 0.0072	< 0.0072	**0.021 b**	< 6.4	**0.011**	< 0.0072
W104	11/07/2007	N	**0.022**	**0.017**	< 0.0068	**0.017**	< 2.0	**0.012 b**	< 0.0068
W104	10/09/2008	N	< 0.0036	< 0.0036	< 0.0036	**0.0053**	< 1.1	**0.024**	< 0.018
W104	9/29/2009	N	**0.013**	**0.017**	< 0.0033	**0.0063 b**	< 0.97	**0.0070**	< 0.0033
W104	10/07/2010	N	**0.015**	**0.018**	**0.032**	**0.072**	**1.2**	**0.029**	**0.0075**
W104	10/15/2011	N	**0.39**	**0.031 b**	**0.081**	**0.063 b**	< 1.0	**0.083**	**0.35**
W104	10/19/2012	N	**0.048 h**	**0.038 h**	**0.028 h**	**0.020 h**	< 2.1 h	**0.037 h**	**0.048 h**
W104	10/10/2013	N	**0.028**	**0.029**	< 0.0070	**0.085**	< 2.1	**0.032 ***	**0.019**
W104	10/17/2014	N	< 0.018	< 0.018	< 0.018	**0.040 b**	< 5.2	< 0.018	< 0.018
W104	10/08/2015	N	**0.0053**	< 0.0034	**0.0062**	**0.0034 b**	< 1.0	**0.0053 b**	**0.0060**
W104	10/20/2016	N	**0.0081**	**0.015**	< 0.0037	**0.011**	**0.37**	< 0.0037	< 0.0037
W104	12/04/2017	N	**0.013**	**0.024**	< 0.017	**0.047**	**0.39**	**0.012**	< 0.0034
W111	1/24/1985	N	**5.2**	**45**	< 1.7	**480**	**6100**	**130**	**28**
W111	5/22/1985	N	< 5.0	**27**	< 5.0	**150**	**2400**	**48**	**9.0**
W111	6/04/1986	N	< 1.0	**26**	< 1.7	**120**	**1800**	**39**	**8.5**
W111	7/30/1987	N	< 50	< 50	< 50	**69**	< 10	< 50	< 50
W111	10/06/1988	N	< 30.0	**14**	< 30.0	**19**	**19**	**17**	< 30.0
W112	1/28/1985	N	**0.082**	**5.0**	< 0.010	**20**	**380**	**2.3**	**0.10**
W112	5/16/1985	N	< 1.0	**26**	< 1.0	**110**	**1100**	**9.8**	< 1.0
W112	12/13/1985	N	< 0.5	**5.8**	< 0.9	**64**	**3500**	**1.3**	< 0.5
W112	3/20/1986	N	< 0.016	**6.9**	< 0.027	**14**	**2400**	**1.5**	< 0.016
W112	6/04/1986	N	< 1.0	**6.9**	< 1.7	**21**	**1900**	**1.8**	< 1.0

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Joslyn Manufacturing and Supply Company
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		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W112	9/25/1986	N	< 1.0	**8.8**	< 1.7	**64**	**6600**	**3.3**	< 1.0
W112	12/11/1986	N	< 2.9	**20**	< 2.9	**200**	**7900**	**7.4**	< 2.9
W112	3/19/1987	N	< 0.6	< 0.6	< 0.6	< 0.6	**570**	**0.9**	< 0.6
W112	5/06/1987	N	< 10	**15**	< 10	**280**	**6700**	< 10	< 10
W112	7/30/1987	N	< 50	< 50	< 50	**29 pp**	**9400**	< 50	< 50
W112	11/05/1987	N	< 150	< 150	< 150	< 150	**4400**	< 150	< 150
W112	2/29/1988	N	< 6.0	**12**	< 6.0	< 6.0 pp	**4100**	< 6.0 pp	< 6.0
W112	10/06/1988	N	< 6.0	**8.1**	< 6.0	< 6.0	**140**	< 6.0 pp	< 6.0
W112	12/12/1988	N	< 10	< 10 pp	< 10	< 10	**760**	< 10 pp	< 10
W112	2/28/1989	N	--	--	--	--	**700**	--	--
W112	8/04/1989	N	< 10 < 10	< 10 pp < 10 pp	< 10 < 10	< 10 < 10	**430** **380**	< 10 pp < 10	< 10 < 10
W112	5/03/1990	N	--	--	--	--	**750**	--	--
W112	10/30/1990	N	< 10 < 10	**3 j** **3 j**	< 10 < 10	< 10 < 10	**320** **2300**	< 10 < 10	< 10 < 10
W112	10/17/1991	N	< 10	< 10	< 10	< 10	**35**	< 10	< 10
W112	10/13/1992	N	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W112	10/19/1993	N	**0.00882**	**0.0112**	< 0.00300	**0.0237 b**	< 6	**0.004850**	**0.00829**
W112	9/30/1994	N	< 0.018	< 0.018	< 0.018	< 0.018	**21**	< 0.018	< 0.018
W112	10/20/1995	N	< 0.060	< 0.060	< 0.060	< 0.060	**120**	< 0.060	< 0.060
W112	10/03/1996	N	**0.010 b**	< 0.006	< 0.006	**0.025 b**	**45**	**0.007 b**	**0.008 b**
W112	10/06/1997	N	**0.004**	**0.023**	< 0.003	**0.17**	**47**	**0.008 b**	< 0.003
W112	11/21/1998	N	< 0.003	**0.006**	< 0.003	**0.009 b**	**7**	< 0.003	< 0.003
W112	11/21/1998	FD	**0.004**	**0.007**	< 0.003	**0.014 b**	**10**	< 0.003	**0.004**
W112	11/17/1999	N	**0.014 b**	**0.005**	**0.004**	**0.006 b**	< 3	**0.019 b**	**0.012 b**
W112	9/27/2000	N	**0.011 b**	< 0.003	< 0.003	**0.008 b**	< 3	**0.008 b**	**0.006 b**
W112	10/19/2001	N	**0.0038 b**	< 0.0033	< 0.0033	**0.0047**	< 3	**0.0053 b**	< 0.0033
W112	10/29/2002	N	**0.0071**	**0.0036**	< 0.0034	**0.0092 b**	< 3.0	**0.0079 b**	**0.0041**
W112	9/04/2003	N	< 0.10	< 0.10	< 0.051	< 0.51	**1.3**	< 0.051	< 0.051
W112	9/15/2003	N	< 0.10	< 0.10	< 0.051	< 0.51	**0.85**	< 0.051	< 0.051
W112	10/01/2003	N	--	--	--	--	< 0.53	--	--
W112	10/08/2003	N	--	--	--	--	< 0.51	--	--
W113	3/28/1985	N	**280**	**330**	< 17	**8500**	**2900**	**650**	**200**
W113	5/22/1985	N	**8900**	**6400**	< 200	**38000**	**12000**	**17000**	**6400**
W113	6/04/1986	N	< 1.0	**2200**	< 1.7	**17000**	**5100**	**7300**	< 1.0
W113	12/07/1987	N	< 1000	< 1000	< 1000	**7500**	**3000**	< 1000	< 1000
W121	3/27/1985	N	**0.0035**	**0.010**	< 0.0017	**0.012**	< 5	**0.032**	**0.0018**

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Historical Water Quality Data
Joslyn Manufacturing and Supply Company
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		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W121	3/28/1985	N	< 0.0050	< 0.0070	< 0.0085	**0.014**	< 5	**0.0091**	< 0.0050
W121	5/06/1985	N	**0.0020**	< 0.0014	< 0.0017	**0.012 s**	**1.4 pp**	**0.0021**	**0.0019**
W121	12/13/1985	N	**0.0014**	< 0.0014	< 0.0017	**0.0015**	< 5	**0.0016**	**0.0017**
W121	3/18/1986	N	**0.0028**	< 0.0014	< 0.0017	**0.0041**	< 5	**0.0051**	**0.0024**
W121	6/02/1986	N	**0.0012**	< 0.0014	< 0.0017	**0.013 s**	< 5	**0.0019**	**0.0012**
W121	9/23/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.0085 s**	< 5	**0.0011**	< 0.0010
W121	12/10/1986	N	**0.0027**	< 0.0014	< 0.0017	**0.033**	< 5	**0.0037**	**0.0024**
W121	3/18/1987	N	< 0.0010	< 0.0014	< 0.0017	**0.0058 s**	< 6	**0.0030**	< 0.0010
W121	5/05/1987	N	**0.0011**	< 0.0014	< 0.0017	**0.014**	< 6	**0.0016**	< 0.0010
W121	7/28/1987	N	< 0.001	< 0.0014	< 0.0017	**0.0052**	**7.7 s**	**0.0027**	< 0.001
W121	11/03/1987	N	**0.0017**	< 0.0014	< 0.0017	**0.010**	< 6	**0.0024**	**0.0019**
W121	2/22/1988	N	**0.0014**	< 0.0014	< 0.0017	**0.0074 s**	< 6	**0.0026 s**	**0.0012**
W121	10/04/1988	N	< 0.0010	< 0.0014	< 0.0017	**0.0051**	< 6	**0.0013**	< 0.0010
W121	12/09/1988	N	< 0.0010	< 0.0014	< 0.0017	**0.015 s**	< 5	**0.0068**	< 0.0010
W121	8/03/1989	N	< 0.0010 < 0.0010	< 0.0014 < 0.0014	**0.0017** **< 0.0017**	**0.0044** **0.0050**	< 5 < 5	**0.0030** **0.0017**	< 0.0010 < 0.0010
W121	5/01/1990	N	< 0.0010 0.0011	< 0.0014 < 0.0014	< 0.0017 < 0.0017	**0.0054 s** **0.0043 s**	< 6 < 6	**0.0027 s** **0.0015 s**	< 0.0010 0.0010
W121	10/30/1990	N	**0.0014 b**	< 0.0014	< 0.0017	**0.0065 b**	< 6	**0.0032 b**	**0.0012**
W121	10/17/1991	N	**0.012**	< 0.0030	**0.0097**	< 0.0040	**1 j**	**0.0072**	**0.012**
W121	10/13/1992	N	**0.0050**	< 0.0030	< 0.0030	**0.0043 b**	< 6	< 0.0030	**0.0040**
W121	10/19/1993	N	**0.00835**	< 0.00300	< 0.00300	**0.00894 b**	< 6	**0.00542**	**0.00800**
W121	9/29/1994	N	**0.018**	< 0.003	**0.004**	**0.006 b**	< 3	**0.010**	**0.012**
W121	10/20/1995	N	**0.016**	**0.024**	< 0.012	**0.29**	< 3	**0.023**	< 0.012
W121	10/03/1996	N	< 0.006 < 0.006	< 0.006 < 0.006	< 0.006 < 0.006	**0.040 b** **0.044 b**	< 3 < 3	< 0.006 < 0.006	< 0.006 < 0.006
W121	10/06/1997	N	< 0.003	< 0.003	< 0.003	**0.012 b**	< 3	**0.006 b**	< 0.003
W121	11/19/1998	N	< 0.003	< 0.003	< 0.003	**0.006**	< 3	< 0.003	< 0.003
W121	11/17/1999	N	**0.012 b**	**0.004**	< 0.003	**0.008 b**	< 3	**0.013 b**	**0.009 b**
W121	11/17/1999	FD	**0.004 b**	< 0.003	< 0.003	**0.004 b**	< 3	**0.004 b**	< 0.003
W121	9/28/2000	N	**0.010 b**	< 0.003	< 0.003	**0.007 b**	< 3	**0.006 b**	**0.008 b**
W121	10/16/2001	N	**0.0053 b**	< 0.0033	< 0.0033	**0.0042 b**	< 3	**0.0059 b**	< 0.0033
W121	5/15/2002	N	**0.0095 b**	**0.0067 b**	< 0.0034	**0.0058**	< 3.0	**0.024 b**	**0.0067 b**
W122	3/26/1985	N	< 0.025	< 0.035	< 0.043	< 0.048	**2.5 pp**	< 0.025	< 0.025
W122	5/06/1985	N	**0.23**	**0.74**	< 0.017	**0.048**	**1.1 pp**	**0.140**	**0.071**
W122	12/13/1985	N	< 0.0050	< 0.0070	< 0.0085	**0.041**	< 5	< 0.0050	< 0.0050
W122	3/18/1986	N	< 0.0020	**0.023**	< 0.0034	**0.011**	**1.2 pp**	**0.024**	< 0.0020

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Joslyn Manufacturing and Supply Company
Brooklyn Center, MN

Parameter			Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W122	6/02/1986	N	**0.0020**	**0.019**	< 0.0017	**0.0086 s**	< 5	**0.0069**	**0.0029**
W122	9/23/1986	N	< 0.0020	**0.0070**	< 0.0034	**0.0099 s**	< 5	**0.0040**	< 0.0020
W122	12/10/1986	N	< 0.0025	**0.014**	< 0.0043	**0.023**	< 5	**0.0079**	**0.0034**
W122	3/19/1987	N	**0.0080**	< 0.0014	< 0.0017	**0.013**	< 6	< 0.0010	**0.0058**
W122	5/06/1987	N	< 0.5	< 0.5	< 0.5	< 0.5	**412**	< 0.5	< 0.5
W122	7/29/1987	N	< 10	< 10	< 10	< 10	**950**	< 10	< 10
W122	11/04/1987	N	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	**420** **510**	< 6 < 6	< 6 < 6
W122	2/25/1988	N	< 6.0	< 6.0 pp	< 6.0	< 6.0 pp	**690**	< 6.0	< 6.0
W122	10/06/1988	N	< 6.0	< 6.0 pp	< 6.0	< 6.0	< 6 pp	< 6.0	< 6.0
W122	12/12/1988	N	< 6.0	< 6.0	< 6.0	< 6.0	< 5	< 6.0	< 6.0
W122	2/28/1989	N	< 6 < 6	< 6 < 6	< 6 < 6	< 6 < 6	< 5 < 5	< 6 < 6	< 6 < 6
W122	8/03/1989	N	< 0.040	< 0.056	< 0.068	< 0.076	< 5	< 0.040	< 0.040
W122	5/01/1990	N	< 0.040	< 0.056	< 0.068	< 0.076	< 6	< 0.040	< 0.040
W122	6/22/1990	N	--	--	--	--	**6 j**	--	--
W122	10/31/1990	N	< 0.052	**0.20**	< 0.088	< 0.099	**4 j**	< 0.052	< 0.052
W122	10/17/1991	N	< 0.030	< 0.030	< 0.030	< 0.040	< 6	< 0.030	< 0.030
W122	10/13/1992	N	**0.0030**	< 0.0030	< 0.0030	**0.0048 b**	< 6	< 0.0030	**0.0032**
W122	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	**0.00917 b**	< 6	< 0.00300	< 0.00300
W122	9/29/1994	N	**0.007**	< 0.003	< 0.003	**0.008 b**	< 3 *	**0.006**	**0.006**
W122	10/19/1995	N	< 0.006	< 0.006	< 0.006	**0.018 b**	< 3	< 0.006	< 0.006
W122	10/03/1996	N	< 0.003	< 0.003	< 0.003	**0.005 b**	< 3	< 0.003	**0.003 b**
W122	10/06/1997	N	< 0.003	< 0.003	< 0.003	**0.014 b**	< 3	**0.004 b**	< 0.003
W122	11/20/1998	N	< 0.003	< 0.003	< 0.003	**0.007**	< 3	**0.015**	**0.012**
W122	11/17/1999	N	**0.013 b**	**0.005**	< 0.003	**0.008 b**	< 3	**0.016 b**	**0.010 b**
W122	9/28/2000	N	**0.007 b**	< 0.003	< 0.003	**0.008 b**	< 3	**0.005 b**	**0.006 b**
W122	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	**0.0055 b**	< 3	**0.0036 b**	< 0.0033
W122	4/08/2002	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 3.0	< 0.0034	**0.0037**
W123	3/26/1985	N	< 0.010 < 0.010	< 0.014 < 0.014	< 0.017 < 0.017	**0.061** **0.093**	**5.8** **6.2**	< 0.012 0.018	< 0.010 < 0.010
W123	5/07/1985	N	**0.078**	< 0.0070	< 0.0085	**0.039**	**4.5 pp**	**0.095**	**0.033**
W123	3/18/1986	N	**0.015**	< 0.0028	< 0.0034	**0.016**	**2.3 pp**	**0.21**	**0.0058**
W123	6/03/1986	N	< 0.0020	< 0.0028	< 0.0034	**0.0086 s**	**2.3 pp**	< 0.0020	< 0.0020
W123	9/24/1986	N	< 0.0020	< 0.0028	< 0.0034	**0.010 s**	< 5	< 0.0020	< 0.0020
W123	12/11/1986	N	**0.020**	< 0.0070	< 0.0085	**0.016 s**	< 5	**0.013**	< 0.0050
W123	3/18/1987	N	**0.0024**	< 0.0014	< 0.0017	**0.0091**	< 6	**0.0014**	**0.0014**

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Joslyn Manufacturing and Supply Company
Brooklyn Center, MN

		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W123	5/05/1987	N	< 0.0025	< 0.0035	< 0.0043	**0.019**	< 6	< 0.0025	< 0.0025
W123	7/29/1987	N	**0.0033** **0.0011**	< 0.0014 < 0.0014	< 0.0017 < 0.0017	**0.010** **0.011**	**11 s** **12 s**	**0.0059** **0.0022**	**0.0049** **< 0.001**
W123	11/04/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 6	< 0.25	< 0.25
W123	2/23/1988	N	**0.0023**	**0.0021 s**	< 0.0017	**0.021**	< 6	**0.0032 s**	**0.0023**
W123	10/05/1988	N	**0.0021**	< 0.0028	< 0.0034	**0.013**	**8**	< 0.0020	**0.0024**
W123	12/12/1988	N	< 0.010	**0.065**	< 0.017	**1.3**	**290**	< 0.010	< 0.010
W123	2/28/1989	N	< 0.0020	< 0.0028	< 0.0034	**1.1**	**200**	< 0.0020	< 0.0020
W123	8/03/1989	N	< 0.010 < 0.020	< 0.014 < 0.028	< 0.017 0.038	< 0.019 pp < 0.038 pp	**40** **35**	< 0.010 < 0.020	< 0.010 < 0.020
W123	6/22/1990	N	< 0.0010	**0.0016**	< 0.0017	**0.0041 s**	--	< 0.0010	< 0.0010
W123	10/30/1990	N	**0.0021 b**	< 0.0014	< 0.0017	**0.0093 b**	< 6	< 0.0010	**0.0014**
W123	10/17/1991	N	**0.0049**	< 0.0030	< 0.0030	**0.0056 b**	< 6	< 0.0030	**0.0053**
W123	10/13/1992	N	< 0.0030	< 0.0030	< 0.0030	< 0.0040	< 6	< 0.0030	**0.0061**
W123	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	**0.00513 b**	< 6	< 0.00300	**0.00864**
W123	9/29/1994	N	**0.003**	< 0.003	< 0.003	**0.007 b**	< 3	**0.005**	< 0.003
W123	10/19/1995	N	< 0.006	< 0.006	< 0.006	**0.009 b**	< 3	< 0.006	< 0.006
W123	10/03/1996	N	**0.003 b**	< 0.003	< 0.003	**0.009 b**	< 3	**0.005 b**	**0.004 b**
W123	10/06/1997	N	< 0.003	< 0.003	< 0.003	**0.023**	< 3	**0.005 b**	< 0.003
W123	11/21/1998	N	< 0.003	< 0.003	< 0.003	**0.008 b**	< 3	< 0.003	< 0.003
W123	11/17/1999	N	**0.012 b**	**0.005**	< 0.003	**0.006 b**	< 3	**0.015 b**	**0.009 b**
W123	9/28/2000	N	**0.006 b**	< 0.003	< 0.003	**0.009 b**	< 3	**0.004 b**	**0.003 b**
W123	10/17/2001	N	< 0.0034	< 0.0034	< 0.0034	**0.0069 b**	< 3	< 0.0034	< 0.0034
W123	10/17/2001	FD	< 0.0034	< 0.0034	< 0.0034	**0.0093 b**	< 3	< 0.0034	< 0.0034
W123	10/29/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.0077 b**	< 3.0	< 0.0034	< 0.0034
W123	6/07/2003	N	< 0.0034	< 0.0034	< 0.0034	**0.0061 b**	< 3.0	**0.0066**	< 0.0034
W124	3/26/1985	N	**0.0080**	< 0.0014	< 0.0017	**0.043**	< 5	**0.0090**	**0.0073**
W124	5/06/1985	N	**0.028**	< 0.0014	< 0.0017	**0.018**	**1.6 pp**	**0.025**	**0.012**
W124	12/13/1985	N	< 0.0020	< 0.0028	< 0.0034	**0.026**	< 5	< 0.0020	< 0.0020
W124	3/18/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.0090**	< 5	**0.0039**	< 0.0010
W124	6/02/1986	N	**0.0014**	< 0.0014	< 0.0017	**0.010 s**	< 5	< 0.0010	**0.0013**
W124	9/23/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.023 s**	< 5	< 0.0010	< 0.0010
W124	12/10/1986	N	**0.0012**	< 0.0014	< 0.0017	**0.031**	< 5	**0.0040**	**0.0013**
W124	3/18/1987	N	< 0.0010	< 0.0014	< 0.0017	**0.025**	< 6	**0.0015**	< 0.0010
W124	5/05/1987	N	< 0.0010	< 0.0014	< 0.0017	**0.013**	< 6	< 0.0010	< 0.0010
W124	8/06/1987	N	< 0.001	< 0.0014	< 0.0017	**0.0067**	**6.2 s**	**0.0014**	< 0.001
W124	11/03/1987	N	< 0.001	< 0.0014	< 0.0017	**0.011**	< 6	**0.002**	< 0.001

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Brooklyn Center, MN

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

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

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Brooklyn Center, MN

		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W126	10/20/2004	N	**0.0039**	< 0.0034	< 0.0034	**0.0058 b**	< 2	**0.0053**	< 0.0034
W126	11/09/2005	N	**0.0074**	< 0.0034	< 0.0034	**0.0076 b**	< 3.0	**0.0039**	**0.0062**
W127	3/18/1986	N	**0.014**	**0.095**	< 0.0068	**0.023**	**17**	**0.28**	**0.013**
W127	6/03/1986	N	< 0.0080	< 0.0112	< 0.0136	**0.070 s**	**160**	**0.020**	**0.030**
W127	9/25/1986	N	< 0.0020	< 0.0028	< 0.0034	**0.015 s**	**31**	< 0.0020	< 0.0020
W127	12/11/1986	N	< 0.0025 0.0015	**0.0051** **0.0033**	< 0.0043 < 0.0017	**0.036** **0.027**	< 5 11	**0.0071** **0.0062**	< 0.0025 0.0014
W127	3/19/1987	N	< 0.0025	< 0.0035	< 0.0043	**0.090**	**7**	< 0.0025	< 0.0025
W127	5/06/1987	N	< 0.0010	< 0.0014	< 0.0017	**0.0088**	**11**	**0.0018**	< 0.0010
W127	7/29/1987	N	**0.0028**	< 0.0014	< 0.0017	**0.0066**	**47**	< 0.001	**0.0035**
W127	11/04/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 6	< 0.25	< 0.25
W127	2/22/1988	N	< 0.001	< 0.0014	< 0.0017	**0.021**	**28**	**0.0038 s**	< 0.001
W127	10/04/1988	N	< 0.0020 < 0.0010	< 0.0028 < 0.0014	< 0.0034 < 0.0017	**0.011** **0.008**	**60** **58**	< 0.0020 < 0.0010	< 0.0020 < 0.0010
W127	12/09/1988	N	< 0.0040	< 0.0056	< 0.0068	**0.032 s**	**290**	< 0.0040	< 0.0040
W127	8/04/1989	N	< 0.0010	< 0.0014	< 0.0017 pp	**0.0038**	**20**	< 0.0010	< 0.0010
W127	6/22/1990	N	< 0.0010	< 0.0014	< 0.0017	**0.0041 s**	--	< 0.0010	< 0.0010
W127	10/30/1990	N	**0.0018 b**	< 0.0014	< 0.0017	**0.0048 b**	< 6	**0.0023 b**	**0.0022**
W127	10/17/1991	N	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0040 < 0.0040	< 6 < 6	< 0.0030 < 0.0030	< 0.0030 0.0030
W127	10/13/1992	N	< 0.0030	< 0.0030	< 0.0030	**0.0079 b**	< 6	**0.0040**	< 0.0030
W127	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	**0.00499 b**	< 6	< 0.00300	< 0.00300
W127	9/29/1994	N	**0.004**	< 0.003	< 0.003	**0.008 b**	< 3	**0.006**	**0.004**
W127	10/19/1995	N	< 0.003	< 0.003	< 0.003	**0.006 b**	< 3	**0.007 b**	< 0.003
W127	10/03/1996	N	< 0.003	< 0.003	< 0.003	**0.009 b**	< 3	**0.007 b**	< 0.003
W127	10/03/1997	N	**0.003 b**	< 0.003	< 0.003	< 0.003	< 3	**0.009 b**	< 0.003
W127	11/20/1998	N	< 0.003	< 0.003	< 0.003	**0.008**	< 3	< 0.003	< 0.003
W127	11/17/1999	N	**0.003 b**	< 0.003	< 0.003	**0.006 b**	< 3	**0.005 b**	< 0.003
W127	9/28/2000	N	< 0.003	< 0.003	< 0.003	**0.009 b**	< 3	**0.003 b**	< 0.003
W127	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	**0.0063 b**	< 3	**0.0043 b**	< 0.0033
W127	10/29/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.010 b**	< 3.0	**0.0035 b**	< 0.0034
W127	9/04/2003	N	< 0.11	< 0.11	< 0.053	< 0.53	< 0.53	< 0.053	< 0.053
W127	9/15/2003	N	< 0.10	< 0.10	< 0.050	< 0.50	< 0.53	< 0.050	< 0.050
W127	9/27/2003	N	< 0.11	< 0.11	< 0.055	< 0.55	< 0.55	< 0.055	< 0.055
W127	10/01/2003	N	--	--	--	--	< 0.55	--	--
W127	10/08/2003	N	--	--	--	--	< 0.50	--	--
W127	10/13/2003	N	--	--	--	--	< 0.051	--	--

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Parameter			Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W127	11/05/2003	N	< 0.10	< 0.10	< 0.051	< 0.51	< 0.57 < 10	< 0.051	< 0.051
W127	11/14/2003	N	< 0.11 < 0.11	< 0.11 < 0.11	< 0.053 < 0.053	< 0.53 < 0.53	< 0.54 < 0.54	< 0.053 < 0.053	< 0.053 < 0.053
W127	12/17/2003	N	< 2	< 2	< 2	< 2	< 0.5	< 2	< 2
W127N	12/17/2003	N	< 0.0034	< 0.0034	< 0.0034	**0.0064 b**	< 3.0	**0.0049 b**	< 0.0034
W127N	10/19/2004	N	< 0.0034	< 0.0034	< 0.0034	**0.0065 b**	< 2	< 0.0034	< 0.0034
W127N	11/08/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.014 b**	< 3.0	< 0.0034	< 0.0034
W127N	10/19/2006	N	< 0.0034	< 0.0034	< 0.0034	**0.0069 b**	< 3.0	< 0.0034	< 0.0034
W127N	8/07/2012	N	< 0.0033	< 0.0033	< 0.0033	**0.030 b**	< 0.95	< 0.0033	< 0.0033
W127N	8/17/2012	N	--	--	--	--	< 1.1	--	--
W127N	8/24/2012	N	< 0.0034	< 0.0034	< 0.0034	**0.0036**	< 1.0	< 0.0034	< 0.0034
W127N	10/09/2013	N	< 0.0038	< 0.0038	< 0.0038	**0.080**	< 1.2	**0.0045**	< 0.0038
W127N	10/14/2014	N	**0.0041**	< 0.0034	< 0.0034	**0.034 b**	< 1.0	**0.0056**	< 0.0034
W127N	10/06/2015	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.97	< 0.0033	< 0.0033
W127N	10/18/2016	N	< 0.0033	< 0.0033	< 0.0033	**0.0034**	< 0.29	< 0.0033	< 0.0033
W127N	10/11/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.0060 b**	< 0.30	< 0.0034	< 0.0034
W128	3/21/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.016**	< 5	**0.0089**	< 0.0010
W128	6/02/1986	N	< 0.0010 < 0.0010	< 0.0014 < 0.0014	< 0.0017 < 0.0017	**0.0089 s** **0.0043 s**	< 5 < 5	**0.0014** **0.0018**	< 0.0010 < 0.0010
W128	9/24/1986	N	**0.0087**	< 0.0014	< 0.0017	**0.018 s**	< 5	**0.020**	**0.0056**
W128	12/11/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.063**	< 5	**0.0031**	< 0.0010
W128	3/19/1987	N	< 0.0010	< 0.0014	< 0.0017	< 0.0019	< 6	**0.0017**	< 0.0010
W128	5/06/1987	N	**0.0018**	< 0.0014	< 0.0017	**0.0088**	**11**	**0.0021**	**0.0012**
W128	7/29/1987	N	< 0.001	< 0.0014	< 0.0017	**0.0063**	**6.8 s**	**0.0019**	< 0.001
W128	11/03/1987	N	**0.003**	< 0.0014	< 0.0017	**0.017**	< 6	**0.0027**	**0.0027**
W128	2/23/1988	N	< 0.001 < 0.001	**0.0014 s** **< 0.0014**	< 0.0017 < 0.0017	**0.015** **0.016**	< 6 < 6	**0.0033 s** **0.0027**	< 0.001 < 0.001
W128	10/04/1988	N	< 0.0010	< 0.0014	< 0.0017	**0.0064**	< 6	**0.0012**	< 0.0010
W128	6/22/1990	N	--	--	--	--	< 10	--	--
W128	10/18/1995	N	**0.032**	**0.005**	**0.006**	**0.005 b**	< 3	**0.035**	**0.023**
W128	10/03/1996	N	**0.018 b**	< 0.003	< 0.003	**0.009 b**	< 3	**0.020 b**	**0.015 b**
W128	10/02/1997	N	**0.006 b**	< 0.003	< 0.003	**0.010 b**	< 3	**0.009 b**	**0.005**
W128	11/20/1998	N	< 0.003	< 0.003	< 0.003	**0.008**	< 3	**0.004**	< 0.003
W128	11/17/1999	N	**0.015 b**	**0.005**	**0.013**	**0.007 b**	< 3	**0.024 b**	**0.010 b**
W128	9/28/2000	N	**0.011 b**	< 0.003	< 0.003	**0.013 b**	< 3	**0.008 b**	**0.005 b**
W128	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	**0.0049 b**	< 3	**0.0044 b**	< 0.0033
W128	10/29/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.0094 b**	< 3.0	< 0.0034	< 0.0034

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Parameter			Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W128	12/17/2003	N	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 0.0081 b	< 0.5 < 3.0	< 2 0.0042 b	< 2 < 0.0034
W128	10/20/2004	N	< 0.0034	< 0.0048	< 0.0034	**0.0045 b**	< 2	< 0.0034	< 0.0034
W128	10/21/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.017 b**	< 3.0	< 0.0034	< 0.0034
W128	11/08/2005	N	**0.0073**	< 0.0034	< 0.0034	**0.0089 b**	< 3.0	**0.0050**	**0.0054**
W128	10/19/2006	N	< 0.0033	< 0.0033	< 0.0033	**0.0046 b**	< 2.9	< 0.0033	< 0.0033
W129	3/18/1986	N	**0.018**	**0.37**	< 0.0068	**0.18**	**180**	**0.16**	**0.046**
W129	6/03/1986	N	**0.0021**	**0.014**	< 0.0017	**0.0075 s**	**8.8**	**0.0035**	**0.0013**
W129	9/25/1986	N	< 0.0080	**0.14**	< 0.013	**0.10**	**38**	**0.031**	< 0.0080
W129	12/11/1986	N	< 0.6	< 0.6	< 0.6	**11**	**11**	< 0.6	< 0.6
W129	3/19/1987	N	< 0.0025 < 0.0050	**0.032** **< 0.0070**	< 0.0043 < 0.0085	**0.130** **0.073**	**77** **65**	< 0.0025 < 0.0050	< 0.0025 < 0.0050
W129	5/06/1987	N	< 0.5	< 0.5	< 0.5	**15**	**123**	< 0.5	< 0.5
W129	7/29/1987	N	< 10	< 10	< 10	< 10	**66**	< 10	< 10
W129	11/04/1987	N	< 6	< 6	< 6	< 6	**8.2**	< 6	< 6
W129	2/25/1988	N	**0.0029**	**0.0049**	< 0.0034	**0.051**	**18**	**0.013**	**0.011**
W129	10/03/1988	N	< 0.0010	< 0.0014	< 0.0017	**0.025**	< 6 pp	< 0.0010	< 0.0010
W129	12/12/1988	N	< 6.0	< 6.0	< 6.0	< 6.0	< 5	< 6.0	< 6.0
W129	8/04/1989	N	**0.0037**	< 0.0014	**0.0022**	**0.032**	**7**	< 0.0010	< 0.0010
W129	5/02/1990	N	< 0.0020	< 0.0028	< 0.0034	**0.0046 s**	**6**	< 0.0020	< 0.0020
W129	10/30/1990	N	**0.0029 b**	**0.017**	< 0.0017	**0.010 b**	< 6	**0.011 b**	**0.0048**
W129	10/17/1991	N	< 0.0030	**0.013**	< 0.0030	**0.031 b**	< 6	**0.0035**	< 0.0030
W129	10/13/1992	N	**0.0055**	**0.012**	< 0.0030	**0.064**	**5 j**	**0.0057**	**0.0065**
W129	10/19/1993	N	< 0.0360	**0.0370**	< 0.0360	< 0.0480	< 6	< 0.0360	< 0.0360
W129	9/29/1994	N	< 0.24	< 0.24	< 0.24	**1.2 b**	< 3	< 0.24	< 0.24
W129	10/19/1995	N	< 0.18	< 0.18	< 0.18	**0.60 b**	**2 j**	< 0.18	< 0.18
W129	10/03/1996	N	< 0.003	**0.020**	< 0.003	**0.028 b**	< 3	**0.011 b**	< 0.003
W129	10/03/1997	N	**0.006 b**	**0.14 e**	< 0.003	**0.74**	< 3	**0.036 b**	**0.005**
W129	11/20/1998	N	< 0.003	**0.033**	< 0.003	**0.11 e**	< 3	**0.009**	< 0.003
W129	11/17/1999	N	**0.019 b**	**0.072**	< 0.003	**0.084 b**	< 3	**0.017 b**	**0.010 b**
W129	9/27/2000	N	**0.007 b**	**0.048**	< 0.003	**0.021 b**	< 3	**0.010 b**	**0.004 b**
W129	10/17/2001	N	< 0.0034	**0.13**	< 0.0034	**0.28**	**2**	**0.014 b**	< 0.0034
W129	10/29/2002	N	< 0.0034	**0.025**	< 0.0034	**0.18**	< 3.0	**0.014 b**	< 0.0034
W129	12/18/2003	N	**0.0034**	**0.026**	< 0.0034	**0.026 b**	< 3.0	**0.0096 b**	**0.0038**
W129	10/20/2004	N	< 0.0034	**0.027**	< 0.0034	**0.039 b**	< 2	**0.0099**	< 0.0034
W129	10/21/2005	N	< 0.0074	< 0.0068	< 0.0068 *	< 0.13	**14**	< 0.057	< 0.0095
W129	11/09/2005	N	< 0.0034	**0.084**	< 0.0034	**0.28**	**4.9**	**0.014**	< 0.0034

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		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W129	10/19/2006	N	< 0.0071	**0.057**	< 0.0071	**0.69**	< 6.2	**0.016**	**0.0094**
W130	5/01/1990	N	**0.011** **0.0056**	< 0.0014 < 0.0014	< 0.0017 < 0.0017	**0.013 s** **0.0078 s**	< 6 < 6	**0.0098** **0.0081**	**0.0083** **0.0050**
W130	10/31/1990	N	**0.0015**	< 0.0014	< 0.0017	**0.0068 b**	< 6	**0.0023 b**	**0.0011**
W130	10/17/1991	N	**0.0032**	< 0.0030	< 0.0030	< 0.0040	< 6	< 0.0030	**0.0032**
W130	10/13/1992	N	< 0.0030	< 0.0030	< 0.0030	< 0.0040	< 6	< 0.0030	< 0.0030
W130	10/19/1993	N	< 0.00300	< 0.00300	< 0.00300	**0.00496 b**	< 6	< 0.00300	< 0.00300
W130	9/29/1994	N	**0.004**	< 0.003	< 0.003	**0.007 b**	< 3	**0.004**	**0.004**
W130	10/19/1995	N	< 0.003	< 0.003	< 0.003	**0.004 b**	< 3	< 0.003	< 0.003
W130	10/03/1996	N	**0.005 b**	< 0.003	< 0.003	**0.006 b**	< 3	**0.009 b**	**0.003 b**
W130	10/06/1997	N	< 0.003	< 0.003	< 0.003	**0.026**	< 3	**0.004 b**	< 0.003
W130	11/20/1998	N	< 0.003	< 0.003	< 0.003	**0.006**	< 3	< 0.003	< 0.003
W130	11/17/1999	N	**0.009 b**	**0.004**	< 0.003	**0.008 b**	< 3	**0.011 b**	**0.007 b**
W130	9/28/2000	N	**0.006 b**	< 0.003	< 0.003	**0.009 b**	< 3	**0.006 b**	**0.004 b**
W130	10/16/2001	N	< 0.0033	< 0.0033	< 0.0033	**0.0042 b**	< 3	< 0.0033	< 0.0033
W130	10/30/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.013 b**	< 3.0	< 0.0034	< 0.0034
W130	12/17/2003	N	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 0.0080 b	< 0.5 < 3.0	< 2 0.0046 b	< 2 < 0.0034
W130	10/19/2004	N	< 0.0034	< 0.0034	< 0.0034	**0.0045 b**	< 2	< 0.0034	< 0.0034
W130	11/09/2005	N	**0.0085**	< 0.0034	< 0.0034	**0.0077 b**	< 3.0	**0.0045**	**0.0057**
W130	10/19/2006	N	< 0.0036	< 0.0036	< 0.0036 *	**0.0071 b**	< 3.1	< 0.0036	< 0.0036
W130	11/07/2007	N	< 0.0034	< 0.0034	< 0.0034	**0.0059**	< 0.98	< 0.0034	< 0.0034
W130	10/09/2008	N	< 0.0033 < 0.0034	< 0.0033 < 0.0034	< 0.0033 < 0.0034	< 0.0033 0.0035	< 0.96 < 1.0	< 0.0033 < 0.0034	< 0.0033 < 0.0034
W130	9/29/2009	N	< 0.0034	**0.0035**	< 0.0034	**0.0040 b**	< 0.99	< 0.0034	< 0.0034
W130	10/05/2010	N	< 0.0033	< 0.0033	< 0.0033	**0.025 b**	< 0.97	**0.0039**	< 0.0033
W130	10/11/2011	N	< 0.0036	< 0.0036	< 0.0036	**0.017 b**	< 1.1	< 0.0036	< 0.0036
W130	10/16/2012	N	< 0.0034 h	< 0.0034 h	< 0.0034 h	**0.030 bh**	< 1.0 h	**0.0048 h**	**0.0035 h**
W130	10/09/2013	N	**0.040**	**0.014**	**0.010**	**0.11**	< 1.3	**0.020**	**0.038**
W130	10/15/2014	N	< 0.0033	< 0.0033	< 0.0033	**0.0077 b**	< 0.95	< 0.0033	< 0.0033
W130	10/15/2014	FD	< 0.0034	< 0.0034	< 0.0034	**0.0078 b**	< 1.0	< 0.0034	< 0.0034
W130	10/07/2015	N	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 1.1	< 0.0035	< 0.0035
W130	10/14/2016	N	**0.0038**	< 0.0034	< 0.0034	**0.0047**	< 0.30	< 0.0034	**0.0038**
W130	10/12/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.0067 b**	< 0.30	< 0.0034	< 0.0034
W130	10/12/2017	FD	< 0.0034	< 0.0034	< 0.0034	**0.0084 b**	< 0.30	< 0.0034	< 0.0034
W131	5/02/1990	N	**0.52**	**1.4**	< 0.068	< 0.076	**77**	**0.37**	**0.35**
W131	10/31/1990	N	< 6	< 6	< 6	< 6	**380**	< 6	< 6

Table A-4
1984-2017 Upper 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W131	10/17/1991	N	< 0.030	< 0.030	< 0.030	< 0.040	**560**	< 0.030	< 0.030
W131	10/14/1992	N	< 60	< 60	< 60	< 60	**1100**	< 60	< 60
W131	10/19/1993	N	< 0.420	< 0.420	< 0.420	< 0.560	**740**	< 0.420	< 0.420
W131	11/07/1994	N	< 0.54	< 0.54	< 0.54	< 0.54	**1600**	< 0.54	< 0.54
W131	10/19/1995	N	< 0.60	< 0.60	< 0.60	< 0.60	**800**	< 0.60	< 0.60
W131	10/03/1996	N	< 0.060	< 0.060	< 0.060	< 0.060	**620**	< 0.060	< 0.060
W131	10/06/1997	N	< 0.003 < 0.003	**0.046** **0.042**	< 0.003 < 0.003	**36** **28**	**12000** **9600**	< 0.003 < 0.003	< 0.003 0.050
W131	11/21/1998	N	< 0.003	< 0.003	< 0.003	**0.031 b**	**610**	< 0.003	< 0.003
W132	12/17/2003	N	< 2 < 0.0034	< 2 < 0.0034	< 2 < 0.0034	< 2 0.0082 b	< 0.5 < 3.0	< 2 0.0042 b	< 2 < 0.0034
W132	10/19/2004	N	**0.017**	< 0.0034	**0.012**	**0.0095 b**	< 2	**0.0099**	**0.015**
W132	11/08/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.0079 b**	< 3.0	< 0.0034	< 0.0034
W132	10/19/2006	N	< 0.0036	< 0.0036	< 0.0036	**0.0071 b**	< 3.1	< 0.0036	< 0.0036
W132	11/07/2007	N	< 0.0034	< 0.0034	< 0.0034	**0.012**	< 0.99	< 0.0034	< 0.0034
W132	11/07/2007	FD	< 0.0034	< 0.0034	< 0.0034	**0.0054**	< 0.99	< 0.0034	< 0.0034
W132	10/09/2008	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 1.0	**0.0038**	< 0.0034
W132	9/29/2009	N	< 0.0033	< 0.0033	< 0.0033	**0.010 b**	< 0.96	< 0.0033	< 0.0033
W132	10/05/2010	N	< 0.0033	< 0.0033	< 0.0033	**0.012 b**	< 0.96	< 0.0033	< 0.0033
W132	10/11/2011	N	< 0.0033	< 0.0033	< 0.0033	**0.012 b**	< 0.96	< 0.0033	< 0.0033
W132	8/07/2012	N	< 0.0033	< 0.0033	< 0.0033	**0.050 b**	< 0.95	< 0.0033	< 0.0033
W132	8/24/2012	N	< 0.0033	< 0.0033	< 0.0033	**0.0038**	< 0.96	< 0.0033	< 0.0033
W132	10/16/2012	N	**0.0045 h**	< 0.0034 h	**0.0041 h**	**0.050 bh**	< 1.0 h	**0.0065 h**	**0.0047 h**
W132	10/10/2013	N	< 0.0035	< 0.0035	< 0.0035	**0.089**	< 1.1	< 0.0035	< 0.0035
W132	10/14/2014	N	**0.0087**	**0.0051**	**0.0059**	**0.060 b**	< 1.0	**0.011**	**0.0074**

Table A-4
1984-2017 Upper 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W132	10/07/2015	N	< 0.0033	< 0.0033	< 0.0033	**0.0059 b**	< 0.97	< 0.0033	< 0.0033
W132	10/14/2016	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.33**	< 0.0034	< 0.0034
W132	10/14/2016	FD	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.29	< 0.0033	< 0.0033
W132	10/11/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.0088 b**	**0.33**	< 0.0034	< 0.0034
S-1	7/14/2003	N	< 10	< 10	< 10	< 10	< 24	< 10	< 10
S-1	8/01/2003	N	< 0.11	< 0.11	< 0.053	< 0.53	< 1.0	< 0.053	< 0.053
S-1	9/04/2003	N	< 0.11	< 0.11	< 0.054	< 0.54	< 0.51	< 0.054	< 0.054
S-1	9/15/2003	N	< 0.11	< 0.11	< 0.055	< 0.55	< 0.053	< 0.055	< 0.055
S-1	9/22/2003	N	< 0.11	< 0.11	< 0.053	< 0.53	< 0.60	< 0.053	< 0.053
S-1	9/27/2003	N	< 0.10	< 0.10	< 0.051	< 0.51	< 0.52	< 0.051	< 0.051
S-1	10/01/2003	N	--	--	--	--	< 0.53	--	--
S-1	10/08/2003	N	--	--	--	--	< 0.50	--	--
S-1	10/13/2003	N	--	--	--	--	< 0.52	--	--
S-1	10/24/2003	N	< 0.10	< 0.10	< 0.051	< 0.51	< 0.52	< 0.051	< 0.051
S-1	10/30/2003	N	**0.13**	< 0.10	< 0.052	< 0.52	< 0.51	< 0.052	**0.082**
S-1	11/05/2003	N	< 0.10	< 0.10	< 0.050	< 0.50	< 0.51 < 10	< 0.050	< 0.050
S-1	11/14/2003	N	< 0.10	< 0.10	< 0.050	< 0.50	< 0.51	< 0.050	< 0.050
S-1	12/04/2003	N	< 0.11	< 0.11	< 0.054	< 0.54	< 0.53	< 0.054	< 0.054
S-1	12/18/2003	N	**0.010**	**0.014**	< 0.0034	**0.014 b**	< 3.0	**0.011 b**	**0.0036**
S-1	1/21/2004	N	< 0.10	< 0.10	< 0.052	< 0.52	< 0.52	< 0.052	< 0.052
S-1	2/26/2004	N	< 0.10	< 0.10	< 0.052	< 0.52	< 0.51	< 0.052	< 0.052
S-1	3/31/2004	N	< 0.10	< 0.10	< 0.052	< 0.52	< 0.52	< 0.052	< 0.052
S-1	4/13/2004	N	< 0.10	< 0.10	< 0.052	< 0.52	< 0.52	< 0.052	< 0.052
S-1	5/04/2004	N	< 0.11	< 0.11	< 0.053	< 0.53	< 0.53	< 0.053	< 0.053
S-1	6/04/2004	N	< 0.10	< 0.10	< 0.051	< 0.51	< 0.51	< 0.051	< 0.051
S-1	7/19/2004	N	< 0.10	< 0.10	< 0.051	< 0.51	< 0.52	**0.19**	< 0.051
S-1	8/02/2004	N	< 0.10	< 0.10	< 0.050	< 0.50	< 0.50	< 0.050	< 0.050
S-1	9/01/2004	N	< 0.10	< 0.10	< 0.051	< 0.51	< 0.51	< 0.051	< 0.051
S-1	10/01/2004	N	< 0.11	< 0.11	< 0.053	< 0.53	< 0.52	< 0.053	< 0.053
S-1	10/19/2004	N	**0.02**	**0.0065**	< 0.0034	**0.0099 b**	< 2	**0.0092**	**0.0092**
S-1	11/05/2004	N	< 0.10	< 0.10	< 0.051	< 0.51	< 0.51	< 0.051	< 0.051
S-1	12/21/2004	N	< 0.10	< 0.10	< 0.052	< 0.52	< 0.51	< 0.052	< 0.052
S-1	11/09/2005	N	**0.015**	< 0.0034	< 0.0034	**0.015 b**	< 3.0	**0.0073**	**0.0044**
S-1	10/20/2006	N	**0.014**	< 0.0034	< 0.0034	**0.011 b**	< 3.0	**0.0060**	**0.0047**
S-1	11/09/2007	N	**0.0080**	< 0.016	< 0.0034	**0.014 b**	< 1.0	**0.0039 b**	< 0.0034

Table A-4
1984-2017 Upper 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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
S-1	10/14/2008	N	**0.010**	< 0.0034	< 0.0034	**0.0080 b**	< 1.0	**0.0068**	**0.0041**
S-1A	6/04/2010	N	**0.011**	< 0.021	< 0.0033	**0.015 b**	< 0.97	< 0.0052	**0.0054**
S-1A	10/05/2010	N	**0.011**	< 0.016	< 0.0034	**0.024 b**	< 1.0	< 0.0053	**0.0047**
S-1A	10/11/2011	N	**0.0076**	< 0.017	< 0.0036	**0.060**	< 1.1	< 0.0043	**0.0053**
S-1A	10/11/2011	FD	**0.0078**	< 0.014	< 0.0033	**0.014 b**	< 0.97	< 0.0044	**0.0047**
S-1A	10/16/2012	N	**0.0050 h**	< 0.017 h	< 0.0035 h	**0.020 bh**	< 1.1 h	**0.0044 h**	**0.0054 h**
S-1A	10/08/2013	N	**0.0070**	< 0.018	< 0.0034	**0.0098 b**	< 1.0	**0.0064 ***	**0.0057**
S-1A	10/15/2014	N	**0.0042**	< 0.013	< 0.0034	**0.0074 b**	< 1.0	**0.0038**	**0.0052**
S-1A	10/06/2015	N	< 0.0033	**0.012 ***	< 0.0033	**0.0047**	< 0.97	< 0.0033 *	**0.0047**
S-1A	10/13/2016	N	< 0.0033	< 0.0033	< 0.0033	**0.0091**	< 0.29	< 0.0033	< 0.0033
S-1A	10/11/2017	N	< 0.0034	**0.0090**	< 0.0034	**0.0080 b**	< 0.30	< 0.0034	**0.0035**
S-2	3/01/2006	N	**0.023**	**0.0075**	**0.0025 j**	**0.018 b**	< 0.011	**0.011**	**0.011**
S-2	3/01/2006	FD	**0.027**	**0.0069**	**0.0034**	**0.019 b**	< 0.011	**0.013**	**0.012**
S-2	10/21/2006	N	**0.018**	< 0.0034	< 0.0034	**0.019 b**	< 3.0	**0.0094**	**0.0090**
S-2	11/08/2007	N	**0.0084**	< 0.016	< 0.0034	**0.013**	< 0.99	**0.0068 b**	**0.0049**
S-2	10/14/2008	N	**0.0068**	< 0.0033	< 0.0033	**0.014 b**	< 0.95	< 0.0033	**0.0034**
S-2	9/30/2009	N	**0.0068**	< 0.019	< 0.0033	**0.014 b**	< 0.97	**0.0045**	**0.0036**
S-2	10/05/2010	N	**0.0051**	< 0.016	< 0.0034	**0.024 b**	< 0.98	**0.0043**	**0.0040**
S-2	10/11/2011	N	**0.0057**	< 0.016	< 0.0033	**0.039**	< 0.96	< 0.0041	**0.0047**
S-2	10/16/2012	N	**0.065 h**	**0.077 h**	**0.0082 h**	**0.39 h**	< 6.1 h	**0.060 h**	**0.050 h**
S-2	10/08/2013	N	< 0.0034	< 0.019	< 0.0034	**0.045 b**	< 1.0	**0.0054 ***	**0.0038**
S-2	10/08/2013	FD	< 0.0035	< 0.020	< 0.0035	**0.015 b**	< 1.1	**0.0061 ***	**0.0038**
S-2	10/15/2014	N	< 0.0034	< 0.013	< 0.0034	**0.014 b**	< 1.0	**0.0043**	**0.0045**
S-2	10/06/2015	N	< 0.0033	**0.013 ***	< 0.0033	**0.0045**	< 0.97	**0.0035**	**0.0037**
S-2	10/13/2016	N	< 0.0033	**0.012**	< 0.0033	**0.0067**	< 0.29	**0.0040**	< 0.0033
S-2	10/11/2017	N	< 0.0034	**0.011**	< 0.0034	**0.0075 b**	< 0.30	< 0.0034	< 0.0034

See Table 3-18 for data qualifiers

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W207	3/28/1985	N	**1.4**	**15**	< 0.050	**0.14**	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.070
W207	5/16/1985	N	**2.0**	**16**	< 0.50	**1.2**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
W207	6/03/1986	N	**0.018** **0.022**	**7.4** **8.7**	**0.033** **< 0.0040**	**0.150** **0.120**	**0.0087** **< 0.0040**	< 0.0020 < 0.0040	< 0.0020 < 0.0040	< 0.0020 < 0.0040	< 0.0020 < 0.0040	**0.022 c** **< 0.0040**	< 0.0028 < 0.0056
W207	7/29/1987	N	< 6	**11**	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
W207	11/04/1987	N	< 0.25	**14.0**	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
W207	2/23/1988	N	< 6.0	**14**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W207	10/06/1988	N	< 6.0	**12**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W209	1/29/1985	N	**0.035**	**0.80**	**0.42**	**0.020**	< 0.0050	< 0.0050	< 0.0050	**0.071**	< 0.0050	< 0.0050	< 0.0070
W209	5/07/1985	N	**0.0055**	**0.13**	**0.049**	**0.0051**	**0.0013**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0013 c**	< 0.0014
W209	6/04/1986	N	**0.0034**	**0.062**	**0.0052**	**0.0025**	< 0.0010	< 0.0010	**0.012 c**	< 0.0010	ND c	**0.020 c**	< 0.0014
W209	7/29/1987	N	**0.0023**	**0.031**	**0.0025**	**0.0019**	**0.0018**	< 0.001	< 0.001	< 0.001	< 0.001	**0.0035 c**	< 0.0014
W209	11/03/1987	N	**0.0062**	**0.071**	**0.0073**	**0.0014**	**0.0015**	< 0.001	< 0.001	< 0.001	< 0.001	**0.0042 c**	< 0.0014
W209	2/23/1988	N	< 0.020	**0.020**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W209	10/05/1988	N	**0.0057**	**0.021**	**0.0035**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W223	7/22/1986	N	< 1.0	**6.1**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.70
W223	9/24/1986	N	< 0.016 < 1.0	**6.4** **5.4**	< 0.0080 < 0.5	< 0.0080 < 0.5	< 0.0080 < 0.5	< 0.0080 < 0.5	< 0.0080 < 0.5	< 0.0080 < 0.5	< 0.0080 < 0.5	< 0.0080 < 0.5	< 0.011 < 0.7
W223	12/11/1986	N	< 0.6	**5.7**	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
W223	3/19/1987	N	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
W223	5/06/1987	N	< 0.5	**13**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
W223	7/29/1987	N	< 10	**4.7 pp**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W223	11/04/1987	N	< 6	**14**	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
W223	2/25/1988	N	< 6.0	**39**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W223	10/06/1988	N	< 6.0	**72**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W223	12/12/1988	N	< 6.0	**20**	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
W223	2/28/1989	N	< 0.006	**0.068**	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
W223	8/04/1989	N	< 6	**13**	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
W223	5/02/1990	N	< 6	**29**	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
W223	10/31/1990	N	< 0.16	**4.5**	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.11
W223	10/17/1991	N	**0.0088**	**1.1**	**0.021**	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030	< 0.0060	< 0.0060	< 0.0030
W223	10/13/1992	N	< 0.036 < 0.021	**1.0** **0.59**	< 0.036 < 0.021	< 0.036 < 0.021	< 0.036 < 0.021	< 0.036 < 0.021	< 0.036 < 0.021	< 0.036 < 0.021	< 0.036 < 0.021	< 0.072 < 0.042	< 0.036 < 0.021
W223	10/20/1993	N	< 0.0240	**0.466**	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0480	< 0.0240
W223	9/29/1994	N	< 0.060 < 0.048	**1.3** **1.1**	< 0.060 < 0.048	< 0.060 < 0.048	< 0.060 < 0.048	< 0.060 < 0.048	< 0.060 < 0.048	< 0.060 < 0.048	< 0.060 < 0.048	< 0.060 < 0.048	< 0.060 < 0.048
W223	10/19/1995	N	**0.008**	**0.016**	< 0.006	< 0.006	**0.007**	**0.010**	**0.011**	**0.007**	**0.008**	**0.014 c**	< 0.006
W223	10/03/1996	N	< 0.030	**0.32**	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W223	10/02/1997	N	**0.014 b**	**0.098**	< 0.003	< 0.003	**0.004**	**0.004**	**0.005**	**0.005**	**0.004**	**0.005 c**	< 0.003
W223	11/20/1998	N	**0.005**	**0.22**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W223	11/18/1999	N	**0.010 jb**	< 0.003	< 0.003	**0.004 b**	< 0.003	< 0.003	**0.006**	**0.004**	**0.005**	**0.005**	< 0.003
W223	9/28/2000	N	**0.005 b**	**0.11**	**0.003**	**0.004**	< 0.003	< 0.003	**0.004**	< 0.003	< 0.003	**0.006 b**	< 0.003
W223	10/16/2001	N	< 0.0033	**0.088**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W223	11/01/2002	N	< 0.0034	< 0.0034	**0.0048**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W223	6/07/2003	N	< 0.0034	**0.023**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W252	5/06/1987	N	< 0.5	**0.7**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
W252	7/30/1987	N	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10
W252	2/25/1988	N	**0.012**	**0.17**	**0.0074**	**0.0019**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0019 c**	< 0.0014
W252	10/06/1988	N	**0.023**	**0.26**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W252	12/09/1988	N	**0.031**	**0.33**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W252	2/28/1989	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W252	8/04/1989	N	**0.051**	**0.14**	< 0.010	**1.9**	**0.027**	**0.013**	**0.055 c**	**0.012**	**0.055 c**	**0.071 c**	< 0.014
W252	5/02/1990	N	**0.0029 s**	**0.043**	< 0.0010	**0.058**	**0.0026**	**0.0020**	**0.0064 c**	< 0.0010	**0.0064 c**	**0.011 c**	< 0.0014
W252	10/31/1990	N	**0.0098 b**	**0.043**	**0.0019**	**0.22**	**0.0085**	**0.0061**	**0.041 c**	**0.011**	**0.041 c**	**0.10 c**	**0.0027**
W252	10/17/1991	N	**0.20**	**0.38**	< 0.036	**0.49**	**0.080**	< 0.036	< 0.072	< 0.036	< 0.072	**0.097 c**	< 0.036
W252	10/16/1992	N	**32**	**14**	< 6	**11**	**2 j**	< 6	< 6	< 6	< 6	**4 jc**	< 6
W252	10/20/1993	N	**0.240 b**	**0.407**	< 0.0840	**1.430**	**0.371**	**0.182**	< 0.0840	< 0.0840	< 0.0840	**0.502 c**	< 0.0840
W252	10/10/1994	N	**0.063**	**0.17**	< 0.042	**0.68**	**0.13**	**0.041 j**	**0.043**	< 0.042	< 0.042	**0.50 c**	< 0.042
W252	10/20/1995	N	< 0.078	**0.15**	< 0.078	**0.73**	**0.13**	< 0.078	< 0.078	< 0.078	< 0.078	**0.34 c**	< 0.078
W252	10/02/1996	N	**0.022**	**0.074**	**0.007**	**0.18**	**0.065**	**0.057**	**0.073**	**0.031**	**0.057**	**0.18 c**	< 0.003
W252	10/03/1997	N	**0.006**	**0.007**	< 0.003	**0.063**	**0.024**	**0.010**	**0.025**	**0.008**	**0.014**	**0.12 c**	< 0.003
W252	11/18/1998	N	**0.015**	**0.002 j**	< 0.003	**0.057**	**0.019**	**0.010**	**0.012**	--	**0.010**	**0.085 c**	< 0.003
W252N	12/10/1999	N	**0.044**	**0.066**	**0.003**	**0.14**	**0.015**	< 0.003	**0.005**	**0.005 b**	**0.003**	**0.010**	< 0.003
W252N	9/27/2000	N	**0.015 b**	**0.023**	< 0.003	**0.11**	**0.009**	< 0.003	**0.005 b**	< 0.003	< 0.003	**0.018 b**	< 0.003
W252N	10/18/2001	N	**0.0075 b**	**0.0059**	< 0.0034	**0.012**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0051**	< 0.0034
W252N	11/01/2002	N	**0.0046 b**	< 0.0034	< 0.0034	**0.013**	**0.0037**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0050**	< 0.0034
W252N	12/21/2003	N	**0.044**	**0.0093**	< 0.0034	**0.0038**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0044**	< 0.0034
W252N	10/20/2004	N	**0.0077 b**	**0.0055**	< 0.0034	**0.015**	**0.0061**	**0.0039**	**0.0061**	**0.0048**	**0.0057**	**0.015**	< 0.0034
W252N	11/10/2005	N	**0.0049**	**0.0042**	**0.0056**	**0.011**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0038**	< 0.0034
W252N	10/21/2006	N	**0.0084**	< 0.0034	< 0.0034	**0.013**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0040**	< 0.0034
W252N	11/08/2007	N	< 0.0034	< 0.0034	< 0.0034	**0.0075**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W252N	10/10/2008	N	< 0.0034	< 0.0034	< 0.0034	**0.0082**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W252N	9/30/2009	N	< 0.0035	**0.0042**	< 0.0035	**0.013**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W252N	10/06/2010	N	**0.0038**	< 0.0036	< 0.0036	**0.0071**	**0.0050**	< 0.0036	**0.0061**	< 0.0036	< 0.0036	**0.010**	< 0.0036
W252N	10/15/2011	N	< 0.0034	< 0.0034	< 0.0034	**0.0062**	**0.0045**	< 0.0034	**0.0041**	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W252N	10/19/2012	N	< 0.0036 h	< 0.0036 h	< 0.0036 h	**0.0048 h**	**0.0050 h**	< 0.0036 h	**0.0081 h**	**0.0048 h**	**0.0068 h**	**0.011 h**	**0.0042 h**
W252N	10/09/2013	N	< 0.0036	< 0.0036	< 0.0036	**0.0088**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
W252N	10/16/2014	N	**0.0045**	**0.010**	< 0.0036	**0.0078**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
W252N	10/08/2015	N	< 0.0034	< 0.0034	< 0.0034	**0.011**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W252N	10/19/2016	N	**0.0054**	< 0.0033	< 0.0033	**0.010**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W252N	10/18/2017	N	< 0.0033	< 0.0033	< 0.0033	**0.0044**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W253	5/06/1987	N	**68** **< 125**	**210** **190**	< 10 < 125	< 10 < 125	< 10 < 125	< 10 < 125	< 10 < 125	< 10 < 125	< 10 < 125	< 10 < 125	< 10 < 125
W253	11/05/1987	N	< 150	**160**	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
W253	2/29/1988	N	< 600.0	**240 pp**	< 600.0	< 600.0	< 600.0	< 600.0	< 600.0	< 600.0	< 600.0	< 600.0	< 600.0
W253	2/27/1989	N	< 250	< 250 pp	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250	< 250
W253	5/04/1990	N	**18 j**	**56**	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
W253	10/30/1990	N	**47 j**	**92**	< 80	< 80	< 80	< 80	< 80	< 80	< 80	< 80	< 80
W253	12/03/1992	N	< 10	**11 ***	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W253	10/18/1993	N	< 50	**26 j**	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
W253	9/28/1994	N	**1 j**	**16**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W253	10/18/1995	N	< 1.5	**16**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
W253	10/02/1996	N	< 10	**11**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W253	10/01/1997	N	< 10	**14**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W253	9/26/2000	N	< 9.6	**18**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
W253	10/16/2001	N	< 9.6	**25**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
W253	11/01/2002	N	< 9.6	**19**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
W253	12/16/2003	N	< 9.8	**13**	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8
W253	10/29/2004	N	**0.012 b**	**12**	**0.097**	**0.025**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
W253	11/12/2005	N	**0.016**	**13**	**0.11**	**0.043**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0036**	< 0.0034
W253	10/18/2006	N	**0.014**	**11**	**0.081**	**0.025**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W253	11/13/2007	N	**0.0060 b**	**4.8**	**0.056**	**0.017**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W253	10/16/2008	N	**0.012**	**10**	**0.061**	**0.019**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W253	10/02/2009	N	**0.0083**	**9.2**	**0.051**	< 0.025	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W253	10/12/2010	N	**0.0078**	**11**	< 0.042	< 0.026	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W253	10/16/2011	N	**0.0070**	**9.2**	**0.037**	**0.045**	**0.11**	**0.060**	**0.10**	**0.027**	**0.037**	**0.031**	**0.0082**
W253	10/18/2012	N	< 0.0035	**6.2**	**0.062**	**0.025**	**0.0083**	**0.0061**	**0.0089**	< 0.0035	< 0.0035	< 0.0035	< 0.0035
W253	10/11/2013	N	**0.0081**	**7.5**	**0.047 ***	**0.034**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
W253	10/21/2014	N	**0.28**	**20**	**0.22**	**0.052**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W253	10/14/2015	N	**0.89**	**17**	**0.53**	**0.059**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W253	10/11/2016	N	**0.013**	**10**	**0.12**	**0.049**	< 0.0065	< 0.0065	< 0.0065 c	< 0.0065	< 0.0065	< 0.0065	< 0.0065
W253	10/20/2017	N	< 0.017	**8.2**	**0.058 ***	**0.032**	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
W254	5/06/1987	N	**0.0049**	< 0.0033	< 0.0025	**0.112**	**0.0034**	< 0.0025	< 0.0025	< 0.0025	< 0.0025	**0.024 c**	< 0.0035
W254	7/28/1987	N	**0.0021**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0028 c**	< 0.0014
W254	2/23/1988	N	**0.033**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.0014 c**	< 0.0014
W254	10/05/1988	N	**0.0059**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W254	8/04/1989	N	**0.014**	**0.036**	< 0.0020	**0.13**	**0.0089**	**0.0075**	**0.020 c**	**0.0080**	**0.020 c**	**0.019 c**	< 0.0028
W254	5/02/1990	N	< 0.040	< 0.026	< 0.020	**1.1**	**0.085**	< 0.020	**0.10 c**	< 0.020	**0.10 c**	**0.028 c**	< 0.028
W254	10/31/1990	N	**0.020 b**	**0.013 b**	< 0.0040	**0.50**	**0.041**	**0.011**	**0.056 c**	**0.0084**	**0.056 c**	**0.10 c**	< 0.0056
W254	10/17/1991	N	< 0.024	< 0.024	< 0.024	**0.24**	< 0.024	**0.047**	**0.17 c**	**0.036**	**0.17 c**	< 0.048	< 0.024
W254	10/14/1992	N	**0.010 b**	**0.016**	< 0.0030	**0.085**	**0.0071**	< 0.0030	**0.0041**	< 0.0030	**0.0030**	**0.030 c**	< 0.0030
W254	10/20/1993	N	**0.0175 b**	**0.00759**	< 0.00600	**0.114**	**0.0172**	**0.00659**	**0.0163**	**0.00835**	**0.0104**	**0.0162 c**	< 0.00600
W254	9/30/1994	N	**0.015 b**	**0.018**	< 0.003	**0.14**	**0.016**	**0.019**	**0.044**	**0.020**	**0.030**	**0.074 c**	**0.007**
W254	10/20/1995	N	**0.016**	**0.023**	< 0.006	**0.073**	**0.023**	**0.009**	**0.032**	**0.010**	< 0.006	**0.13 c**	< 0.006
W254	10/02/1996	N	**0.010**	**0.078**	< 0.003	**0.025**	**0.014**	< 0.003	**0.006**	< 0.003	**0.006**	**0.021 c**	< 0.003
W254	10/03/1997	N	**0.006**	**0.025**	< 0.003	**0.080**	**0.035**	**0.015**	**0.021**	**0.010**	**0.014**	**0.069 c**	< 0.003
W254	11/19/1998	N	**0.005**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W254	11/18/1999	N	**0.013 jb**	**0.005**	**0.004**	**0.028 b**	**0.021**	**0.019**	**0.070**	**0.029**	**0.045**	**0.11**	**0.006**
W254	9/27/2000	N	**0.004 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.006 b**	< 0.003	**0.003**	**0.011 b**	< 0.003
W254	10/18/2001	N	**0.0065 b**	**0.0039**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/30/2002	N	**0.0091 b**	< 0.0034	< 0.0034	**0.0039**	< 0.0034	< 0.0034	**0.0053**	< 0.0034	< 0.0034	**0.0063**	< 0.0034
W254	12/21/2003	N	**0.019 b**	**0.0042**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/20/2004	N	**0.012 b**	**0.0068**	< 0.0034	**0.0093**	**0.0054**	**0.0054**	**0.020**	< 0.0034	< 0.0034	**0.013**	< 0.0034
W254	11/10/2005	N	**0.0072**	< 0.0034	< 0.0034	**0.0034**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/20/2006	N	< 0.0038	< 0.0038	< 0.0038	**0.0053**	< 0.0038	< 0.0038	**0.0042**	< 0.0038	< 0.0038	**0.0048**	< 0.0038
W254	11/08/2007	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/10/2008	N	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
W254	9/29/2009	N	< 0.0033	< 0.0033	< 0.0033	**0.0045**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W254	9/29/2009	FD	< 0.0034	< 0.0034	< 0.0034	**0.0055**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/06/2010	N	< 0.0033	< 0.0033	< 0.0033	**0.0044**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W254	10/14/2011	N	< 0.0034	< 0.0034	< 0.0034	**0.0034**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/17/2012	N	< 0.0034 h	< 0.0034 h	< 0.0034 h	**0.0046 h**	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h	< 0.0034 h
W254	10/17/2012	FD	< 0.0033 h	< 0.0033 h	< 0.0033 h	**0.0045 h**	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h
W254	10/09/2013	N	**0.0053**	< 0.0034	< 0.0034	**0.0082**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034

Table A-5
1984-2017 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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W254	10/16/2014	N	< 0.0034	**0.011**	< 0.0034	**0.0050**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/08/2015	N	< 0.0034	< 0.0034	< 0.0034	**0.0034**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/08/2015	FD	< 0.0034	< 0.0034	< 0.0034	**0.0054**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W254	10/18/2016	N	< 0.0033	< 0.0033	< 0.0033	**0.0097**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W254	10/18/2017	N	< 0.0034	< 0.0034	< 0.0034	**0.0042**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W255	12/29/1988	N	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000
W255	2/27/1989	N	< 500 pp	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
W255	8/03/1989	N	**130**	**120**	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
W255	10/30/1990	N	**63** **69 j**	**120** **130**	< 50 < 100	< 50 < 100	< 50 < 100	< 50 < 100	< 50 < 100	< 50 < 100	< 50 < 100	< 50 < 100	< 50 < 100
W255	10/17/1991	N	**110**	**330**	< 50	**20 j**	< 50	< 50	< 50	< 50	< 50	< 50	< 50
W255	10/18/1993	N	**58 j**	**120**	< 100	**21 j**	**71 j**	< 100	< 100	< 100	< 100	< 100	< 100
W255	9/28/1994	N	**300 j**	**1100**	< 350	**460**	**1300**	**720**	**820**	**240 j**	**690**	**610 c**	**92 j**
W255	10/24/1995	N	**110**	**170**	**4.4**	**13**	**4.6**	< 3.6	< 3.6	< 3.6	< 3.6	**3.7 c**	< 3.6
W255	10/02/1996	N	**85 j**	**130 j**	< 500	**120 j**	< 500	< 500	< 500	< 500	< 500	< 500	< 500
W255	10/01/1997	N	**81 j**	**140 j**	**5 j**	**4 j**	< 10	< 10	< 10	< 10	< 10	< 10	< 10
W255	11/18/1998	N	**61 j**	**140 j**	< 200	< 200	< 200	< 200	< 200	--	< 200	< 200	< 200
W255	1/14/2000	N	**55**	**210**	**6 j**	**4 j**	**1 j**	**0.7 j**	**0.7 j**	< 10	**0.6 j**	**0.8 j**	< 10
W255	9/26/2000	N	**180 e**	**260**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
W255	10/16/2001	N	**98**	**190**	< 9.8	**14**	**10**	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8	< 9.8
W255	11/01/2002	N	**140**	**290**	< 9.6	**31**	**53**	**28**	**32**	**9.8**	**22**	**25**	< 9.6
W255	12/16/2003	N	**92**	**170**	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6	< 9.6
W255	10/29/2004	N	**79**	**190**	**4.5**	**7.0**	**1.7**	**0.5**	**0.98**	< 0.17	**0.28**	**0.45**	< 0.17
W255	11/12/2005	N	**45**	**130**	**5.2**	**9.5**	**4.7**	**2.1**	**1.6**	**0.53**	**3.6**	**2.7**	< 0.17
W255	10/18/2006	N	**80**	**220**	**5.7**	**11**	**16**	**9.0**	**11**	**3.2**	**8.2**	**8.0**	**1.0**
W255	11/13/2007	N	**180**	**710**	**28**	**210**	**730**	**440**	**700**	**160**	**230**	**200**	**51**
W255	10/16/2008	N	**63**	**150**	**4.3**	**4.2**	**3.2**	**1.5**	**2.4**	**0.51**	**0.77**	**1.6**	**0.17**
W255	10/02/2009	N	**89**	**260**	**6.4**	**16**	**34**	**21**	**34**	**7.6**	**11**	**11**	**2.4**
W255	10/12/2010	N	**83**	**210**	**5.7**	**7.9**	**9.9**	**6.3**	**7.8**	**1.6**	**4.3**	**4.1**	**0.58**
W255	10/16/2011	N	**68**	**230**	**4.8**	**11**	**16**	**7.8**	**13**	**2.9**	**4.2**	**10**	**1.0**
W255	10/18/2012	N	**71**	**250**	**5.0**	**8.7**	**12**	**7.4**	**10**	**2.0**	**3.3**	**3.5**	**0.72**
W255	10/11/2013	N	**93**	**240**	**4.6**	**5.1**	**1.2**	**0.31**	**0.51**	**0.093**	**0.15**	**0.48**	< 0.034
W255	10/21/2014	N	**100**	**200**	**6.3**	**6.9**	**8.9**	**4.6**	**6.7**	**1.6**	**2.3**	**3.5**	**0.55**
W255	10/14/2015	N	**110**	**260**	**6.2**	**8.0**	**6.8**	**3.1**	**5.4 c**	**1.2**	**2.5**	**4.7**	**0.35**
W255	10/11/2016	N	**110**	**210**	**5.0**	**10**	**17**	**9.2**	**14 c**	**3.3**	**4.7**	**9.6**	**1.2**
W255	10/20/2017	N	**93**	**220**	**4.2**	**8.5**	**17**	**8.2**	**13**	**2.8**	**2.8**	**7.7**	**0.92**

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											

See Table 3-18 for data qualifiers and footnotes.

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W207	3/28/1985	N	**0.38**	**0.85**	< 0.085	**0.48**	**15**	**2.0**	**0.29**
W207	5/16/1985	N	< 0.50	**7.3**	< 0.50	< 0.50	**15**	**1.2**	< 0.50
W207	6/03/1986	N	**0.250** **0.240**	**0.270** **0.310**	< 0.0034 < 0.0068	**0.028 s** **0.049 s**	**5.5** **< 5**	**0.030** **0.150**	**0.190** **0.150**
W207	7/29/1987	N	< 6	< 6	< 6	< 6	**12 s**	< 6	< 6
W207	11/04/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 6	< 0.25	< 0.25
W207	2/23/1988	N	< 6.0	< 6.0	< 6.0	< 6.0	< 6	< 6.0	< 6.0
W207	10/06/1988	N	< 6.0	< 6.0	< 6.0	< 6.0	< 6	< 6.0	< 6.0
W209	1/29/1985	N	**0.022**	**0.20**	< 0.0085	**1.3**	**16**	**0.25**	**0.027**
W209	5/07/1985	N	**0.039**	**0.034**	< 0.0017	**0.17**	< 5	**0.10**	**0.028**
W209	6/04/1986	N	**0.057**	**0.0039**	< 0.0017	**0.029 s**	< 5	**0.0098**	**0.041**
W209	7/29/1987	N	**0.0078**	< 0.0014	< 0.0017	**0.005**	**6.2 s**	**0.0042**	**0.010**
W209	11/03/1987	N	**0.0069**	**0.0083**	< 0.0017	**0.033**	< 6	**0.0064**	**0.0082**
W209	2/23/1988	N	< 0.010	< 0.014	< 0.017	**0.045**	< 6	< 0.010	< 0.010
W209	10/05/1988	N	< 0.0020	< 0.0028	< 0.0034	**0.019**	< 6	< 0.0020	**0.0024**
W223	7/22/1986	N	< 0.50	**1.7**	< 0.90	**0.70**	< 5	< 0.50	< 0.50
W223	9/24/1986	N	< 0.0080 < 0.5	**1.4** **1.1**	< 0.013 < 0.9	**0.74** **0.6**	< 5 < 5	**0.19** **< 0.5**	< 0.0080 < 0.5
W223	12/11/1986	N	< 0.6	**1.4**	< 0.6	**0.8**	< 5	< 0.6	< 0.6
W223	3/19/1987	N	< 0.6	< 0.6	< 0.6	< 0.6	**490**	< 0.6	< 0.6
W223	5/06/1987	N	< 0.5	**2.1**	< 0.5	**1.2**	< 24	< 0.5	< 0.5
W223	7/29/1987	N	< 10	< 10	< 10	< 10	**280**	< 10	< 10
W223	11/04/1987	N	< 6	< 6	< 6	< 6	**110**	< 6	< 6
W223	2/25/1988	N	< 6.0	**10**	< 6.0	< 6.0 pp	**640**	< 6.0	< 6.0
W223	10/06/1988	N	< 6.0	**26**	< 6.0	**6.4**	**300**	**6.0**	< 6.0
W223	12/12/1988	N	< 6.0	**12**	< 6.0	< 6.0 pp	**580**	< 6.0 pp	< 6.0
W223	2/28/1989	N	< 0.006	**0.016**	< 0.006	**0.012**	**1200**	< 0.006 pp	< 0.006
W223	8/04/1989	N	< 6	< 6 pp	< 6	< 6	< 5	< 6	< 6
W223	5/02/1990	N	< 6	**11**	< 6	**2 j**	**32**	**2 j**	< 6
W223	10/31/1990	N	< 0.080	**1.3**	< 0.14	**0.27**	< 6	**0.38**	< 0.080
W223	10/17/1991	N	**0.0033**	**0.33**	< 0.0030	**0.012 b**	< 6	**0.0088**	**0.0032**
W223	10/13/1992	N	< 0.036 < 0.021	**0.44** **0.23**	< 0.036 < 0.021	< 0.048 < 0.028	< 6 < 6	< 0.036 < 0.021	< 0.036 < 0.021
W223	10/20/1993	N	< 0.0240	**0.203**	< 0.0240	< 0.0320	< 6	< 0.0240	< 0.0240
W223	9/29/1994	N	< 0.060 < 0.048	**0.26** **0.22**	< 0.060 < 0.048	< 0.060 < 0.048	< 3 * < 3	< 0.060 < 0.048	< 0.060 < 0.048
W223	10/19/1995	N	**0.031**	< 0.006	< 0.006	**0.016 b**	**2 j**	**0.008 b**	**0.034**
W223	10/03/1996	N	< 0.030	**0.089**	< 0.030	**0.26 b**	< 3	< 0.030	< 0.030

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1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W223	10/02/1997	N	**0.015 b**	**0.008 b**	**0.004**	**0.022 b**	< 3	**0.017 b**	**0.014**
W223	11/20/1998	N	< 0.003	< 0.003	< 0.003	**0.013**	< 3	**0.005**	**0.005**
W223	11/18/1999	N	**0.011**	< 0.003	**0.003**	**0.006 jb**	< 3	**0.008 b**	**0.006**
W223	9/28/2000	N	**0.012 b**	**0.004 b**	< 0.003	**0.013 b**	< 3	**0.007 b**	**0.008 b**
W223	10/16/2001	N	**0.0058 b**	< 0.0033	< 0.0033	**0.0081 b**	< 3	**0.0073 b**	< 0.0033
W223	11/01/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.015 b***	< 3.0	< 0.0034	< 0.0034
W223	6/07/2003	N	< 0.0034	< 0.0034	< 0.0034	**0.0042 b**	< 3.0	< 0.0034	< 0.0034
W252	5/06/1987	N	< 0.5	< 0.5	< 0.5	< 0.5	**16**	< 0.5	< 0.5
W252	7/30/1987	N	< 10 < 10	< 10 < 10	< 10 < 10	< 10 < 10	**29** **19**	< 10 < 10	< 10 < 10
W252	2/25/1988	N	**0.023**	< 0.0014	< 0.0017	**0.019**	**22**	**0.011**	**0.020**
W252	10/06/1988	N	**0.015**	< 0.014	< 0.017	**0.82**	**12**	< 0.010	**0.013**
W252	12/09/1988	N	**0.013**	< 0.0028	< 0.0034	**0.062**	**24**	**0.014**	**0.012**
W252	2/28/1989	N	< 0.0010	< 0.0014	< 0.0017	< 0.0019	--	< 0.0010	< 0.0010
W252	8/04/1989	N	**0.15**	**0.18**	**0.017**	**0.036**	< 5	**0.25**	**0.15**
W252	5/02/1990	N	**0.032**	**0.0061**	< 0.0017	**0.0063 s**	--	**0.020**	**0.028**
W252	10/31/1990	N	**0.099**	**0.028**	**0.010**	**0.011 b**	< 6	< 0.0010	**0.071**
W252	10/17/1991	N	**0.82**	**0.39**	< 0.036	**0.12 b**	**2 j**	**1.0**	**0.46**
W252	10/16/1992	N	**10**	**12**	< 6	**39**	**320**	**20**	**6**
W252	10/20/1993	N	**1.560**	**0.694**	< 0.0840	< 0.112	< 6	**1.650**	**1.310**
W252	10/10/1994	N	**0.97**	**0.27**	< 0.042	< 0.042	**2 j**	**1.1**	**0.56**
W252	10/20/1995	N	**1.1**	**0.26**	< 0.078	**0.15 b**	**2 j**	**1.3**	**0.77**
W252	10/02/1996	N	**0.39**	**0.068**	**0.026**	**0.033 b**	**2 j**	**0.30**	**0.47**
W252	10/03/1997	N	**0.068**	**0.008 b**	**0.007**	**0.008**	< 3	**0.030 b**	**0.058**
W252	11/18/1998	N	**0.12**	**0.026**	< 0.003	**0.024**	< 3	**0.038**	**0.13**
W252N	12/10/1999	N	**0.13**	**0.065**	**0.004 b**	**0.038 b**	**9.6**	**0.17**	**0.094**
W252N	9/27/2000	N	**0.13 b**	**0.028**	< 0.003	**0.014 b**	**15**	**0.12 b**	**0.087 b**
W252N	10/18/2001	N	**0.02**	< 0.0034	< 0.0034	**0.015 b**	**8.3**	**0.0049 b**	**0.017**
W252N	11/01/2002	N	**0.049**	**0.0039**	< 0.0034	**0.0063 b***	**5.2**	**0.022 b**	**0.034**
W252N	12/21/2003	N	**0.010**	**0.0067**	< 0.0034	**0.052 b**	**12**	**0.010**	**0.011**
W252N	10/20/2004	N	**0.015**	**0.0094**	**0.0043**	**0.044 b**	**5.6**	**0.015**	**0.022**
W252N	11/10/2005	N	**0.019**	**0.0038**	< 0.0034	**0.0088 b**	**2.3**	**0.013**	**0.015**
W252N	10/21/2006	N	**0.019**	< 0.0034	< 0.0034	**0.018 b**	< 3.0	**0.0087**	**0.017**
W252N	11/08/2007	N	**0.015**	< 0.0034	< 0.0034	**0.0075**	< 1.0	**0.0061 b**	**0.016**
W252N	10/10/2008	N	**0.010**	< 0.0034	< 0.0034	**0.0076**	< 1.0	**0.0054**	**0.010**
W252N	9/30/2009	N	**0.021**	< 0.0035	< 0.0035	**0.012 b**	< 1.1	**0.0086**	**0.018**

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Joslyn Manufacturing and Supply Company
Brooklyn Center, MN

		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W252N	10/06/2010	N	**0.012**	**0.0079**	< 0.0036	**0.11**	< 1.1	**0.019**	**0.012**
W252N	10/15/2011	N	**0.018**	**0.0035**	< 0.0034	**0.071 b**	< 1.0	**0.0095 b**	**0.014**
W252N	10/19/2012	N	**0.012 h**	< 0.0036 h	**0.0054 h**	**0.032 h**	< 1.1 h	**0.0053 h**	**0.011 h**
W252N	10/09/2013	N	**0.0096**	< 0.0036	< 0.0036	**0.071**	< 1.1	**0.0072**	**0.011**
W252N	10/16/2014	N	**0.0063**	< 0.0036	< 0.0036	**0.031**	< 1.1	**0.0065**	**0.011**
W252N	10/08/2015	N	**0.016**	< 0.0034	< 0.0034	**0.0039 b**	< 0.98	**0.0057 b**	**0.017**
W252N	10/19/2016	N	**0.0074**	**0.0066**	< 0.0033	**0.058**	< 0.29	**0.012**	**0.0083**
W252N	10/18/2017	N	**0.0043**	**0.0056**	< 0.0033	**0.065**	< 0.29	**0.0082**	**0.0047**
W253	5/06/1987	N	< 10 < 125	**42** **< 125**	< 10 < 125	**3600** **4000**	< 120 < 120	< 10 < 125	< 10 < 125
W253	11/05/1987	N	< 150	< 150	< 150	**1900**	< 150	< 150	< 150
W253	2/29/1988	N	< 600.0	< 600.0	< 600.0	**2200**	**6**	< 600.0	< 600.0
W253	2/27/1989	N	< 250	< 250	< 250	**1700**	--	< 250	< 250
W253	5/04/1990	N	< 30	**13 j**	< 30	**720**	--	**3 j**	< 30
W253	10/30/1990	N	< 80	**25 j**	< 80	**1600**	< 10	< 80	< 80
W253	12/03/1992	N	< 10	**3 j***	< 10	**81 ***	< 10	< 10	< 10
W253	10/18/1993	N	< 50	< 50	< 50	**300**	< 50	< 50	< 50
W253	9/28/1994	N	< 10	**3 j**	< 10	**76**	< 10	**1 j**	< 10
W253	10/18/1995	N	< 1.5	**3.4**	< 1.5	**18 b**	< 3	< 1.5	< 1.5
W253	10/02/1996	N	< 10	**3 j**	< 10	**25**	< 10	**1 j**	< 10
W253	10/01/1997	N	**1 j**	**3 j**	< 10	**62**	< 50	**1 j**	< 10
W253	9/26/2000	N	< 9.6	< 9.6	< 9.6	**67**	< 48	< 9.6	< 9.6
W253	10/16/2001	N	< 9.6	< 9.6	< 9.6	**78**	< 48	< 9.6	< 9.6
W253	11/01/2002	N	< 9.6	< 9.6	< 9.6	**21 ***	< 48	< 9.6	< 9.6
W253	12/16/2003	N	< 9.8	< 9.8	< 9.8	< 9.8	< 49	< 9.8	< 9.8
W253	10/29/2004	N	< 0.0035	**2.4**	< 0.0035	**1.7**	< 2 *	**0.15**	< 0.0035
W253	11/12/2005	N	< 0.0034	**2.1**	< 0.0034	**3.3**	< 3.0	**0.088**	< 0.0034
W253	10/18/2006	N	**0.0037**	**1.8**	< 0.0034	**3.7**	< 3.0	**0.054**	< 0.0034
W253	11/13/2007	N	< 0.0034	**0.91**	< 0.0034	**0.42 b**	< 0.98	**0.022**	< 0.0034
W253	10/16/2008	N	< 0.0034	**0.63**	< 0.0034	**1.6**	< 1.0	**0.016**	< 0.0034
W253	10/02/2009	N	< 0.0034	**1.3**	< 0.0034	**1.1**	< 1.0	**0.024**	< 0.0034
W253	10/12/2010	N	< 0.0033	**0.53**	< 0.0033	**0.37**	< 0.96	< 0.018	< 0.0033
W253	10/16/2011	N	**0.34**	**0.42**	**0.027**	**0.91 b**	< 0.96	**0.19**	**0.24**
W253	10/18/2012	N	**0.024**	**0.24**	< 0.0035	**0.16**	< 1.1	**0.011**	**0.020**
W253	10/11/2013	N	**0.0066**	**0.19**	< 0.0035	**0.91**	< 1.1	**0.018**	**0.0062**
W253	10/21/2014	N	**0.013**	**2.8**	< 0.0034	**0.11**	< 1.0	**0.17**	< 0.0034

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W253	10/14/2015	N	**0.019**	**2.6**	< 0.0033	**83**	< 0.97	**0.27**	**0.012**
W253	10/11/2016	N	**0.023**	**1.4**	< 0.0065	**0.028**	< 0.57	**0.14**	**0.012**
W253	10/20/2017	N	< 0.017	**0.43**	< 0.017	**0.077**	< 1.5	**0.040**	< 0.017
W254	5/06/1987	N	**0.013**	< 0.0035	< 0.0043	**0.017**	< 6	< 0.0025	**0.010**
W254	7/28/1987	N	**0.0059**	< 0.0014	< 0.0017	**0.0042**	**7.6 s**	**0.0017**	**0.0042**
W254	2/23/1988	N	**0.0038**	< 0.0014	< 0.0017	**0.030**	< 6	**0.0027 s**	**0.0032**
W254	10/05/1988	N	**0.0015**	< 0.0014	< 0.0017	**0.0086**	< 6	**0.0017**	**0.0013**
W254	8/04/1989	N	**0.11**	**0.038**	**0.0089**	**0.026**	< 5	**0.041**	**0.037**
W254	5/02/1990	N	**0.47**	**0.17**	< 0.034	< 0.038	--	**0.41**	**0.42**
W254	10/31/1990	N	**0.44**	**0.11**	**0.011**	**0.020 b**	**2 j**	**0.25**	**0.31**
W254	10/17/1991	N	**0.36**	**0.048**	**0.053**	**0.034 b**	**2 j**	**0.11**	**0.34**
W254	10/14/1992	N	**0.026**	**0.020**	< 0.0030	**0.011 b**	< 6	**0.031**	**0.020**
W254	10/20/1993	N	**0.118**	**0.0216**	**0.00829**	**0.0447 b**	< 6	**0.0542**	**0.101**
W254	9/30/1994	N	**0.076**	**0.024**	**0.020**	**0.016 b**	< 3	**0.076**	**0.053**
W254	10/20/1995	N	**0.15**	**0.022**	**0.008**	**0.10 b**	< 3	**0.068**	**0.10**
W254	10/02/1996	N	**0.083**	**0.040**	< 0.003	**0.020 b**	< 3	**0.060**	**0.071**
W254	10/03/1997	N	**0.17**	**0.031**	**0.008**	**0.010**	< 3	**0.054 b**	**0.15**
W254	11/19/1998	N	< 0.003	< 0.003	< 0.003	< 0.003	< 3	**0.004**	< 0.003
W254	11/18/1999	N	**0.078**	**0.009**	**0.022**	**0.012 jb**	< 3	**0.047 b**	**0.056**
W254	9/27/2000	N	**0.023 b**	< 0.003	< 0.003	**0.007 b**	< 3	**0.011 b**	**0.013 b**
W254	10/18/2001	N	< 0.0034	< 0.0034	< 0.0034	**0.012 b**	< 3	< 0.0034	< 0.0034
W254	10/30/2002	N	**0.012**	< 0.0034	< 0.0034	**0.012 b**	< 3.0	**0.0080**	**0.0071**
W254	12/21/2003	N	< 0.0034	< 0.0034	< 0.0034	**0.024 b**	< 3.0	**0.0047**	< 0.0034
W254	10/20/2004	N	**0.014**	**0.0071**	< 0.0034	**0.017 b**	< 2	**0.015**	**0.012**
W254	11/10/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.014 b**	< 3.0	**0.0044**	< 0.0034
W254	10/20/2006	N	**0.0056**	**0.0050**	< 0.0038	**0.068 b**	< 3.4	**0.012**	**0.0043**
W254	11/08/2007	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.99	< 0.0034	< 0.0034
W254	10/10/2008	N	< 0.0035	< 0.0035	< 0.0035	**0.0043**	< 1.1	< 0.0035	< 0.0035
W254	9/29/2009	N	< 0.0033	< 0.0033	< 0.0033	**0.0068 b**	< 0.96	< 0.0033	< 0.0033
W254	9/29/2009	FD	< 0.0034	< 0.0034	< 0.0034	**0.0061 b**	< 0.98	< 0.0034	< 0.0034
W254	10/06/2010	N	< 0.0033	< 0.0033	< 0.0033	**0.022**	< 0.96	< 0.0033	< 0.0033
W254	10/14/2011	N	< 0.0034	< 0.0034	< 0.0034	**0.021**	< 0.99	< 0.0034	< 0.0034
W254	10/17/2012	N	< 0.0034 h	< 0.0034 h	< 0.0034 h	**0.013 bh**	< 1.0 h	< 0.0034 h	< 0.0034 h
W254	10/17/2012	FD	< 0.0033 h	< 0.0033 h	< 0.0033 h	**0.016 bh**	< 0.97 h	< 0.0033 h	< 0.0033 h
W254	10/09/2013	N	< 0.0034	< 0.0034	< 0.0034	**0.089**	< 0.99	< 0.0034	< 0.0034

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W254	10/16/2014	N	< 0.0034	< 0.0034	< 0.0034	**0.0077**	< 1.0	< 0.0034	< 0.0034
W254	10/08/2015	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.98	< 0.0034	< 0.0034
W254	10/08/2015	FD	< 0.0034	< 0.0034	< 0.0034	**0.0051 b**	< 0.98	< 0.0034	< 0.0034
W254	10/18/2016	N	< 0.0033	< 0.0033	< 0.0033	**0.0046**	< 0.29	< 0.0033	< 0.0033
W254	10/18/2017	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.30	< 0.0034	< 0.0034
W255	12/29/1988	N	< 2000	< 2000	< 2000	**5600**	< 50	< 2000	< 2000
W255	2/27/1989	N	< 500	< 500	< 500	**2700**	--	< 500	< 500
W255	8/03/1989	N	< 100 pp	< 100 pp	< 100	**1600**	< 5	**110**	< 100 pp
W255	10/30/1990	N	**24 j** **< 100**	**63** **69 j**	< 50 < 100	**1200** **1300**	< 10 < 10	**220** **120**	**18 j** **< 100**
W255	10/17/1991	N	**91**	**170**	< 50	**2600**	< 50	**300**	**58**
W255	10/18/1993	N	**230**	**63 j**	< 100	**1400**	< 100	**240**	**130**
W255	9/28/1994	N	**4800**	**1100**	**220 j**	**2700**	< 350	**5700**	**3800**
W255	10/24/1995	N	**46**	**93**	< 3.6	**2200**	< 29	**130**	**22**
W255	10/02/1996	N	< 500	**66 j**	< 500	**1700**	< 500	**130 j**	< 500
W255	10/01/1997	N	**9 j**	**63**	< 10	**1500**	**5 j**	**58**	**5 j**
W255	11/18/1998	N	< 200	**64 j**	< 200	**1400**	< 200	**82 j**	< 200
W255	1/14/2000	N	**12**	**81**	**0.3 j**	**1900**	< 50	**92**	**7 j**
W255	9/26/2000	N	**24**	**92**	< 9.6	**3600**	< 48	**95**	**19**
W255	10/16/2001	N	**57**	**110**	< 9.8	**1600**	< 49	**150**	**36**
W255	11/01/2002	N	**220**	**150**	**11**	**2700 ***	< 48	**380**	**150**
W255	12/16/2003	N	**21**	**75**	< 9.6	**1800**	< 48	**95**	**14**
W255	10/29/2004	N	**27**	**85**	< 0.17	**2000**	< 10 *	**120**	**19**
W255	11/12/2005	N	**48**	**74**	**0.53**	**2000**	< 150	**98**	**39**
W255	10/18/2006	N	**70**	**110**	**3.4**	**2700**	< 150	**150**	**50**
W255	11/13/2007	N	**2300**	**550**	**180**	**3200**	< 55	**1900**	**1700**
W255	10/16/2008	N	**21**	**74**	**0.56**	**1800**	**6.8**	**88**	**15**
W255	10/02/2009	N	**150**	**160**	**8.5**	**2500**	< 48	**230**	**74**
W255	10/12/2010	N	**41**	**90**	**1.9**	**2700**	< 48	**110**	**32**
W255	10/16/2011	N	**46**	**73**	**1.8**	**1400**	**11**	**91**	**28**
W255	10/18/2012	N	**45**	**88**	**2.6**	**1700**	< 48	**160**	**38**
W255	10/11/2013	N	**17**	**120**	**0.11**	**270**	**10**	**130**	**12**
W255	10/21/2014	N	**37**	**100**	**2.0**	**1500**	**9.2**	**110**	**31**
W255	10/14/2015	N	**42**	**110**	**1.2**	**1900**	**13**	**150**	**30**
W255	10/11/2016	N	**85**	**110**	**4.1**	**2800**	**14**	**170**	**48**
W255	10/20/2017	N	**70**	**110**	**3.5**	**2900**	**8.9**	**150**	**48**

Table A-5
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							

See Table 3-18 for data qualifiers

Table A-6
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W300	12/11/1984	N	**0.0076**	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W300	3/28/1985	N	**0.0025**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W300	12/13/1985	N	**0.0037**	< 0.0013	**0.0014**	< 0.0010	**0.0036**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0033 c**	< 0.0014
W300	3/20/1986	N	**0.0040**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W300	6/04/1986	N	**0.0088**	**0.0096**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W300	9/23/1986	N	**0.0047**	< 0.0013	< 0.0010	**0.0043**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0011 c**	< 0.0014
W300	12/10/1986	N	**0.0048**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W300	3/19/1987	N	**0.0042**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W300SP	5/08/1987	N	**0.0071**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W300SP	7/28/1987	N	< 0.002	**0.0014**	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W300SP	11/03/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
W300SP	2/23/1988	N	< 0.016	< 0.010	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.011
W300SP	10/07/1988	N	< 0.016 0.0042	< 0.010 < 0.0013	< 0.0080 < 0.0010	< 0.0080 < 0.0010	< 0.0080 < 0.0010	< 0.0080 < 0.0010	< 0.0080 < 0.0010	< 0.0080 < 0.0010	< 0.0080 < 0.0010	< 0.0080 < 0.0010	< 0.011 < 0.0014
W300SP	12/20/1988	N	**0.027**	**0.0042**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W300SP	8/07/1989	N	**0.0090**	**0.016**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W300SP	5/02/1990	N	**0.0029 s**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0019 c**	< 0.0014
W300SP	10/30/1990	N	**0.014**	< 0.0013	< 0.0010	**0.0016**	< 0.0010	< 0.0010	**0.0021 c**	< 0.0010	**0.0021 c**	**0.0067 c**	< 0.0014
W300SP	10/17/1991	N	< 0.0060	< 0.0060	< 0.0060	< 0.0060	< 0.0060	< 0.0060	**0.012 c**	< 0.0060	**0.012 c**	**0.014 c**	< 0.0060
W300SP	10/14/1992	N	**0.010 b**	**0.0046**	< 0.0030	**0.0058**	< 0.0030	< 0.0030	< 0.0030	**0.0036**	< 0.0030	**0.011 c**	< 0.0030
W300SP	10/20/1993	N	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W300SP	9/30/1994	N	**0.008 b**	< 0.003	< 0.003	< 0.003	< 0.003	**0.003**	**0.005**	< 0.003	**0.004**	**0.011 c**	< 0.003
W300SP	10/19/1995	N	**0.007** **0.007**	**0.004** **< 0.006**	< 0.003 < 0.006	< 0.003 < 0.006	< 0.003 < 0.006	< 0.003 < 0.006	< 0.003 < 0.006	< 0.003 < 0.006	< 0.003 < 0.006	< 0.003 < 0.006	< 0.003 < 0.006
W300SP	10/02/1996	N	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
W300SP	10/02/1997	N	**0.004 b**	< 0.003	< 0.003	**0.004**	< 0.003	< 0.003	**0.003**	< 0.003	< 0.003	**0.030 c**	< 0.003
W300SP	11/19/1998	N	**0.008**	**0.005**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W300SP	11/18/1999	N	**0.005 jb**	< 0.003	< 0.003	**0.004 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.007**	< 0.003
W300SP	11/18/1999	FD	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.005**	< 0.003
W300SP	9/27/2000	N	**0.004 b**	< 0.003	< 0.003	**0.005**	**0.005**	**0.003**	**0.009 b**	**0.006 b**	**0.005**	**0.013 b**	< 0.003
W300SP	10/18/2001	N	**0.0069 b**	**0.0037**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SP	5/15/2002	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	10/31/2002	N	**0.021 b**	**0.0097**	**0.0049**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	12/21/2003	N	**0.029 b**	**0.0094**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	10/20/2004	N	**0.0058 b**	**0.01**	< 0.0034	**0.0073**	< 0.034	< 0.034	< 0.034	< 0.034	< 0.034	**0.041**	< 0.034
W300SPN	11/10/2005	N	**0.013**	**0.0049**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034

Table A-6
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W300SPN	10/20/2006	N	**0.017 b**	**0.015**	< 0.0038	**0.010**	< 0.0038	< 0.0038	**0.0076**	< 0.0038	< 0.0038	**0.0073**	< 0.0038
W300SPN	11/08/2007	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	10/09/2008	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.030	< 0.0033
W300SPN	9/29/2009	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W300SPN	10/06/2010	N	**0.0062**	< 0.0040	< 0.0040	**0.025**	**0.062**	**0.031**	**0.048**	**0.016**	**0.030**	**0.11**	**0.0063**
W300SPN	11/12/2010	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	10/11/2011	N	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
W300SPN	10/16/2012	N	< 0.0036 h	< 0.0036 h	< 0.0036 h	**0.013 h**	**0.059 h**	**0.043 h**	**0.069 h**	**0.020 h**	**0.024 h**	**0.074 h**	**0.0069 h**
W300SPN	10/08/2013	N	< 0.0034	< 0.0034	< 0.0034	**0.0041**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	10/15/2014	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	10/06/2015	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	10/18/2016	N	< 0.0034	< 0.0034	< 0.0034	**0.0049**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W300SPN	10/13/2017	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0042**	**0.0081**	**0.0070 c**	**0.015**	**0.0073**	**0.0038**	**0.0087**
W301	3/28/1985	N	**0.0091**	**0.0026**	< 0.0010	**0.0024**	**0.0045**	**0.0017**	**0.014 c**	< 0.0010	ND c	**0.011 c**	< 0.0014
W301	5/06/1985	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	12/13/1985	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	3/20/1986	N	**0.0021**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	6/03/1986	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	9/23/1986	N	**0.0024**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	12/10/1986	N	**0.0031**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	3/19/1987	N	**0.0054**	< 0.0013	< 0.0010	**0.0022**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0014 c**	< 0.0014
W301	5/06/1987	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	8/06/1987	N	**0.0042**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W301	11/03/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
W301	2/25/1988	N	< 0.004	< 0.0026	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0028
W301	10/05/1988	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	12/09/1988	N	**0.0052**	< 0.0013	**0.0016**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	8/07/1989	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W301	5/03/1990	N	< 0.0080	< 0.0052	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0056
W301	10/30/1990	N	**0.0049** **0.0025**	**0.0026** **< 0.0013**	**0.0021** **< 0.0010**	**0.0018** **< 0.0010**	**0.0017** **< 0.0010**	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	**0.0013 c** **< 0.0010**	< 0.0014 < 0.0014
W301	10/16/1991	N	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0060 < 0.0060	< 0.0030 < 0.0030	< 0.0060 < 0.0060	< 0.0060 < 0.0060	< 0.0030 < 0.0030
W301	10/14/1992	N	< 0.0030 < 0.0030	< 0.0030 0.016	< 0.0030 0.014	< 0.0030 0.0041	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0060 < 0.0060	< 0.0030 < 0.0030
W301	10/20/1993	N	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00300	< 0.00600	< 0.00300
W301	9/29/1994	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003

Table A-6
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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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W301	10/20/1995	N	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
W301	10/02/1996	N	**0.003**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W301	10/02/1997	N	**0.004 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.003**	< 0.003	< 0.003	< 0.003
W301	11/19/1998	N	**0.003**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W301	1/14/2000	N	**0.013 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.003**	**0.004**	< 0.003	**0.007**	< 0.003
W301	9/28/2000	N	**0.010 b**	< 0.003	< 0.003	**0.004**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	**0.005 b**	< 0.003
W301	10/19/2001	N	**0.0072**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W301	11/01/2002	N	**0.010 b**	**0.0034**	**0.0037**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W301	12/23/2003	N	**0.0072 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W301	10/21/2004	N	**0.028**	**0.005**	< 0.0034	**0.005**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W301	11/10/2005	N	**0.0086**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W301	10/21/2006	N	< 0.0034	< 0.0034	< 0.0034	**0.0048**	**0.0035**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W301	11/09/2007	N	**0.0063 b**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W301	10/16/2008	N	**0.0035**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W301	10/08/2009	N	**0.0036**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W301	10/13/2010	N	< 0.0034	< 0.0034	**0.012**	**0.0043**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W301	10/16/2011	N	**0.0044 b**	**0.0049**	< 0.0038	**0.0074**	**0.0070**	**0.0057**	**0.013**	**0.0060**	**0.0043**	**0.016**	< 0.0038
W301	11/01/2012	N	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065
W301	10/17/2013	N	**0.015 b***	**0.0057 ***	**0.0034 ***	**0.011**	**0.0094**	**0.0062**	**0.0099**	**0.0050**	**0.0052**	**0.015**	< 0.0034
W301	10/22/2014	N	**0.0095**	< 0.017	< 0.017	**0.0092**	**0.010**	< 0.017	< 0.017	< 0.017	< 0.017	**0.016**	< 0.017
W301	10/12/2015	N	**0.0056**	**0.0038**	< 0.0034	**0.0045**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W301	10/20/2016	N	**0.0083**	**0.0075**	< 0.0033	**0.018**	**0.0065**	**0.0084**	**0.0057 c**	**0.0034**	< 0.0033	**0.025**	< 0.0033
W301	12/04/2017	N	**0.012**	**0.0034**	< 0.0033	**0.0058**	**0.0095**	< 0.0033	**0.014 c**	**0.0052**	< 0.0033	**0.013**	< 0.0033
W307	3/27/1985	N	**0.0059**	**0.069**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	**0.0035 c**	< 0.0028
W307	5/07/1985	N	**0.0067**	**0.011**	< 0.0010	< 0.0010	**0.0013**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010 c	< 0.0014
W307	12/13/1985	N	**0.0040**	**0.0056**	**0.0014**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W307	3/20/1986	N	**0.0026**	< 0.0013	< 0.0010	**0.0011**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W307	6/03/1986	N	**0.0026**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W307	9/23/1986	N	**0.0022**	**0.0020**	**0.0011**	**0.0010**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W307	12/10/1986	N	**0.0036**	< 0.0013	< 0.0010	**0.0011**	**0.0014**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0027 c**	< 0.0014
W307	3/19/1987	N	< 0.050	**1.3**	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.035
W307	5/05/1987	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0020 c**	< 0.0014
W307	7/28/1987	N	< 0.002	< 0.0013	< 0.001	< 0.001	**0.0012**	< 0.001	< 0.001	< 0.001	< 0.001	**0.0015 c**	< 0.0014
W307	11/03/1987	N	< 0.008	< 0.0052	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.0056
W307	2/25/1988	N	< 0.004	< 0.0026	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0028
W307	10/07/1988	N	< 0.0040	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028

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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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W307	12/09/1988	N	< 0.0040 < 0.0040	< 0.0026 < 0.0026	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0020 < 0.0020	< 0.0028 < 0.0028
W307	8/07/1989	N	**0.0032**	**0.0029**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0010 c**	< 0.0014
W307	5/03/1990	N	< 0.0040	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W307	10/30/1990	N	**0.0065**	< 0.0013	< 0.0010	**0.0048**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0018 c**	< 0.0014
W307	10/17/1991	N	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0060 < 0.0060	**0.0065** **< 0.0030**	< 0.0060 < 0.0060	**0.0061 c** **< 0.0060**	< 0.0030 < 0.0030
W307	10/14/1992	N	**0.0052 b**	**0.0089**	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W307	10/20/1993	N	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0240	< 0.0480	< 0.0240
W307	9/30/1994	N	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024
W307	10/20/1995	N	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024	< 0.024
W307	10/02/1996	N	**0.004**	**0.020**	< 0.003	**0.006**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W307	10/02/1997	N	**0.004 b**	**0.006**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W307	11/18/1998	N	< 0.003	**0.012**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W307	11/18/1998	FD	**0.003**	**0.013**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W323	3/19/1987	N	**0.0030**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W323	5/05/1987	N	< 0.5	**2.4**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
W323	7/07/1987	N	< 0.050	**3.7**	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.035
W323	7/28/1987	N	**0.18** **< 10**	**1.7** **3.2 pp**	**0.012** **< 10**	< 0.010 < 10	< 0.010 < 10	< 0.010 < 10	< 0.010 < 10	< 0.010 < 10	< 0.010 < 10	< 0.010 < 10	< 0.014 < 10
W323	11/03/1987	N	**0.020**	**2.5**	**0.022**	**0.015**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W323	2/25/1988	N	< 0.040	**0.92**	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.028
W323	10/06/1988	N	< 0.020	**1.2**	**0.013**	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.014
W323	10/20/1995	N	< 0.11	**1.1**	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
W323	10/02/1996	N	< 0.048	**1.1**	< 0.048	< 0.048	< 0.048	< 0.048	< 0.048	< 0.048	< 0.048	< 0.048	< 0.048
W323	10/02/1997	N	**0.004 b**	**0.63**	< 0.003	**0.004**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W323	11/19/1998	N	< 0.003	**0.57**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W323	11/18/1999	N	**0.007 jb**	**0.59**	**0.004**	**0.011 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W323	9/28/2000	N	**0.005 b**	**0.55**	**0.004**	**0.010**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W323	9/28/2000	FD	**0.004 b**	**0.54**	**0.006**	**0.009**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W323	10/19/2001	N	**0.0035**	**0.39**	**0.0043**	**0.0090**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W323	10/19/2001	FD	< 0.0033	**0.44**	**0.0052**	**0.0089**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W323	10/31/2002	N	**0.0044 b**	**0.36**	< 0.0034	**0.0040**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W323	6/07/2003	N	< 0.0034	**0.46**	**0.0049**	**0.0089**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	3/20/1986	N	**0.0043**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W328	6/03/1986	N	< 0.0040	< 0.0026	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0028
W328	9/23/1986	N	**0.0063**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014

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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
Unit			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W328	12/10/1986	N	**0.0041**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W328	3/19/1987	N	**0.0023**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W328	5/05/1987	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W328	8/06/1987	N	**0.0038**	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0014
W328	11/03/1987	N	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25
W328	2/25/1988	N	< 0.002	< 0.0013	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	**0.002**
W328	10/07/1988	N	< 0.0020 < 0.0020	< 0.0013 < 0.0013	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0010 < 0.0010	< 0.0014 < 0.0014
W328	12/09/1988	N	**0.0034**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W328	8/04/1989	N	< 0.0020	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W328	5/03/1990	N	**0.0040 s**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W328	10/30/1990	N	**0.0032**	< 0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0014
W328	10/17/1991	N	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030	< 0.0060	< 0.0060	< 0.0030
W328	10/14/1992	N	**0.0038 b**	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0060	< 0.0030
W328	10/20/1993	N	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00600 < 0.0120	< 0.00300 < 0.00600
W328	10/10/1994	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W328	1/09/1996	N	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009	< 0.009
W328	10/02/1996	N	**0.007**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W328	10/02/1997	N	**0.003 b** **< 0.003**	< 0.003 < 0.003	< 0.003 < 0.003	< 0.003 < 0.003	< 0.003 0.007	< 0.003 0.007	< 0.003 0.007	< 0.003 0.009	< 0.003 0.006	< 0.003 0.008 c	< 0.003 0.004
W328	11/19/1998	N	**0.005**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	--	< 0.003	< 0.003	< 0.003
W328	11/18/1999	N	**0.007 jb**	< 0.003	< 0.003	**0.005 b**	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W328	9/28/2000	N	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
W328	10/19/2001	N	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W328	10/31/2002	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	10/31/2002	FD	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	12/22/2003	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	10/21/2004	N	**0.039**	**0.0039**	< 0.0034	**0.0039**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	10/21/2004	FD	**0.031**	< 0.0034	< 0.0034	**0.0044**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	11/10/2005	N	**0.010**	< 0.0034	**0.0039**	**0.0056**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	11/10/2005	FD	**0.0084**	< 0.0034	< 0.0034	**0.0035**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	10/21/2006	N	**0.0057**	< 0.0034	< 0.0034	**0.0056**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	11/09/2007	N	**0.0037 b**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W328	10/16/2008	N	**0.0067**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	10/08/2009	N	**0.0069**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W328	10/13/2010	N	**0.0091**	< 0.0033	< 0.0033	**0.0046**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033

Table A-6
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type											
W328	10/16/2011	N	< 0.0039	< 0.0039	< 0.0039	**0.0056**	**0.0079**	**0.0084**	**0.016**	**0.0078**	**0.0062**	**0.0096**	< 0.0039
W328	11/01/2012	N	**0.0048 b**	< 0.0033	< 0.0033	**0.0075**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W328	11/01/2012	FD	**0.0044 b**	< 0.0033	< 0.0033	**0.0082**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W328	10/17/2013	N	**0.0034 b**	< 0.0033	< 0.0033	**0.0096**	**0.0096**	< 0.0033	< 0.0033	< 0.0033	**0.0035**	**0.014**	< 0.0033
W328	10/17/2013	FD	**0.0037 b**	< 0.0034	< 0.0034	**0.0073**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
W328	10/22/2014	N	**0.0037**	< 0.0033	< 0.0033	**0.0048**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W328	10/12/2015	N	< 0.0035	< 0.0035	< 0.0035	**0.0042**	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 0.0035
W328	10/20/2016	N	**0.0061**	< 0.0033	< 0.0033	**0.013**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
W328	12/04/2017	N	**0.011**	< 0.0033	< 0.0033	**0.0071**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-3	3/01/2006	N	**0.086**	**0.0079**	**0.0041**	**0.014**	**0.00056 j**	< 0.00055	**0.00076 j**	**0.00053 j**	< 0.00061	**0.00099 j**	< 0.00098
S-3	10/21/2006	N	**0.14**	**0.012**	**0.0050**	**0.024**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-3	11/08/2007	N	**0.0040**	< 0.0032	< 0.0032	**0.0092**	< 0.0032	< 0.0032	< 0.0032	< 0.0032	< 0.0032	< 0.0032	< 0.0032
S-3	10/14/2008	N	**0.013**	< 0.0036	< 0.0036	**0.011**	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036	< 0.0036
S-3	9/30/2009	N	**0.012**	< 0.0033	< 0.0033	**0.016**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-3	10/05/2010	N	**0.0073**	< 0.0033	< 0.0033	**0.013**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-3	10/05/2010	FD	**0.0074**	< 0.0033	< 0.0033	**0.013**	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-3	10/11/2011	N	**0.018**	**0.0067**	< 0.0051	**0.0092**	**0.0080**	< 0.0039	**0.0066**	< 0.0039	< 0.0039	**0.0074**	< 0.0039
S-3	10/16/2012	N	< 0.0033 h	< 0.0033 h	< 0.0033 h	**0.012 h**	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h	< 0.0033 h
S-3	10/08/2013	N	**0.0045 b**	< 0.0034	< 0.0034	**0.017**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-3	10/15/2014	N	< 0.0034	< 0.0034	< 0.0034	**0.0089**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-3	10/06/2015	N	< 0.0034	< 0.0034	< 0.0034	**0.010**	< 0.0034	< 0.0034	< 0.0034 c	< 0.0034	< 0.0034	< 0.0034	< 0.0034
S-3	10/13/2016	N	< 0.0033	< 0.0033	< 0.0033	**0.016**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	< 0.0033	< 0.0033
S-3	10/11/2017	N	< 0.0033	< 0.0033	< 0.0033	**0.013**	< 0.0033	< 0.0033	< 0.0033 c	< 0.0033	< 0.0033	**0.0034**	< 0.0033

See Table 3-18 for data qualifiers and footnotes.

Table A-6
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W300	12/11/1984	N	< 0.0020	< 0.0028	< 0.0034	**0.022**	< 5	< 0.0020	< 0.0020
W300	3/28/1985	N	< 0.0010	< 0.0014	< 0.0017	**0.015**	< 5	**0.0025**	**0.0028**
W300	12/13/1985	N	**0.044**	< 0.0014	< 0.0017	**0.0047**	< 5	**0.0086**	**0.038**
W300	3/20/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.0071**	< 5	**0.0029**	< 0.0010
W300	6/04/1986	N	**0.0010**	< 0.0014	< 0.0017	**0.250**	< 5	**0.0079**	**0.0027**
W300	9/23/1986	N	**0.010**	**0.0019**	< 0.0017	**0.0075 s**	< 5	**0.0083**	**0.0079**
W300	12/10/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.0072 s**	< 5	**0.0029**	< 0.0010
W300	3/19/1987	N	< 0.0010	< 0.0014	< 0.0017	**0.0093**	< 6	**0.0012**	< 0.0010
W300SP	5/08/1987	N	**0.0014**	**0.0012**	< 0.0017	**0.024**	< 6	**0.0052**	**0.0014**
W300SP	7/28/1987	N	< 0.001	**0.0016**	< 0.0017	**0.0047**	**6.0 s**	**0.0024**	< 0.001
W300SP	11/03/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 6	< 0.25	< 0.25
W300SP	2/23/1988	N	< 0.008	< 0.011	< 0.014	< 0.015	< 6	< 0.008	< 0.008
W300SP	10/07/1988	N	< 0.0080 < 0.0010	< 0.011 < 0.0014	< 0.014 < 0.0017	< 0.015 0.0075	< 6 < 6	< 0.0080 0.0015	< 0.0080 0.0011
W300SP	12/20/1988	N	**0.016**	**0.0026**	< 0.0017	**0.064**	< 5	**0.0053**	**0.0026**
W300SP	8/07/1989	N	**0.0034**	< 0.0014	< 0.0017	**0.12**	< 5	**0.0094**	**0.0029**
W300SP	5/02/1990	N	**0.0020**	< 0.0014	< 0.0017	**0.0064 s**	< 6	**0.0053 s**	**0.0029**
W300SP	10/30/1990	N	**0.0055 b**	< 0.0014	< 0.0017	**0.016 b**	< 6	**0.0068 b**	**0.0059**
W300SP	10/17/1991	N	**0.014**	< 0.0060	< 0.0060	< 0.0080	< 6	< 0.0060	**0.020**
W300SP	10/14/1992	N	**0.016**	**0.0074**	**0.0038**	**0.013 b**	< 6	**0.020**	**0.014**
W300SP	10/20/1993	N	**0.00460**	< 0.00300	< 0.00300	**0.00894 b**	< 6	**0.00453**	**0.00688**
W300SP	9/30/1994	N	**0.006**	< 0.003	< 0.003	**0.012 b**	< 3	**0.009**	**0.007**
W300SP	10/19/1995	N	**0.004** **< 0.006**	< 0.003 < 0.006	< 0.003 < 0.006	**0.042 b** **0.032 b**	< 3 < 3	**0.008 b** **0.006 b**	**0.006** **< 0.006**
W300SP	10/02/1996	N	< 0.060	< 0.060	< 0.060	< 0.060	< 3	< 0.060	< 0.060
W300SP	10/02/1997	N	**0.006 b**	**0.003 b**	< 0.003	**0.009 b**	< 3	**0.009 b**	**0.007**
W300SP	11/19/1998	N	**0.004**	**0.010**	< 0.003	**0.018**	< 3	**0.019**	**0.005**
W300SP	11/18/1999	N	**0.010**	**0.004**	< 0.003	**0.007 jb**	< 3	**0.016 b**	**0.007**
W300SP	11/18/1999	FD	**0.006**	< 0.003	< 0.003	**0.005 jb**	< 3	**0.007 b**	**0.004**
W300SP	9/27/2000	N	**0.016 b**	< 0.003	**0.005 b**	**0.010 b**	< 3	**0.013 b**	**0.012 b**
W300SP	10/18/2001	N	< 0.0034	< 0.0034	< 0.0034	**0.013 b**	< 3	**0.0044 b**	< 0.0034
W300SP	5/15/2002	N	**0.0054 b**	< 0.0034	< 0.0034	**0.0043 b**	< 3	**0.0077 b**	**0.0046 b**
W300SPN	10/31/2002	N	**0.0065**	**0.011**	< 0.0034	**0.035 b**	< 3.0	**0.016**	**0.0042**
W300SPN	12/21/2003	N	< 0.0034	**0.0072**	< 0.0034	**0.032 b**	< 3.0	**0.0087**	< 0.0034
W300SPN	10/20/2004	N	**0.038**	**0.012**	< 0.034	**0.0045 b**	< 2	**0.017**	**0.063**
W300SPN	11/10/2005	N	**0.0041**	**0.0071**	< 0.0034	**0.020 b**	< 3.0	**0.0085**	**0.0039**

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Joslyn Manufacturing and Supply Company
Brooklyn Center, MN

		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W300SPN	10/20/2006	N	**0.026**	**0.028**	< 0.0038	**0.20**	< 3.4	**0.065**	**0.021**
W300SPN	11/08/2007	N	< 0.0034	< 0.0034	< 0.0034	**0.0041**	< 1.0	**0.012 b**	< 0.0034
W300SPN	10/09/2008	N	**0.0073**	**0.0047**	< 0.0033	**0.072**	< 0.95	**0.012**	**0.0052**
W300SPN	9/29/2009	N	< 0.0033	< 0.0033	< 0.0033	**0.0094 b**	< 0.97	< 0.0033	< 0.0033
W300SPN	10/06/2010	N	**0.043**	**0.019**	**0.017**	**0.17**	< 1.2	**0.068**	**0.031**
W300SPN	11/12/2010	N	< 0.0034	< 0.0034	< 0.0034	**0.021 b**	< 1.0	< 0.0034	< 0.0034
W300SPN	10/11/2011	N	< 0.0036	< 0.0036	< 0.0036	**0.023**	< 1.1	**0.0054 b**	< 0.0036
W300SPN	10/16/2012	N	**0.048 h**	**0.0077 h**	**0.023 h**	**0.044 bh**	< 1.1 h	**0.027 h**	**0.041 h**
W300SPN	10/08/2013	N	< 0.0034	< 0.0034	< 0.0034	**0.044 b**	< 0.99	**0.0036**	< 0.0034
W300SPN	10/15/2014	N	< 0.0034	< 0.0034	< 0.0034	**0.0034 b**	< 1.0	< 0.0034	< 0.0034
W300SPN	10/06/2015	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 1.0	< 0.0034	< 0.0034
W300SPN	10/18/2016	N	**0.0036**	< 0.0034	< 0.0034	**0.011**	< 0.30	**0.0035**	< 0.0034
W300SPN	10/13/2017	N	**0.0040**	< 0.0034	**0.011**	< 0.0034	< 0.30	< 0.0034	< 0.0034
W301	3/28/1985	N	**0.031**	**0.0048**	< 0.0017	**0.011**	< 5	**0.043**	**0.024**
W301	5/06/1985	N	**0.0029**	**0.0024**	< 0.0017	**0.0063 s**	< 5	**0.036**	**0.0039**
W301	12/13/1985	N	**0.0014**	< 0.0014	< 0.0017	< 0.0019	< 5	**0.0034**	**0.0019**
W301	3/20/1986	N	**0.0015**	< 0.0014	< 0.0017	**0.0064**	< 5	**0.0042**	**0.0021**
W301	6/03/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.022 s**	< 5	**0.0037**	< 0.0010
W301	9/23/1986	N	**0.0035**	< 0.0014	< 0.0017	**0.0067 s**	< 5	**0.0033**	**0.0016**
W301	12/10/1986	N	**0.0014**	< 0.0014	< 0.0017	**0.0071 s**	< 5	**0.0026**	**0.0015**
W301	3/19/1987	N	**0.0094**	**0.0044**	< 0.0017	**0.032**	< 6	**0.0061**	**0.011**
W301	5/06/1987	N	< 0.0010	< 0.0014	< 0.0017	**0.012**	< 6	< 0.0010	**0.0011**
W301	8/06/1987	N	< 0.001	< 0.0014	< 0.0017	**0.0064**	**8.9 s**	**0.0016**	< 0.001
W301	11/03/1987	N	< 0.25	< 0.25	< 0.25	< 0.25	< 6	< 0.25	< 0.25
W301	2/25/1988	N	**0.013**	< 0.0028	< 0.0034	**0.0065 s**	< 6	**0.017**	**0.013**
W301	10/05/1988	N	< 0.0010	< 0.0014	< 0.0017	**0.0033 s**	< 6	< 0.0010	< 0.0010
W301	12/09/1988	N	< 0.0010	< 0.0014	< 0.0017	**0.006 s**	< 5	**0.002**	< 0.0010
W301	8/07/1989	N	< 0.0010	< 0.0014	< 0.0017	**0.0039**	< 5	**0.0015**	< 0.0010
W301	5/03/1990	N	< 0.0040	< 0.0056	< 0.0068	< 0.0076	< 6	< 0.0040	< 0.0040
W301	10/30/1990	N	**0.0029 b** **< 0.0010**	**0.0023** **< 0.0014**	< 0.0017 < 0.0017	**0.017 b** **0.0067 b**	< 6 < 6	**0.0066 b** **0.0031 b**	**0.0023** **< 0.0010**
W301	10/16/1991	N	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0040 < 0.0040	< 6 < 6	< 0.0030 < 0.0030	< 0.0030 < 0.0030
W301	10/14/1992	N	< 0.0030 0.0048	< 0.0030 0.011	< 0.0030 < 0.0030	**0.0041 b** **0.0055 b**	< 6 < 6	**0.0042** **0.0097**	< 0.0030 0.0038
W301	10/20/1993	N	< 0.00300	< 0.00300	< 0.00300	< 0.00400	< 6	**0.00358**	< 0.00300
W301	9/29/1994	N	< 0.003	< 0.003	< 0.003	**0.004 b**	< 3	< 0.003	< 0.003

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Brooklyn Center, MN

		Parameter	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W301	10/20/1995	N	< 0.006	< 0.006	< 0.006	< 0.006	< 3	< 0.006	< 0.006
W301	10/02/1996	N	**0.004**	< 0.003	< 0.003	**0.005 b**	< 3	< 0.003	**0.004**
W301	10/02/1997	N	**0.008 b**	< 0.003	< 0.003	**0.007 b**	< 3	**0.013 b**	**0.020**
W301	11/19/1998	N	< 0.003	< 0.003	< 0.003	**0.006**	< 3	**0.003**	< 0.003
W301	1/14/2000	N	**0.017**	**0.003**	< 0.003	**0.024 b**	< 3	**0.015 b**	**0.008**
W301	9/28/2000	N	**0.010 b**	**0.004 b**	< 0.003	**0.014 b**	< 3	**0.021 b**	**0.009**
W301	10/19/2001	N	**0.0048 b**	**0.0033**	< 0.0033	**0.0096**	< 3	**0.012 b**	**0.0047**
W301	11/01/2002	N	**0.0062**	< 0.0034	< 0.0034	**0.015 b***	< 3.0	**0.013**	**0.0044**
W301	12/23/2003	N	< 0.0034	< 0.0034	< 0.0034	**0.010 b**	< 3.0	**0.0054**	< 0.0034
W301	10/21/2004	N	**0.0039**	**0.0058**	< 0.0034	**0.028 b**	< 2 *	**0.02**	**0.0043**
W301	11/10/2005	N	**0.0036**	**0.0064**	< 0.0034	**0.017 b**	< 3.0	**0.011**	< 0.0034
W301	10/21/2006	N	**0.0096**	< 0.0034	< 0.0034	**0.0095 b**	< 3.0	**0.0082**	**0.0082**
W301	11/09/2007	N	< 0.0034	< 0.0034	< 0.0034	**0.026 b**	< 1.0	**0.0086 b**	< 0.0034
W301	10/16/2008	N	< 0.0033	< 0.0033 *	< 0.0033	**0.012**	< 0.97	**0.0053**	< 0.0033
W301	10/08/2009	N	**0.0044**	< 0.0033	< 0.0033	**0.0090**	< 0.96	**0.0081**	< 0.0033
W301	10/13/2010	N	< 0.0034	**0.0046**	< 0.0034	**0.025 b**	< 0.98	**0.0065**	< 0.0034
W301	10/16/2011	N	**0.057**	**0.0076 b**	**0.0048**	**0.018 b**	< 1.1	**0.058**	**0.039**
W301	11/01/2012	N	**0.098**	< 0.065	< 0.065	< 0.065	< 19	< 0.065	< 0.27
W301	10/17/2013	N	**0.035**	**0.0056 ***	**0.0051**	**0.11 b**	< 0.98	**0.033**	**0.028**
W301	10/22/2014	N	**0.018**	< 0.017	< 0.017	**0.048**	< 5.0	**0.027**	**0.014**
W301	10/12/2015	N	**0.0057**	< 0.0034	< 0.0034	**0.011**	< 1.0	**0.0088**	**0.0051**
W301	10/20/2016	N	**0.012**	**0.0073**	< 0.0033	**0.018**	< 0.29	**0.041**	**0.017**
W301	12/04/2017	N	**0.022**	< 0.0033	< 0.0033	**0.024**	< 0.29	**0.017**	**0.019**
W307	3/27/1985	N	**0.0083**	**0.0073**	< 0.0034	**0.081**	< 5	**0.013**	**0.0085**
W307	5/07/1985	N	**0.013**	**0.0033**	< 0.0017	**0.016 s**	< 5	< 0.024	**0.013**
W307	12/13/1985	N	**0.0078**	**0.0046**	< 0.0017	**0.0078**	< 5	**0.0087**	**0.0088**
W307	3/20/1986	N	**0.0067**	**0.0062**	< 0.0017	**0.0082**	< 5	**0.0081**	**0.0083**
W307	6/03/1986	N	**0.0078**	**0.0055**	< 0.0017	**0.0071 s**	< 5	**0.0083**	**0.0095**
W307	9/23/1986	N	**0.0083**	**0.0042**	< 0.0017	**0.0065 s**	< 5	**0.0063**	**0.011**
W307	12/10/1986	N	**0.0093**	**0.0054**	< 0.0017	**0.0084 s**	< 5	**0.011**	**0.011**
W307	3/19/1987	N	< 0.025	**0.067**	< 0.0425	< 0.047	< 6	< 0.025	< 0.025
W307	5/05/1987	N	**0.0054**	**0.0035**	< 0.0017	**0.014**	< 6	**0.0038**	**0.0071**
W307	7/28/1987	N	**0.0076**	**0.0035**	< 0.0017	**0.0062**	**21 s**	**0.0052**	**0.010**
W307	11/03/1987	N	**0.0065**	**0.0082**	< 0.0068	**0.013**	< 6	**0.005**	**0.0096**
W307	2/25/1988	N	**0.0086**	**0.0035**	< 0.0034	**0.017**	< 6	**0.0075**	**0.011**
W307	10/07/1988	N	**0.0034**	**0.005**	< 0.0034	**0.0074**	< 6	**0.0027**	**0.0058**

Table A-6
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W307	12/09/1988	N	< 0.0020 0.0023	**0.0032** **0.0059**	< 0.0034 < 0.0034	**0.0083 s** **0.0089 s**	< 5 < 5	**0.003** **0.004**	**0.0052** **0.0055**
W307	8/07/1989	N	**0.0037**	**0.0058**	< 0.0017	**0.0072**	< 5	**0.0034**	**0.0051**
W307	5/03/1990	N	**0.0071**	**0.0051**	< 0.0034	**0.0075 s**	< 6	**0.0065 s**	**0.0083**
W307	10/30/1990	N	**0.011**	**0.0062**	< 0.0017	**0.010 b**	< 6	**0.016 b**	**0.0096**
W307	10/17/1991	N	**0.018** **0.0095**	< 0.0030 < 0.0030	< 0.0030 < 0.0030	< 0.0040 < 0.0040	< 6 < 6	**0.014** **0.0057**	**0.051** **0.012**
W307	10/14/1992	N	**0.0036**	**0.012**	< 0.0030	**0.0081 b**	< 6	**0.0044**	**0.0058**
W307	10/20/1993	N	< 0.0240	< 0.0240	< 0.0240	< 0.0320	< 6	< 0.0240	< 0.0240
W307	9/30/1994	N	< 0.024	< 0.024	< 0.024	< 0.024	< 3	< 0.024	< 0.024
W307	10/20/1995	N	< 0.024	< 0.024	< 0.024	< 0.024	< 3	< 0.024	< 0.024
W307	10/02/1996	N	**0.003**	**0.035**	< 0.003	**0.009 b**	< 3	**0.004**	**0.005**
W307	10/02/1997	N	**0.007 b**	**0.029**	< 0.003	**0.007 b**	< 3	**0.008 b**	**0.007**
W307	11/18/1998	N	< 0.003	**0.030**	< 0.003	**0.006**	< 3	< 0.003	**0.004**
W307	11/18/1998	FD	< 0.003	**0.029**	< 0.003	**0.006**	< 3	< 0.003	**0.004**
W323	3/19/1987	N	< 0.0010	< 0.0014	< 0.0017	**0.0071**	< 6	< 0.0010	< 0.0010
W323	5/05/1987	N	< 0.5	< 0.5	< 0.5	< 0.5	< 6	< 0.5	< 0.5
W323	7/07/1987	N	< 0.025	< 0.035	< 0.043	< 0.048	< 10	< 0.025	< 0.025
W323	7/28/1987	N	< 0.010 < 10	**0.083** **< 10**	< 0.017 < 10	**0.25** **< 10**	**7.7 s** **< 10**	< 0.010 < 10	< 0.010 < 10
W323	11/03/1987	N	< 0.010	**0.19**	< 0.017	**0.048**	< 6	**0.037**	**0.016**
W323	2/25/1988	N	< 0.020	**0.068**	< 0.034	< 0.038	< 6	< 0.020	< 0.020
W323	10/06/1988	N	< 0.010	**0.11**	< 0.017	**0.019**	< 6	< 0.010	< 0.010
W323	10/20/1995	N	< 0.11	< 0.11	< 0.11	< 0.11	< 3	< 0.11	< 0.11
W323	10/02/1996	N	< 0.048	< 0.048	< 0.048	< 0.048	< 3	< 0.048	< 0.048
W323	10/02/1997	N	**0.006 b**	**0.021**	< 0.003	< 0.003	< 3	**0.011 b**	**0.017**
W323	11/19/1998	N	< 0.003	**0.016**	< 0.003	**0.012**	< 3	< 0.003	**0.013**
W323	11/18/1999	N	**0.005**	**0.008**	< 0.003	**0.007 jb**	< 3	**0.006 b**	**0.013**
W323	9/28/2000	N	**0.006 b**	**0.007 b**	< 0.003	**0.009 b**	< 3	**0.006 b**	**0.012 b**
W323	9/28/2000	FD	**0.005 b**	**0.007 b**	< 0.003	**0.023 b**	< 3	**0.005 b**	**0.010 b**
W323	10/19/2001	N	**0.0072 b**	< 0.0033	< 0.0033	**0.0075**	< 3	**0.0066 b**	**0.011**
W323	10/19/2001	FD	< 0.0033	< 0.0033	< 0.0033	**0.0068**	< 3	**0.0043 b**	**0.011**
W323	10/31/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.0076 b**	< 3.0	**0.0039**	**0.0081**
W323	6/07/2003	N	**0.0043**	< 0.0034	< 0.0034	**0.0062 b**	< 3.0	**0.0036**	**0.010**
W328	3/20/1986	N	< 0.0010	< 0.0014	< 0.0017	**0.011**	< 5	**0.012**	< 0.0010
W328	6/03/1986	N	**0.0031**	< 0.0028	< 0.0034	**0.0068 s**	< 5	**0.0055**	**0.0018**
W328	9/23/1986	N	**0.0054**	< 0.0014	< 0.0017	**0.034 s**	< 5	**0.0085**	**0.0036**

Table A-6
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W328	12/10/1986	N	**0.0030**	< 0.0014	< 0.0017	**0.0074 s**	< 5	**0.0059**	**0.0022**
W328	3/19/1987	N	**0.0029**	< 0.0014	< 0.0017	**0.0082**	< 6	**0.0024**	**0.0013**
W328	5/05/1987	N	**0.0018**	**0.0035**	< 0.0017	**0.0055 s**	< 6	**0.0030**	**0.0015**
W328	8/06/1987	N	**0.0023**	< 0.0014	< 0.0017	**0.0066**	**8.5 s**	**0.0037**	**0.0014**
W328	11/03/1987	N	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 0.25 < 0.25	< 6 < 6	< 0.25 < 0.25	< 0.25 < 0.25
W328	2/25/1988	N	**0.0015**	< 0.0014	< 0.0017	< 0.0019	< 6	< 0.001	**0.0011**
W328	10/07/1988	N	**0.0012** **0.001**	< 0.0014 < 0.0014	< 0.0017 < 0.0017	**0.0048** **0.0044**	< 6 < 6	**0.0013** **0.0012**	< 0.0010 0.001
W328	12/09/1988	N	< 0.0010	< 0.0014	< 0.0017	**0.0076 s**	< 5	**0.0024**	< 0.0010
W328	8/04/1989	N	< 0.0010	< 0.0014	< 0.0017	**0.0047**	< 5	**0.0023**	< 0.0010
W328	5/03/1990	N	**0.0016**	< 0.0014	< 0.0017	**0.0096 s**	< 6	**0.0021 s**	**0.0013**
W328	10/30/1990	N	**0.0021 b**	< 0.0014	< 0.0017	**0.0088 b**	< 6	**0.0076 b**	**0.0024**
W328	10/17/1991	N	< 0.0030	< 0.0030	< 0.0030	< 0.0040	< 6	< 0.0030	< 0.0030
W328	10/14/1992	N	< 0.0030	< 0.0030	< 0.0030	**0.0074 b**	< 6	**0.0038**	< 0.0030
W328	10/20/1993	N	**0.00338** **< 0.00600**	< 0.00300 < 0.00600	< 0.00300 < 0.00600	< 0.00400 0.00888 b	< 6 < 6	**0.00369** **< 0.00600**	< 0.00300 < 0.00600
W328	10/10/1994	N	**0.003**	< 0.003	< 0.003	**0.004 b**	< 3	**0.003**	< 0.003
W328	1/09/1996	N	< 0.009	< 0.009	< 0.009	< 0.009	< 3	< 0.009	< 0.009
W328	10/02/1996	N	< 0.003	< 0.003	< 0.003	**0.008 b**	< 3	**0.003**	< 0.003
W328	10/02/1997	N	**0.004 b** **0.017**	< 0.003 < 0.003	< 0.003 0.009	**0.007 b** **0.006 b**	< 3 < 3	**0.007 b** **0.013 b**	**0.003** **0.014**
W328	11/19/1998	N	< 0.003	< 0.003	< 0.003	**0.009**	< 3	**0.004**	< 0.003
W328	11/18/1999	N	**0.004**	**0.003**	< 0.003	**0.009 jb**	< 3	**0.008 b**	**0.003**
W328	9/28/2000	N	**0.004 b**	< 0.003	< 0.003	**0.013 b**	< 3	**0.004 b**	< 0.003
W328	10/19/2001	N	< 0.0033	< 0.0033	< 0.0033	**0.0044**	< 3	**0.0045 b**	< 0.0033
W328	10/31/2002	N	< 0.0034	< 0.0034	< 0.0034	**0.0055 b**	< 3.0	< 0.0034	< 0.0034
W328	10/31/2002	FD	< 0.0034	< 0.0034	< 0.0034	**0.0055 b**	< 3.0	< 0.0034	< 0.0034
W328	12/22/2003	N	< 0.0034	< 0.0034	< 0.0034	**0.0053 b**	< 3.0	< 0.0034	< 0.0034
W328	10/21/2004	N	< 0.0034	< 0.0034	< 0.0034	**0.027 b**	< 2 *	**0.004**	< 0.0034
W328	10/21/2004	FD	< 0.0034	< 0.0034	< 0.0034	**0.020 b**	< 2 *	**0.0037**	< 0.0034
W328	11/10/2005	N	< 0.0034	< 0.0034	< 0.0034	**0.015 b**	< 3.0	< 0.0034	< 0.0034
W328	11/10/2005	FD	< 0.0034	< 0.0034	< 0.0034	**0.014 b**	< 3.0	< 0.0034	< 0.0034
W328	10/21/2006	N	< 0.0034	< 0.0034	< 0.0034	**0.012 b**	< 3.0	< 0.0034	< 0.0034
W328	11/09/2007	N	< 0.0033	< 0.0033	< 0.0033	**0.0083 b**	< 0.96	< 0.0033	< 0.0033
W328	10/16/2008	N	< 0.0034	< 0.0034 *	< 0.0034	**0.010**	< 0.98	**0.0053**	< 0.0034
W328	10/08/2009	N	< 0.0033	< 0.0033	< 0.0033	**0.022**	< 0.96	< 0.0033	< 0.0033
W328	10/13/2010	N	< 0.0033	< 0.0033	< 0.0033	**0.048 b**	< 0.96	**0.0063**	< 0.0033

Table A-6
1984-2017 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
		Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Location	Date	Sample Type							
W328	10/16/2011	N	**0.017**	< 0.0039	**0.0082**	**0.029 b**	< 1.2	**0.012 b**	**0.013**
W328	11/01/2012	N	**0.0074**	< 0.0033	< 0.0033	**0.037 b**	< 0.95	**0.0083 b**	**0.0066**
W328	11/01/2012	FD	**0.0073**	< 0.0033	< 0.0033	**0.054 b**	< 0.95	**0.0072 b**	**0.0065**
W328	10/17/2013	N	< 0.0033	< 0.0033	< 0.0033	**0.021 b**	< 0.96	**0.0048**	< 0.0033
W328	10/17/2013	FD	< 0.0034	< 0.0034	< 0.0034	**0.11 b**	< 0.99	< 0.0034	< 0.0034
W328	10/22/2014	N	< 0.0033	< 0.0033	< 0.0033	**0.0088**	< 0.95	**0.0043**	< 0.0033
W328	10/12/2015	N	< 0.0035	< 0.0035	< 0.0035	< 0.0035	< 1.1	< 0.0035	< 0.0035
W328	10/20/2016	N	**0.0050**	**0.0037**	< 0.0033	**0.013**	< 0.29	**0.0083**	**0.0041**
W328	12/04/2017	N	**0.0044**	< 0.0033	< 0.0033	**0.012**	< 0.29	**0.0079**	**0.0047**
S-3	3/01/2006	N	**0.0032 j**	**0.0083**	< 0.0016	**0.056 b**	< 0.011	**0.0084**	**0.0020 j**
S-3	10/21/2006	N	**0.0050**	**0.0096**	< 0.0034	**0.094 b**	< 3.0	**0.015**	**0.0037**
S-3	11/08/2007	N	< 0.0032	< 0.0032	< 0.0032	**0.0064**	< 0.94	**0.0033 b**	< 0.0032
S-3	10/14/2008	N	< 0.0036	**0.0046**	< 0.0036	**0.014 b**	< 1.1	**0.0079**	< 0.0036
S-3	9/30/2009	N	< 0.0033	**0.0036**	< 0.0033	**0.011 b**	< 0.95	**0.0068**	< 0.0033
S-3	10/05/2010	N	< 0.0033	< 0.0033	< 0.0033	**0.024 b**	< 0.96	**0.0069**	< 0.0033
S-3	10/05/2010	FD	< 0.0033	< 0.0033	< 0.0033	**0.026 b**	< 0.96	**0.0062**	< 0.0033
S-3	10/11/2011	N	**0.019**	**0.013**	< 0.0039	**0.11**	< 1.2	**0.022 b**	**0.014**
S-3	10/16/2012	N	< 0.0033 h	< 0.0033 h	< 0.0033 h	**0.020 bh**	< 0.95 h	< 0.0033 h	**0.0078 h**
S-3	10/08/2013	N	< 0.0034	**0.0046**	< 0.0034	**0.060 b**	< 1.0	**0.0082**	**0.0068**
S-3	10/15/2014	N	< 0.0034	< 0.0034	< 0.0034	**0.012 b**	< 1.0	< 0.0034	**0.0081**
S-3	10/06/2015	N	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 1.0	< 0.0034	**0.0078**
S-3	10/13/2016	N	< 0.0033	< 0.0033	< 0.0033	**0.0044**	< 0.29	< 0.0033	< 0.0033
S-3	10/11/2017	N	**0.0041**	< 0.0033	< 0.0033	**0.022 b**	< 0.29	**0.0053**	**0.0089**

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		Pentachloro phenol
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** **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**

Chemical Name		Pentachloro phenol
Location	Sample Date	
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** **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**

Chemical Name		Pentachloro phenol
Location	Sample Date	
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		Pentachloro phenol
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**

Chemical Name		Pentachloro phenol
Location	Sample Date	
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**

Chemical Name		Pentachloro phenol
Location	Sample Date	
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**
EFF	3/21/2017	**250 ug/l**
EFF	6/29/2017	**210 ug/l**
EFF	9/12/2017	**330 ug/l**
EFF	10/20/2017	**240 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	**39 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
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

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	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
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

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	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	**0.020 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	**0.008 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
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

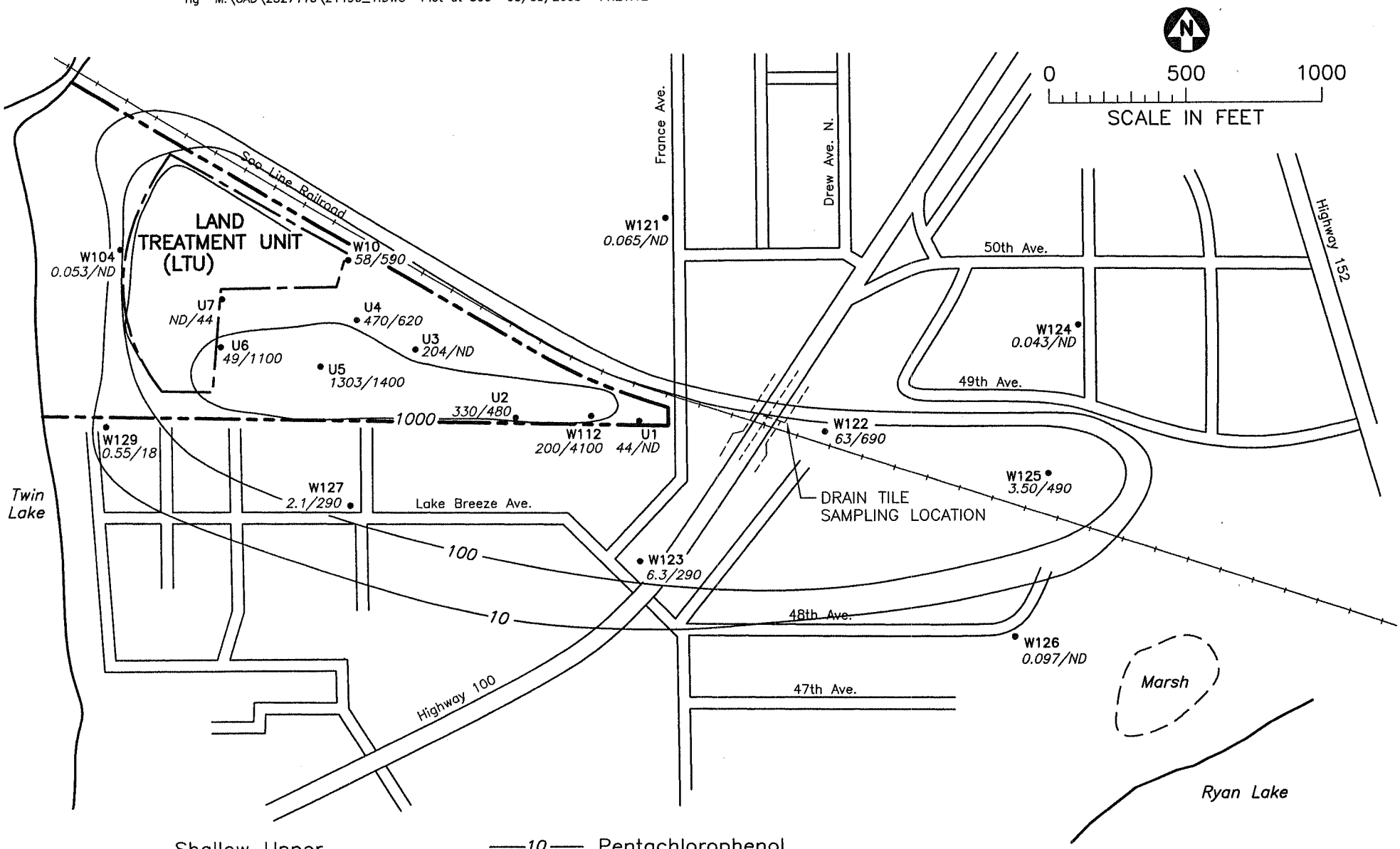
Table A-8
Historical Surface Water Quality Data
Comparison to ARARs and TBCs
Joslyn Manufacturing and Supply Company
Brooklyn Center, MN

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	11/10/2005	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

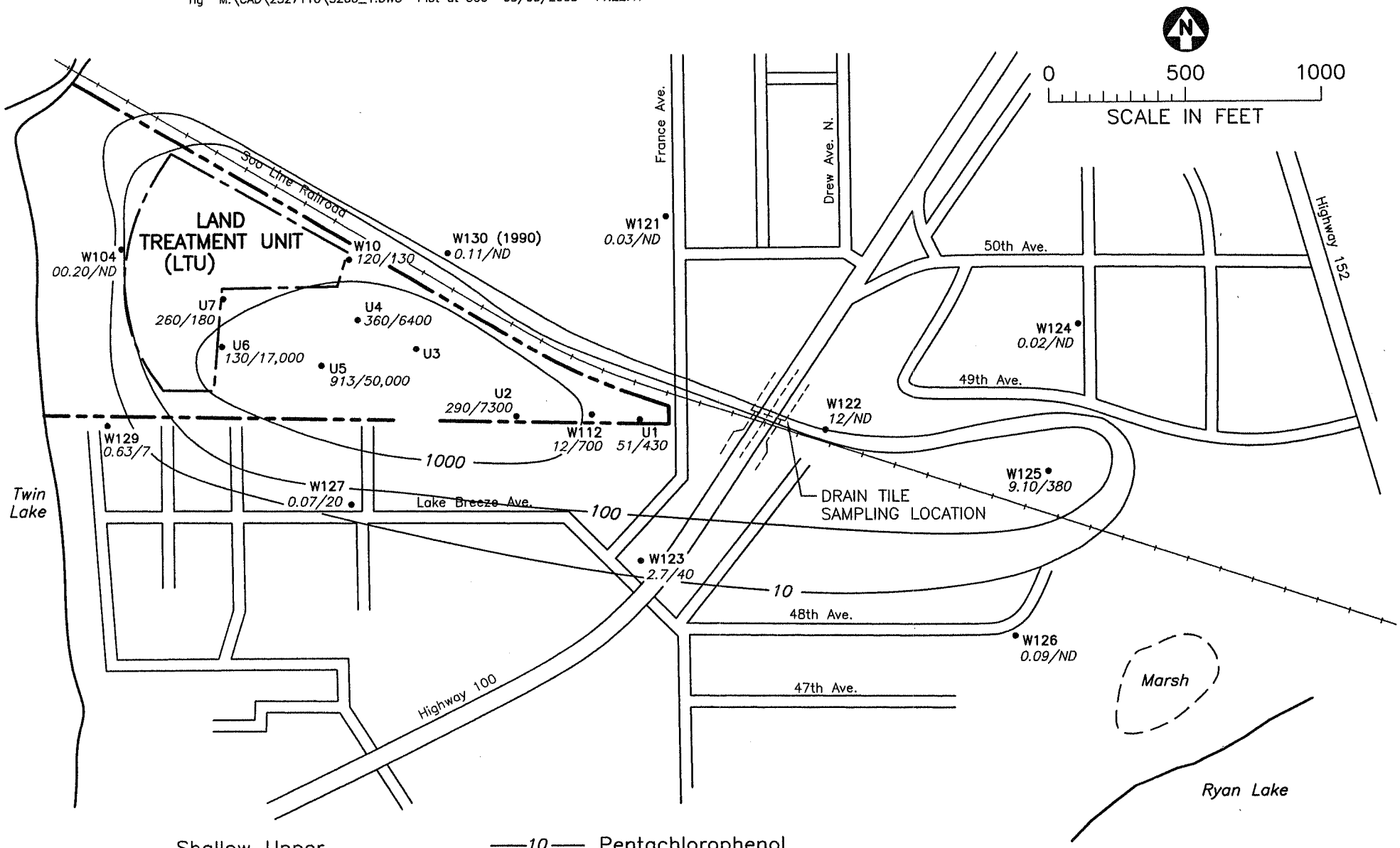


- Shallow Upper Aquifer Well
- 0.55/18 — Total PAH/Heterocycles (ug/L) / Pentachlorophenol (ug/L)
- —10— Pentachlorophenol Concentration Contour
- ND Not Detected

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

Figure A–1

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



• Shallow Upper Aquifer Well

Total PAH/Heterocycles (ug/L)

0.63/7

Pentachlorophenol (ug/L)

—10— Pentachlorophenol Concentration Contour

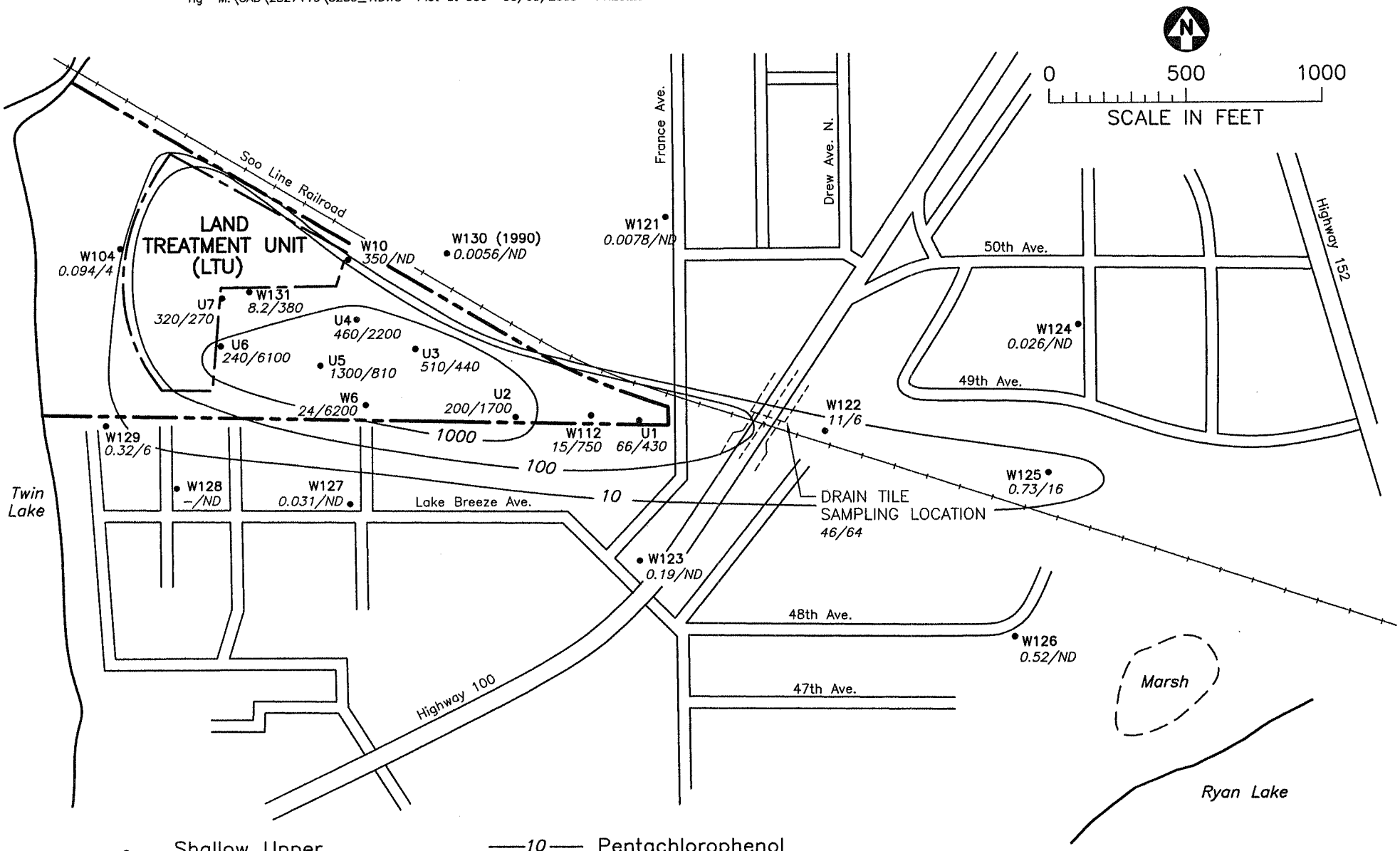
ND Not Detected

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



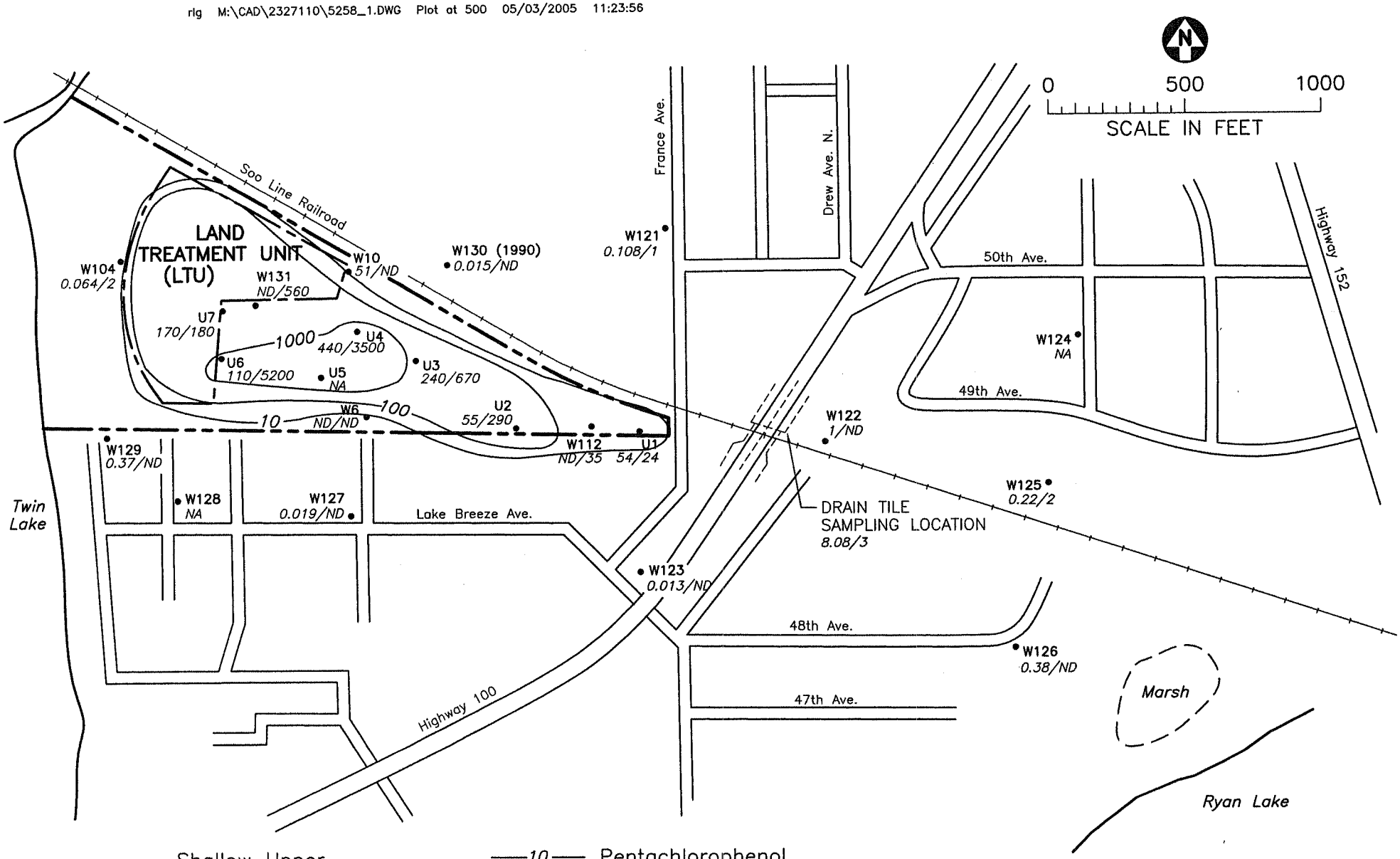
- Shallow Upper Aquifer Well
- 0.32/6 — Total PAH/Heterocycles (ug/L) / Pentachlorophenol (ug/L)
- —10— Pentachlorophenol Concentration Contour
- ND Not Detected

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

Figure A–3

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

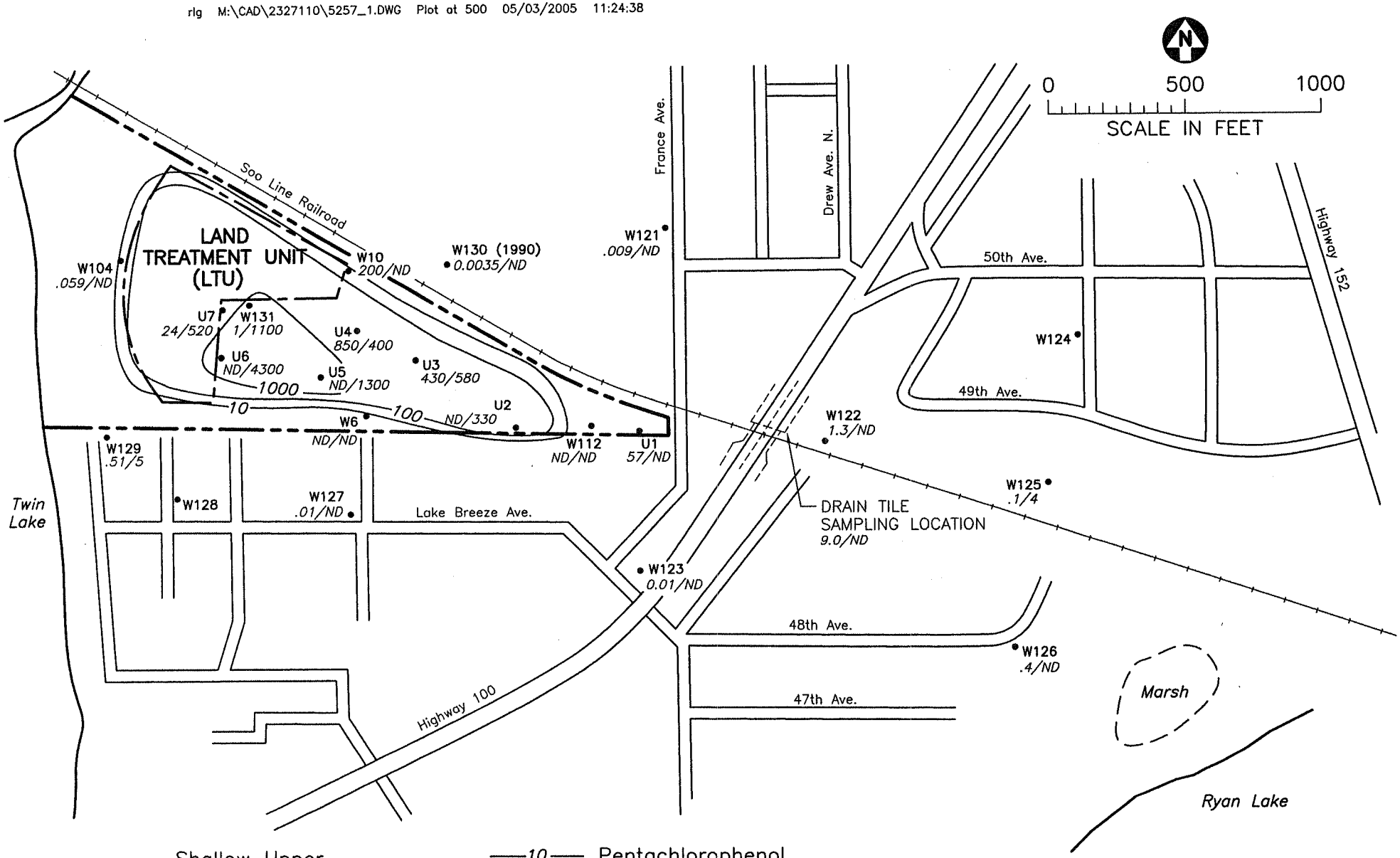
rlg M:\CAD\2327110\5258_1.DWG Plot at 500 05/03/2005 11:23:56



- Shallow Upper Aquifer Well
- 170/180 — Total PAH/Heterocycles (ug/L)
- 170/180 — Pentachlorophenol (ug/L)
- —10— Pentachlorophenol Concentration Contour
- ND Not Detected
- NA Not Analyzed

Figure A–4

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



- 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

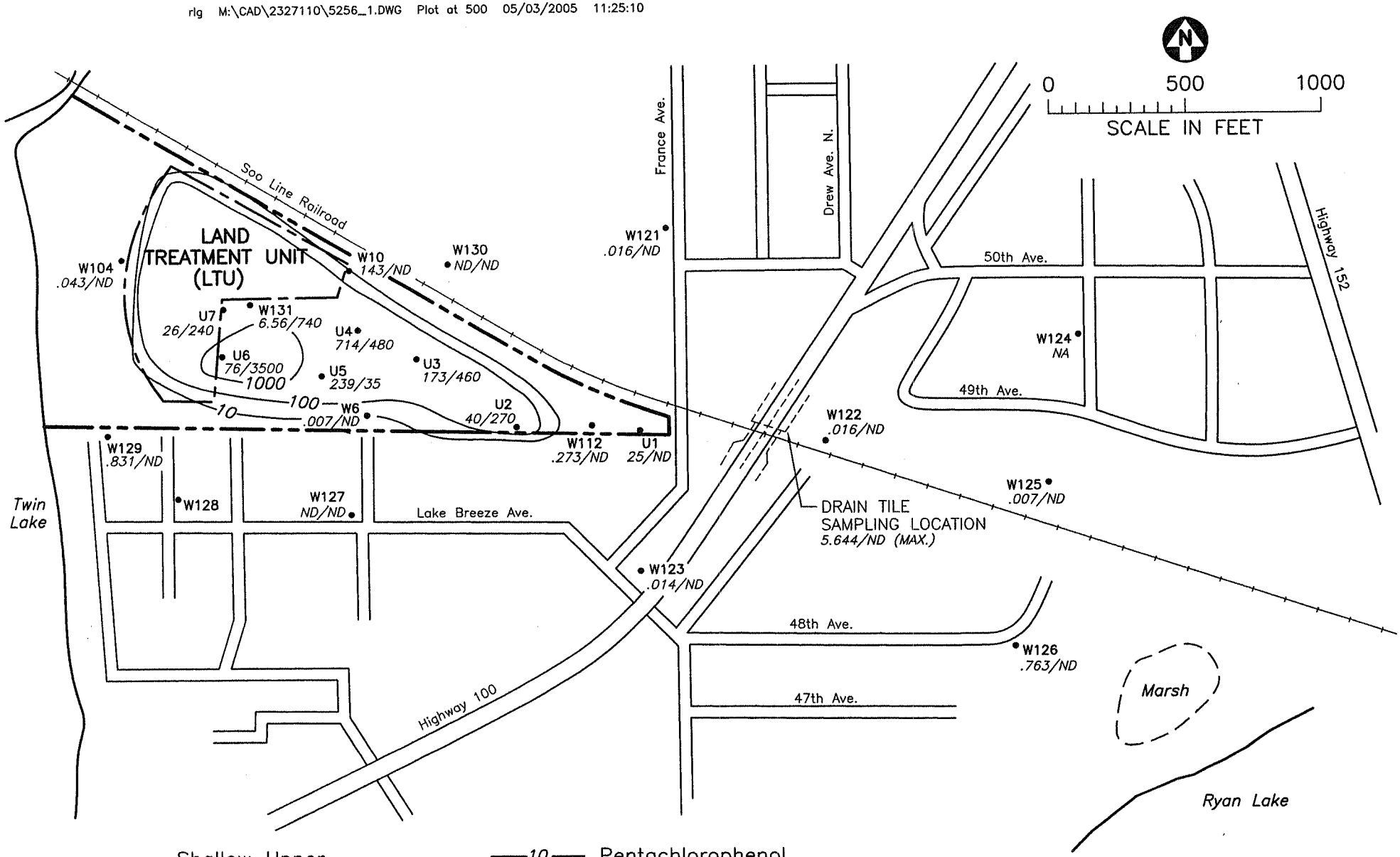
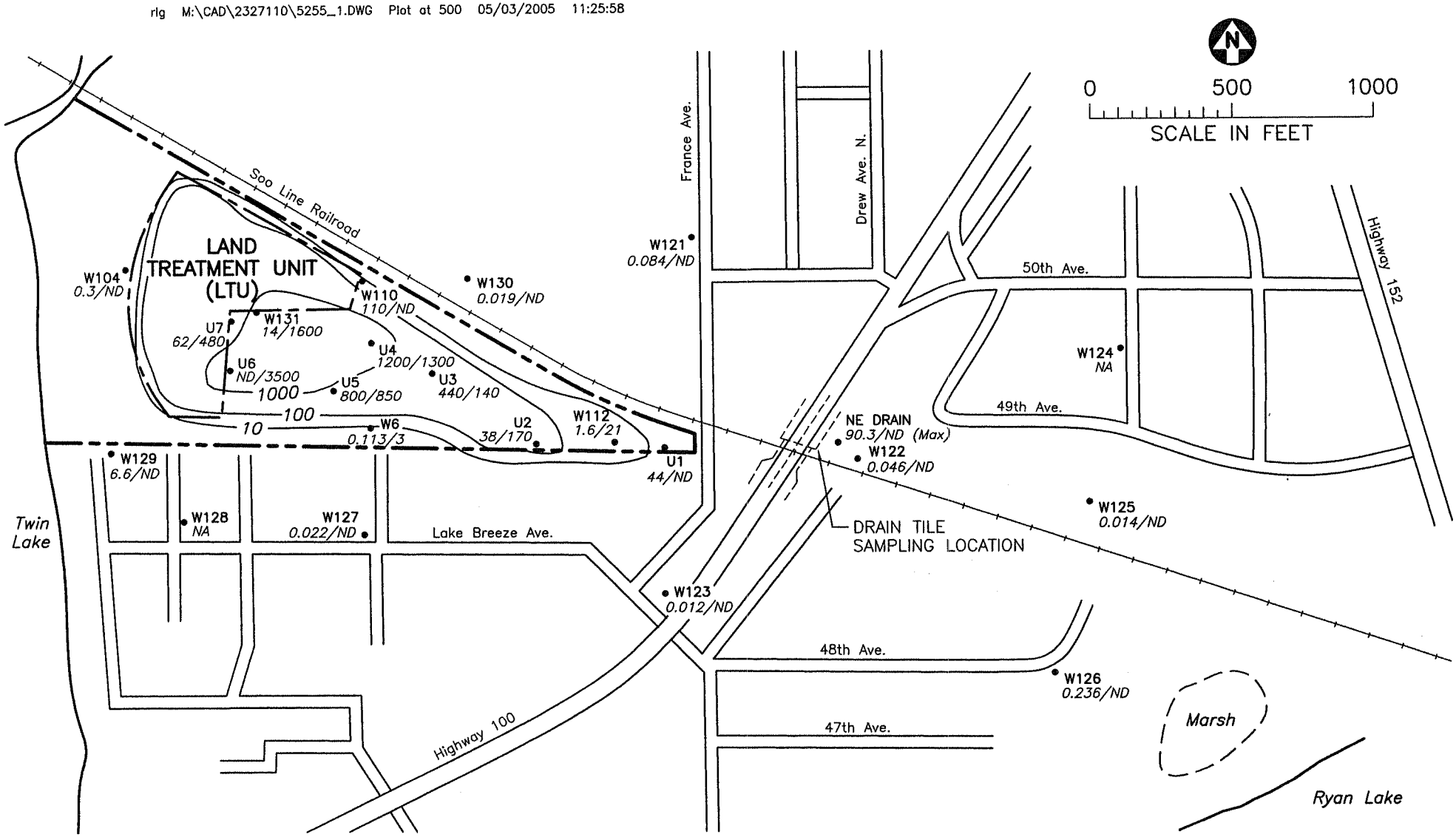


Figure A–6

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

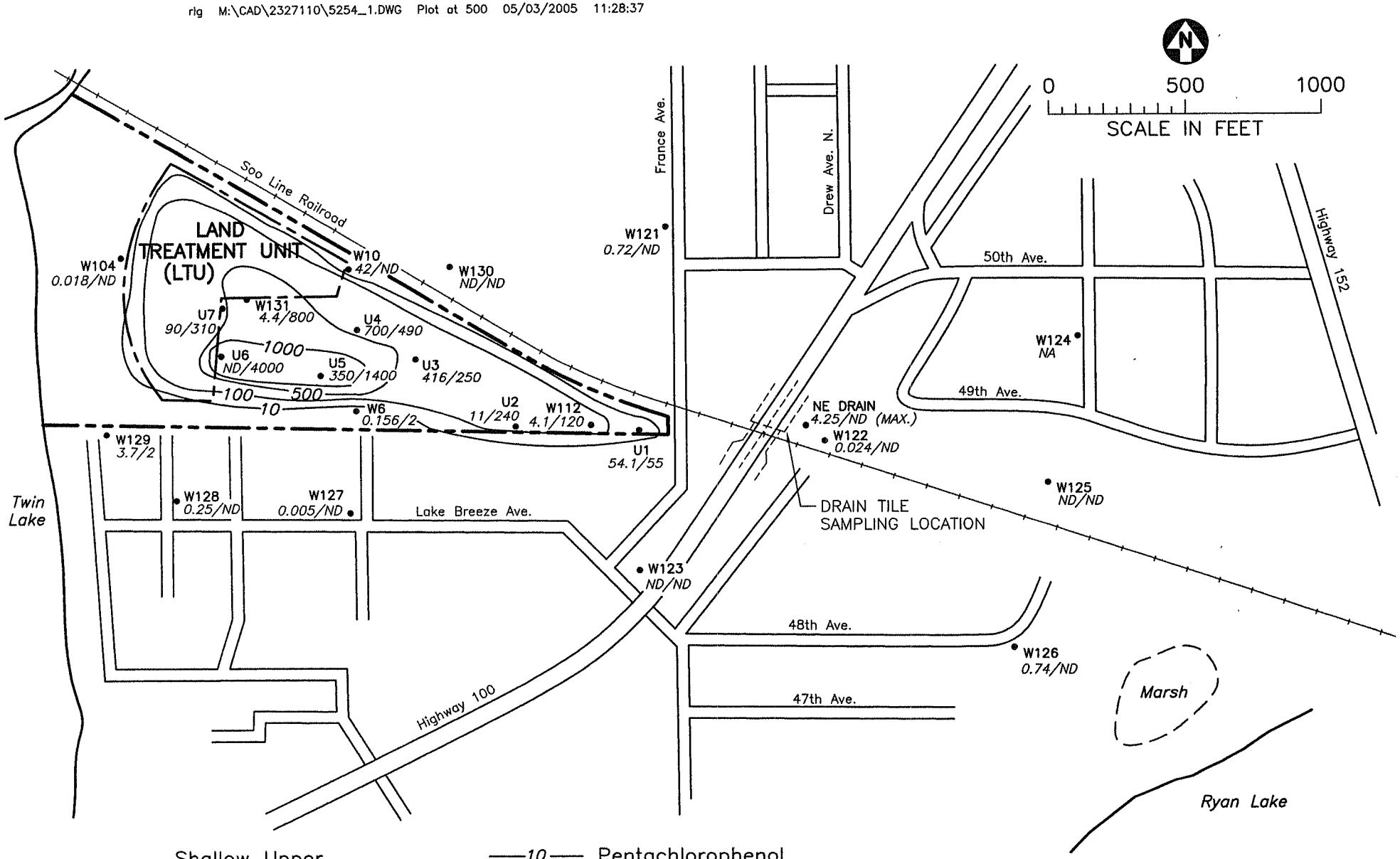


- Shallow Upper Aquifer Well
- 0.019/ND — Total PAH/Heterocycles (ug/L)
- 0.019/ND — Pentachlorophenol (ug/L)
- —10— Pentachlorophenol Concentration Contour
- ND Not Detected
- NA Not Analyzed

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



- Shallow Upper Aquifer Well
- .006/2 — Total PAH/Heterocycles (ug/L) / Pentachlorophenol (ug/L)
- —10— Pentachlorophenol Concentration Contour
- ND Not Detected
- NA Not Analyzed

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

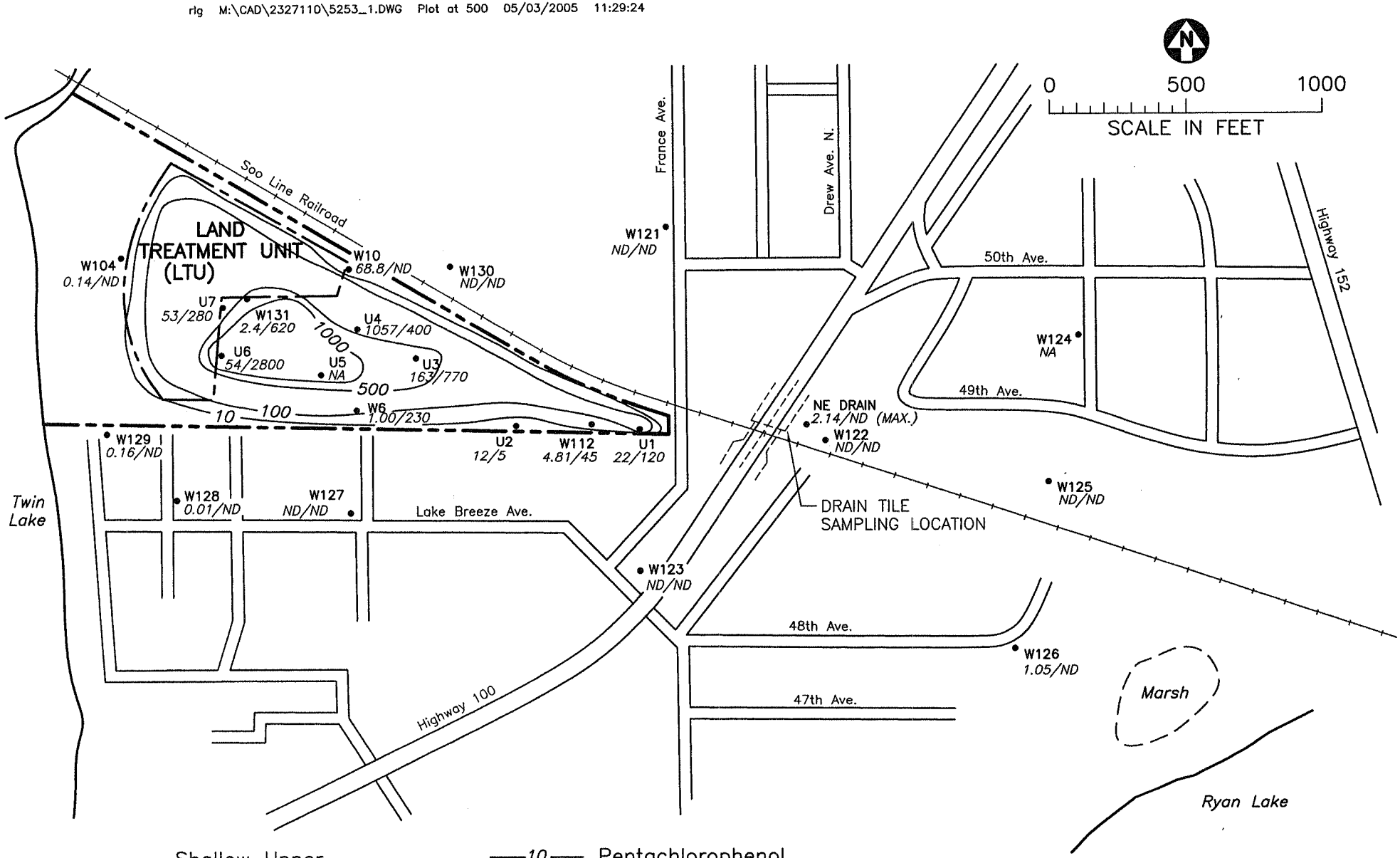
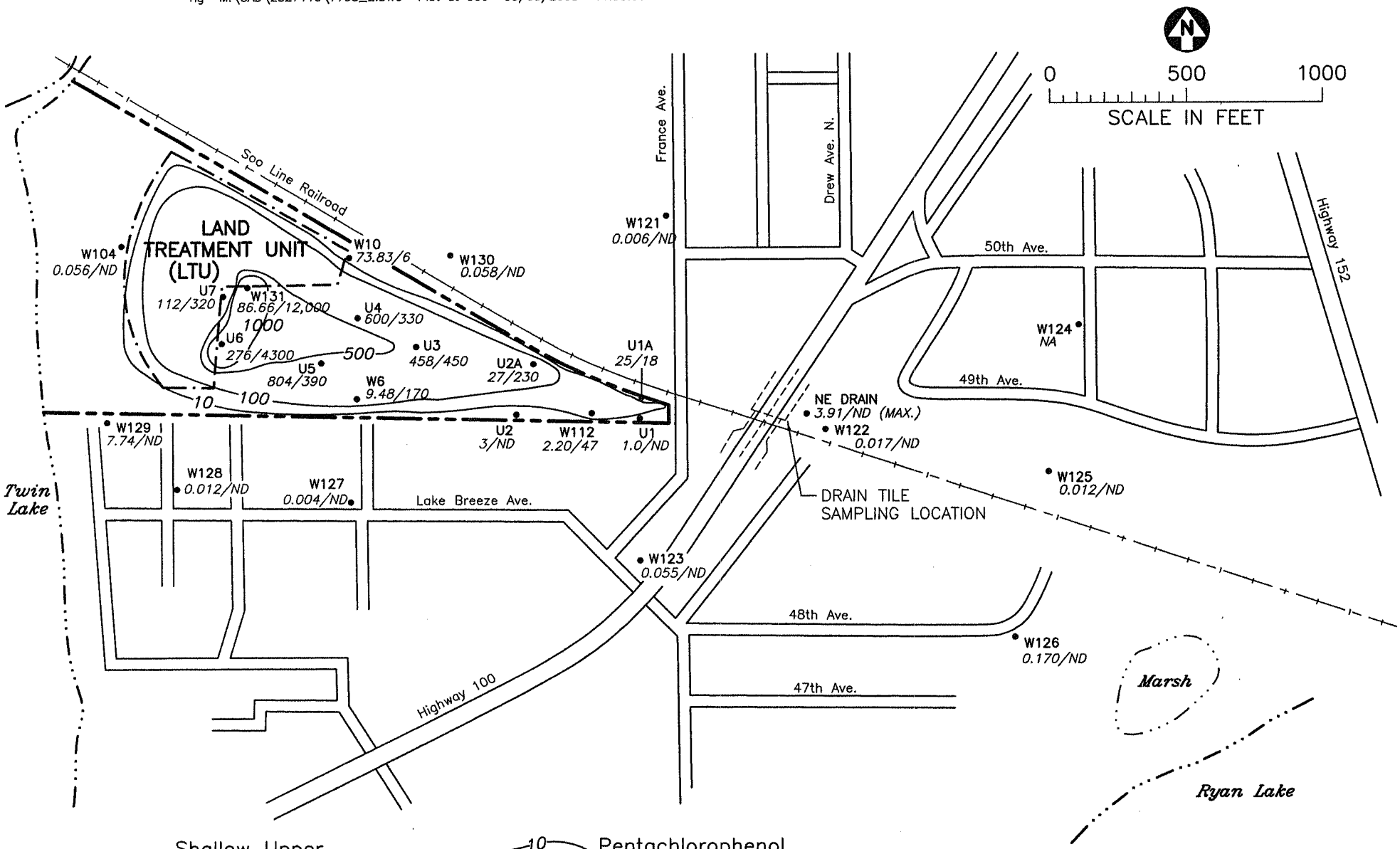


Figure A–9

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

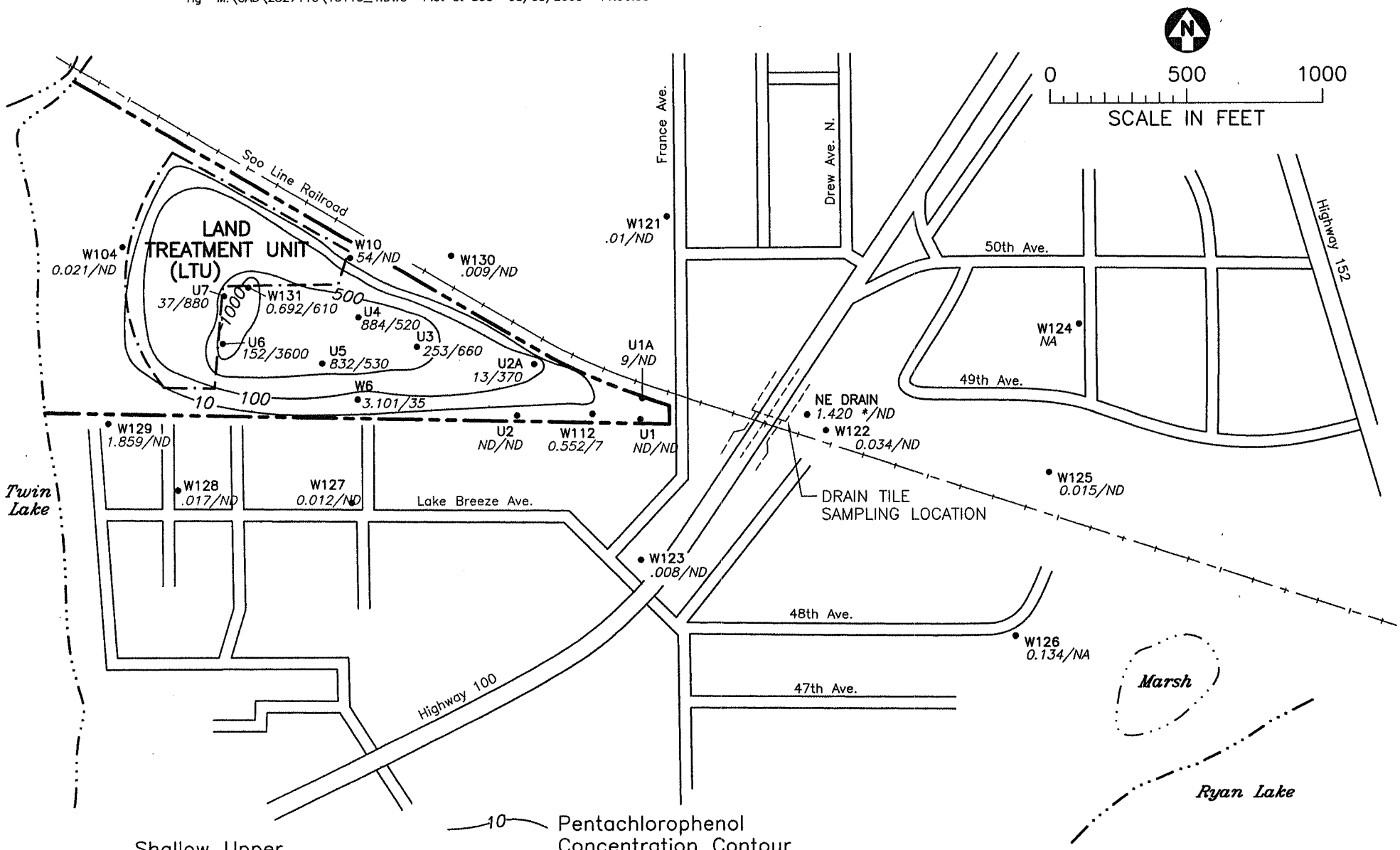


- Shallow Upper Aquifer Well
- Total PAH/Heterocycles (ug/L)
- .006/2
- Pentachlorophenol (ug/L)
- 10 — Pentachlorophenol Concentration Contour
- ND — Not Detected
- NA — Not Analyzed

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

rlg M:\CAD\2327110\21486_1.DWG Plot at 500 05/03/2005 11:31:37

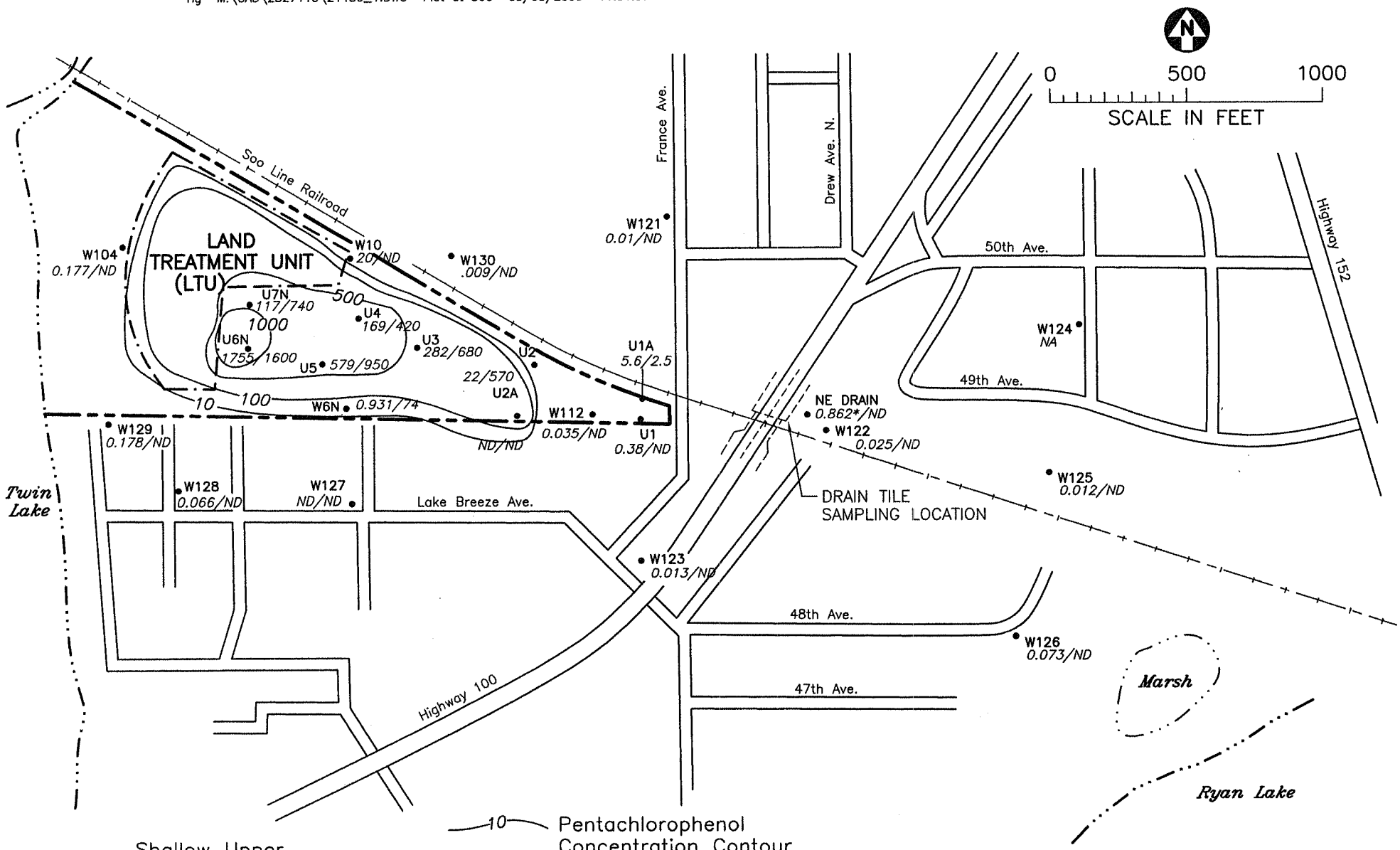
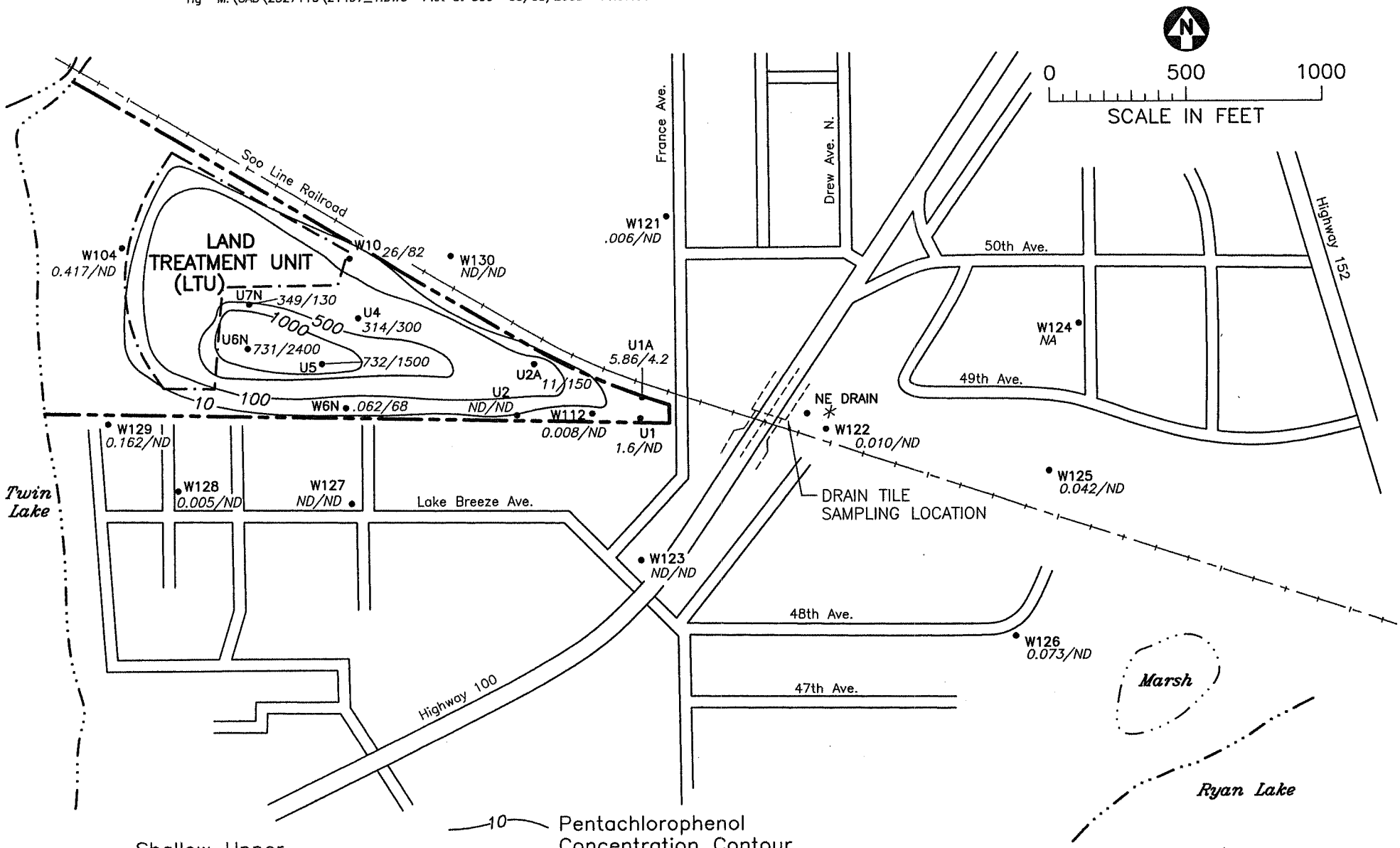


Figure A–12

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



- Shallow Upper Aquifer Well
- Total PAH/Heterocycles (ug/L)
- .006/2 — 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

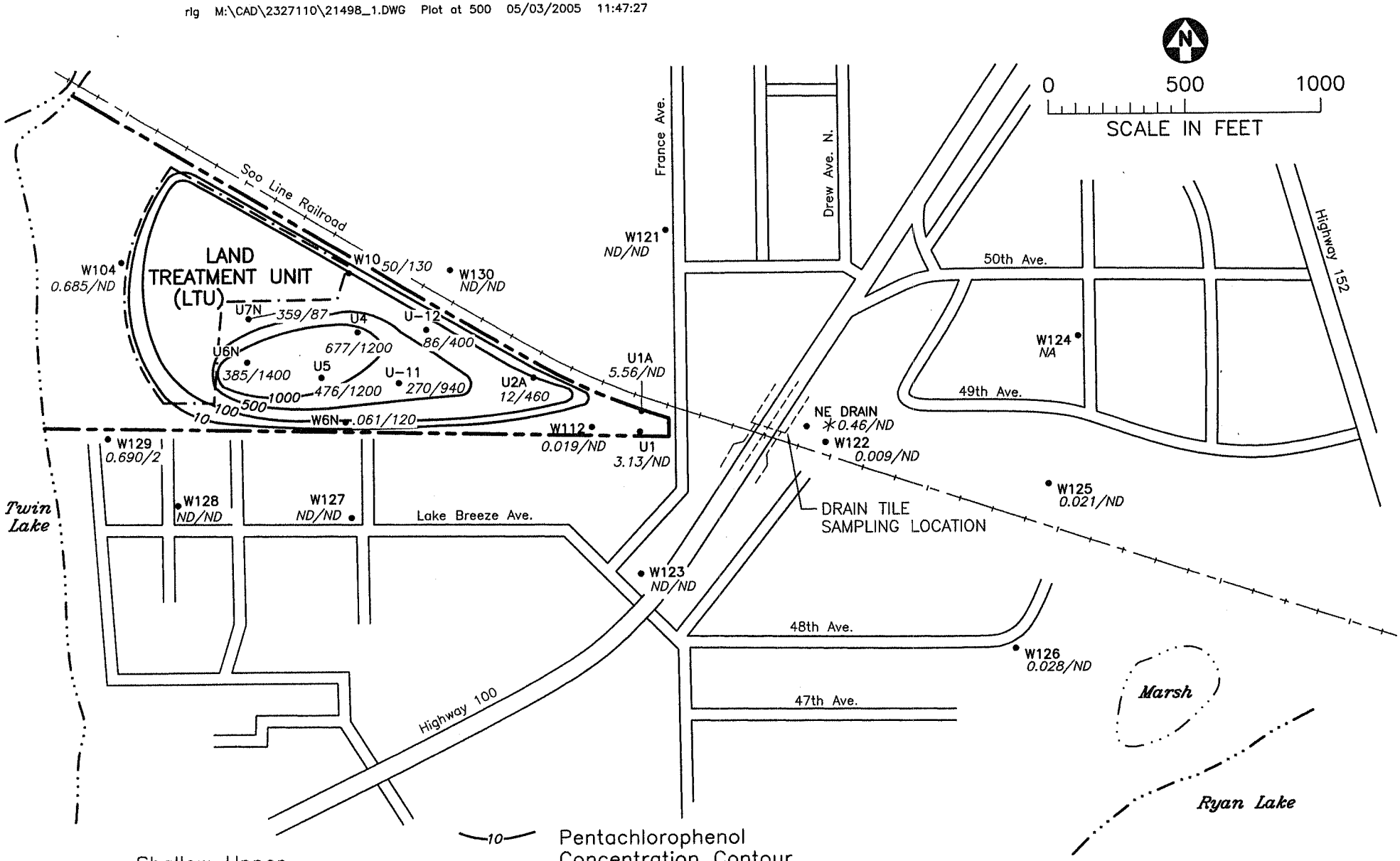


Figure A–14

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

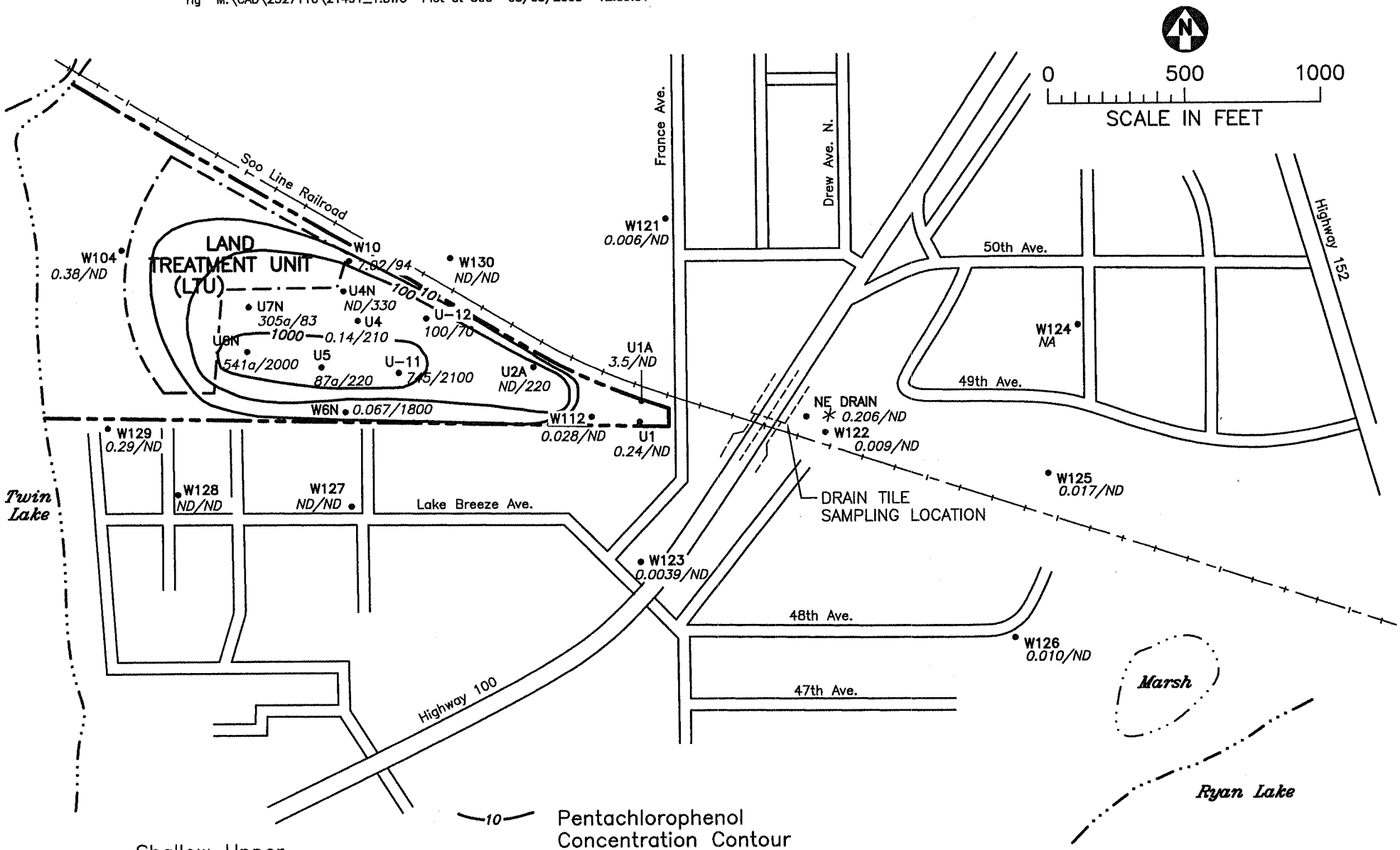
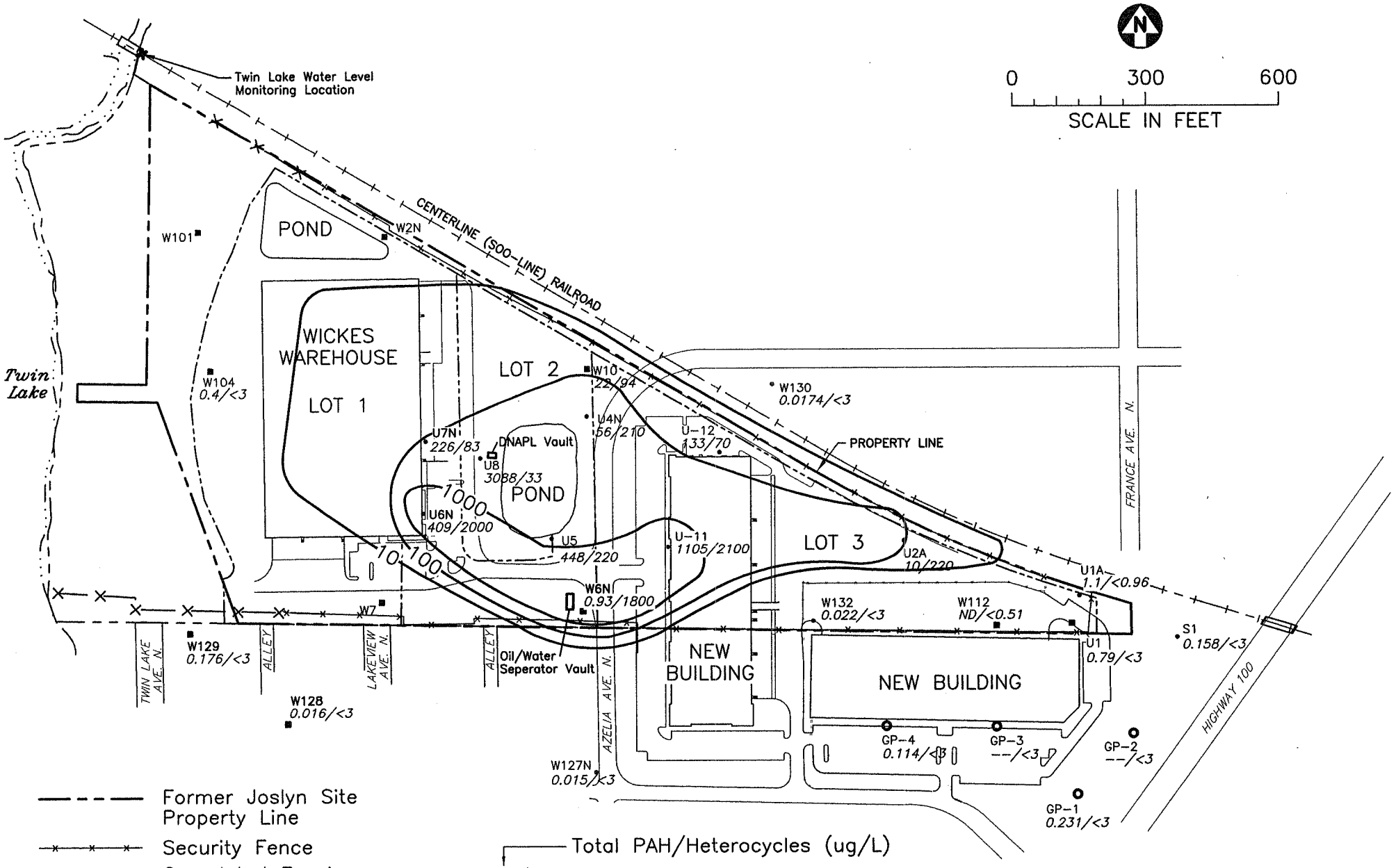


Figure A–15

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



Former Joslyn Site Property Line

Security Fence

Completed Fencing

Pump-Out Well

Monitoring Well

Geoprobe Sampling Location

10 Pentachlorophenol Concentration Contour

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

ND Not Detected

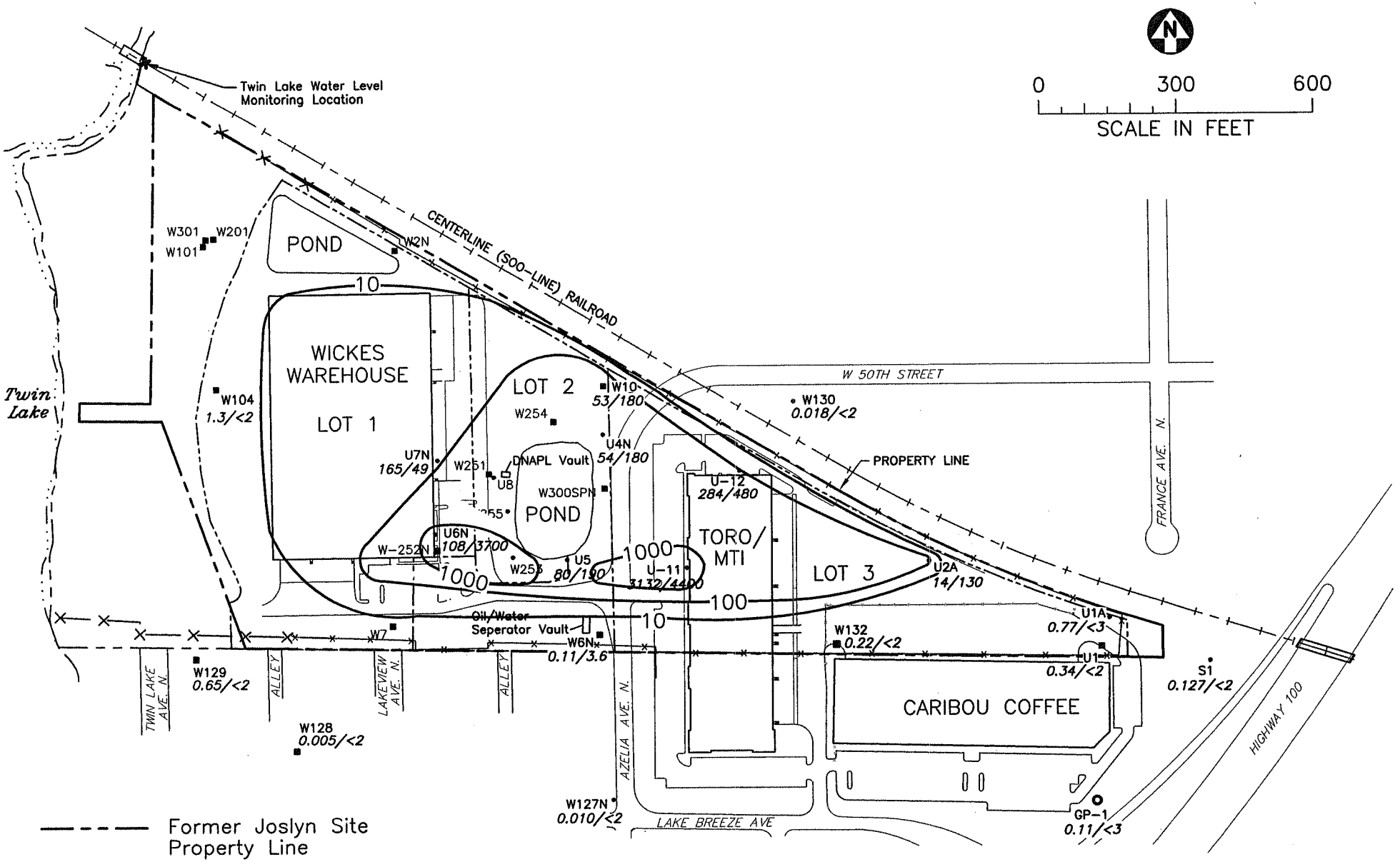
NA Not Analyzed

* Average from Barr Sampling Events

Figure A-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

10 Pentachlorophenol Concentration Contour

Total PAH/Heterocycles (ug/L)

.006/2 Pentachlorophenol (ug/L)

ND Not Detected

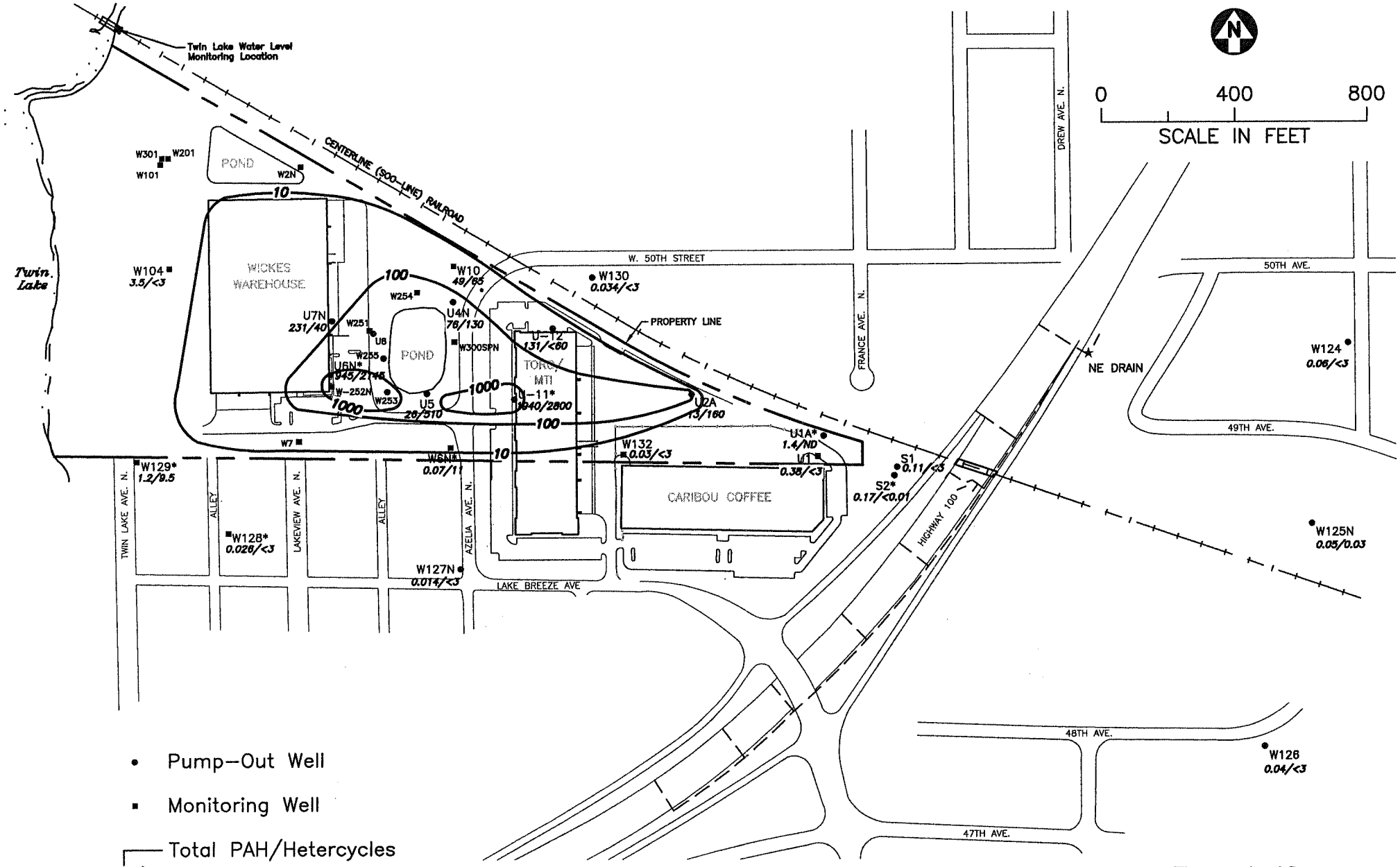
NA Not Analyzed

* 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

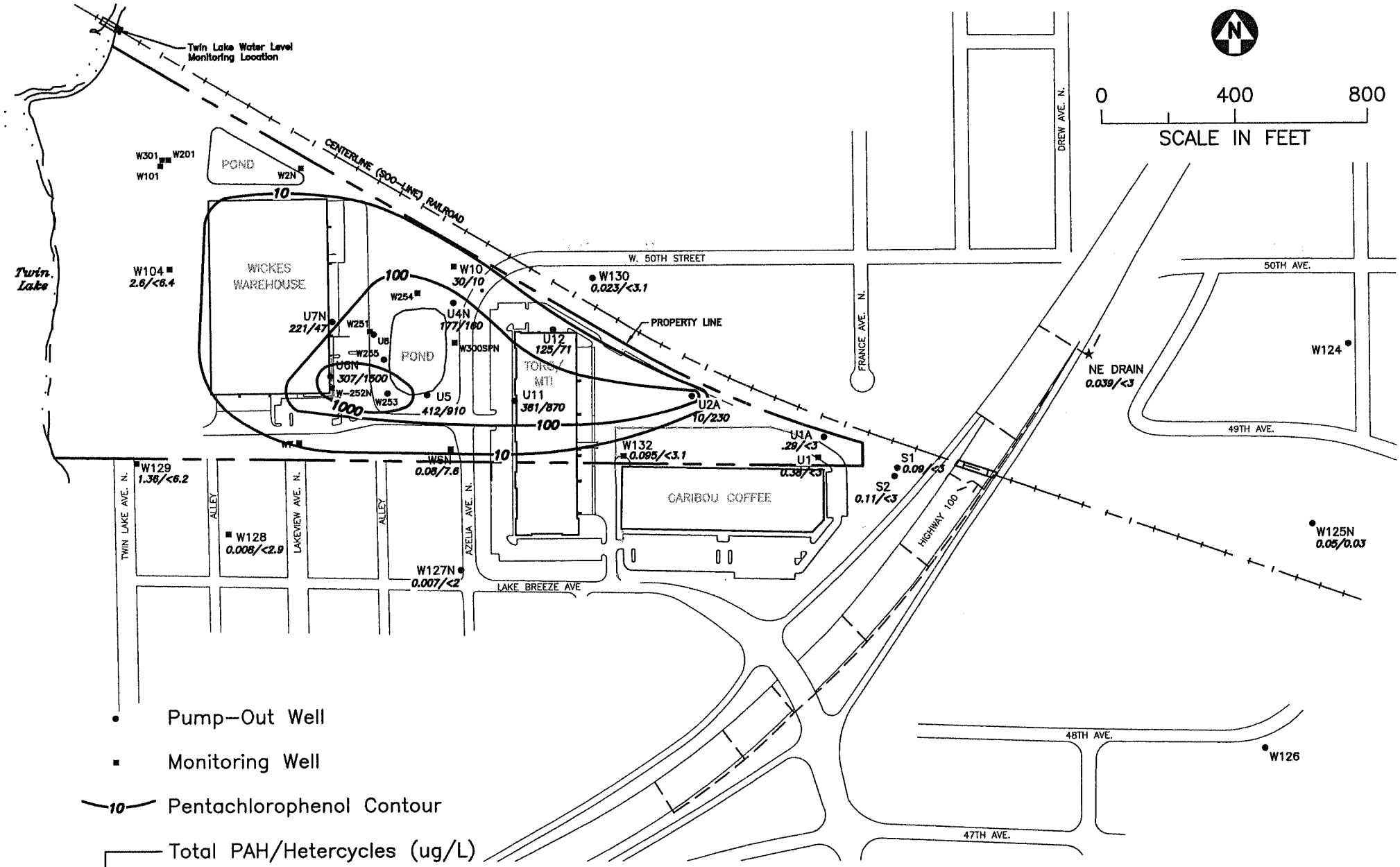


- Pump–Out Well
- Monitoring Well
- Total PAH/Hetercycles
- 0.15/11 Pentachlorophenol
- ND Not Detected
- * Average from Barr Sampling Events

Figure A–18

2005
PAH AND PENTACHLOROPHENOL CONCENTRATIONS
Upper Portion of Upper Aquifer

RLG M:\CAD\2327110\25172_1.DWG Plot at 0 01/25/2007 11:46:20



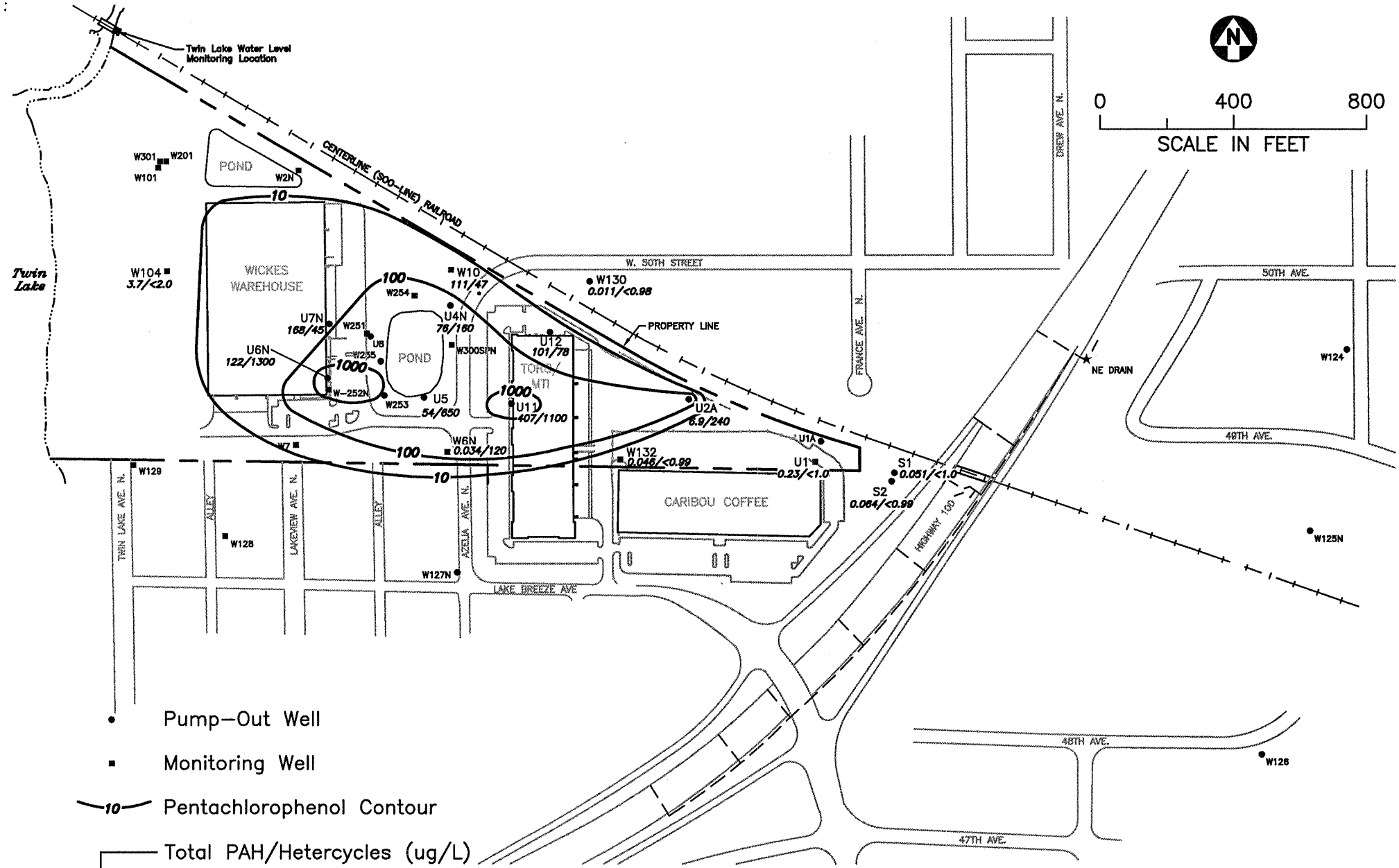
- Pump–Out Well
- Monitoring Well
- 10 — Pentachlorophenol Contour
- Total PAH/Hetercycles (ug/L)
- 0.15/11 — Pentachlorophenol (ug/L)
- ND — Not Detected

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



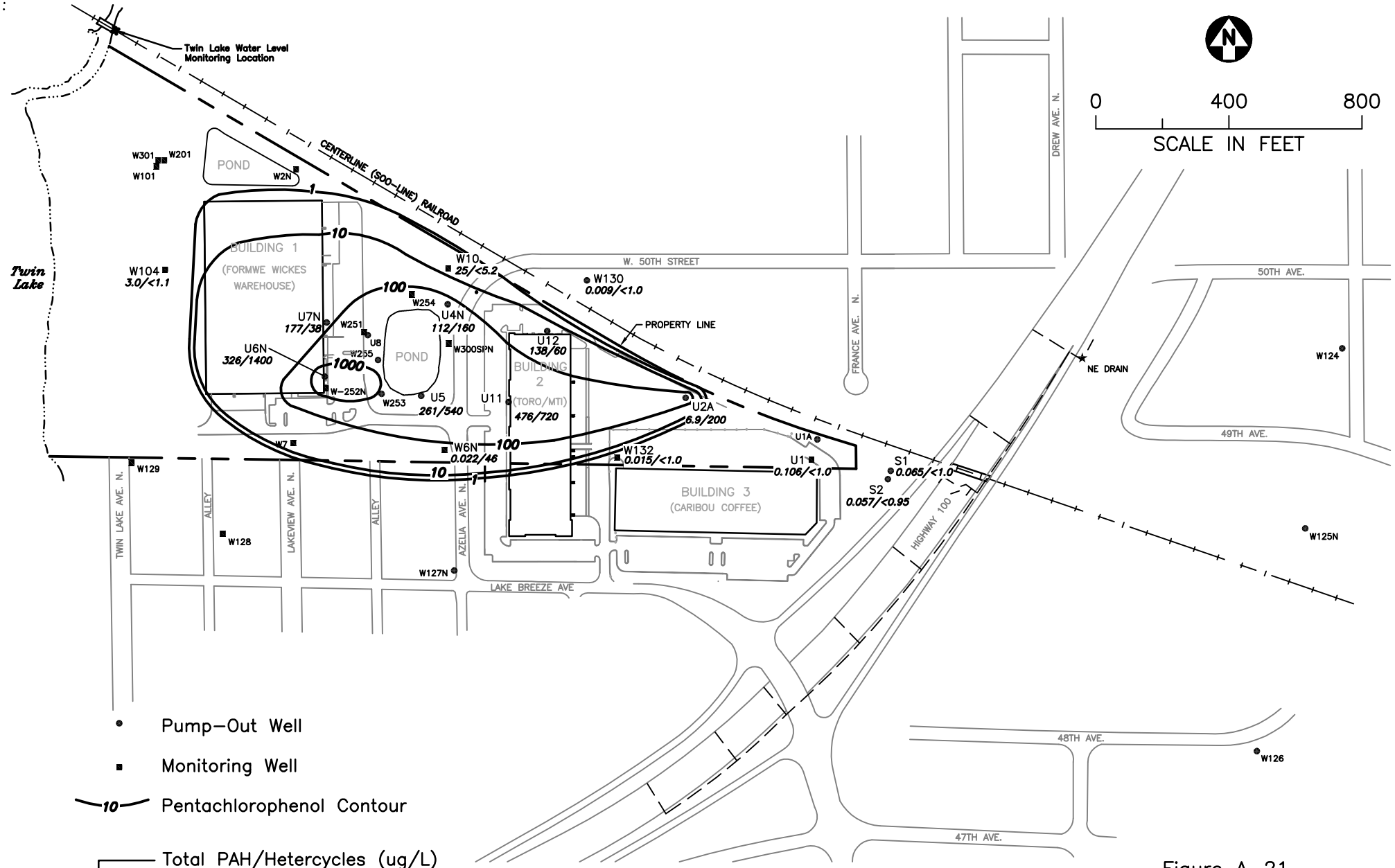
- Pump–Out Well
- Monitoring Well
- 10 Pentachlorophenol Contour
- Total PAH/Hetercycles (ug/L)
- 6.9/240 Pentachlorophenol (ug/L)
- ND Not Detected

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



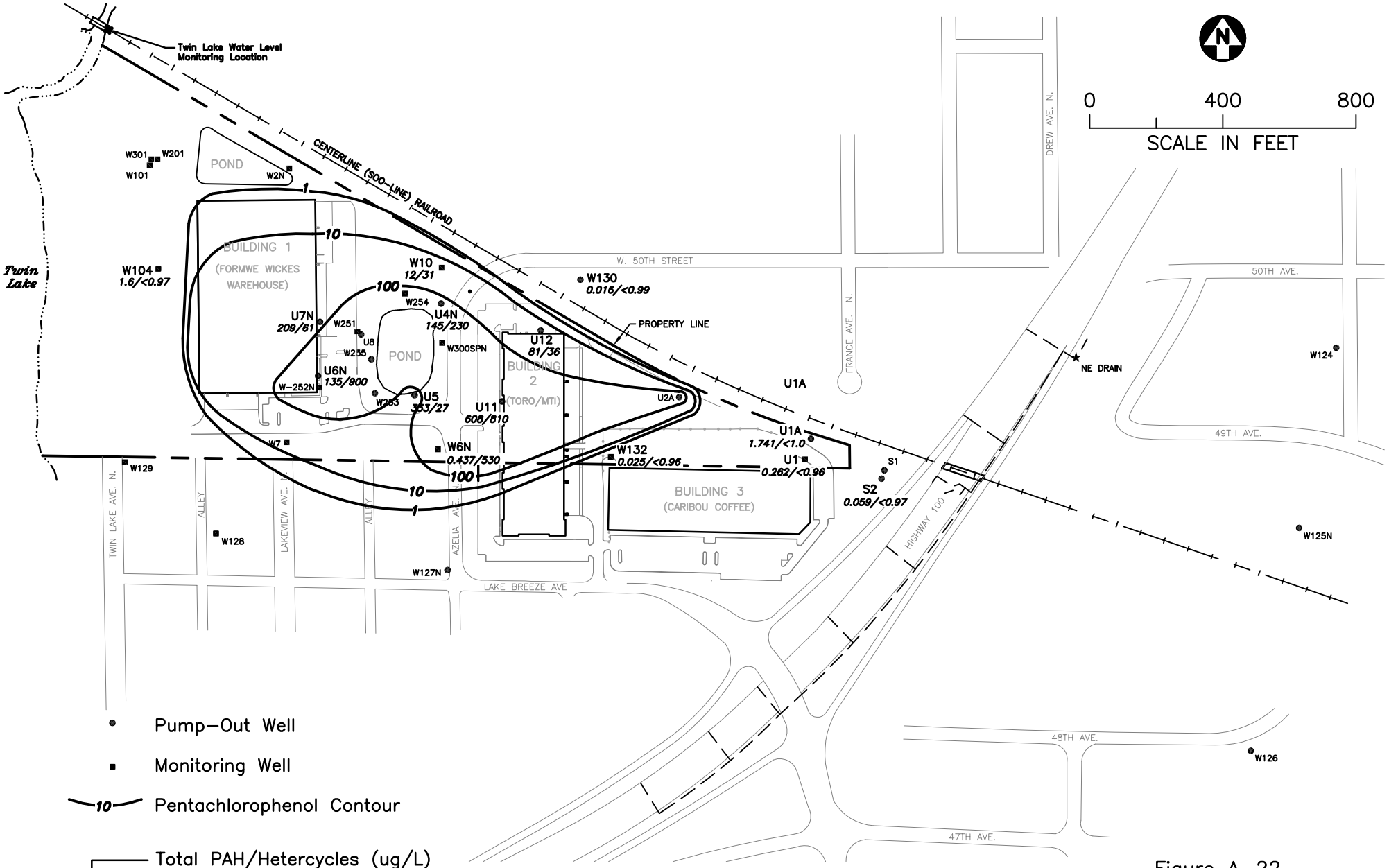
- Pump–Out Well
- Monitoring Well
- 10 Pentachlorophenol Contour
- 177/38 Total PAH/Hetercycles (ug/L) / Pentachlorophenol (ug/L)
- ND Not Detected

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



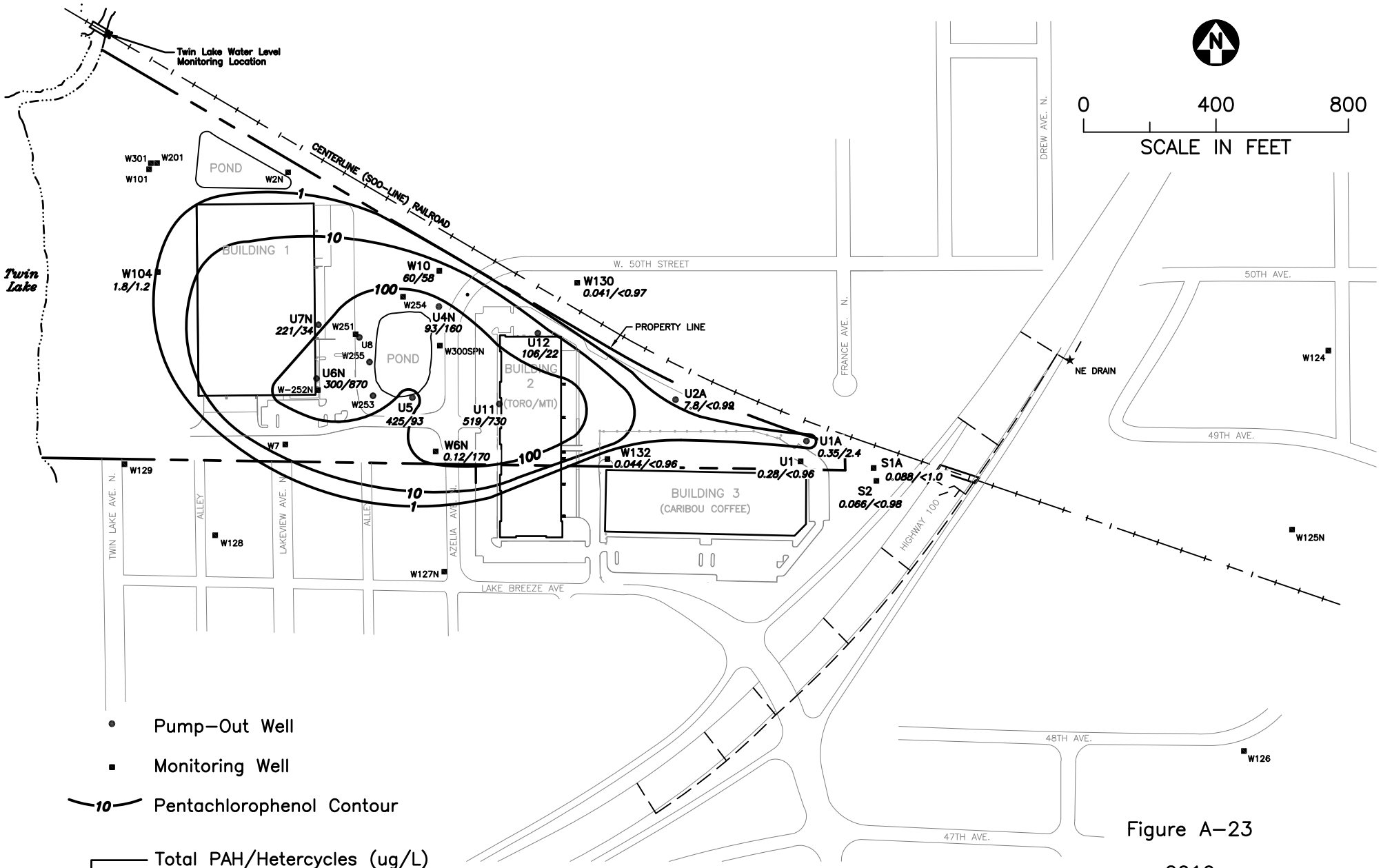
- Pump–Out Well
- Monitoring Well
- 10 Pentachlorophenol Contour
- 145/230 Total PAH/Hetercycles (ug/L) / Pentachlorophenol (ug/L)
- ND Not Detected

NOTE: All Results from September/October 2009

Figure A–22

2009
PAH AND PENTACHLOROPHENOL CONCENTRATIONS
Upper Portion of Upper Aquifer

RLG M:\AdeptWork\RLG\2327011000_2010 AR Figure A-23.dwg Plot at 0 06/10/2011 12:16:22



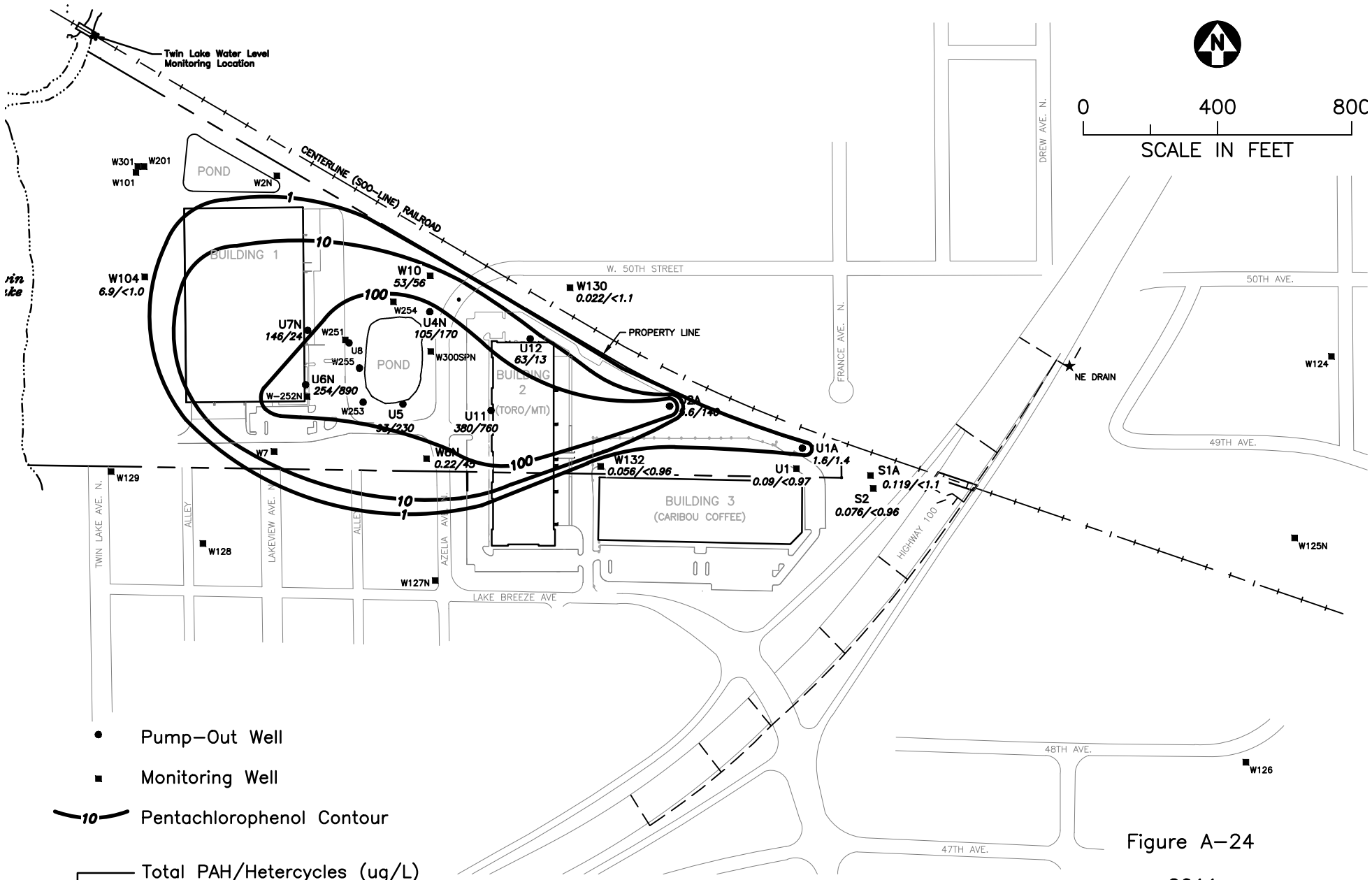
- Pump-Out Well
- Monitoring Well
- 10 Pentachlorophenol Contour
- 93/160 Total PAH/Hetercycles (ug/L) / Pentachlorophenol (ug/L)
- ND Not Detected

NOTE: All Results from October 2010

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



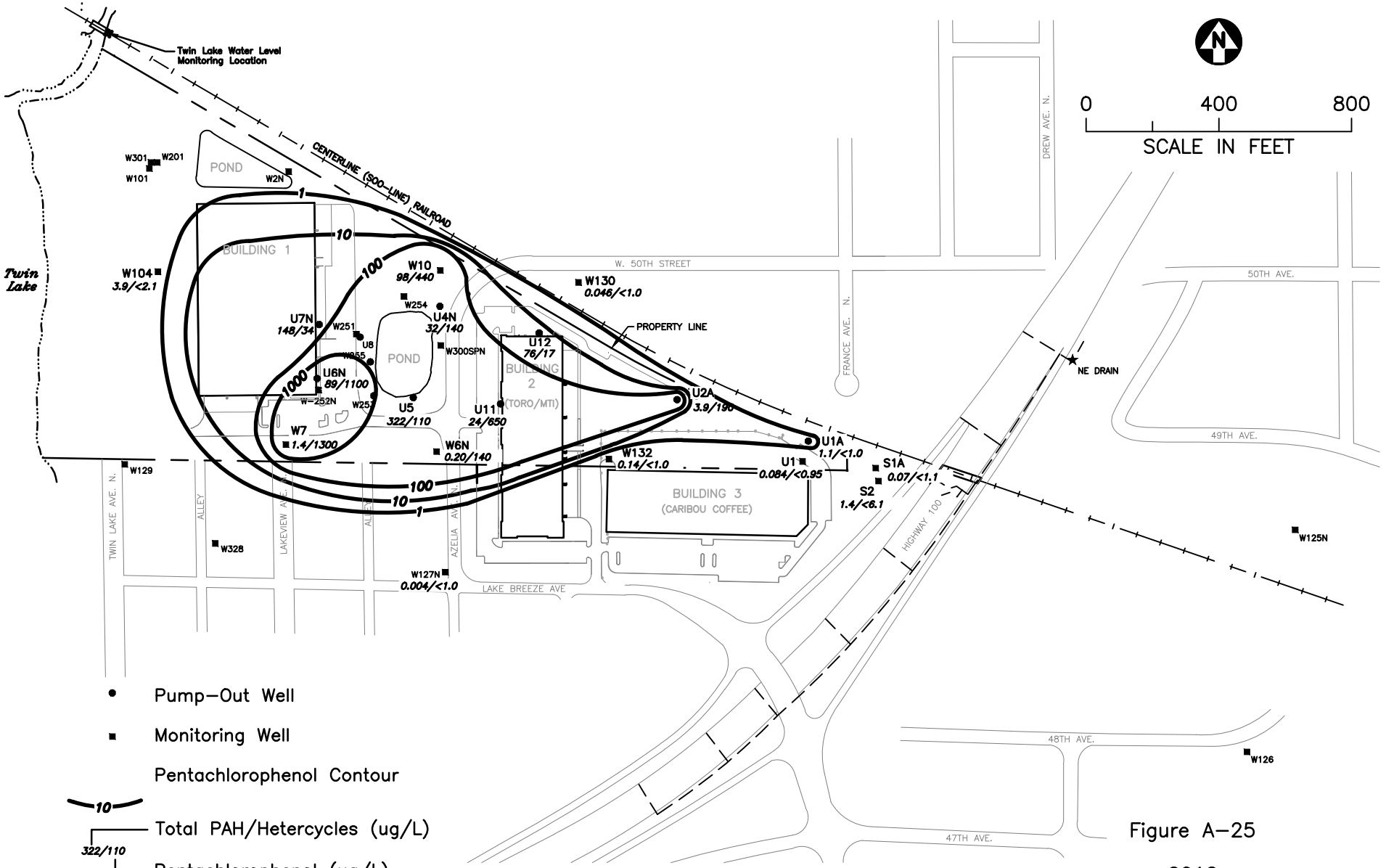
- Pump-Out Well
- Monitoring Well
- 10 Pentachlorophenol Contour
- 105/170 Total PAH/Hetercycles (ug/L) / Pentachlorophenol (ug/L)
- ND Not Detected

NOTE: All Results from October 2011

Figure A-24

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

rlg M:\AdeptWork\RLG\2327011000_2012 AR Figure 4-2.dwg Plot at 0 02/06/2013 15:45:54



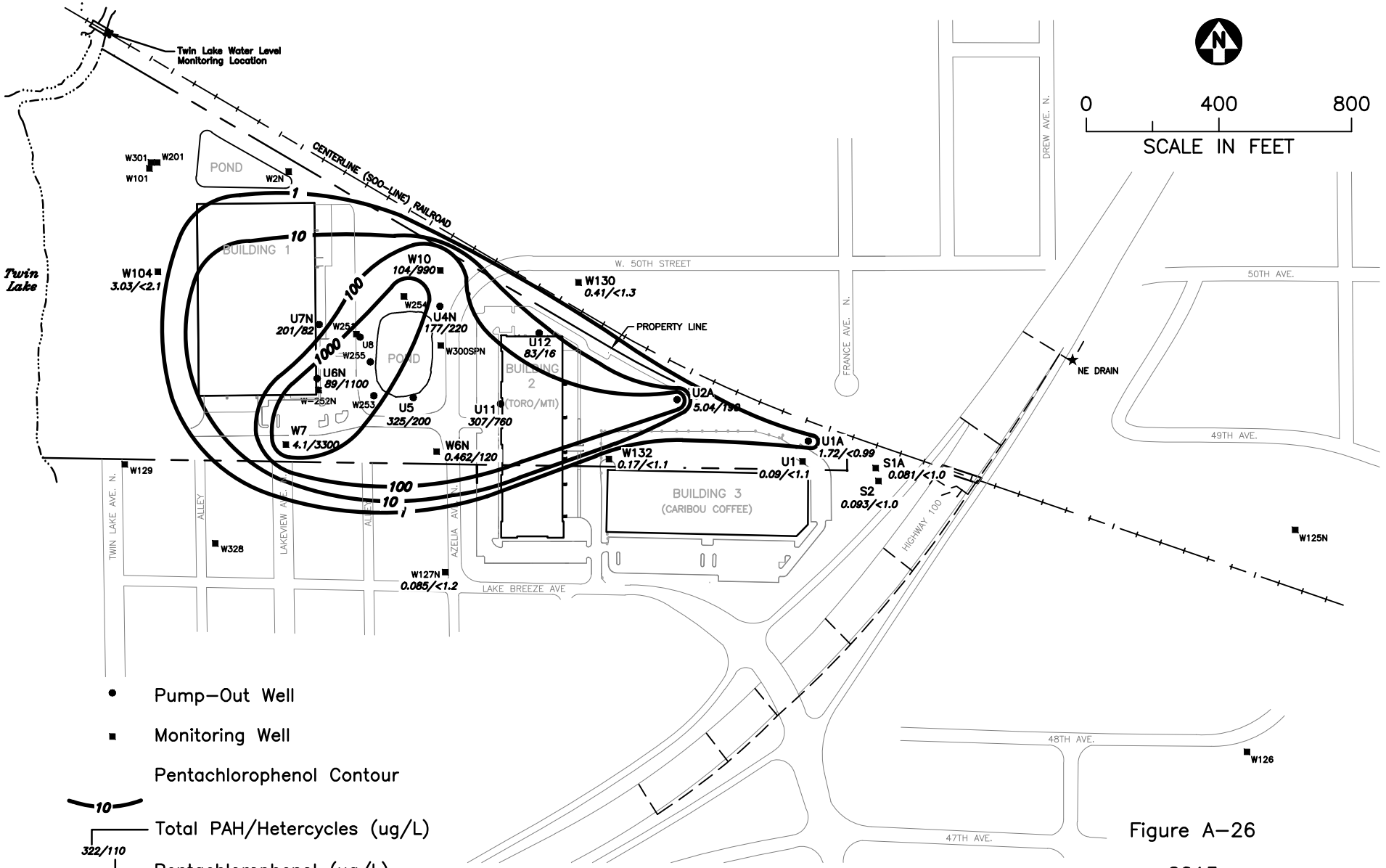
- Pump-Out Well
- Monitoring Well
- Pentachlorophenol Contour
- 10 — Total PAH/Hetercycles (ug/L)
- 322/110 — Pentachlorophenol (ug/L)
- ND — Not Detected

NOTE: Results from October 2012
(W127N Results from August 2012)

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



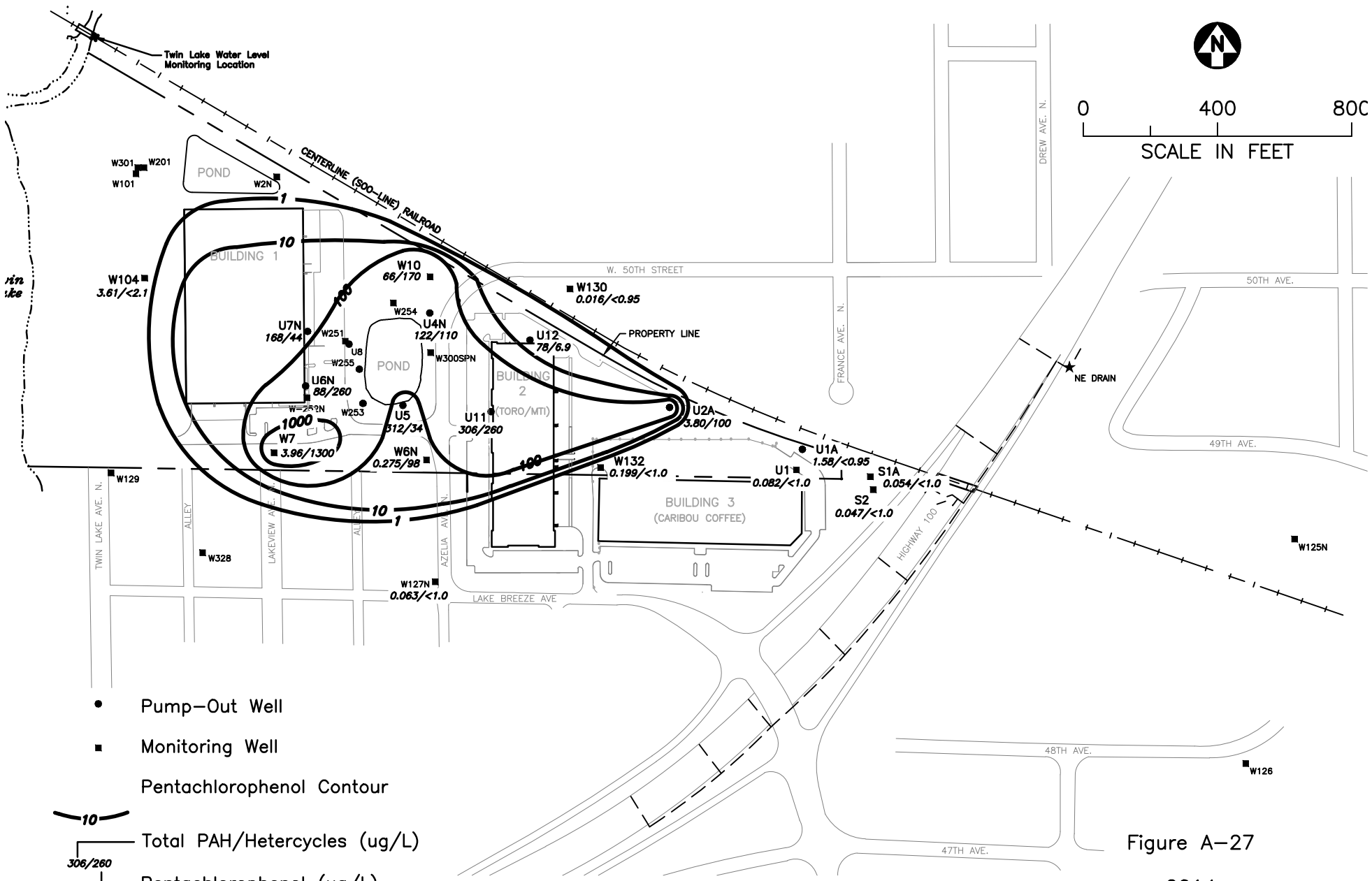
- Pump-Out Well
- Monitoring Well
- Pentachlorophenol Contour
- 10 — Total PAH/Hetercycles (ug/L)
- 322/110 — Pentachlorophenol (ug/L)
- ND — Not Detected

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



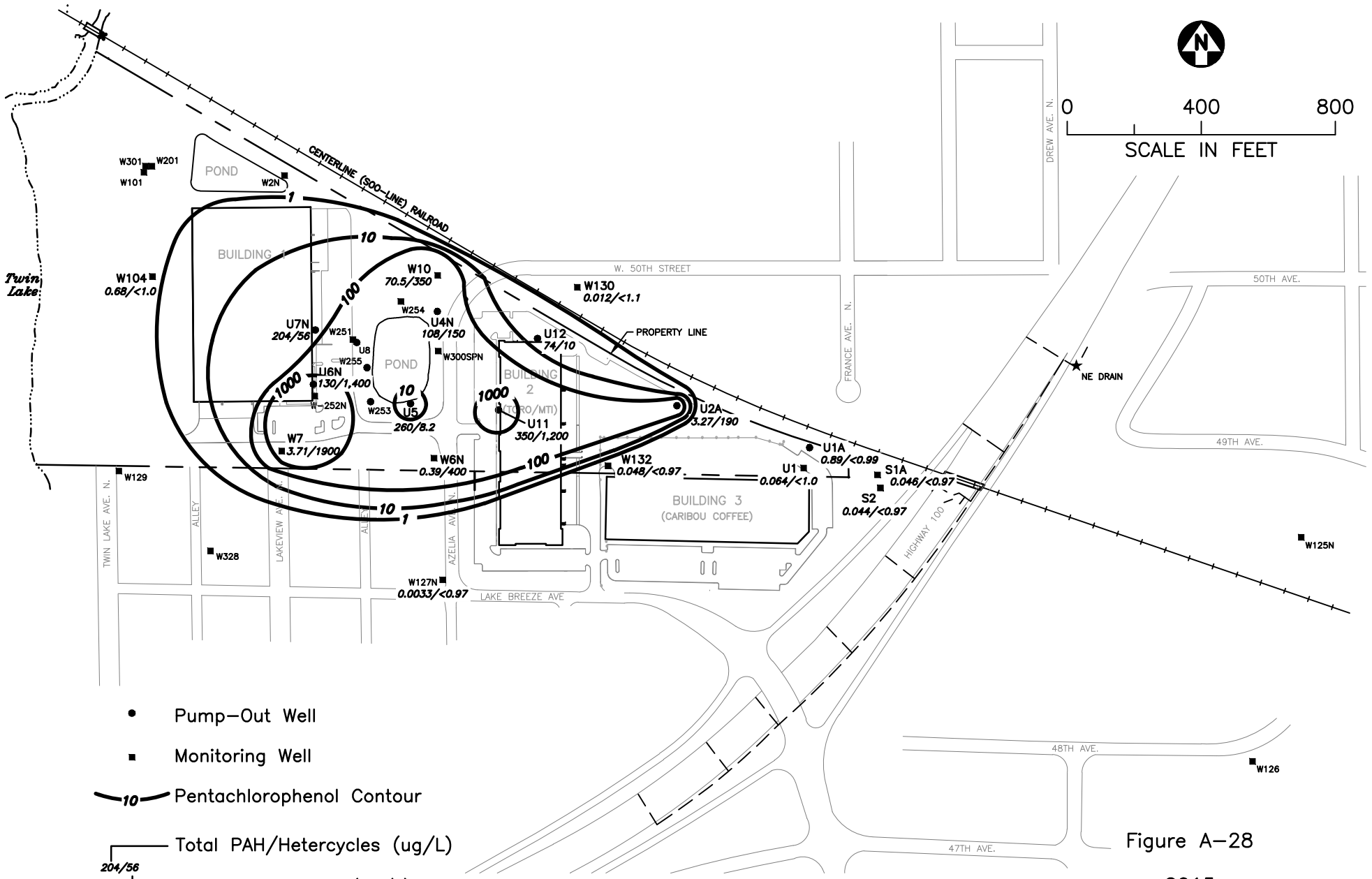
- Pump-Out Well
- Monitoring Well
- Pentachlorophenol Contour (10)
- 306/260 — Total PAH/Hetercycles (ug/L) / Pentachlorophenol (ug/L)
- ND — Not Detected

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



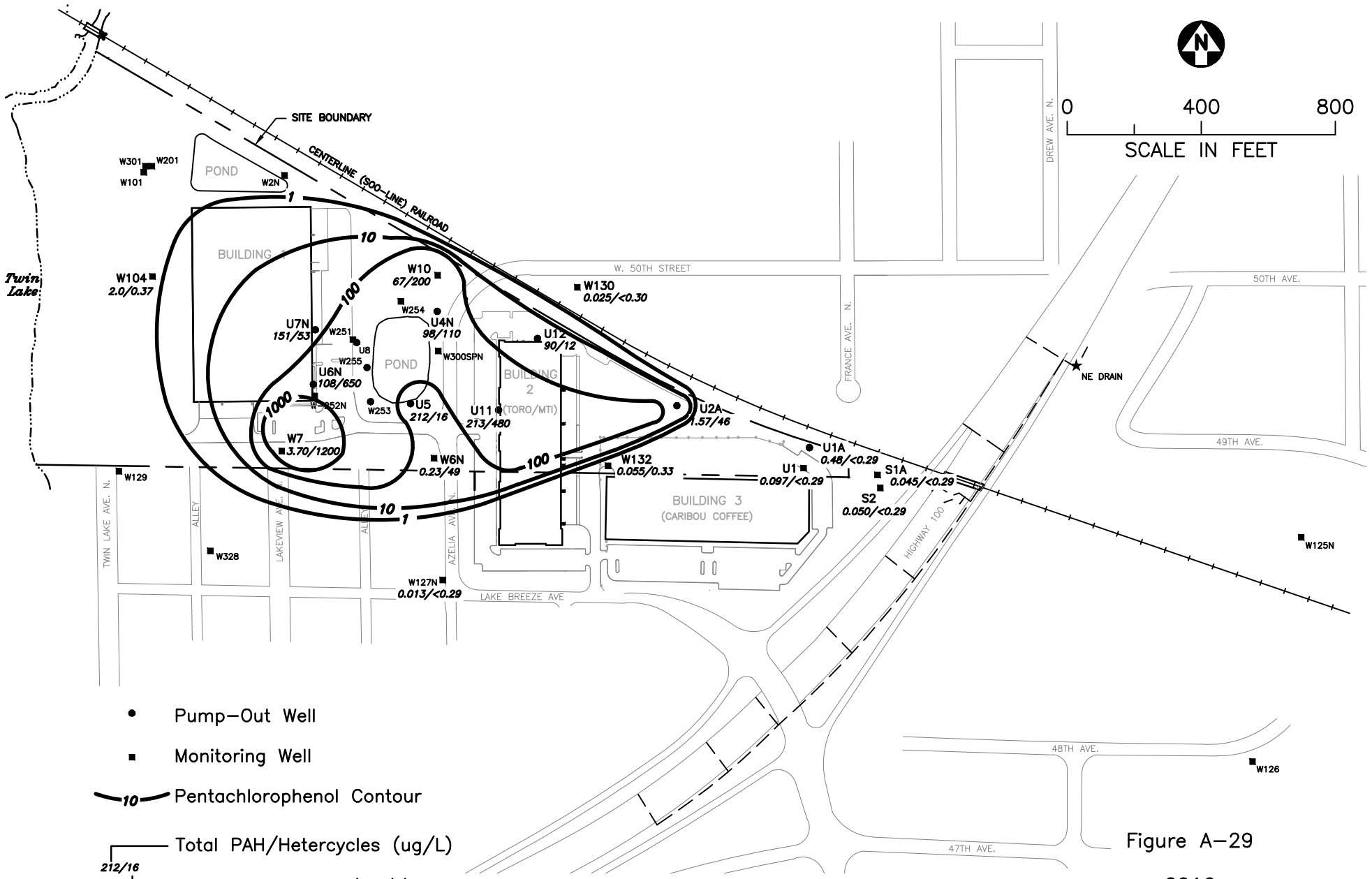
- Pump-Out Well
- Monitoring Well
- 10 Pentachlorophenol Contour
- Total PAH/Hetercycles (ug/L)
- 204/56 Pentachlorophenol (ug/L)
- ND Not Detected

NOTE: Results from October 2015

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



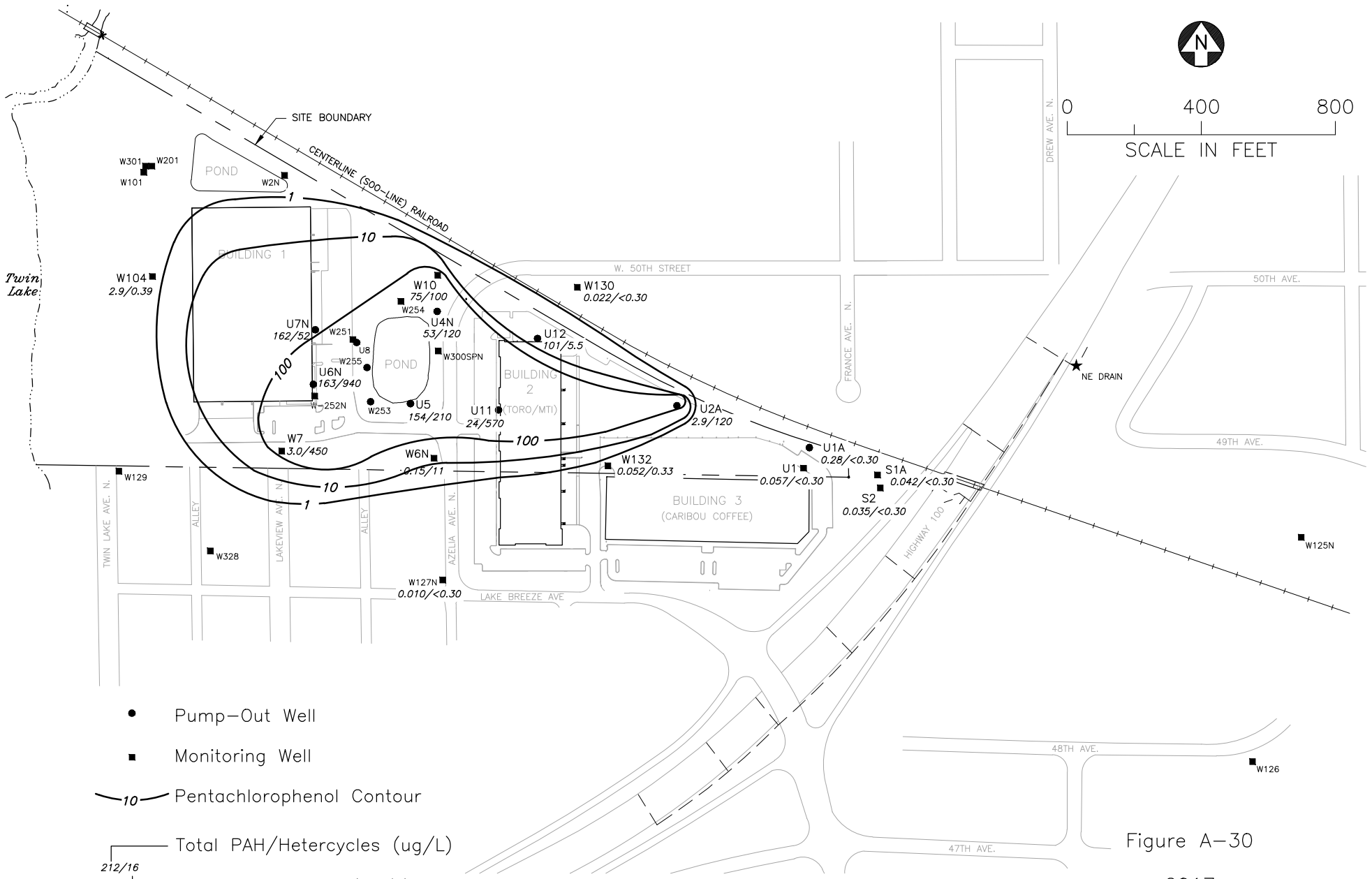
- Pump-Out Well
- Monitoring Well
- 10 Pentachlorophenol Contour
- 212/16 Total PAH/Hetercycles (ug/L) / Pentachlorophenol (ug/L)
- ND Not Detected

NOTE: Results from October 2016

Figure A-29

2016
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



- Pump-Out Well
- Monitoring Well
- 10 — Pentachlorophenol Contour
- 212/16 — Total PAH/Hetercycles (ug/L)
- Pentachlorophenol (ug/L)
- ND — Not Detected

NOTE: Results from October 2017

Figure A-30

2017
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 2017*

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.

Table B-1
Monitoring and Recovery Well History
Updated Through 2017*

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	--	--

Sys Loc Code	NE Drain	Storm Sewer	Upstream in Shingle Creek
Sample Date			
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

Twin Lake Water Level Monitoring Location

N

0 200 400

SCALE IN FEET

W301 W201 W101

GATE

W2 W2N

BUILDING 1

B'

CENTERLINE (SOO-LINE) RAILROAD

PROPERTY LINE

W104

W10

Twin Lake

W254

DB-H1 DB-H2

W131

U7N

DB-J

DB-C2

DNAPL Vault

U4

U-12

U-7

W251

U8

DB-K

W300SP

DB-3 DB-3A W207

W255

DB-D2

DB-3B2

DB-L

U3 P-3

W111

U-6

U6N

W113

W9

P-5 W209

DB-8

W252N W252

DB-1B1

DB-1

W253

U5

U-11

U2A

W6N

DB-1B2

W307

1999 Pump-Out System

Electrical Control Building

Control Building

A

B

W7

Oil/Water Separator Vault

W6N

W6 W206

P-2

U2

U1A

A'

CONTINUES TO LAKE

GATE

END OF FENCE

W112

S1A S1

S3 S2

W122

TWIN LAKE AVE. N.

ALLEY

LAKEVIEW AVE. N.

ALLEY

AZELIA AVE. N.

TORO/ MTI

CARIBOU COFFEE

FRANCE AVE. N.

W323-1

HIGHWAY 100

Current Site Features

Former Site Features

Property Line

Posted Signs/Security Fence

Pump-Out Well

Monitoring Well

Piezometers

Abandoned Wells

Abandoned Piezometers

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

Figure B-1

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

West

East

TWIN LAKE

W111

DB–3

DB–3A

U6* W207

DB–3B2

W251 U6* DB–C2

DB–K

W113* DB–D2

W300SP U4*

U3 W9 W209 B8

W112

U1

W323* S3 S2

HWY 100

SOO LINE RAILROAD

W122

FILL

PEAT

SILTY SAND

SAND

DRAIN TILE SYSTEM

SAND AND GRAVEL

SANDY CLAY

SAND AND SILTY SAND

SAND AND SILTY SAND WITH CLAY BEDS

SILT AND CLAY BEDS

SILT WITH SAND AND CLAY BEDS

SAND AND SILTY SAND WITH CLAY BEDS

RIP–UP BLOCK ST. PETER SANDSTONE

SAND, SILTY SAND, AND GRAVEL

WEATHERED SHALE

ST. PETER SANDSTONE

Upper Aquifer

Middle Sand Units

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

Elevation, feet (MSL)

880 860 840 820 800 780 760 740 720 700

200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200

Distance, feet

▼ Average Water Level 2005

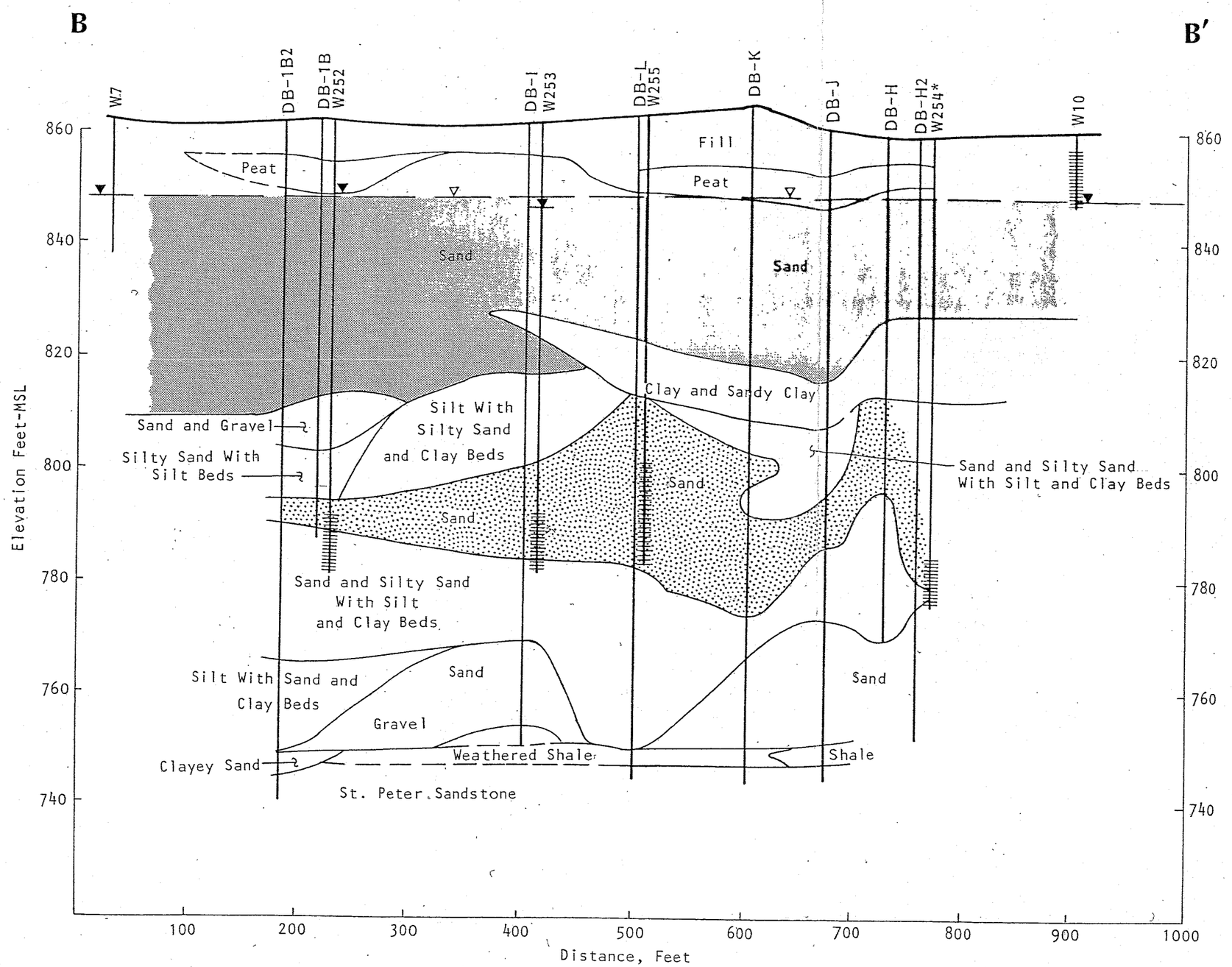
▽ Surface of Average Shallow Groundwater Level 2005

* 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'

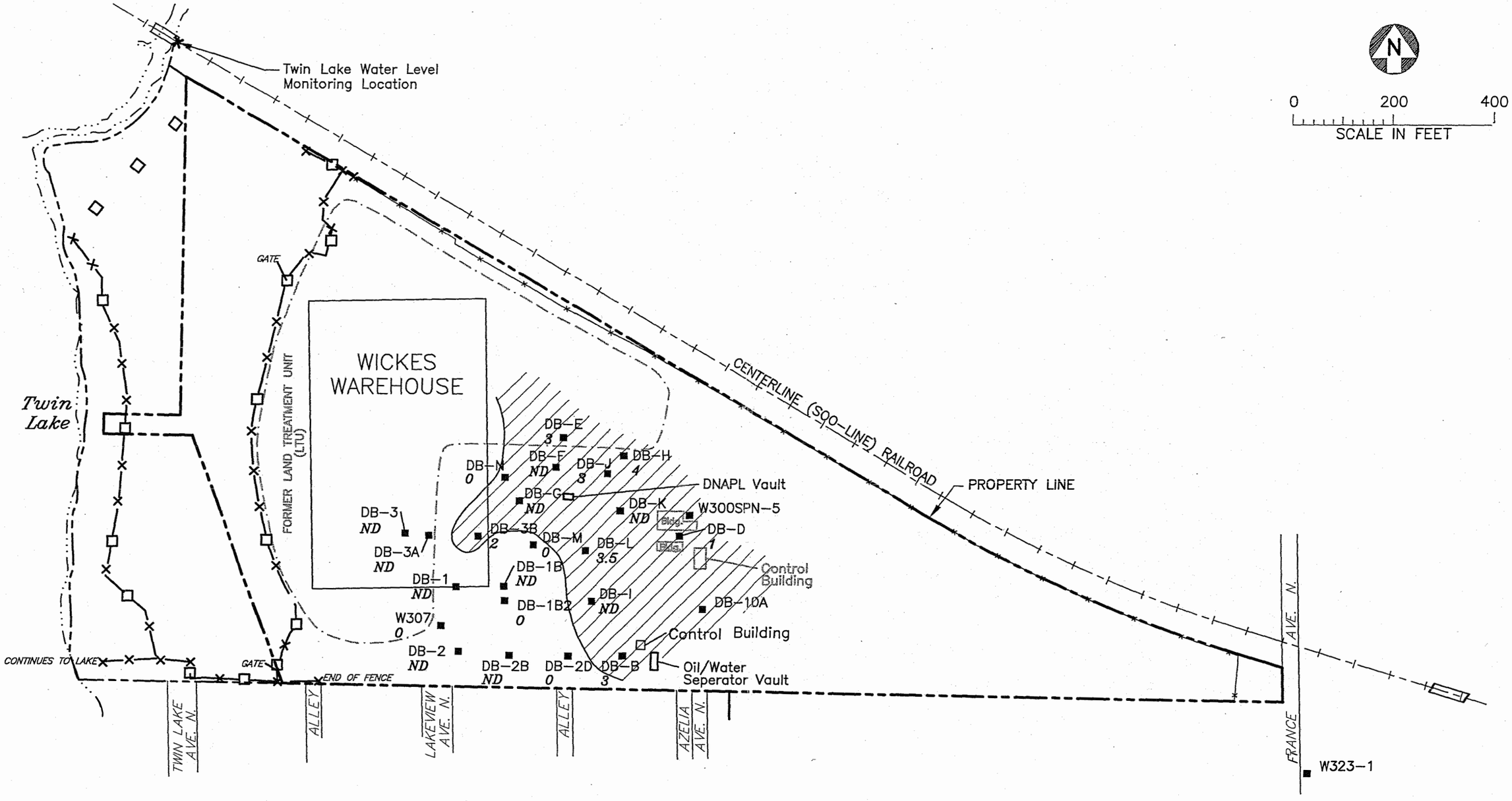
mpm M:\cad\2327110\Section 16 June 2006\SectionAA.DWG Plot at 200 7/14/06



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'



Former Site Features

Property Line

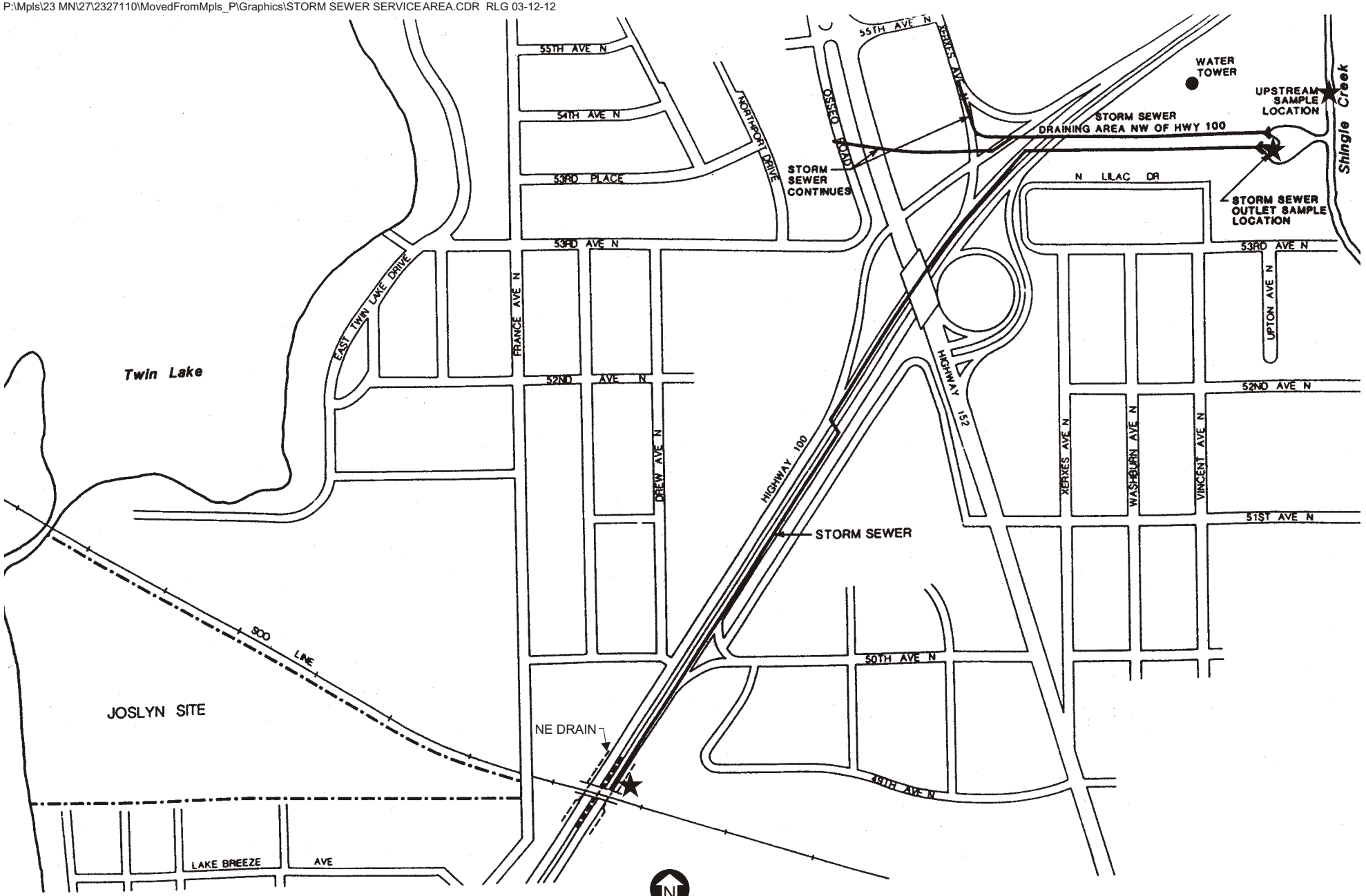
Posted Signs/Security Fence

jmw M:\CAD\2327110\1b131_1.DWG Plot at 200 04/18/2003 16:05:13

Figure B-4

EXTENT OF WEATHERED SHALE

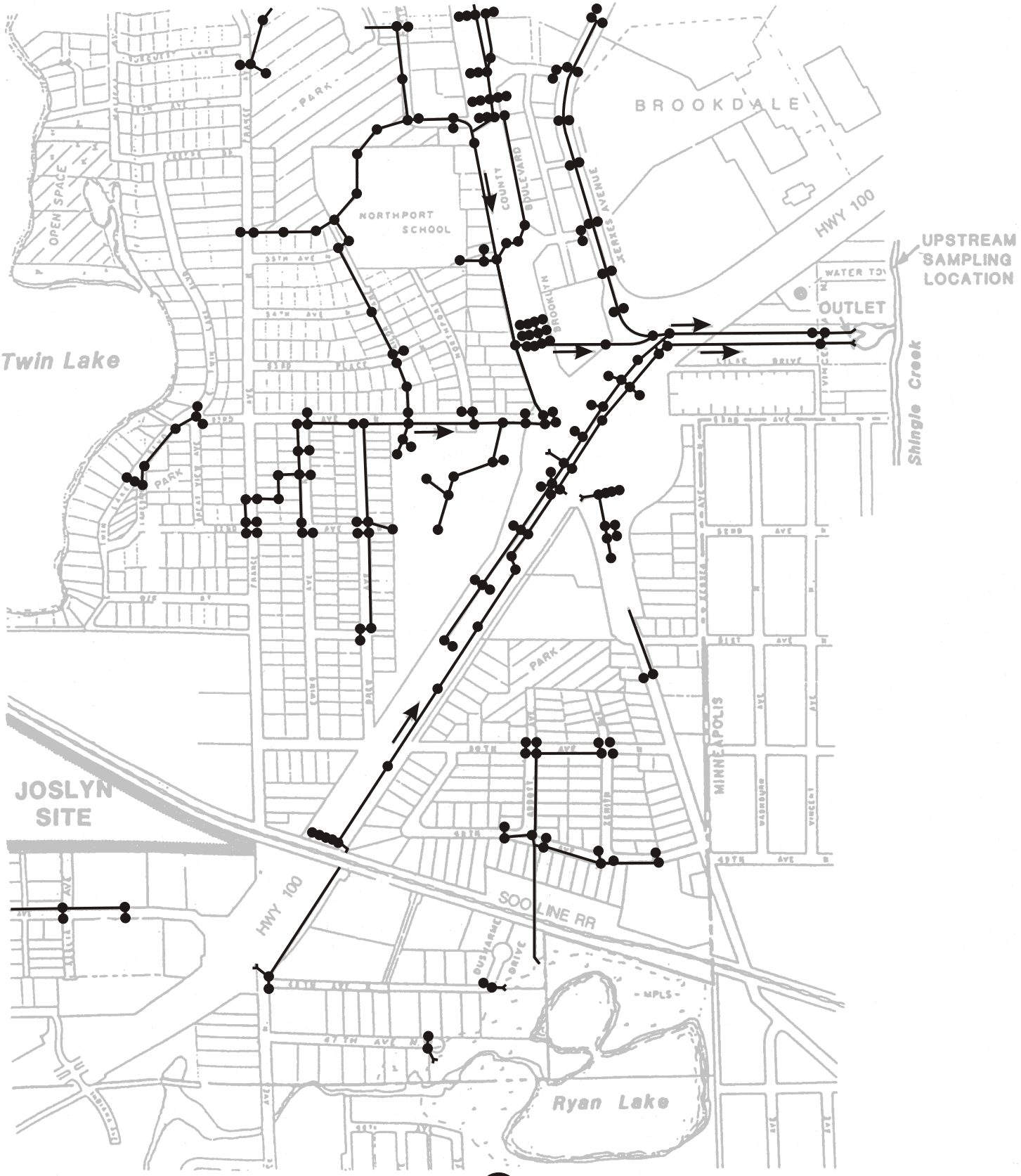
P:\Mpls\23 MN\27\2327110\MovedFromMpls_P\Graphics\STORM SEWER SERVICE AREA.CDR RLG 03-12-12



★ Surface Water Sampling Points

Figure B-5

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



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

Source: MnDOT

N

0 80 160

Scale in Feet

Storm Sewer

Catch Basins

Direction of Flow

Figure B-6

STORM SEWER SERVICE AREAS

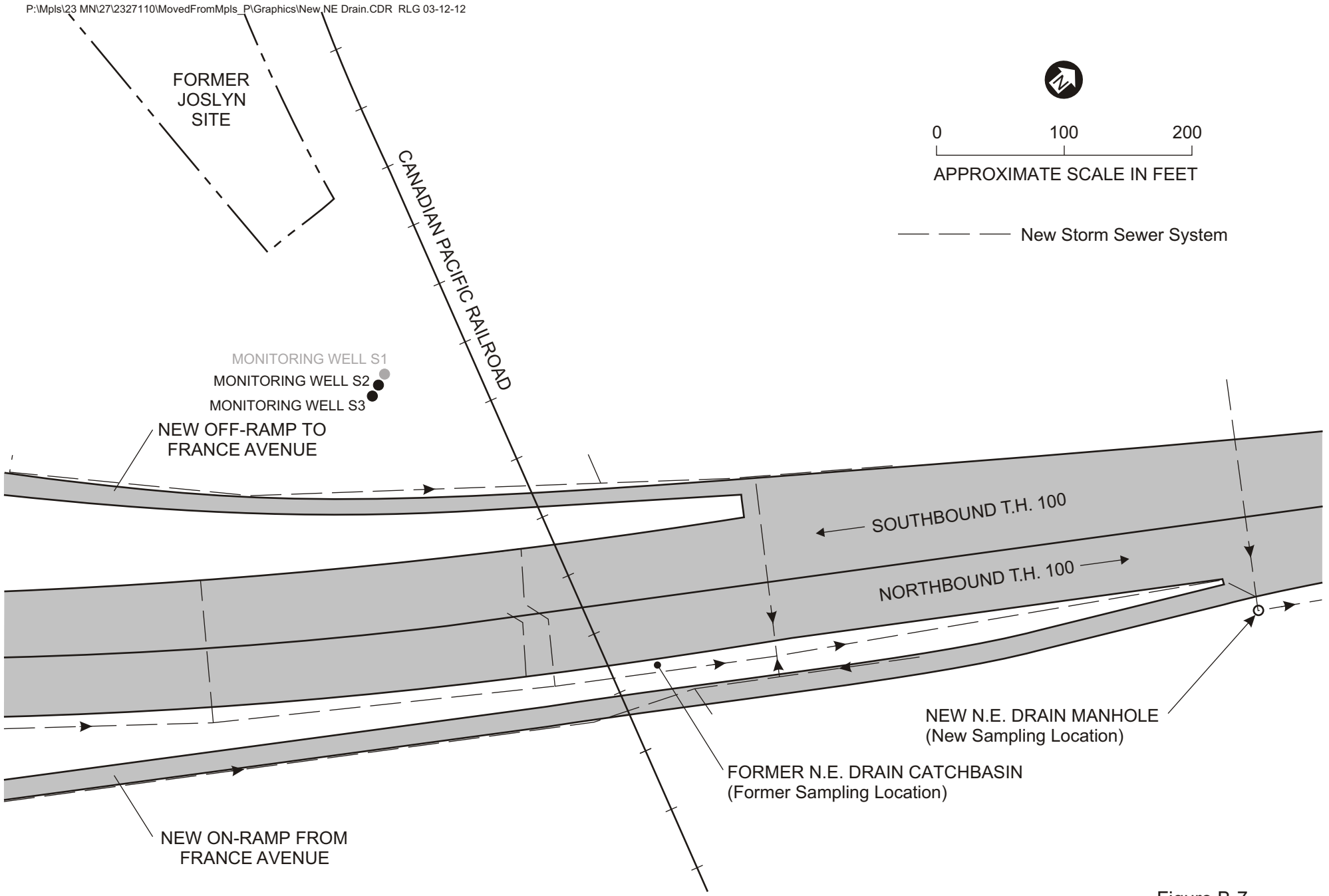


Figure B-7

NEW N.E. DRAIN
SAMPLING LOCATION

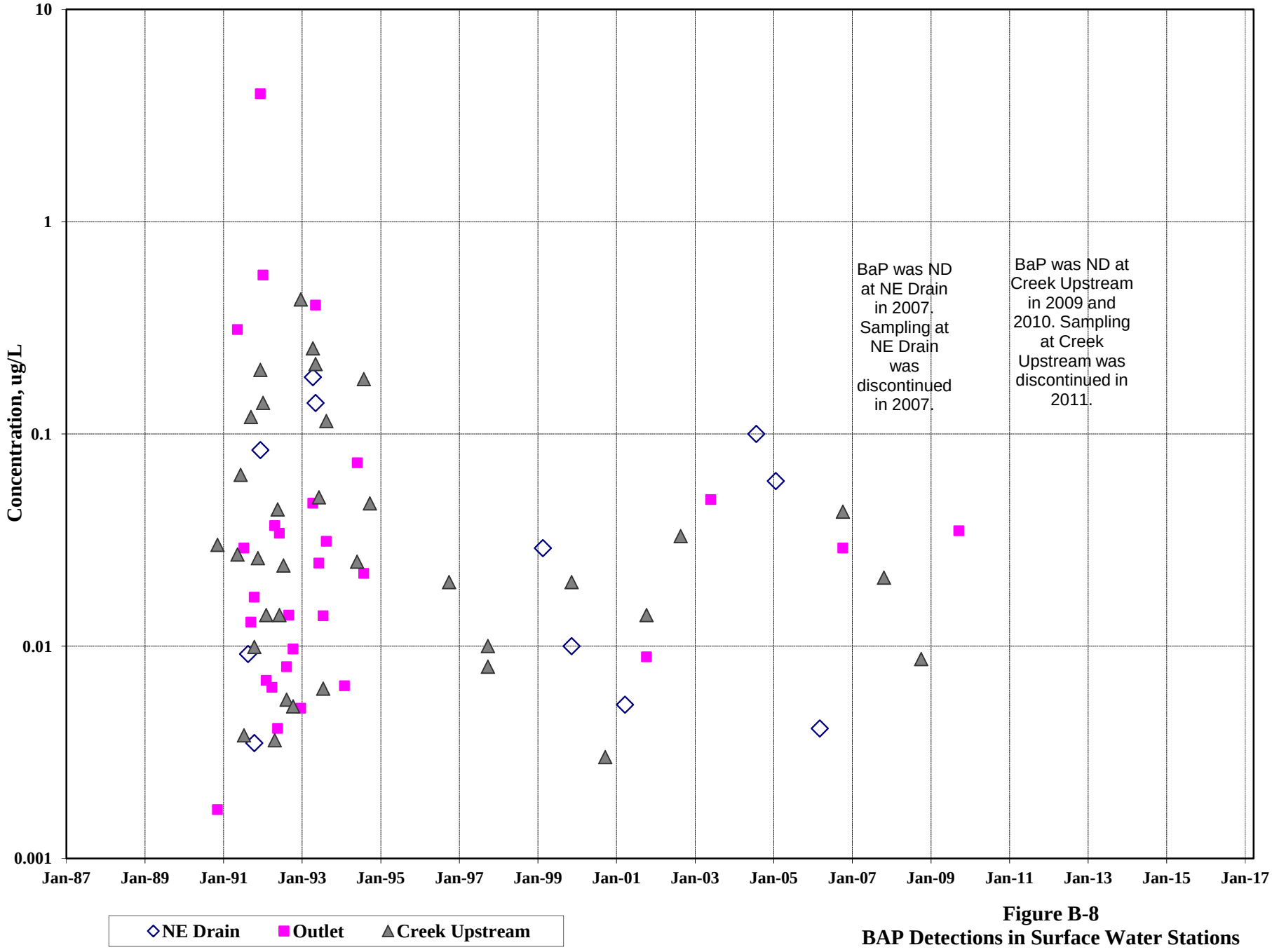


Figure B-8
BAP Detections in Surface Water Stations

2/16/2016 11:06 AM
P:\Mpls\23 MN\27\2327110\WorkFiles\DATA MGMT\2015 Annual Report\Review Complete\Joslyn_2015 ann rpt_charts_01172016.xlsx, SW bap v2

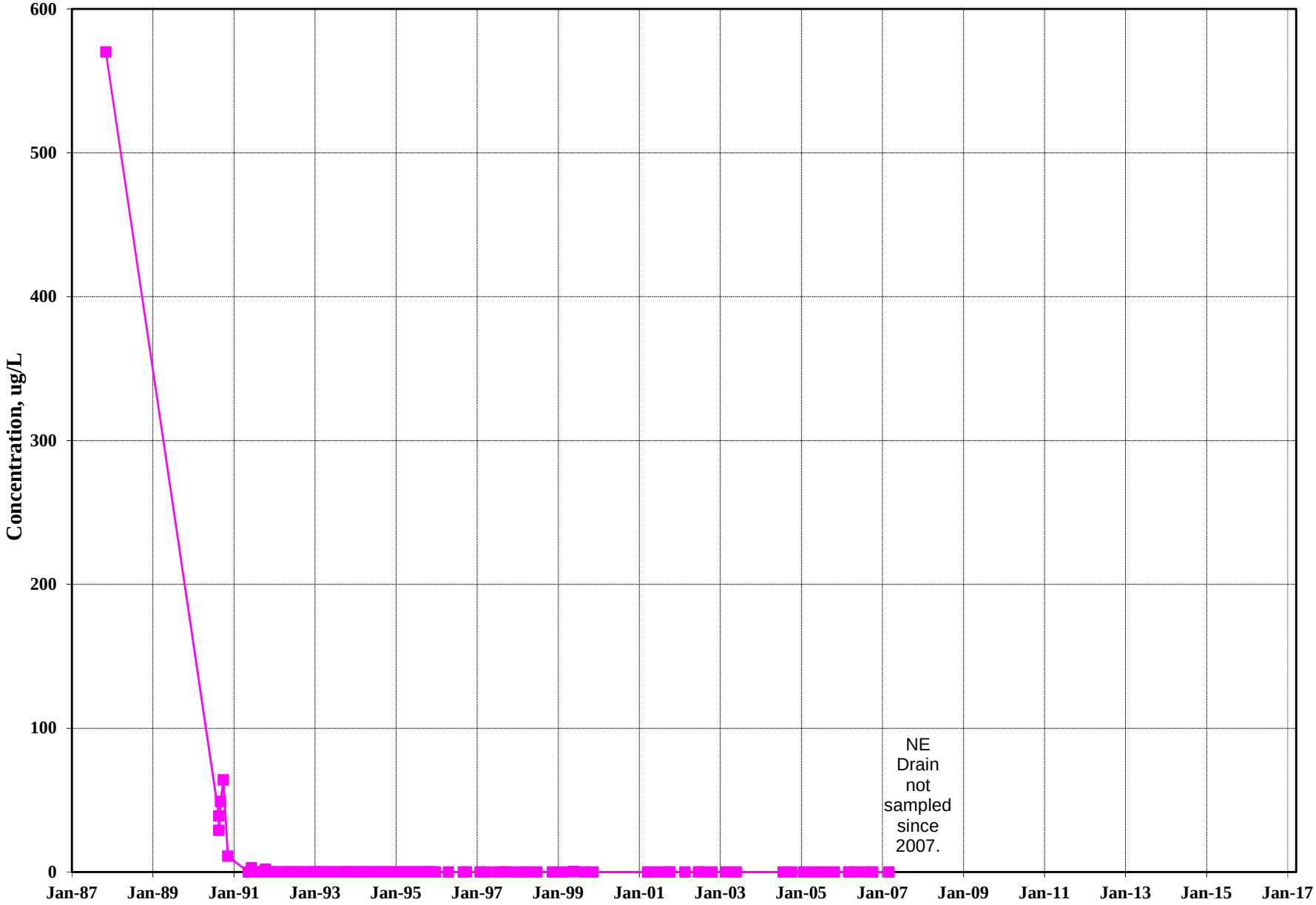


Figure B-9
PCP In NE Drain Samples

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).

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.

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 (Barr, 2016).

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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 2017 monitoring period. The review was performed in accordance with the Joslyn Quality Assurance Project Plan (QAPP), Revision 3.0, dated September 2016 (Barr, 2016b). The quality control procedures followed during the collection and analysis of the samples in 2016 are described in the QAPP.

Five iron bacteria maintenance (pigging or jetting) events took place at the Joslyn Site in 2017 and the subsequent samples collected were analyzed for pH, chemical oxygen demand (COD), and total suspended solids (TSS). The pH analysis was performed in the field. The COD and TSS analyses were performed by ALS Environmental (ALS) located in Kelso, Washington. This data evaluation includes sample data contained within ALS reports K1700620, K1703035, K1705023, K1709114, and K1711908.

Groundwater monitoring well, pumpout well, and effluent samples collected during 2017 were analyzed for polycyclic aromatic hydrocarbons (PAHs) and pentachlorophenol (PCP). Effluent samples were also analyzed for pH, oil and grease, TSS, and COD. The pH analysis was performed in the field. The remaining analyses were performed by ALS. This data evaluation includes sample data contained within ALS reports K1702817, K1706897, K1709738, K1711121, K1711193, K1711422, K1711464, and K1713055.

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 was detected above the reporting limit in the field blank sample associated with the samples collected on 10/12/17 and 10/13/17. The naphthalene concentration in the field blank sample was compared against the naphthalene concentrations in the associated project samples. Sample concentrations within five times of the blank sample detection concentrations were qualified "b" in the data summary table and should be considered a potential false positive concentration. 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 (W130 and U1A) were collected and sent to ALS for analysis during the 2017 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. 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 conducts quality control/quality assurance procedures on an ongoing basis to validate the data generated by its 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 technical holding times were within criteria for the analyses. The samples collected during the various sampling events arrived at the laboratories at the correct temperatures and with the appropriate chemical preservative with the exception of a temperature for the pigging samples collected on 08/25/17. The cooler had two temperatures taken upon receipt at the laboratory, temperature blank and cooler. The temperature blank is a small container within the cooler that is measured and the cooler temperature is taken from a thermometer placed in the cooler and allowed to equilibrate a minimum of 10 minutes with the lid closed. The temperature blank temperature was 7.1°C and the cooler temperature was 6.0°C. No data were qualified based on the temperatures upon receipt at the laboratory.

Laboratory method blank analyses are used to determine the existence and magnitude of any contamination introduced at the laboratory. ALS 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 following exceptions. Benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene were detected above the RL in the method blank associated with the 8270D SIM analysis for sample U1 collected on 09/12/17. The results for these compounds for sample U1 were qualified "b" in the data

summary table indicating a potential false positive concentration. Naphthalene was detected above the RL in the method blank associated with the 8270D SIM analysis for the groundwater samples collected on 10/12/17 and 10/13/17. The naphthalene detections were already qualified based on the higher concentration of naphthalene in the field blank as noted above.

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 comparing the RPD of the LCS/LCSD sample pairs, MS/MSD sample pairs, and laboratory duplicate samples to QAPP acceptance criteria.

The LCS and LCSD percent recoveries and RPDs met QAPP acceptance criteria.

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 percent recoveries and RPDs met QAPP acceptance criteria.

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 exceptions. The PCP surrogate recovery for 2,4,6-tribromophenol in sample W7 collected on 06/28/17 exceeded QAPP acceptance criteria; however, the sample required a dilution which resulted in the surrogate being diluted below the calibration range which does not allow for accurate measurement. Since dilution is a standard and necessary laboratory procedure, no data were qualified. The PAH surrogate spike recovery for fluoranthene-d10 in sample W255 collected on 10/20/17 exceeded QAPP acceptance criteria; however, no data were 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 QAPP acceptance criteria.

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.

Summary of Data Evaluation

The quality control review of the 2017 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
2017 Groundwater Quality Data
Duplicate Samples with RPD Calculated
Joslyn Manufacturing and Supply Company
Brooklyn Center, MN

Location		U1A			W130		
Sample Date		10/13/2017			10/12/2017		
Sample Type		N	FD	RPD	N	FD	RPD
Parameter	Units						
SVOCs							
2-Methylnaphthalene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Acenaphthene	ug/l	**0.20**	**0.21**	**4.9 %**	< 0.0034	< 0.0034	
Acenaphthylene	ug/l	**0.0085**	**0.0081**	**4.8 %**	< 0.0034	< 0.0034	
Anthracene	ug/l	**0.034**	**0.036**	**5.7 %**	**0.015**	**0.015**	**0 %**
Benz(a)anthracene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Benzo(a)pyrene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Benzo(b)fluoranthene	ug/l	< 0.0034 c	< 0.0034 c		< 0.0034 c	< 0.0034 c	
Benzo(g,h,i)perylene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Benzo(k)fluoranthene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Chrysene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Dibenz(a,h)anthracene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Fluoranthene	ug/l	**0.0070**	**0.0076**	**8.2 %**	< 0.0034	< 0.0034	
Fluorene	ug/l	**0.0062**	**0.0065**	**4.7 %**	< 0.0034	< 0.0034	
Indeno(1,2,3-cd)pyrene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Naphthalene	ug/l	**0.011**	**0.014**	**24 %**	**0.0067 b**	**0.0084 b**	**NA**
Pentachlorophenol	ug/l	< 0.30	< 0.30		< 0.30	< 0.30	
Phenanthrene	ug/l	< 0.0034	< 0.0034		< 0.0034	< 0.0034	
Pyrene	ug/l	**0.016**	**0.016**	**0 %**	< 0.0034	< 0.0034	

%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 1, 2017

Submitted via email to:
Ms. Andri Dahlmeier
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155

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

Dear Ms. Dahlmeier:

On behalf of Joslyn Manufacturing Company (Joslyn), Barr is submitting the attached record drawings documenting replacement of the dense non-aqueous liquid (DNAPL) tank and improvements to the subgrade vault, part of Operable Unit 3 (OU3) at the Joslyn Brooklyn Center Site. The work was conducted as described in the plans and letter submitted to the Minnesota Pollution Control Agency (MPCA) on September 8, 2016, except where noted herein.

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 was emptied in late 2015 and the OU3 system remained off until the new tank was connected. Plans were made to replace the tank and also modify the existing subgrade vault to minimize and manage water infiltration. Materials applied to modify and seal the vault required moderate weather conditions for proper curing, so the work was conducted between June 22 and August 30, 2017. Operation of the OU3 system resumed on August 9, 2017, after the new tank was installed.

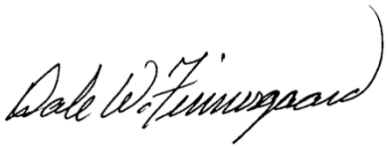
The work included the following general components:

- Cleaned, demolished, and removed the existing 2,000-gallon tank and vault roof.
    - Liquids from the tank cleaning were containerized and disposed of at the Clean Harbors Hazardous Waste disposal facility in Deer Park, Texas.
    - Insulation from under the vault roof and disposable personal protective equipment was disposed of as nonregulated solid waste.
    - The tank and vault roof were demolished and salvaged or disposed of as nonregulated solid waste.
- Cleaned the subgrade concrete vault, sealed walls, joints, and other potential water infiltration points.
- Constructed concrete piers to elevate the new tank above the vault floor.
- Added 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.
- Installed a new 2,000-gallon double-walled steel tank in the vault.

- Replaced the vault roof with a new single-panel roof, raised about one foot higher than the old roof.
- Installed a new high level float attached to the tank manway cover, accessible through the main vault access door.
- Installed a fluid measurement point in the new tank vent.
- Regraded to direct surface drainage away from the vault and added clean fill and topsoil as needed to meet the new roof elevation. The site was restored with new sod.

Project photos and record drawings are attached for your files. Thank you for your continued assistance on this project.

Sincerely,



Dale W. Finnesgaard, Vice President

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

Attachments:
Photos
Record Drawings

Removal of existing vault cover.

Old tank, vault cover removed, tank cleaned.

Tank removed, vault cleaned.

New footings poured.

Concrete patched, grout poured on floor, CIM 100 sealant being placed.

New tank and vent/access pipes installed.

New high level float and wiring installed.

Nonregulated solid waste (drums) and hazardous waste liquids (tanks).

New vault cover delivered.

New vault cover installed.

Vault cover in place, new sod placed.

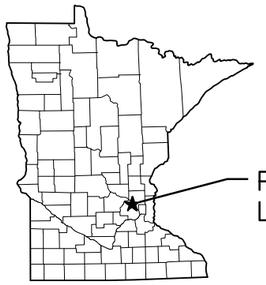
CONTRACT DRAWINGS

DNAPL PUMP-OUT SYSTEM MODIFICATION

JOSLYN MANUFACTURING AND SUPPLY CO. SITE

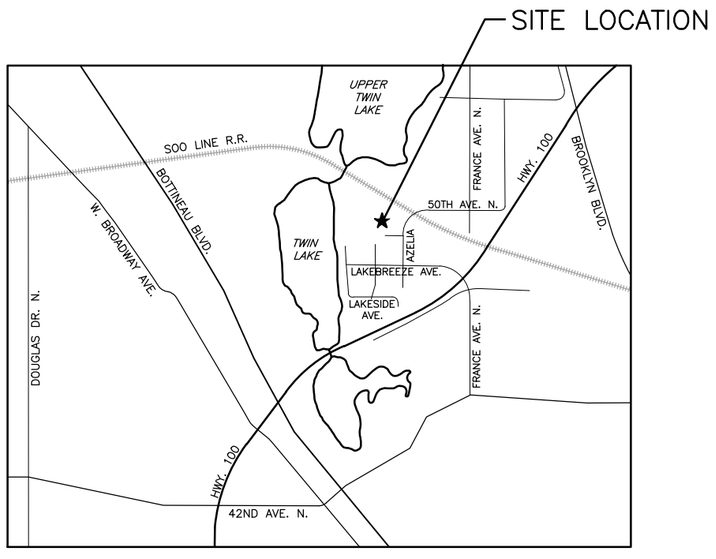
4837 AZELIA AVENUE NORTH

BROOKLYN CENTER, MINNESOTA

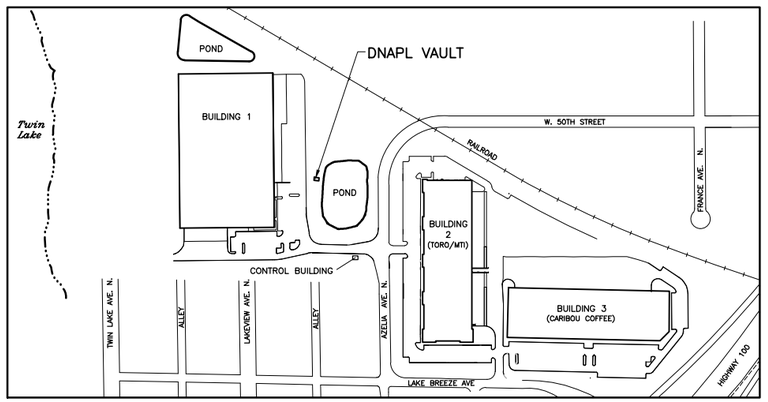


LOCATION MAP

SHEET INDEX



VICINITY MAP



SITE LOCATION MAP

GOPHER STATE ONE CALL

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

RECORD DRAWING

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
2	RLG	JLB	BTO	08/28/17	RECORD DRAWING

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

CLIENT								
BID								
CONSTRUCTION					9/8/16	3/28/17		
RECORD DWG							8/23/17	
RELEASED TO/FOR	A	B	C	0	1	2	3	
	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

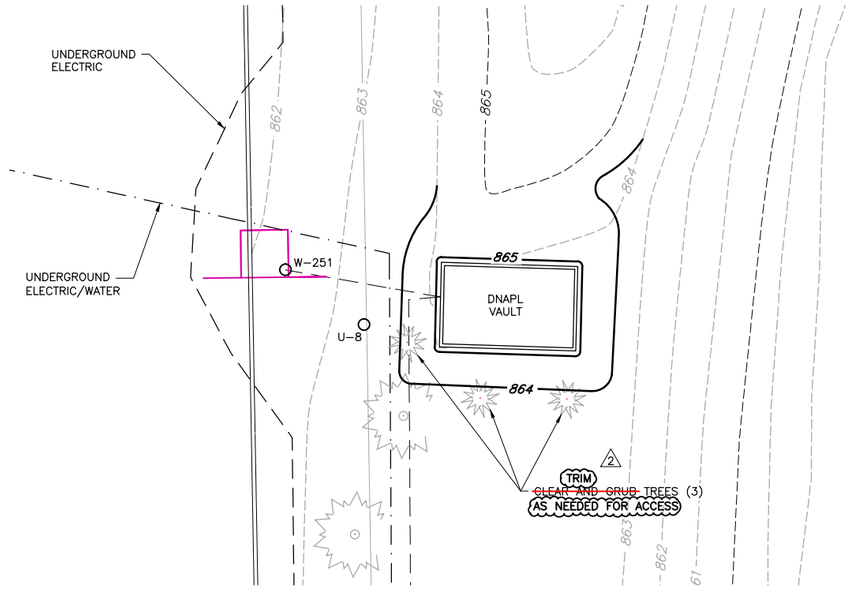
Scale	AS SHOWN
Date	08-03-16
Drawn	RLG
Checked	DWF, JLB
Designed	KAD
Approved	BTO

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.	REV. No.
G-01	2



1 PLAN: SITE GRADING PLAN

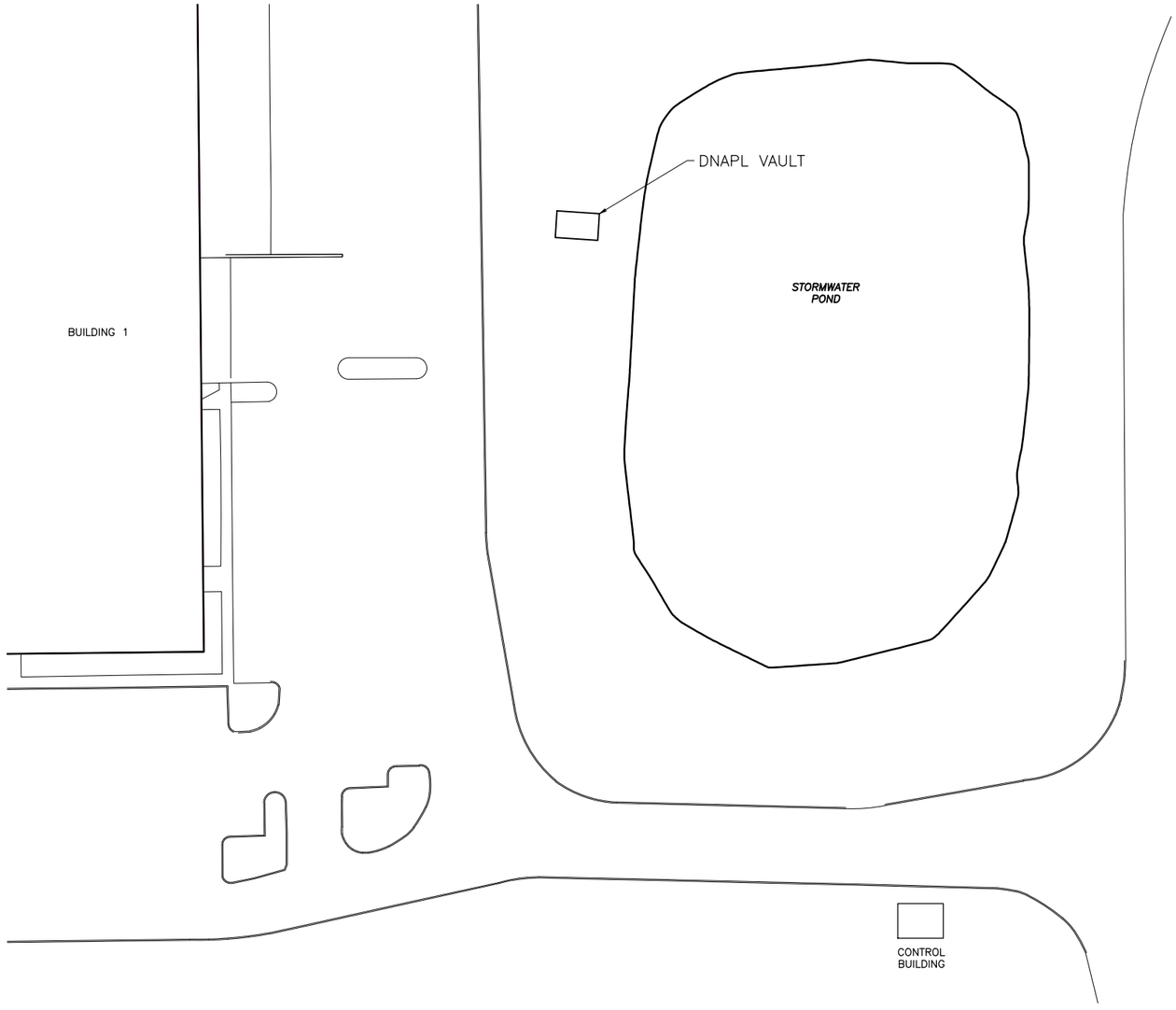
0 10 20
SCALE IN FEET

LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOUR
- UNDERGROUND ELECTRIC
- UNDERGROUND ELECTRIC/WATER

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.



2 PLAN: SITE ACCESS

0 30 60
SCALE IN FEET

RECORD DRAWING

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
2	RLG	JLB	BTO	08/28/17	RECORD DRAWING
1	RLG	BTO	BTO	02-20-17	ADD SITE ACCESS PLAN

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

RELEASED TO/FOR

	A	B	C	0	1	2	3
CLIENT							
BID							
CONSTRUCTION					9/8/16	12/28/17	
RECORD DWG							08/23/17

DATE RELEASED

BARR
Corporate Headquarters: Minneapolis, Minnesota
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Fax: (952) 832-2601
www.barr.com

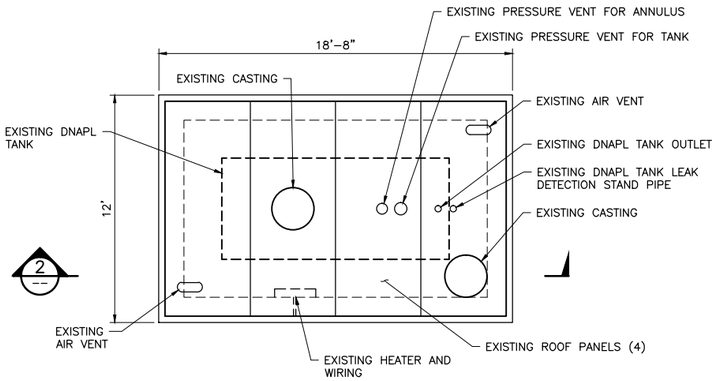
Scale	AS SHOWN
Date	08-03-16
Drawn	RLG
Checked	DWF, JLB
Designed	KAD
Approved	BTO

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. 2

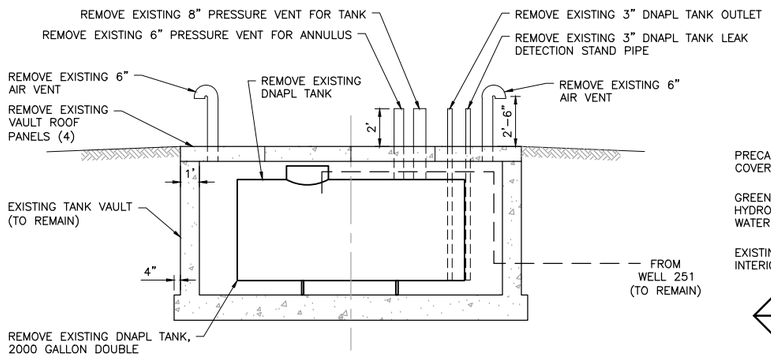


1 PLAN: EXISTING VAULT ROOF

0 2 4 6 8
SCALE IN FEET

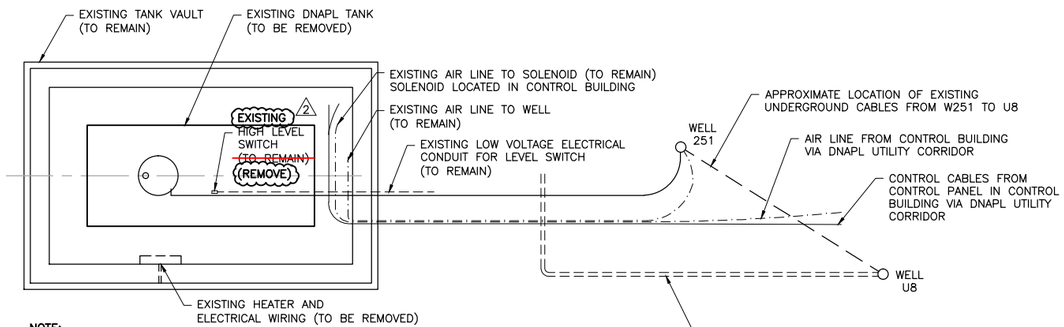
REMOVAL NOTES:

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

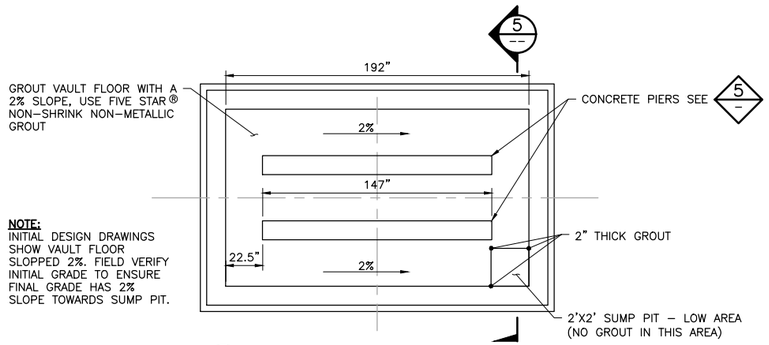
0 2 4 6 8
SCALE IN FEET



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

3 PLAN: EXISTING CONDITIONS

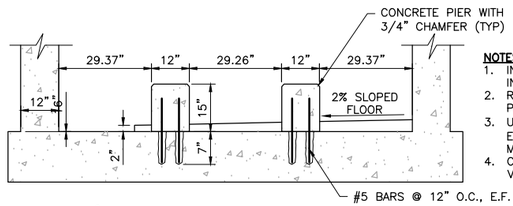
0 2 4 6 8
SCALE IN FEET



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

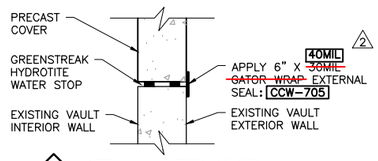


NOTES:

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"~~ 6" MINIMUM EMBEDMENT. (2)
4. CENTER CONCRETE PIERS LENGTHWISE IN VAULT.

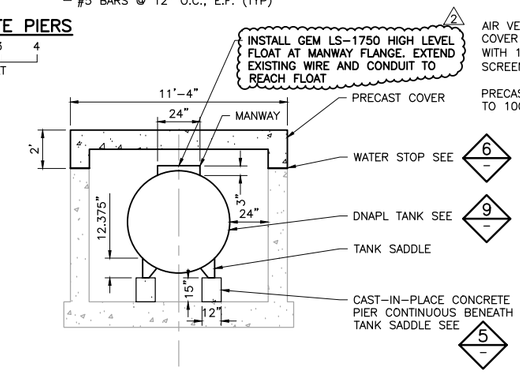
5 DETAIL: CONCRETE PIERS

0 1 2 3 4
SCALE IN FEET



6 DETAIL: WATER STOP

NO SCALE



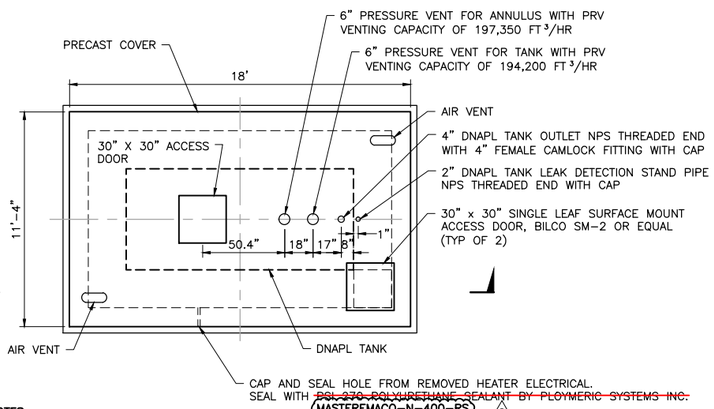
7 SECTION: PROPOSED COVER AND DNAPL TANK

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". (TWO COATS APPLIED) (2)
5. CENTER TANK ON PIERS. CENTERLINE IN TANK TO 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.

REPAIR LEAKS IN FLOOR AND WALLS WITH MASTEREMACO-N-400-RS. (2)



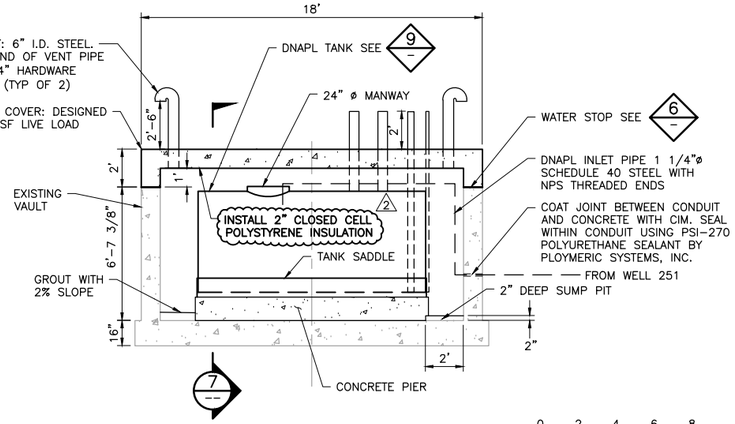
NOTES:

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).

(2) WITH DECK-O-SEAL OVER HBR-XL POLYETHYLENE FOAM BACKER ROD. USE PG PRIMER WITH DECK-O-SEAL ON GAPS >1"

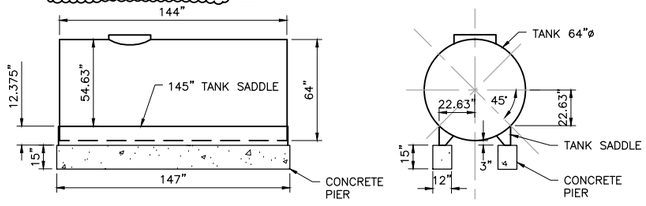
8 PLAN: PROPOSED COVER PLAN SEE SHOP DRAWING (2)

0 2 4 6 8
SCALE IN FEET



9 SECTION: PROPOSED COVER AND DNAPL TANK SEE SHOP DRAWING (2)

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

RECORD DRAWING

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
2	RLG	JLB	BTO	08/28/17	RECORD DRAWING
1	RLG	BTO	BTO	02-20-17	MODIFY HATCHES

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

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT							
BID							
CONSTRUCTION				9/8/16	5/28/17		
RECORD DWG						08/23/17	
DATE RELEASED							

BARR
Corporate Headquarters: Minneapolis, Minnesota
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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

DNAPL TANK VAULT PLAN AND SECTIONS

BARR PROJECT No.	
23270110.00	
CLIENT PROJECT No.	
DWG. No.	REV. No.
C-02	2

VENTING CAPACITY PRIMARY TANK: 194,200 CU. FT/HR
VENTING CAPACITY SECONDARY TANK: 197,350 CU. FT/HR

NOTES:
1. BUTT WELD INNER SHELL TO HEADS.
2. LAP WELD OUTER SHELL TO HEADS.
3. PRESSURE TEST INNER TANK FROM 3 psi. TO 5 psi. & VACUUM TEST INTERSTITIAL SPACE UP TO 7" hg.
4. APPLY TO EXTERIOR TWO COATS OF ENVIROLASTIC 840 DTM HIGH GLOSS URETHANE WHITE.

Level switch, no hole in precast cover required

2" DNAPL leak detection stand pipe, through precast cover

4" DNAPL tank outlet, through precast cover

2" main tank vent, through precast cover

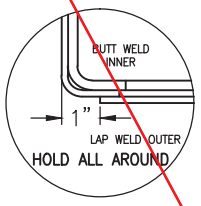
Cap

Cap

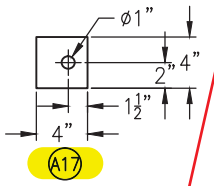
6" pressure vent, through precast cover

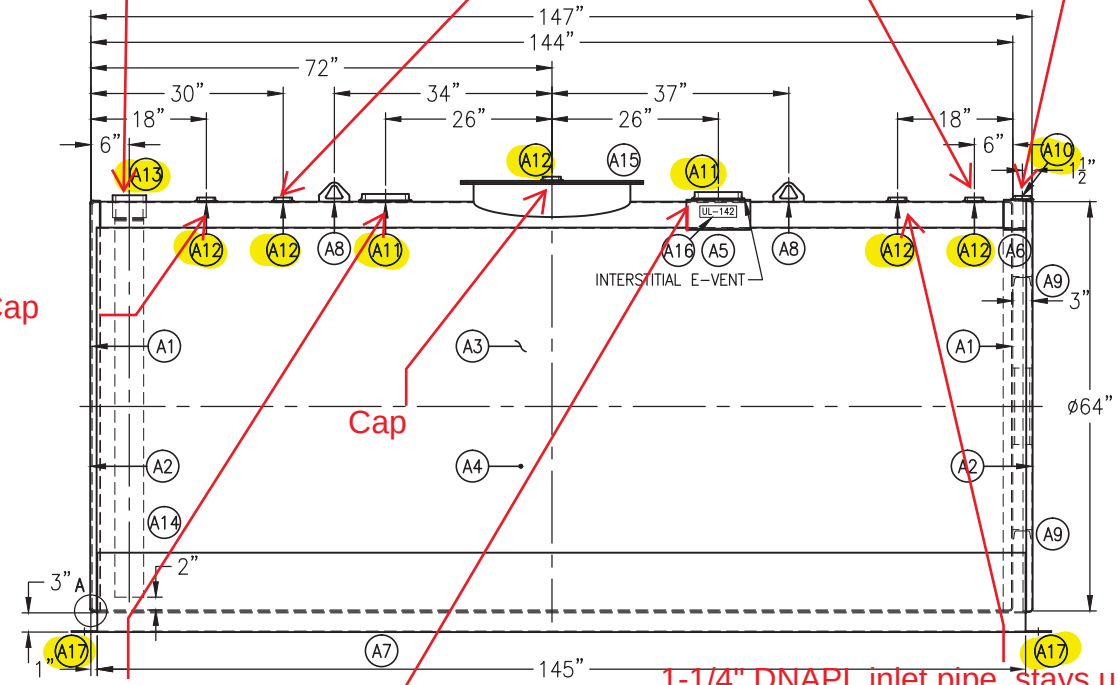
6" pressure vent, through precast cover

1-1/4" DNAPL inlet pipe, stays under precast cover, no hole in precast cover required

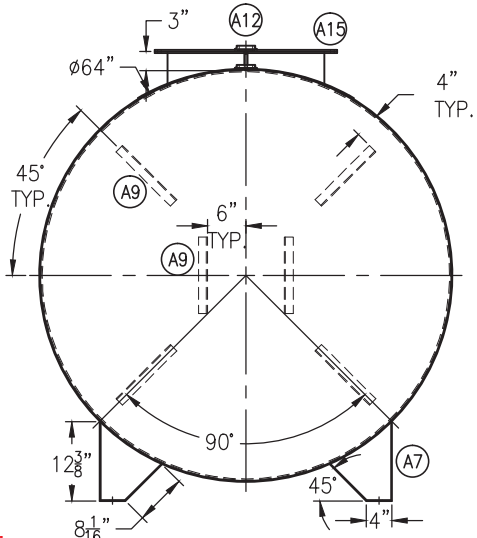


DETAIL A





ELEVATION VIEW



END VIEW

BILL OF MATERIALS

ITEM	QTY.	DESCRIPTION
A1	2	HEAD, 7 GA. x 64" O.D. FLANGED (INNER)(A36)
A2	2	HEAD, 10 GA. x 64" I.D. FLANGED (OUTER)(A36)
A3	1	COIL, 7 GA. x 64" O.D. x 144" LONG (INNER SHELL)(A36)
A4	1	COIL, 10GA. x 147"LONG x 169"C(300° OUTER SHELL)(A36)
A5	1	COIL, 10 GA. x 10" WIDE x 35½"C(INTERSTITIAL SHELL)(A36)
A6	1	COIL, 10 GA. x 3½" WIDE x 35½"C (MONITOR SHELL)(A36)
A7	2	SKIDS, 10 GA. x 3" HIGH x 145" LONG (A36)
A8	2	LIFT LUG, SMALL (A105)
A9	6	CHANNEL, C3 x 4.1# x 12" LONG (SPACER) (A36)
A10	1	THREADED WELD FLANGE, ø2" NPT (A105)
A11	2	THREADED WELD FLANGE, ø6" NPT(EMERGENCY VENT)(A105)
A12	5	THREADED WELD FLANGE, ø2" NPT (A105)
A13	1	FULL COUPLING, ø4" NPT (A105)
A14	1	PIPE, ø4" SCH 40 x 60½" LONG T.O.E. (A105)
A15	1	MANWAY, ø24" w/ COVER, GASKET, NUTS & BOLTS (A36)
A16	1	LABELS, UL-142 DOUBLE WALL SKID TANK
A17	4	PLATE, 10 GA. x 4" x 4" w/ ø1" HOLE

NO.	DATE	REVISION	INT	APP'D
2	06/02/17	REVISED PER CUSTOMER	DMS	
1	05/30/17	REVISED PER CUSTOMER	DMS	

Lannon Tank CORPORATION
20134 Main Street
P.O. Box 516 Lannon, WI 53046
Phone: 1-800-207-7890

TITLE: 5'-4" DIA. x 12' 2,000 GAL. D.W. SKID w/ 3" STANDOFF UL-142

DRN BY: DMS
CHKD BY:
CUSTOMER: ZAHL PETROLEUM
PO NO: 60394
DATE: 05/18/17
DWG NO: 2000DW.3
WEIGHT: 4,041 LBS.
SIZE: "A"
PAGE: 1 OF 1
SCALE: 1:30

HORIZONTAL TANK CALIBRATION CHART

PREPARED BY STEEL TANK INSTITUTE
Lake Zurich, IL
(708) 438-8265

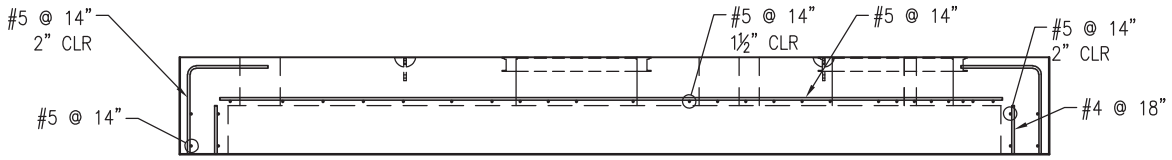
TANK DIAMETER 64.0 INCHES
TANK LENGTH 144.0 INCHES
TOTAL TANK CAPACITY 2005.4 GALLONS

INCHES	GALLONS	INCHES	GALLONS	INCHES	GALLONS	INCHES	GALLONS
0.000	0.00	10.750	222.18	21.500	591.43	32.250	1012.67
0.250	0.83	11.000	229.67	21.750	600.87	32.500	1022.64
0.500	2.35	11.250	237.23	22.000	610.33	32.750	1032.62
0.750	4.30	11.500	244.85	22.250	619.82	33.000	1042.59
1.000	6.62	11.750	252.54	22.500	629.33	33.250	1052.55
1.250	9.24	12.000	260.30	22.750	638.87	33.500	1062.52
1.500	12.13	12.250	268.11	23.000	648.43	33.750	1072.48
1.750	15.27	12.500	275.99	23.250	658.01	34.000	1082.44
2.000	18.63	12.750	283.93	23.500	667.61	34.250	1092.39
2.250	22.20	13.000	291.93	23.750	677.24	34.500	1102.34
2.500	25.97	13.250	299.98	24.000	686.89	34.750	1112.28
2.750	29.93	13.500	308.09	24.250	696.55	35.000	1122.21
3.000	34.06	13.750	316.26	24.500	706.24	35.250	1132.14
3.250	38.36	14.000	324.48	24.750	715.95	35.500	1142.05
3.500	42.82	14.250	332.75	25.000	725.67	35.750	1151.96
3.750	47.43	14.500	341.08	25.250	735.41	36.000	1161.86
4.000	52.19	14.750	349.45	25.500	745.17	36.250	1171.76
4.250	57.08	15.000	357.88	25.750	754.94	36.500	1181.64
4.500	62.12	15.250	366.35	26.000	764.73	36.750	1191.51
4.750	67.28	15.500	374.87	26.250	774.54	37.000	1201.36
5.000	72.57	15.750	383.44	26.500	784.36	37.250	1211.21
5.250	77.99	16.000	392.06	26.750	794.19	37.500	1221.04
5.500	83.52	16.250	400.72	27.000	804.03	37.750	1230.86
5.750	89.17	16.500	409.42	27.250	813.89	38.000	1240.66
6.000	94.93	16.750	418.17	27.500	823.76	38.250	1250.45
6.250	100.80	17.000	426.96	27.750	833.64	38.500	1260.23
6.500	106.77	17.250	435.79	28.000	843.53	38.750	1269.98
6.750	112.85	17.500	444.66	28.250	853.43	39.000	1279.73
7.000	119.02	17.750	453.57	28.500	863.34	39.250	1289.45
7.250	125.30	18.000	462.52	28.750	873.26	39.500	1299.16
7.500	131.67	18.250	471.51	29.000	883.19	39.750	1308.84
7.750	138.13	18.500	480.53	29.250	893.12	40.000	1318.51
8.000	144.68	18.750	489.59	29.500	903.06	40.250	1328.16
8.250	151.32	19.000	498.69	29.750	913.01	40.500	1337.78
8.500	158.05	19.250	507.82	30.000	922.96	40.750	1347.39
8.750	164.86	19.500	516.99	30.250	932.92	41.000	1356.97
9.000	171.76	19.750	526.19	30.500	942.88	41.250	1366.53
9.250	178.73	20.000	535.42	30.750	952.84	41.500	1376.07
9.500	185.79	20.250	544.68	31.000	962.81	41.750	1385.58
9.750	192.92	20.500	553.97	31.250	972.78	42.000	1395.07
10.000	200.12	20.750	563.29	31.500	982.75	42.250	1404.53
10.250	207.40	21.000	572.64	31.750	992.72	42.500	1413.96
10.500	214.75	21.250	582.02	32.000	1002.70	42.750	1423.37

HORIZONTAL TANK CALIBRATION CHART

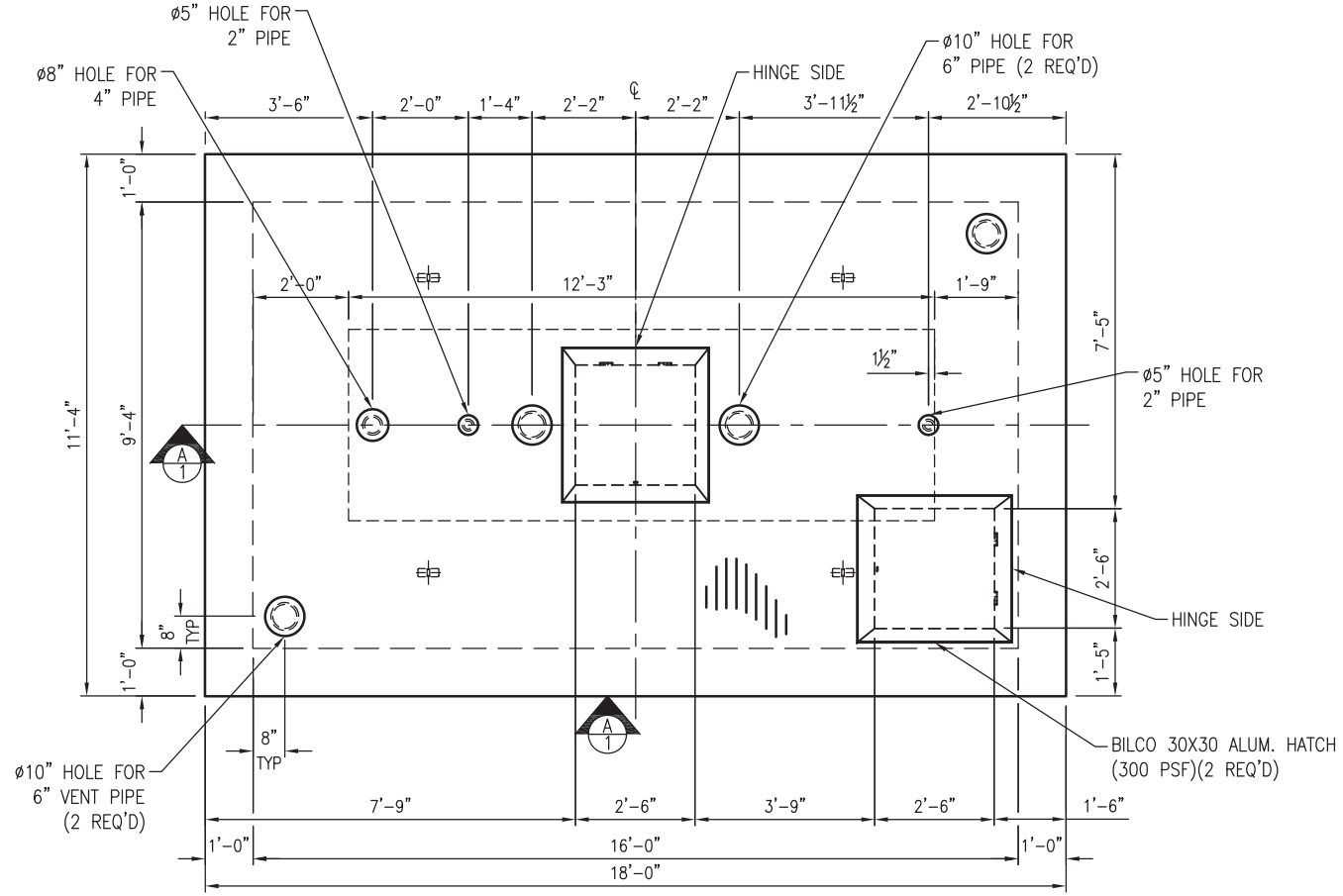
PREPARED BY STEEL TANK INSTITUTE
Lake Zurich, IL
(708) 438-8265

INCHES	GALLONS	INCHES	GALLONS	INCHES	GALLONS	INCHES	GALLONS
43.000	1432.75	48.250	1621.95	53.500	1790.64	58.750	1927.41
43.250	1442.10	48.500	1630.52	53.750	1797.99	59.000	1932.82
43.500	1451.43	48.750	1639.04	54.000	1805.27	59.250	1938.11
43.750	1460.72	49.000	1647.52	54.250	1812.48	59.500	1943.28
44.000	1469.98	49.250	1655.94	54.500	1819.61	59.750	1948.31
44.250	1479.21	49.500	1664.32	54.750	1826.66	60.000	1953.21
44.500	1488.41	49.750	1672.64	55.000	1833.64	60.250	1957.97
44.750	1497.57	50.000	1680.92	55.250	1840.53	60.500	1962.58
45.000	1506.70	50.250	1689.14	55.500	1847.34	60.750	1967.04
45.250	1515.80	50.500	1697.30	55.750	1854.07	61.000	1971.33
45.500	1524.86	50.750	1705.41	56.000	1860.71	61.250	1975.47
45.750	1533.89	51.000	1713.47	56.250	1867.26	61.500	1979.42
46.000	1542.87	51.250	1721.46	56.500	1873.73	61.750	1983.19
46.250	1551.82	51.500	1729.40	56.750	1880.10	62.000	1986.77
46.500	1560.73	51.750	1737.28	57.000	1886.37	62.250	1990.13
46.750	1569.61	52.000	1745.10	57.250	1892.55	62.500	1993.27
47.000	1578.44	52.250	1752.85	57.500	1898.62	62.750	1996.16
47.250	1587.23	52.500	1760.54	57.750	1904.60	63.000	1998.78
47.500	1595.97	52.750	1768.17	58.000	1910.47	63.250	2001.09
47.750	1604.68	53.000	1775.73	58.250	1916.23	63.500	2003.05
48.000	1613.34	53.250	1783.22	58.500	1921.87	63.750	2004.57



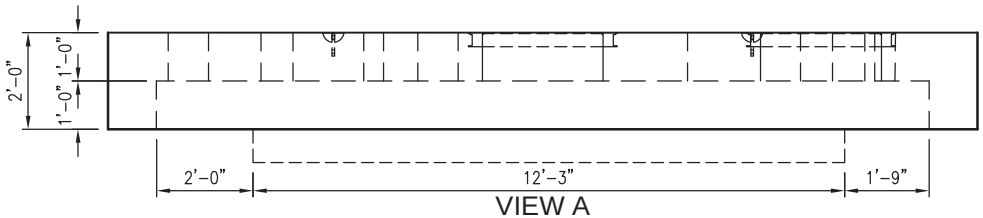
S1

NOT TO SCALE



PLAN VIEW

SCALE: 1/4" = 1'-0"



VIEW A

SCALE: 1/4" = 1'-0"

DESIGN NOTES

1. DESIGN CODE: ACI 318-14
2. CONCRETE: 28 DAY COMPRESSIVE STRENGTH f'c= 6000 PSI
3. REBAR: ASTM A-615 GRADE 60
4. CEMENT: ASTM C-150 SPECIFICATIONS
5. LOADS:
   A. UNIFORM LIVE LOAD= 105 PSF
   B. SOIL WEIGHT = 120 PCF
   C. CONCRETE WEIGHT= 150 PCF
   D. DESIGN FILL RANGE 0' MIN, 2' MAX
   E. ASSUMED WATER TABLE: 5' BELOW FINISHED GRADE
   F. EQUIV. FLUID PRESSURE = 40 PCF
   G. LIVE LOAD SURCHARGE= 80 PSF
   H. REPLACEMENT LID TO BE SUPPORTED UNIFORMLY ON ALL FOUR SIDES
6. JOINT SEALANT: ASTM C-990
7. NO HEAVY EQUIPMENT /CONSTRUCTION LOADS SHALL BE APPLIED, PRECAST STRUCTURE NOT DESIGNED FOR ADDITIONAL LIVE OR SURCHARGE LOADING.
8. CONCRETE DESIGNED FOR 300 PSF LIVE LOAD. COVER SELECTED BY CONTRACTOR RATED FOR 105 PSF

WEIGHTS	
TOP SLAB	25,400 LBS

Oldcastle Precast®
5230 N.W. 17th TOPEKA, KS 66618
PHONE: 785-232-2982 FAX: 785-232-5842

9-4X16X1 -LID

SUBMITTAL

DNAPL PUMP OUT SYSTEM

CUSTOMER

US SITE WORK

DATE	SALES	DRAWN	ENGINEER	CHECKED	SALES ORDER
6/5/17	BG	NG			25398

DRAWING NUMBER	REVISION	SHEET
120-SO25398-9-4X16-ID-LID	3 REV DATE 06/02/17	1 OF 2

Jennifer L. Brekken

From: Dahlmeier, Andri (MPCA) <andri.dahlmeier@state.mn.us>
Sent: Wednesday, October 04, 2017 5:02 PM
To: Jennifer L. Brekken; Timm, Allan (MPCA)
Subject: Joslyn Brooklyn Center Annual Monitoring

Hello Jennifer,

This email is to notify you that MPCA approves without comment the proposed monitoring plan for 2017 as provided in the 2016 Operable Units 1, 2, and 3 Operations and Monitoring Annual Report (provided by Barr on April 28, 2017). Comments on the annual monitoring report will be provided on a later date.

Regards,

Andri Dahlmeier
Superfund Project Manager
Remediation Division | MPCA
520 Lafayette Road N | St. Paul, MN | 55155
Office 651-757-2718 | Fax 651-296-5341
andri.dahlmeier@state.mn.us | www.pca.state.mn.us

MINNESOTA POLLUTION CONTROL AGENCY

Jennifer L. Brekken

From: Dahlmeier, Andri (MPCA) <andri.dahlmeier@state.mn.us>
Sent: Tuesday, January 30, 2018 11:11 AM
To: Jennifer L. Brekken
Cc: Sara Gaffin; Timm, Allan (MPCA)
Subject: Joslyn 2016 Annual Report

Hi Jennifer,
Thank you for submitting the "*2016 Annual Operations and Monitoring Report, Operable Units 1, 2, and 3, Joslyn Manufacturing & Supply Co., Brooklyn Center, Minnesota*" dated April 2017. MPCA approves this report and has a few minor comments below:

- Note that MPCA approved (by email) the sampling plan portion of the report prior to the October 2016 groundwater sampling event.
- U1/U1A – sampling results in 2016 indicate that the PCP plume no longer extends that far (eastern boundary). Continue sampling there as recommended in the report.
- W7 - had highest concentrations of PCP in 2016, and W6N has had recent PCP concentration fluctuations; however, PCP was not detected further off-site from W7/W6N (at W127N). MPCA agrees that W7 and W6N should continue to be monitored semiannually, and W127N should be monitored annually.
- Continue monitoring W10 annually as noted in report to observe PCP trend – this well appears to have generally increasing PCP detections over time.

Please call or email with any questions or comments.

Regards,

Andri Dahlmeier
Superfund Project Manager
Remediation Division | MPCA
520 Lafayette Road N | St. Paul, MN | 55155
Office 651-757-2718 | Fax 651-296-5341
andri.dahlmeier@state.mn.us | www.pca.state.mn.us

Appendix F

Laboratory and Field Data

(Included on CD in hard copy report)

2017 Field Data

Weekly Readings

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 1-5-2017 — 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 8 5 0 0 0	0.0	42	* NOT Running
U1A	6 7 5 3 1 9 0	OFF	0 -> 10	Used as needed
U2A	8 7 7 8 1 4 0	19	22	ON
W253	4 0 1 0 1 3 0	off	0 -> 5	Check On / (Off) schedule
U5	3 8 8 3 8 1 0	1	4	ON
U4	9 1 6 3 9 7 0	16	16	ON
U8 / U1	0 9 7 2 5 0 0	0.0	0	Off
W255	3 4 2 6 8 5 0	6.5	0 -> 5	Check (On) Off schedule
U6	2 7 7 2 2 5 0	16	15	ON
U7	9 7 0 3 9 7 0	19	18	ON
U11	1 0 6 8 3 3 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: DNAPL Vault Depth to Water 6.19'

* U12 Breakers ok, Switch on no water to Vault.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 1-5-17 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: 1300 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting
Topic: Sure footing on 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.):

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 1-12-17 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 9 8 5 1 0 0	0.0	42	Pump on No Flow
U1A	[redacted] 6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	[redacted] 8 9 5 5 6 2 0	19	22	ON
W253	[redacted] 4 0 1 0 1 3 0	0.0	0 -> 5	Check On / (Off) schedule
U5	[redacted] 3 8 9 3 3 9 0	1	4	ON
U4	[redacted] 9 3 2 3 9 8 0	16	16	ON
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 3 4 9 2 1 9 0	6	0 -> 5	Check (On) / Off schedule
U6	[redacted] 2 9 2 6 1 4 0	15.5	15	ON
U7	[redacted] 7 8 9 0 6 4 0	19	18	ON
U11	[redacted] 1 2 8 3 0 2 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)

Notes:

- DNAPL Vault Depth to water 6.14' - New probe battery needed.

- V12 pump on - Not pumping. TL Stevens scheduled for service on Wednesday January 18th

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 1-12-17 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)	0			
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: 0945 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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 1-18-17 Project manager notified prior to site visit. Y / N
Barr Technician: JWJ/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 7 9 8 5 6 0 0	0 → 32	42	* Pigged - new pump
U1A	[redacted] 6 7 5 3 1 9 0	0	0 > 10	Used as needed
U2A	[redacted] 9 1 1 2 8 5 0	20 → 20	22	Pigged
W253	[redacted] 4 0 1 0 1 3 0	0	0 -> 5	Check On / Off schedule
U5	[redacted] 3 9 0 1 7 2 0	21	4	
U4	[redacted] 9 4 6 0 5 6 0	16	16	
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 3 5 4 8 5 9 0	7	0 -> 5	Check On / Off schedule
U6	[redacted] 3 0 5 8 7 0 0	16	15	
U7	[redacted] 8 0 5 1 7 2 0	18.5	18	
U11	[redacted] 1 4 6 2 8 8 0	21 → 24	22	PIGGED
	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)

Pigged	Start	Stop	total time	total gallons	pH
U12			39 minutes (JWJ)	~1250 gallons (JWJ)	7.38
U11			14 mins	~300 gallons	7.66
U2A	10 min + 10 min + 10 min		30 minutes	660 gallons	7.72

Notes:
~~Swapped pump @ U12~~
* U12 pitless connection to rest of drop pipe rusted out. Pump found @ bottom of well. TL Stevens ordered new 8'4" drop pipe (Stainless Steel).
* Concrete next to door to building heaved, does not shut off well. Needs repair.
* Water column in vault (DNAPL) = 1.49'
* Drop pipe repaired, flows out U12 ~28 gpm, replaced pump and pigged 2 times

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 1-25-17
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 8 0 7 7 7 0 0	0.0	42	Breaker Tripped.
U1A	6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	9 3 1 1 4 5 0	19	22	ON
W253	4 0 1 0 1 3 0	off	0 -> 5	Check On / (Off) schedule
U5	3 9 1 1 7 9 0	1	4	ON
U4	9 6 2 2 1 3 0	16	16	ON
U8 / U1	0 9 7 2 5 0 0	0.0	0	Off
W255	3 6 1 7 5 1 0	6.5	0 -> 5	Check (On) / Off schedule
U6	3 2 2 0 2 2 0	15	15	ON
U7	8 2 4 8 4 0 0	19	18	ON
U11	1 7 0 4 6 3 0	22	22	ON
	Total		**144**	

On / Off Schedule

	~~2016~~ 2017	
	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 1 TREE
Has there been any evidence of trespassing? Y / (N)
Any areas of concern with the West Area, or fence? (Y) / N (Sketch Below) 1 Tree
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: U12 Breaker in Starter B of tripping. TL Stevens (Joe) will Bring a new Box to the site 1/26 @ 0830.

U2A, U11 and U4 have been treated to reduce well and transfer line fouling.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 1-25-17 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: 1430 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: 1-30-17 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

Buddy System

Recovery Well	Meter Readings (Gal.)							Actual Flow Rate GPM	Design Flow Rate GPM	Comments: meter ticks, max flow = below optimal,
U12	6	8	0	7	8	1	0	0	46	42	ON
U1A	[redacted]							0	off	0 -> 10	Used as needed
U2A	[redacted]	9	4	4	6	9	4	0	20	22	ON
W253	[redacted]	4	0	1	0	1	3	0	off	0 -> 5	Check On / (Off) schedule
U5	[redacted]	3	9	1	8	6	1	0	1	4	ON
U4	[redacted]	9	7	3	1	7	1	0	16	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	3	6	6	4	5	7	0	6.5	0 -> 5	Check On / Off schedule
U6	[redacted]	3	3	3	0	2	8	0	15	15	ON
U7	[redacted]	8	3	8	2	8	0	0	18	18	ON
U11	[redacted]	1	8	6	3	3	5	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)

one tree on west area fence.

Notes:

- U12 pump and/or motor failure. See (TL Summary) onsite
- 40S20-7 pump and 5 Hp motor removed.
- New 45S50-12 pump and New 5Hp motor installed.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 1-30-17 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault		@ VR	
Time Interval at Location	Constant Venting		Power LOTO at Control Bldg.	
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: 1300 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting
Topic: VR2 power LOTO applied @ control panel.

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: 2-8-2017 Project manager notified prior to site visit. (Y) / N
Barr Technician: PWS Project manager notified before leaving site. (Y) / N EMJ
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	8	6	7	4	9	0	0	48	42	ON
U1A	[redacted]							0	~~0 -> 10~~	~~0 -> 10~~	~~Used as needed~~ off
U2A		9	6	9	1	7	8	0	19	22	ON
W253		4	0	1	0	1	3	0	off	0 -> 5	Check On / Off schedule
U5		3	9	3	0	7	3	0	1	4	ON
U4		9	9	3	7	7	7	0	16	16	ON
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		3	7	4	9	7	2	0	6	0 -> 5	Check On / Off schedule
U6		3	5	2	8	9	0	0	16	15	ON
U7		8	6	2	6	2	1	0	19	18	ON
U11		2	1	4	3	4	7	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 1 TREE
Has there been any evidence of trespassing? Y / (N) 1 TREE
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: - Tree on west Area fence. Scheduled for removal next week.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 2-8-2017 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)	0			
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: 1250 Conducted by: PWS

Topic: Slip, trip and fall on uneven icy 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: 2-14-2017
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	9	0	7	8	4	0	0	48	42	ON
U1A								0		~~0 -> 10~~	~~Used as needed~~ off
U2A		9	8	5	4	3	3	0	19	22	ON
W253		4	0	1	0	1	3	0	0 ff	0 -> 5	Check On / Off schedule
U5		3	9	3	8	9	7	0	1	4	ON
U4		0	0	7	2	4	2	0	15/17	16	ON
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		3	8	0	6	9	2	0	6.25	0 -> 5	Check On / Off schedule
U6		3	6	6	1	8	5	0	16	15	ON
U7		8	7	8	9	5	9	0	19	18	ON
U11		2	3	2	5	7	5	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 I Tree
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) I Tree
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y (N) Discolored wires? Y (N)

Notes: - West Area fence scheduled for tree removal and repair on 2/20/17

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: 2-14-2017 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)	0			
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: 1330 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting
Topic: Sure footing on Slippery 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: 2-16-2017
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 prior email/update ENW

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:
- el received a call from Mike Webber @ City of BC
office # 763-585-7104
cell # 651-775-3579

- Mike stated he is the new Utility Supervisor for City of BC and Lift Station #6 (in front of Caribou) is not turning off with the switch locked in their control panel.

- Meeting @ 2:00 pm for shutdown testing.

- Shutdown switch tested in City control panel turned system off. Water continues to flow from Separator tank for 10-15 min.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 2-16-17 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Control Panel			
Time Interval at Location	No work on personal Control panel parts			
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)				
Organic Vapor Readout (ppm)	X			
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: 1230 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting
Topic: Testing of Control panel components.

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: 2-20-2017 Project manager notified prior to site visit. Y / N
Barr Technician: 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	9	4	6	4	7	0	0	46	42	ON
U1A	[redacted]							0		~~0 -> 10~~	~~Used as needed~~ OFF
U2A	[redacted]	0	0	1	2	1	9	0	19	22	ON
W253	[redacted]	4	0	1	6	1	3	0	off	0 -> 5	Check On / (Off) schedule
U5	[redacted]	3	9	4	6	9	5	0	1	4	ON
U4	[redacted]	0	2	2	7	0	6	0	19	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	3	8	6	2	3	1	0	6.5	0 -> 5	Check (On) / Off schedule
U6	[redacted]	3	7	9	1	0	5	0	16	15	ON
U7	[redacted]	8	9	4	7	7	2	0	19	18	ON
U11	[redacted]	2	5	1	0	7	0	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:
- 2 large trees removed from west side of west area fence.
- Wells U2A, U11 and U12 Treated with 1 lbs each of dissolved chlorine solution.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 2-20-17 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	West Area			
Time Interval at Location	Constant			
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)	Open Air			
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: 1220 Conducted by: PWS / SRNZ

☐ Daily "Tool-Box" Safety Meeting

Topic: Chainsaw use.
- 2nd person maintain a safe distance from Stew and falling trees
- Saw off until ready to cut.
- Sure footing - slipping/wet

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: 2-28-17 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	9	9	7	3	4	0	0	44	42	ON
U1A	[redacted]	6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A	[redacted]	0	2	2	7	6	4	0	19	22	ON
W253	[redacted]	4	0	1	0	1	3	0	off	0 -> 5	Check On / (Off) schedule
U5	[redacted]	3	9	5	7	7	3	0	1	4	ON
U4	[redacted]	0	4	3	8	1	8	0	18	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	3	9	3	7	4	3	0	6.5	0 -> 5	Check On / Off schedule
U6	[redacted]	3	9	6	6	7	2	0	16	15	ON
U7	[redacted]	9	1	6	2	0	8	0	19	18	ON
U11	[redacted]	2	7	5	8	8	7	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 *

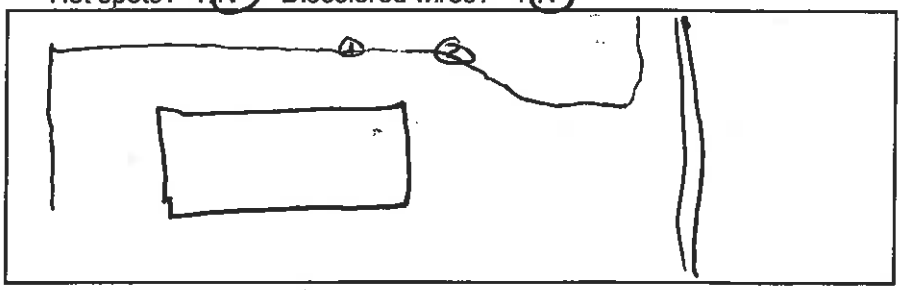
Any areas of concern with the West Area, or fence? (Y) / N (Sketch Below)

Air compressor tank pressure 6 (psi)

Vault copper lines inspection (Pass) Fail

Control panel inspection (By trained individuals only)

Hot spots? Y (N) Discolored wires? Y (N)



Notes: * Police tape on west area fence ① and Jacket inside fence on a tree.

② The gate has been kicked open - Bracket Bent Back and got re-locked.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 2-28-17 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 0900 Conducted by PWS

☒ Daily "Tool-Box" Safety Meeting
Topic: Watch for trespassers in work area.

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: 3-9-2017 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	7	0	5	6	1	3	0	0	44	42	ON
U1A		6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A		0	4	7	8	3	1	0	19	22	ON
W253		4	0	1	0	1	3	0	off	0 -> 5	Check On / (Off) schedule
U5		3	9	7	0	2	2	0	1	4	ON
U4		0	6	6	3	3	3	0	16	16	ON
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		4	0	2	6	0	0	0	7	0 -> 5	Check (On) / Off schedule
U6		4	1	7	3	5	0	0	15	15	ON
U7		9	4	1	4	3	8	0	19	18	ON
U11		3	0	4	2	9	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 90 (psi)
Vault copper lines inspection (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/(N) Discolored wires? Y/(N)

Orange item can be seen from east side of west area fence. The orange item is located near where the last tent was erected.
- Inspection will be made next week w/ 2 people.

Notes: * Vault air monitoring completed.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 3-9-17 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 ~~2.0%~~ 0.0% PWS	O_2 20.8%	CO 0.0	H_2S 0.0
Organic Vapor Readout (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

CHECK (☐) THE FOLLOWING AFTER COMPLETION

Time: 1645 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.):

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 3-14-17 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	7 0 8 4 5 1 0 0	42	42	ON
U1A	[redacted] 0	off	0 -> 10	Used as needed
U2A	[redacted] 0 6 0 0 8 5 0	18	22	ON
W253	[redacted] 4 0 1 0 3 4 0	6.5	0 -> 5	Check (On) / Off schedule
U5	[redacted] 3 9 7 6 3 6 0	1	4	ON
U4	[redacted] 0 7 6 7 7 6 0	15/16	16	ON / Adjusted 4
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 4 0 6 9 8 3 0	off	0 -> 5	Check On / (Off) schedule
U6	[redacted] 4 2 7 6 3 0 0	16	15	ON
U7	[redacted] 9 5 3 9 8 7 0	19	18	ON
U11	[redacted] 3 1 8 1 6 1 0	21/22	22	ON / Adjusted 4
	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: * W255 turned off and W253 turned on.

- Brian Oakley (BARR) and Ryan Johnson (Clean Harbors) onsite for DNAPL Vault replacement meeting.

- Orange object in West area is no longer visible from the east side Lee Road.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 3/14/17 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: 0830 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting
Topic: No Contact with Water or DNAPL

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

BARR

Monthly Readings 4 WEEKLY
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 3/21/17
Technician: SDI
Quarter (1st) 2nd 3rd 4th

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	7	1	2	3	6	7	0	0	40	42		
U1A	[redacted]							0	0	0 -> 10		OFF
U2A	[redacted]	0	7	8	3	3	8	0	18	22		
W253	[redacted]	4	0	6	6	1	5	0	5.5	0 -> 5		
U5	[redacted]	3	9	8	5	7	9	0	1	6		
U4	[redacted]	0	9	2	7	8	5	0	13.5	16		
U8 / U1	[redacted]							0	0	0		OFF
W255	[redacted]	4	0	6	9	8	3	0	0	0 -> 5		OFF
U6	[redacted]	4	4	3	1	0	2	0	16	15		
U7	[redacted]	4	7	2	8	7	6	0	18	18		
U11	[redacted]	3	3	9	0	3	9	0	21	22		
					Total					**146**		

Product / Water Levels:

				Time				Time
W 253	Water Level	Below 60'	On/Off		Water Level		On/Off	
W 255	Water Level	16.71	On/Off		Water Level		On/Off	
W 300spn	Water Level	18.90						
W 328	Water Level	13.33						

Tank Effluent Sample (Y) N pH 6.91 Temp 9.00 Cond 749 D.O. 3.89 EH -71.4 TURB. 1.11

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	14.63	DNAPL =	—
Oil =	—	DNAPL =	79.80	Water =	6.30
				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:

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 3-28-2017 Project manager notified prior to site visit. Y / (N) Buddy System

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	7	1	6	1	3	1	0	0	36/44	42	ON Pigged 3x
U1A	[redacted]	6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A	[redacted]	0	9	6	2	8	8	0	18/23	22	ON Pigged 3x
W253	[redacted]	4	1	1	9	4	8	0	5	0 -> 5	Check (On) / Off schedule
U5	[redacted]	3	9	4	5	3	6	0	1	4	ON
U4	[redacted]	1	0	8	0	5	7	0	15	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	4	0	6	9	8	3	0	off	0 -> 5	Check On / (Off) schedule
U6	[redacted]	4	5	8	4	9	3	0	16	15	ON
U7	[redacted]	9	9	1	6	5	8	0	19	18	ON
U11	[redacted]	3	5	9	2	7	7	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) off

Vault copper lines inspection (Pass) / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y (N) Discolored wires? Y (N)

Notes: U2A Pigged 3x @ 24 gpm for 36m. = 864g Sampled @ 1030

U12 Pigged 3x @ 50 gpm for 22m = 1100g Sampled @ 1125

U11 Pigged 3x @ 30 gpm for 12m = 360g Sampled @ 1215

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 3-28-17 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: 0800 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting

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.):

Final Q1 2017 Readings

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 3-31-17 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	7 1 8 0 4 5 0 0	44	42	ON
U1A	[redacted] 6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	[redacted] 1 0 4 6 3 0 0	19	22	ON
W253	[redacted] 4 1 4 5 8 9 0	6	0 -> 5	Check On / Off schedule
U5	[redacted] 3 9 9 9 6 9 0	1	4	ON
U4	[redacted] 1 0 9 8 7 5 0	16	16	ON - meter stuck / Sensed ok.
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 4 0 6 9 8 3 0	off	0 -> 5	Check On / Off schedule
U6	[redacted] 4 6 5 4 3 7 0	16	15	ON
U7	[redacted] 0 0 0 1 2 1 0	19	18	ON
U11	[redacted] 3 6 8 7 0 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 _____(psi)

Vault copper lines inspection: Pass / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/N Discolored wires? Y/N

Notes:

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 4-3-2017 Project manager notified prior to site visit. Y (N) onsite
Barr Technician: PWS / 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	71,984,250	44	42	ON
U1A	[redacted]6,705,319,0	off	0 -> 10	Used as needed
U2A	[redacted]1,123,962,0	19	22	ON
W253	[redacted]4,169,961,0	off	0 -> 5	Check On / (Off) schedule
U5	[redacted]4,003,620,0	1	4	ON
U4	[redacted]1,165,350,0	16	16	ON
U8 / U1	[redacted]0,972,750,0	0.0	0	Off
W255	[redacted]4,069,961,0	6	0 -> 5	Check On / Off schedule
U6	[redacted]4,717,700,0	16	15	ON
U7	[redacted]0,078,450,0	19	18	ON
U11	[redacted]8,773,120,0	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: W253 turned off, W255 turned on.

- US Sitworks onsite for DNAPL Vault replacement bid meeting.

*Small fence tightening required on lakeside of west Area.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 4-3-2017 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: 0850 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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 4-6-2017
Barr Technician: PWS / SWS

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							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	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

Onsite for West Area fence repair.

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: 4/6/2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	West Area			
Time Interval at Location				
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: 1430 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting
Topic: - Sure footing on uneven surfaces.
- Line of fire for cable winch and fence stretcher.
Attended:
- Be aware of trip hazards.
- Maintain safe distance from wildlife.
- Proper gloves during fence repair.

☐ 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: 4-11-17
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	7	2	4	9	6	3	0	0	42	42	ON
U1A		6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A		1	3	4	4	0	2	0	18	22	ON
W253		4	1	6	9	9	1	0	off	0 -> 5	Check On / (Off) schedule
U5		4	0	1	4	3	6	0	1	4	ON
U4		1	3	5	2	8	0	0	16	16	ON
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		4	1	4	7	9	8	0	6.25	0 -> 5	Check (On) / Off schedule
U6		4	8	9	4	9	6	0	16	15	ON
U7		0	3	0	0	7	8	0	19	18	ON
U11		4	0	1	5	7	1	0	20/21	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:
- U2A Valve 100% open
- U11 Valve now 100% open

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 4-11-17 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: 1350 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: Safe driving

No contact w/ 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.):

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 4-14-17 Project manager notified prior to site visit. Y / N Buddy System
Barr Technician: PMS/SWS 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]	2	6	7	6	8	0	0	42	42	ON
U1A		6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A		1	4	2	1	8	1	0	23	22	ON
W253		4	1	6	9	9	1	0	off	0 -> 5	Check On / Off schedule
U5		4	0	1	8	0	4	0	1	4	ON
U4		1	4	1	7	1	3	0	17	16	ON - New kit
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		4	1	7	5	8	7	0	6.5	0 -> 5	Check On / Off schedule
U6		4	9	6	4	9	8	0	16	15	ON
U7		0	3	8	0	1	4	0	19	18	ON
U11		4	1	0	1	3	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:
- Spring vault cleaning with pressure washer completed
- Wells U2A, U11 and U12 Treated to kill fouling of pump intake, well screen and transfer line
- Q2 Floats tested
- High Soaring lift Station - ok
- High Separator tank level - ok
- Street manhole high level - ok
- New internal parts kit installed in U4.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 4-14-17 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)	0			
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: 1200 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting
Topic: - No contact with groundwater or cleaning 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: 4-18-2017 — 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	72907600	42	42	ON
U1A	6705319	off	0 -> 10	Used as needed
U2A	1528720	20	22	ON
W253	4169910	off	0 -> 5	Check On / (Off) schedule
U5	4023531	1	4	ON
U4	1516616	17	16	ON
U8 / U1	0972500	0.0	0	Off
W255	4213430	7	0 -> 5	Check (On) / Off schedule
U6	5052791	16	15	ON
U7	0487140	20	18	ON
U11	4144120	off / off	22	ON / off
	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 meter needs a new internal parts kit. - Pump is flowing but not recording - Pump turned off.

Part # 33334-010

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 4-18-17 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)	0			
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: 1145 Conducted by: PWS

☑ ~~Daily~~ "Tool-Box" Safety Meeting
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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 4-21-2017
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	7307788 00	40	42	ON
U1A	[redacted]67531900	off	0 -> 10	Used as needed
U2A	[redacted]16081200	19	22	ON
W253	[redacted]41699100	off	0 -> 5	Check On / Off schedule
U5	[redacted]40275800	1	4	ON
U4	[redacted]15902300	17	16	ON
U8 / U1	[redacted]09725000	0.0	0	Off
W255	[redacted]42741600	6.5	0 -> 5	Check On / Off schedule
U6	[redacted]51187100	16	15	ON
U7	[redacted]05676700	19	18	ON
U11	[redacted]41442200	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)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: - Onsite for U1 meter repair
- New internal parts kit installed - U11 restarted.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 4-21-2017 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)	D			
Organic Vapor Readout (ppm)	D			
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: 1115 Conducted by: PWS

Topic: -3 Points of Contact on 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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 4-26-2017 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	7 3 3 5 5 9 0 0	40	42	ON
U1A	[redacted] 6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	[redacted] 1 7 3 8 1 3 0	19	22	ON
W253	[redacted] 4 1 6 9 9 1 0	Off	0 -> 5	Check On / Off schedule
U5	[redacted] 4 0 3 3 6 8 0	1	4	ON
U4	[redacted] 1 7 1 0 6 1 0	17	16	ON
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 4 2 8 8 0 3 0	6	0 -> 5	Check On / Off schedule
U6	[redacted] 5 2 2 7 1 2 0	15	15	ON
U7	[redacted] 0 7 0 0 1 2 0	19	18	ON
U11	[redacted] 4 3 0 6 9 9 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) off
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 tank replacement meeting.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 4-26-2017 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)	0			
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: - Rain - Slip, trip and fall on uneven, wet 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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 5-2-17 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	73702400	40	42	ON
U1A	67537190	off	0 -> 10	Used as needed
U2A	19022220	19	22	ON
W253	41699610	off	0 -> 5	Check On / (Off) schedule
U5	40419760	1	4	ON
U4	18626960	17	16	ON
U8 / U1	09725000	0.0	0	Off
W255	43470000	7	0 -> 5	Check (On) / Off schedule
U6	53642880	16	15	ON
U7	08677770	19	18	ON
U11	45077770	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)

Notes: - More field shots needed onsite, field sheet to be updated for 2017.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 5-2-2017 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: 1150 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: - Safe driving

- 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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 5-9-17
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

Recovery Well	Meter Readings (Gal.)	Actual Flow Rate GPM	Design Flow Rate GPM	Comments: meter ticks, max flow = below optimal,
U12	7 4 0 7 1 2 0 0	36	42	ON
U1A	6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	2 0 8 4 0 6 0	18	22	ON
W253	4 1 6 9 9 1 0	off	0 -> 5	Check On / (Off) schedule
U5	4 0 5 1 8 9 0	1	4	ON
U4	2 0 3 2 8 1 0	17	16	ON
U8 / U1	0 9 7 2 5 0 0	0.0	0	Off
W255	4 4 1 3 1 7 0	7	0 -> 5	Check (On) / Off schedule
U6	5 5 1 7 7 2 0	16	15	ON
U7	1 0 5 5 6 0 0	19	18	ON
U11	4 7 2 6 8 7 0	22	22	ON
		Total	**144**	

On / Off Schedule

	2017	
	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 PWS
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 of BC working on down stream Sanitary lift Station
- Pigging has been scheduled for 5/17.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 5/9/2017 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: _____ Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting

Topic: Safe driving

Attended: 3 points of contact on Vault Stairs.

☐ 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: 5-17-17
Barr Technician: PWJ

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	74460800	34/44	42	ON - Pigged 5x
U1A	67531900	off	0 -> 10	Used as needed
U2A	22876000	19/20	22	ON - Pigged 3x
W253	41699910	off	0 -> 5	Check On / (Off) schedule
U5	40634660	1	4	ON
U4	22285500	18	16	ON
U8 / U1	09725020	0.0	0	Off
W255	44885970	6.5	0 -> 5	Check (On) / Off schedule
U6	56924810	16	15	ON
U7	12698200	19	18	ON
U11	49702020	21/22	22	ON Pigged 3x
	Total		**144**	

On / Off Schedule

	2017	
	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 85 (psi)
Vault copper lines inspection (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y (N) Discolored wires? Y (N)

Notes: TL Stevens onsite for line piggings.

Pigged	Flowrate	Time	gallons discharged	Sample time	pH	Pigged x
U2A	20	56	1120	0940	7.12	3x
-U2A Drawn down to pump inlet, slurping						
U12	55	35	1925	1050	6.95	5x
U11	30	18	540	1150	6.80	3x

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 5/17/17 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Site			
Time Interval at Location	Constant			
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)	ND Contant w/Groundwater			
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: 0800 Conducted by: PWS

☑ ~~Daily~~ "Tool-Box" Safety Meeting
Topic: ND Contant w/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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 5-23-2017
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	74848500	96	42	ON
U1A	6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	2 4 4 5 8 7 0	19	22	ON
W253	4 1 6 9 9 1 0	off	0 -> 5	Check On / Off schedule
U5	4 0 7 2 7 8 0	1	4	ON
U4	2 3 8 2 6 0 0	17	16	ON
U8 / U1	0 9 7 2 5 0 0	0.0	0	Off
W255	4 5 4 7 7 8 0	6.5	0 -> 5	Check On / Off schedule
U6	5 8 2 9 3 7 0	15	15	ON
U7	1 4 3 7 8 6 0	19	18	ON
U11	5 1 5 3 6 7 0	21/23	22	ON
	Total		144	

On / Off Schedule

	2017	
	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 treated to inhibit biological fouling of pump inlet, well screen and transfer line.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 5-23-2017 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)	0			
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: 0900 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

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: 5-30-2017
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	7	5	2	9	7	2	0	0	44	42	ON
U1A	[redacted]	6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A	[redacted]	2	6	2	9	9	1	0	19	22	ON
W253	[redacted]	4	1	6	9	9	1	0	off	0 -> 5	Check On / Off schedule
U5	[redacted]	4	0	8	3	5	0	0	1	4	ON
U4	[redacted]	2	5	5	6	7	0	0	17	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	4	6	1	4	4	7	0	7	0 -> 5	Check On / Off schedule
U6	[redacted]	5	9	8	3	7	6	0	16	15	ON
U7	[redacted]	1	6	2	6	8	9	0	19	18	ON
U11	[redacted]	5	3	8	7	2	4	0	23	22	ON
								Total		144	

On / Off Schedule

	2017	
	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:

- Normal System checks completed.

- Met with MT - Our work next tuesday at U2A, with 3 Service trucks and Support equipment is not a problem for them.

- After checking West Area fence a City of Brooklyn Center police officer Stopped and asked if I was driving on the Rail tracks ! I said no Just the access road to inspect the NE Corner of our fence - Officer Stated Someone called and said I was driving down the tracks. - officer said "No problem, thanks" and left.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 5/30/2017 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: 1130 Conducted by: PWS

☑ ~~Daily~~ "Tool-Box" Safety Meeting

Topic: - Safe driving

- 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: 6-6-17
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

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

	2017	
	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: [redacted] - TLSkuens pulled U2A pump and drop pipe. Set setting and Air lifting equipment.

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: 6/6/17 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Control Panel			
Time Interval at Location	Constant			
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: LOTO on Control panel Verified By BARR/STEVENS

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: 6-7-17
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

Recovery Well	Meter Readings (Gal.)	Actual Flow Rate GPM	Design Flow Rate GPM	Comments: meter ticks, max flow = below optimal,
U12	7 5 8 0 6 2 0 0	44	42	ON
U1A	[redacted] 6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	[redacted] 2 8 1 2 6 0 0	0.0	22	off - LOTO
W253	[redacted] 4 1 6 9 9 1 0	off	0 -> 5	Check On (Off) schedule
U5	[redacted] 4 0 9 5 3 7 0	1	4	ON
U4	[redacted] 2 7 6 1 8 4 0	18	16	ON
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 4 6 9 2 4 5 0	6	0 -> 5	Check On / Off schedule
U6	[redacted] 6 1 6 4 2 0 0	16	15	ON
U7	[redacted] 1 8 4 7 7 6 0	19	18	ON
U11	[redacted] 5 6 5 2 6 1 0	22	22	ON
	Total		144	

On / Off Schedule

	2017	
	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

- LOTO Remains on Control panel.

Notes:
- Soc/off from TL Stevens Supervised removal of PVC 1" pipe @ bottom of well and Redevelopment of well U2A.
- Development water pumped from transfer tank to Separator Vault tank. 750 gallons of development water transferred.
- U2A pump taken by TL Stevens to their Shop for Cleaning.
- Schedule
  - Pump to be reset 6/8, Send drummed and equipment Demob

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 6/7/2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault			
Time Interval at Location	Constant venting during entry			
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: 1030 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting
Topic: LOTO remains on Gatol Pond.

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: 6-8-2017
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

Recovery Well	Meter Readings (Gal.) Recorded 6/7							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	17	22	ON
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

	2017	
	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:
- TC Stevens onsite to complete U2A pumpset.
- Flow from U2A 17 GPM and pump still drawing down to inlet.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 6/8/17 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)	0			
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: 1330 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting
Topic: -Control LOTO in Place.

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: 6-12-17
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

Recovery Well	Meter Readings (Gal.)	Actual Flow Rate GPM	Design Flow Rate GPM	Comments: meter ticks, max flow = below optimal,
U12	7 6 1 0 8 3 0 0	45	42	ON
U1A	[redacted] 6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	[redacted] 2 9 0 3 7 6 0	16	22	ON
W253	[redacted] 4 1 6 9 9 1 0	off	0 -> 5	Check On / (Off) schedule
U5	[redacted] 4 1 0 3 0 4 0	1	4	ON
U4	[redacted] 2 8 8 4 1 5 0	17	16	ON
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 4 7 3 8 5 9 0	6.5	0 -> 5	Check On / (Off) schedule
U6	[redacted] 6 2 7 1 1 8 0	16	15	ON
U7	[redacted] 1 9 7 8 7 8 0	19	18	ON
U11	[redacted] 5 8 0 6 8 5 0	22	22	ON
	Total		**144**	

On / Off Schedule

	2017	
	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: - All pumps operating

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 6/12/2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault			
Time Interval at Location	Constant Vent			
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: 1400 Conducted by: PWS

Topic: - 5% 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
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 6-19-17 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	7 6 5 3 6 8 0 0	41	42	
U1A	6 7 5 3 1 9 0	0	0 -> 10	Used as needed
U2A	3 0 7 3 4 0 0	18.5	22	Sucking Air
W253	4 1 6 9 9 1 0	0	0 -> 5	Check On / Off schedule
U5	4 1 9 3 3 2 0	1	4	
U4	3 0 6 4 7 5 0	18	16	
U8 / U1	0 9 7 2 5 0 0	0.0	0	Off
W255	4 8 0 5 1 4 0	7	0 -> 5	Check On / Off schedule
U6	6 4 2 6 1 6 0	15.5	15	
U7	2 1 6 8 5 9 0	19	18	
U11	6 0 2 3 3 0 0	21	22	
	Total		**144**	

On / Off Schedule

	2017	
	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: Cameraed w/ Borehole camera down U2A.

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BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 6-26-17
Barr Technician: JWJ

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	7	6	9	3	2	7	0	0	40	42	
U1A	[redacted]	6	7	5	3	1	9	0	0	0 -> 10	Used as needed
U2A	[redacted]	3	2	6	6	5	2	0	215	22	
W253	[redacted]	4	1	6	9	9	1	0	0	0 -> 5	Check On / (Off) schedule
U5	[redacted]	4	1	2	3	2	8	0	1	4	
U4	[redacted]	3	2	4	0	4	6	0	18	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	4	8	6	9	5	4	0	8	0 -> 5	Check (On) / Off schedule
U6	[redacted]	6	5	7	6	1	5	0	15	15	
U7	[redacted]	2	3	5	2	2	1	0	19	18	
U11	[redacted]	6	2	2	4	3	3	0	21	22	
								Total		144	

On / Off Schedule

	2017	
	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 for DNAPL Tank Repairs
Vault copper lines inspection. (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y (N) Discolored wires? Y (N)

Notes: Sprayed exterior of Building for paper wasp nests.

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 7-7-17
Barr Technician: JLJ

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	7	7	4	6	3	0	0	0	37	42	
U1A	[redacted]	6	7	5	3	1	9	0	0	0 -> 10	Used as needed
U2A	[redacted]	3	5	9	0	3	6	0	22	22	
W253	[redacted]	4	1	6	9	9	1	0	0	0 -> 5	Check On / Off schedule
U5	[redacted]	4	1	3	7	5	1	0	1	4	
U4	[redacted]	3	5	3	0	4	2	0	20	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	4	9	6	3	2	0	0	6	0 -> 5	Check On / Off schedule
U6	[redacted]	6	7	9	5	3	9	0	16	15	
U7	[redacted]	2	6	2	0	5	5	0	19	18	
U11	[redacted]	6	5	1	5	0	4	0	22	22	
							Total			**144**	

On / Off Schedule

	2017	
	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:

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BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 7-10-17 — 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	7	7	6	2	1	6	0	0	36.0	42	
U1A	[redacted]	6	7	5	3	1	9	0	Ø.0	0 -> 10	Used as needed X
U2A	[redacted]	3	6	8	9	3	9	0	22.5	22	
W253	[redacted]	4	1	6	9	9	1	0	Ø.0	0 -> 5	Check On / Off schedule
U5	[redacted]	4	1	4	1	8	2	0	1.0	4	
U4	[redacted]	3	6	1	8	9	2	0	20	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	4	9	9	1	8	0	0	8.0	0 -> 5	Check On / Off schedule
U6	[redacted]	6	8	6	1	9	5	0	16.0	15	
U7	[redacted]	2	7	0	2	4	7	0	19.0	18	
U11	[redacted]	6	6	0	6	6	6	0	21.0	22	
							Total			144	

On / Off Schedule

	2017	
	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 Ø (psi) OFF

Vault copper lines inspection. (Pass) / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/N Discolored wires? Y/N

Notes: Oil water separator vault fan making noises like something is loose inside (still pushing air). May need replacing soon.

* Water level indicator still stuck (wrapped around pitless

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 7-20-17 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	78125800	35	42	
U1A	6753191 0	0	0 -> 10	Used as needed
U2A	4004540	21	22	
W253	4169910	0	0 -> 5	Check On / (Off) schedule
U5	4155850	1	4	
U4	3907750	20	16	
U8 / U1	0972500	0.0	0	Off
W255	5086810	7	0 -> 5	Check On / Off schedule
U6	7089980	15.5	15	
U7	2973060	19	18	
U11	6905700	20	22	
	Total		**144**	

On / Off Schedule

	2017	
	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: Vault fan still making noise may be rusting out and will need replacement in future

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 7-25-17 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	7	8	3	5	5	0	0	0	34	42	
U1A	[redacted]	6	7	5	3	1	9	0	0	0 -> 10	Used as needed
U2A	[redacted]	4	1	5	2	4	0	0	21	22	
W253	[redacted]	4	1	6	9	9	1	0	0	0 -> 5	Check On / Off schedule
U5	[redacted]	4	1	6	2	7	8	0	1	4	
U4	[redacted]	4	0	4	7	2	3	0	20	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	1	3	3	3	7	0	6	0 -> 5	Check On / Off schedule
U6	[redacted]	7	1	8	8	0	4	0	15	15	
U7	[redacted]	3	1	0	5	5	8	0	19	18	
U11	[redacted]	7	0	4	6	6	2	0	20	22	
							Total			144	

On / Off Schedule

	2017	
	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:

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 8-3-17
Barr Technician: JLJ

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	7	8	7	5	4	5	0	0	36	42	
U1A		6	7	5	3	1	9	0	0	0 -> 10	Used as needed
U2A		4	4	2	3	1	7	0	21	22	
W253		4	1	6	9	9	1	0	0	0 -> 5	Check On / Off schedule
U5		4	1	7	5	6	1	0	1	4	
U4		4	3	0	4	3	3	0	20	16	
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		5	2	1	9	4	2	0	6	0 -> 5	Check On / Off schedule
U6		7	3	8	6	9	2	0	16	15	
U7		3	3	5	0	4	7	0	19	18	
U11		7	3	0	2	6	7	0	19.5	22	
							Total			**144**	

On / Off Schedule

	2017	
	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) OFF
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes:

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 8-9-17 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	7	9	0	0	6	5	0	0	29	42	
U1A	[redacted]	6	7	5	3	1	9	0	0	0 -> 10	Used as needed
U2A	[redacted]	4	5	9	8	0	0	0	20	22	
W253	[redacted]	4	1	6	9	9	1	0	0	0 -> 5	Check On / (Off) schedule
U5	[redacted]	4	1	8	4	0	1	0	1	4	
U4	[redacted]	4	4	7	1	5	9	0	19.5	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	2	7	6	1	7	0	7	0 -> 5	Check On / (Off) schedule
U6	[redacted]	7	5	1	8	3	6	0	16	15	
U7	[redacted]	3	5	1	2	0	4	0	19	18	
U11	[redacted]	7	4	6	5	4	9	0	19	22	
							Total			**144**	

On / Off Schedule

	2017	
	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 120 (psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: Turned on DNAPL Pump today
DTB = 10.66

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 8-15-2017
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	7	9	2	6	3	6	0	0	30	42	ON
U1A	[redacted]	6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A	[redacted]	4	7	9	0	0	9	0	21	22	ON
W253	[redacted]	4	1	6	9	9	1	0	off	0 -> 5	Check On (Off) schedule
U5	[redacted]	4	1	9	2	8	2	0	1	4	ON
U4	[redacted]	4	6	4	8	4	2	0	20	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	3	3	5	6	6	0	7	0 -> 5	Check (On) Off schedule
U6	[redacted]	7	6	5	6	8	3	0	16	15	ON
U7	[redacted]	3	6	8	2	0	5	0	19	18	ON
U11	[redacted]	7	6	3	6	8	3	0	20	22	ON
								Total		144	

On / Off Schedule

	2017	
	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 118 (psi)
Vault copper lines inspection: (Pass) Fail
Control panel inspection (By trained individuals only)
Hot spots? Y (N) Discolored wires? Y (N)

Notes:
- Pigging to be scheduled.
- Vault vent fan emitting loud noise.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 8/15/2017 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: 1510 Conducted by: PWS

☑ ~~Daily~~ "Tool-Box" Safety Meeting
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.):

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 8-22-17
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	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

	2017	
	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 115 (psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y (N) Discolored wires? Y (N)

- U2A Lots Applied @ Control panel.

Notes:

- TL Stevens onsite for U2A well re-development/Acid treatment.
- Arrived on site 1130. w/pump truck and Air Compressor.
- 55 lbs of encased well acid treatment
- 2.5 gallons of catalyst.
- Added at about 1:00 pm
- Well mixing / Surging
- Well mixed - Surged until ~~1:30~~ PWS 4:00
- U2A maintaining a pH of <2.0

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 8/22/17 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault		U2A	
Time Interval at Location	Constant Vault		Constant	
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)	↓		LOTO ↓	
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: 0950 Conducted by: PWS

☒ Daily "Tool-Box" Safety Meeting
Topic: - U2 A LOTO
- Vault Vent fan
- No Contact with injected 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: 8-23-2017
Barr Technician: RWS

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							0	0		42	
U1A	[redacted]							0		0 -> 10	Used as needed
U2A								0	22 gpm	22	on - open flow 26gpm
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

	2017	
	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 115 (psi)
Vault copper lines inspection. Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

- pH probe calibrated @ 1145 7/10 Buffers.
- Vault vent fan failed - Repair or replacement required.
- < 5 gallons of solids removed from settling tank and placed in drum for contract hauling.

Notes:
- U2A LOTO Verified
- TL Stevens onsite for U2A surging and acid neutralization. -1125
- 1135 well pH. ~3.5
- 1215 began air lift pumping well pH 4.0
- 1245 continued air lifting pH ~5.10
- 1300 Stopped surging/pumping - added Soda Ash to tank to pH of 5.14 and began pumping to vault through transfer line.
- Water transfer at 21.5 gpm
- Separator tank effluent pH 6.98

1330 - Pumping tank @ well 7.34 pH.
1400 - Pumping tank pH 7.43 - Continued Surging/Settling/Pumping
1430 - Pumping tank pH 7.64 - Continued Surging/Settling/Pumping
1600 - Well Redevelopment complete
* 1700 - 100 gallons of water pumped to Separator tank in Vault.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 8/23/2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault	~~[illegible]~~	U2A	
Time Interval at Location	Constant		LOTO in	
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)	Venting ↓		Control Building	
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: PWS

☑ ~~Daily~~ "Tool-Box" Safety Meeting

Topic: - Safe drivers
- No contact with groundwater
- LOTO Verified.

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: 8-25-17
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	7 9 6 6 0 0 0 0	30 / 40	42	ON - Pigged 3x - Sampled
U1A	6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	5 0 1 8 6 0 0	22 / 23	22	Pigged 3x - Sampled
W253	4 1 6 8 9 1 0	off	0 -> 5	Check On / (Off) schedule
U5	4 2 0 6 9 5 0	1	4	ON
U4	4 9 2 4 3 7 0	19	16	ON
U8 / U1	0 9 7 2 5 0 0	0.0	0	Off
W255	5 4 2 9 6 9 0	6	0 -> 5	Check (On) / Off schedule
U6	7 8 7 5 4 3 0	15	15	ON
U7	3 9 5 0 6 5 0	19	18	ON
U11	7 9 0 4 9 9 0	19	22	ON - Pigged 3x - Sampled.
	Total		144	

On / Off Schedule

	2017	
	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 115 (psi)
Vault copper lines inspection (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y / (N) Discolored wires? Y (N)

Notes: TL Stevens (Soil) on site for pigging of U2A, U11 and ~~U11~~ U12 lines.

	Flow	minutes	total discharge	Sampled @	Field pH
U2A Pigged 3x	30 gpm	28	840 g.	1330	7.48
U12 Pigged 3x	45 gpm	18	810 g.	1410	7.41
U11 Pigged 3x	30 gpm.	15	450 g.	1450	7.40

* 100 gallons of water pumped to Vault tank on 8/23 from U2A redevelopment.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 8/25/2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault		Pumping wells	
Time Interval at Location	Constant venting		Constant	
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)	W/ Portable Blower		- Safe distance from Drill rig	
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: - Constant Venting of Vault
= Buddy System
Attended: - Safe distance from Drill rig

☐ 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: 9-1-17 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							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

	2017	
	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

W129 = 4.09'

W127N = 15.48

Notes: System running upon entry to site

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 9-5-17
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							0	0		42	
U1A	[redacted]							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

	2017	
	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

W129 = 4.47'
W127N = 15.92'

Notes:

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 05092016.xls

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 9-6-2017
Barr Technician: PWS / JWS

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	8	0	3	3	5	5	0	0	42	42	ON
U1A	[redacted]	6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A	[redacted]	5	4	4	5	0	2	0	26/24	22	ON
W253	[redacted]	4	2	2	4	2	3	0	6.25	0 -> 5	Check (On) Off schedule
U5	[redacted]	4	2	2	2	3	6	0	0	4	ON
U4	[redacted]	5	2	5	0	8	6	0	18	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	4	8	4	8	3	0	off	0 -> 5	Check On (Off) schedule
U6	[redacted]	8	1	4	0	6	4	0	15	15	ON
U7	[redacted]	4	2	7	6	7	8	0	19	18	ON
U11	[redacted]	8	2	9	0	6	3	0	22	22	ON
							Total			144	

On / Off Schedule

	2017	
	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 115 (psi)
Vault copper lines inspection: (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y (N) Discolored wires? Y (N)

W-129 15.89'
W-127N 4.57'

Notes: Q3 Vault Air check.
PID - 0
LEL - 0%
O_2 20.8%
H_2S -2ppm
CO - 0%

Shutdown floats tested.
City Lift Station - OK
First discharge manhole -
Vault Separator tank - OK
DNAPL Float - Done @ install in Q3.

- Vault Vent fan motor 3ph 460v 1/2Hp.
Vent fan 14"x14"x28"T

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 9/6/2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault			
Time Interval at Location	Constant Venting w/ Portable Blower			
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)	LEL 0%	O_2 % 20.8	CO 0ppm	H_2S 0.2 ppm
Organic Vapor Readout (ppm)	0.0			
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: _____ 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: 9-12-2017
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	8	0	6	5	9	6	0	0	38	42	ON
U1A		6	7	5	3	1	9	0	off	0 -> 10	Used as needed
U2A		5	6	4	8	3	4	0	24	22	ON
W253		4	2	7	5	5	7	0	5.5	0 -> 5	Check (On) / Off schedule
U5		4	2	2	2	3	6	0	0.0	4	ON
U4		5	4	0	4	4	0	0	19	16	ON
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		5	4	8	4	8	3	0	off	0 -> 5	Check On / (Off) schedule
U6		8	2	6	9	2	0	0	16	15	ON
U7		4	4	3	4	2	8	0	19	18	ON
U11		8	4	6	2	2	1	0	21	22	ON
							Total			144	

On / Off Schedule

	2017	
	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 118 (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 Cover Sealed - pictures taken.
- Used tarp and plastic bagged and placed in Control building.
- U5 pump running but not moving water.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 9/21/17 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: 1130 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting
Topic: -Safe driving
-3 points of Contact on 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: 9/20/17
Barr Technician: SDL

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	8	1	0	7	9	0	0	0	36	42	
U1A	[redacted]							0	0	0 -> 10	Used as needed OFF
U2A	[redacted]	5	9	1	0	4	0	0	22	22	
W253	[redacted]	4	3	4	3	5	2	0	6	0 -> 5	Check On / Off schedule
U5	[redacted]	4	2	2	2	3	6	0	-	4	FLOW METER NOT WORKING
U4	[redacted]	5	6	0	9	6	4	0	18	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	4	8	4	8	3	0	0	0 -> 5	Check On / (Off) schedule
U6	[redacted]	8	4	4	2	3	9	0	16	15	
U7	[redacted]	4	6	4	6	9	9	0	20	18	
U11	[redacted]	8	6	8	9	9	6	0	21	22	
								Total		144	

On / Off Schedule

	2017	
	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 120 (psi)
Vault copper lines inspection. (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/N Discolored wires? Y/N

Notes: U5- FLOW METER NOT WORKING.

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 4-27-17
Barr Technician: JWJ/DWS

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

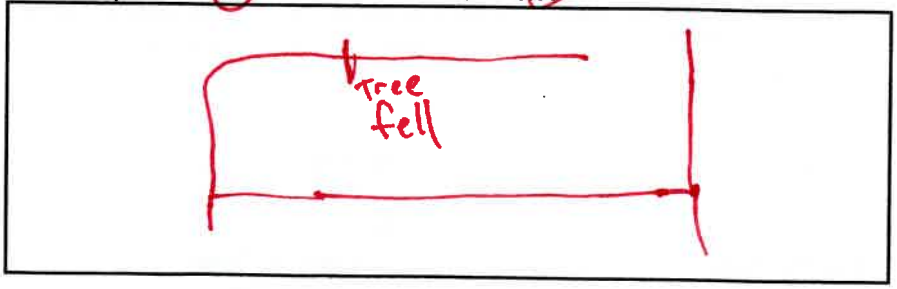
Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments: meter ticks, max flow = below optimal,
U12	8	1	4	3	3	4	0	0	36	42	
U1A	[redacted]	6	1	5	3	1	9	0	0	0 -> 10	Used as needed OFF
U2A		6	1	3	8	6	1	0	22.5	22	
W253		4	4	0	3	1	6	0	5	0 -> 5	Check On / Off schedule
U5		4	2	2	2	3	6	0	—	4	Swapped internal meter parts
U4		5	4	9	5	4	1	0	18	16	
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		5	4	8	4	3	3	0	0	0 -> 5	Check On / Off schedule
U6		8	6	0	0	8	4	0	16	15	
U7		4	8	4	1	7	7	0	19	18	
U11		8	8	8	9	9	4	0	20	22	
								Total		144	

On / Off Schedule

	2017	
	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: H_2O = 0.33' in DNAPL sump

Performed Air Monitoring w/ MX4 (4-gas meter) notes on back of this sheet

Treated wells 11, 12 and U2

~~X~~ swapped inside parts of U5 meter - still no flow.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 9-27-17 PHSTL: JWJ

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault, Before	Vault 5mn	10min	15
Time Interval at Location				
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)	LEL 2% O_2=20.8% CO=0 H_2S 0	LEL=1% O_2=20% CO=0 H_2S=0	LEL=0 O_2=21.8% CO=0 H_2S=0	LEL=0% O_2=20.9% CO=0 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: Air Monitoring

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.):

SEPT.

BARR

WEEKLY AND Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 10/4/17
Technician: SDF
Quarter 1st 2nd (3rd) 4th

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	8	1	7	5	2	6	0	0	32	42		
U1A		6	7	5	3	1	9	0	0	0 -> 10		OFF
U2A		6	3	5	2	2	4	0	22	22		
W253		4	4	5	9	8	1	0	6	0 -> 5		
U5		4	2	2	2	3	4	0	1	6		
U4		5	9	6	8	8	9	0	18	16		
U8 / U1								0	0	0		OFF
W255		5	4	8	4	8	3	0	0	0 -> 5		OFF
U6		8	7	5	1	0	1	0	16	15		
U7		5	0	2	6	7	9	0	18	18		
U11		9	0	7	6	8	5	0	19	22		
					Total					146		

10

TURNED OFF 253 - ON 255.

Product / Water Levels:

				Time			Time
W 253	Water Level	Below 60'	On/Off		Water Level	On/Off	
W 255	Water Level	16.44	On/Off		Water Level	On/Off	
W 300spn	Water Level	18.63					
W 328	Water Level	13.03					

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~~	10.66	Total depth = 83 feet		Total depth = ~~7.70~~	8.60
Water =	—	Water Level	14.04	DNAPL =	—
Oil =	10.40	DNAPL =	80.00	Water = depth=	8.35

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:
4 GAS READINGS - Befor fan
CO - 0 LEL - 0 H_2S - 0 ~~O2~~ O2 20.7

WITH Fan Running
CO - 0 LEL - 0 H_2S - 0 O2 - ~~20.9~~ 21.3

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 10-11-2017 Project manager notified prior to site visit. (Y) N
Barr Technician: PLS 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	8	2	0	8	3	0	0	0	32	42	ON
U1A	[redacted]	6	7	5	3	1	9	0	OFF	0 -> 10	Used as needed
U2A	[redacted]	6	5	7	2	6	8	0	22	22	ON
W253	[redacted]	4	4	6	0	1	2	0	OFF	0 -> 5	Check On / (Off) schedule
U5	[redacted]	4	2	2	2	3	6	0	0	4	ON
U4	[redacted]	6	1	4	7	6	4	0	17	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	5	5	2	2	9	0	6.25	0 -> 5	Check (On) / Off schedule
U6	[redacted]	8	9	0	9	9	1	0	15	15	ON
U7	[redacted]	5	2	2	2	7	4	0	19	18	ON
U11	[redacted]	9	2	7	5	9	4	0	20	22	ON
							Total			144	

On / Off Schedule

	2017	
	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 1 Tree on fence
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 115 (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 Construction Sediment Containment (STRAW tubes) along curb have been placed in the West Area.
- US pumping - New meter retrofit parts kit installed on previous visit - No water to meter from well.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 10/11/17 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. ~~0~~	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

☑ ~~Daily~~ "Tool-Box" Safety Meeting Time: 1430 Conducted by: ~~1430~~ PWS
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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 10-19-2017 Project manager notified prior to site visit. Y (N)
Barr Technician: PWJ/JWS 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	8 2 4 3 3 9 0 0	30	42	ON
U1A	[redacted] 6 7 5 3 1 9 0	off	0 -> 10	Used as needed
U2A	[redacted] 6 8 0 8 1 6 0	21	22	ON
W253	[redacted] 4 4 6 0 1 2 0	off	0 -> 5	Check On / (Off) schedule
U5	[redacted] 4 2 2 2 3 6 0	0	4	Turned off / pump not running
U4	[redacted] 6 3 3 9 6 7 0	18	16	ON
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 5 6 2 7 1 7 0		0 -> 5	Check (On) / Off schedule
U6	[redacted] 9 0 8 3 2 4 0	16	15	ON
U7	[redacted] 5 4 3 6 1 9 0	19	18	ON
U11	[redacted] 9 4 9 8 2 2 0	21	22	ON
	Total		**144**	

On / Off Schedule

	2017	
	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 120 (psi)
Vault copper lines inspection (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y (N) Discolored wires? Y (N)

- Temp vent for Used

Notes:
- 150 gallons of water removed from DNAPL Vault and discharged to Vault Separator Tank.
- 5 gallon pail of sand removed from well during treatment.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 10-19-2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault			
Time Interval at Location	After 15 minutes of venting			
Typical Combustible Gas Monitoring Readout (% LEL, $\%O_2$, CO, H_2S)	LEL 0%	O_2 20.9%	CO 0%	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: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: - 3 points of contact on Vault Stairs
- No contact w/ any site groundwater

Attended: — Chainsaw Safety gaiters.

☐ 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: 10/26/17 — 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	[redacted]	2	9	3	6	9	0	0	30	42	
U1A	[redacted]	6	7	5	3	1	9	0	Off	0 -> 10	Used as needed
U2A	[redacted]	7	0	1	7	2	7	0	20	22	
W253	[redacted]	4	4	6	0	3	6	0	0	0 -> 5	Check On / Off schedule
U5	[redacted]	4	2	2	2	3	6	0	0	4	OFF
U4	[redacted]	6	5	1	8	3	7	0	17	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	6	9	5	2	5	0	6	0 -> 5	Check On / Off schedule
U6	[redacted]	9	2	3	9	9	1	0	16	15	
U7	[redacted]	5	6	7	9	1	3	0	19	18	
U11	[redacted]	9	6	9	9	8	4	0	19	22	
							Total			144	

On / Off Schedule

	2017/2018	
	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

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% 0 O2% 20.9 CO% 0 ppm H2S 0.0

Vent Fan ON (10 Min): LEL% 0 O2% 20.9 CO% 0 H2S 0.0

Readings During Entry: LEL% 0 O2% 20.9 CO% 0 H2S 0.0

Notes: USED Portable air fan for air circulation in Vault.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 10202017.xls

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 10-31-2017 Project manager notified prior to site visit. Y (N)
Barr Technician: 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	82930000	30/40	42	ON - Pigged 3x + Sampled
U1A	6751310	Off	0 -> 10	Used as needed
U2A	7154440	20/22	22	ON - Pigged 3x + Sampled
W253	4460370	off	0 -> 5	Check On / Off schedule
U5	4223460	0.0/6.0	4	off / ON - New pump and motor
U4	6634080	16	16	ON
U8 / U1	0972500	0.0	0	Off
W255	5740440	7	0 -> 5	Check On / Off schedule
U6	9343680	16	15	ON
U7	5757150	19	18	ON
U11	9824640	19/21	22	ON / Pigged 3x - Sampled.
	Total		144	

On / Off Schedule

	2017/2018	
	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 118 (psi)
Vault copper lines inspection: (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y (N) Discolored wires? Y (N)

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% 0 O2% 20.6 CO% 0 H2S 0
Vent Fan ON (10 Min): LEL% 0 O2% 20.9 CO% 0 H2S 0
Readings During Entry: LEL% 0 O2% 20.9 CO% 0 H2S 0

- U5 New pump and (10505-9) and motor (0.50HP) installed. Used parts placed in drum for disposal.
- 3 Drums onsite
  2 Drums full w/ Sand + Dirt
  1 Drum of Sorbents, pump parts, meter parts and used 5 gallon pails.

Notes: - Field pH probe calibrated 7/10.

- TL Stevens onsite (Steve) for pigging lines U2A, U12 and U11

	Pigging Flow	Time	Total Discharge (g)	Sample time	Field pH.
U2A	23	22	506 gallons	1210	6.89
U11	30	18	540 gallons	1300	6.63
U12	50 g.	~~18~~ 18 min	900 gallons	1120	6.94

- U12 Clean pump and installed.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 10/31/2017 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)	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: 0800 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting
Topic: - 3 points of contact on Vault Stairs
- 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.):

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 11-10-17
Barr Technician: 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

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments: meter ticks, max flow = below optimal,
U12	8	3	4	6	5	1	0	0	48	42	
U1A	[redacted]	6	7	5	3	1	9	0	Off	0 -> 10	Used as needed
U2A	[redacted]	4	4	6	9	9	7	0	22	22	
W253	[redacted]	4	4	6	0	3	6	0	0	0 -> 5	Check On / Off schedule
U5	[redacted]	4	2	5	1	6	8	0	3	4	
U4	[redacted]	6	8	8	4	4	3	0	19	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	8	3	6	1	1	0	6	0 -> 5	Check On / Off schedule
U6	[redacted]	9	5	3	6	0	7	0	15	15	
U7	[redacted]	6	0	2	7	2	7	0	18	18	
U11	[redacted]	0	1	0	5	1	5	0	20	22	
							Total			144	

On / Off Schedule

	2017/2018	
	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 120 (psi)
Vault copper lines inspection. (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/(N) Discolored wires? Y/(N)

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% 0 O2% 20.9 CO% 0 H2S 0.0
Vent Fan ON (10 Min): LEL% 0 O2% 20.9 CO% 0 H2S 0.0
Readings During Entry: LEL% 0 O2% 20.9 CO% 0 H2S 0.0

Notes:

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 10202017.xls

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 11-14-2017 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	8	3	6	9	2	6	0	0	37	42	on
U1A	[redacted]	6	7	5	3	1	9	0	Off	0 -> 10	Used as needed
U2A	[redacted]	7	6	0	4	6	2	0	22	22	on
W253	[redacted]	4	4	6	0	3	6	0	0	0 -> 5	Check On / Off schedule
U5	[redacted]	4	2	6	4	7	4	0	4.5	4	on
U4	[redacted]	6	9	9	8	6	1	0	19	16	on
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	5	8	7	6	9	0	0	6.5	0 -> 5	Check On / Off schedule
U6	[redacted]	9	6	5	6	3	9	0	15	15	on
U7	[redacted]	6	1	4	1	7	5	0	18	18	on
U11	[redacted]	0	2	2	0	6	7	0	19	22	on
								Total		144	

On / Off Schedule

	2017/2018	
	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 115 (psi)
Vault copper lines inspection: (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/(N) Discolored wires? Y/(N)

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% NA O2% NA CO% NA ppm H2S NA
Vent Fan ON (10 Min): LEL% 0 O2% 20.9 CO% 0 H2S 0
Readings During Entry: LEL% 0 O2% 20.9 CO% 0 H2S 0

Notes: -New Vault Vent fan delivered to site. Receipt attached.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 11/14/2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault			
Time Interval at Location	Constant Venting during entry			
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: 1350 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: - Safe driving

- No contact with process 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: 11/21/17
Barr Technician: JWS/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

Recovery Well	Meter Readings (Gal.)	Actual Flow Rate GPM	Design Flow Rate GPM	Comments: meter ticks, max flow = below optimal,
U12	8 4 0 5 6 8 0 0	34	42	
U1A	[redacted] 6 7 5 3 1 9 0	Off	0 -> 10	Used as needed
U2A	[redacted] 7 8 2 4 2 5 0	22	22	
W253	[redacted] 4 4 6 0 3 6 0	0	0 -> 5	Check On / Off schedule
U5	[redacted] 4 2 8 6 4 8 0	4	4	
U4	[redacted] 2 1 8 2 7 6 0	18.5	16	
U8 / U1	[redacted] 0 9 7 2 5 0 0	0.0	0	Off
W255	[redacted] 5 9 4 4 1 4 0	6	0 -> 5	Check On / Off schedule
U6	[redacted] 9 8 1 0 1 4 0	16	15	
U7	[redacted] 6 3 3 0 6 3 0	19	18	
U11	[redacted] 0 4 0 5 8 1 0	18.5	22	
	Total		**144**	

On / Off Schedule

	2017/2018	
	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 105 (psi)
Vault copper lines inspection: (Pass) / Fail
Control panel inspection (By trained individuals only) X
Hot spots? (Y)/N Discolored wires? (Y)/N

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% 0 O2% 20.9 CO% 0 H2S 0 ppm
Vent Fan ON (10 Min): LEL% 0 O2% 20.9 CO% 0 H2S 0 ppm
Readings During Entry: LEL% 0 O2% 20.9 CO% 0 H2S 0 ppm

Notes: * U12 Contact wires loose connection
removed old vent fan from vault.

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 10202017.xls

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 11-27-17
Barr Technician: JLT/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	8	4	3	3	9	1	0	0	32	42	ON
U1A		6	7	5	3	1	9	0	Off	0 -> 10	Used as needed
U2A		8	0	0	1	6	6	0	22	22	ON
W253		4	4	6	0	3	6	0	0	0 -> 5	Check On / (Off) schedule
U5		4	3	0	4	5	7	0	3	4	ON
U4		~~4~~	3	2	9	9	1	0	17	16	ON
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
5999590 → W255		~~7~~	~~3~~	~~2~~	~~9~~	~~9~~	~~1~~	0	6.5	0 -> 5	Check On / Off schedule
U6		9	9	3	5	9	6	0	15	15	OK
U7		6	4	8	6	7	1	0	19	18	↓
U11		0	5	5	3	6	1	0	19.5	22	↓
							Total			144	

On / Off Schedule

	2017/2018	
	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 115 (psi)
Vault copper lines inspection: (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/(N) Discolored wires? Y/(N)

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL%____ O2%____ CO% ____ H2S____
Vent Fan ON (10 Min): LEL% ~~0~~ O2% ~~20.9~~ CO% ~~0~~ H2S ~~0~~
Readings During Entry: LEL% ~~0~~ O2% ~~20.9~~ CO% ~~0~~ H2S ~~0~~

Notes:
- Final cleanup of vaults after fan install
- Wells U2A, V11 and V12 treated.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 11-27-17 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: - 3 points of Contact on Vault Steps
- Constant Air Monitoring

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: 12-7-17 Project manager notified prior to site visit. Y / N
Barr Technician: _____ 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	3	4	7	8	6	5	0	0	36	42	
U1A	[redacted]	6	7	5	3	1	9	0	Off	0 -> 10	Used as needed
U2A	[redacted]	3	3	0	5	9	2	0	20	22	
W253	[redacted]	4	4	6	0	3	6	0	0	0 -> 5	Check On / Off schedule
U5	[redacted]	4	3	3	6	0	7	0	4	4	
U4	[redacted]	7	5	5	3	9	8	0	17	16	
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	6	0	9	5	3	2	0	6	0 -> 5	Check On / Off schedule
U6	[redacted]	0	1	3	9	8	2	0	10	15	* Recov-Flow
U7	[redacted]	6	7	5	6	5	3	0	20	18	
U11	[redacted]	8	8	0	3	7	4	0	13	22	
							Total			144	

On / Off Schedule

	2017/2018	
	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

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% 1 O2% 20.7 CO% 0 H2S 0
Vent Fan ON (10 Min): LEL% 0 O2% 20.9 CO% 0 H2S 0
Readings During Entry: LEL% 0 O2% 20.9 CO% 0 H2S 0

Notes: Relay for vent fan is faulty still

P:\Mpls\23 MN\27\2327110\WorkFiles\Wells and Pumpout System\Weekly&Monthly Blank Field Sheets\weekly field sheet updated 10202017.xls

BARR

Weekly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 12-15-17
Barr Technician: JWS/PWC

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	8	5	1	3	8	6	0	0	30	42	ON - Low Flow
U1A	[redacted]	6	7	5	3	1	9	0	Off	0 -> 10	Used as needed
U2A	[redacted]	8	5	4	7	2	4	0	21	22	ON
W253	[redacted]	4	4	6	0	3	6	0	0	0 -> 5	Check On / (Off) schedule
U5	[redacted]	4	3	6	1	7	4	0	2.5	4	ON
U4	[redacted]	7	7	4	0	4	9	0	15	16	ON
U8 / U1	[redacted]	0	9	7	2	5	0	0	0.0	0	Off
W255	[redacted]	6	1	7	2	6	4	0	6	0 -> 5	Check On / Off schedule
U6	[redacted]	0	2	3	4	2	1	0	3.5	15	* LOW FLOW
U7	[redacted]	6	9	7	3	5	4	0	19	18	ON
U11	[redacted]	1	0	0	1	6	4	0	18	22	ON Low Flow
							Total			144	

On / Off Schedule

	2017/2018	
	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 118 (psi)
Vault copper lines inspection. (Pass) / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y/(N) Discolored wires? Y/(N)

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% 0 O2% 20.9 CO% 0 H2S 0
Vent Fan ON (10 Min): LEL% 0 O2% 20.9 CO% 0 H2S 0
Readings During Entry: LEL% 0 O2% 20.9 CO% 0 H2S 0

Notes:

Fixed wiring issue on new fan in vault, system running normal

Cycled DNAPL pump
- No product adapt. Air through to DNAPL tank.
- Stuck Bottom inlet check valve

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 12/15/2017 PHSTL: PWS

Safety Record for Quarterly Pigging Events and Site Air Monitoring

	WORK LOCATION			
Location Identifier	Vault			
Time Interval at Location	Constant venting during entry			
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: 1100 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: - Electrical Safety.

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: 12-21-17 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	8	5	4	3	3	4	0	0	30	42	ON
U1A		6	7	5	3	1	9	0	Off	0 -> 10	Used as needed
U2A		8	7	4	8	0	3	0	20	22	ON
W253		4	4	6	0	3	7	0	—	0 -> 5	Check On / (Off) schedule
U5		4	3	8	3	8	1	0	2	4	ON
U4		7	8	9	1	6	0	0	15	16	ON
U8 / U1		0	9	7	2	5	0	0	0.0	0	Off
W255		6	2	3	9	7	4	0	7	0 -> 5	Check (On) / Off schedule
U6		0	3	1	6	4	5	0	9	15	ON
U7		7	1	6	1	5	5	0	18	18	ON
U11		1	1	6	6	0	5	0	16	22	ON
								Total		144	

On / Off Schedule

	2017/2018	
	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 118 (psi)

Vault copper lines inspection. (Pass) / Fail

Control panel inspection (By trained individuals only)

Hot spots? Y/(N) Discolored wires? Y/(N)

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% 0 O2% 20.7 CO% 0 H2S 0

Vent Fan ON (10 Min): LEL% 0 O2% 20.7 CO% 0 H2S 0

Readings During Entry: LEL% 0 O2% 20.9 CO% 0 H2S 0

Notes: - Line maintence is scheduled for January 3rd.

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 12-21-17 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

☑ Daily "Tool-Box" Safety Meeting Time: 1150 Conducted by: PWS

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: 12-29-2017
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	85714600	30	42	ON
U1A	6753190	Off	0 -> 10	Used as needed
U2A	8940820	19	22	ON
W253	4460370	okf	0 -> 5	Check On / Off schedule
U5	4705640	2.5	4	ON
U4	8038280	14/16	16	ON
U8 / U1	0972500	0.0	0	Off
W255	6306770	7	0 -> 5	Check On / Off schedule
U6	0397980	8	15	ON
U7	7348270	19	18	ON
U11	1322430	16	22	ON
	Total		144	

On / Off Schedule

	2017/2018	
	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 118 (psi)
Vault copper lines inspection Pass / Fail
Control panel inspection (By trained individuals only)
Hot spots? Y N Discolored wires? Y N

Oil / Water Vault Air Monitoring (4-Gas Meter):

Before Entry / No Vent Fan: LEL% 0 O2% 20.7 CO% 0 H2S 0
Vent Fan ON (10 Min): LEL% 0 O2% 20.7 CO% 0 H2S 0
Readings During Entry: LEL% 0 O2% 20.7 CO% 0 H2S 0

Notes: - Pumping well maintance and pigging scheduled for 1-3-18

Work Area Quarterly Safety Record
Former Joslyn Manufacturing Site

DATE: 12-29-2017 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: 1030 Conducted by: PWS

☑ Daily "Tool-Box" Safety Meeting

Topic: -Sure footing on uneven surfaces.
-Safe winter 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.):

Monthly Readings

JAN 2017

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 12/27/16
Technician: SDI
Quarter 1st 2nd 3rd 4th

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	1	7	9	8	5	1	0	0	0	42		off
U1A		—	—	—	—	—	—	0	0	0 -> 10		off
U2A		8	5	2	1	9	3	0	20	22		
W253		4	0	1	0	1	3	0	0	0 -> 5		off
U5		3	8	7	1	1	4	0	1	6		
U4		8	9	4	9	5	2	0	17	16		
U8 / U1		—	—	—	—	—	—	0	0	0		off
W255		3	3	3	9	2	9	0	6.5	0 -> 5		
U6		2	5	6	5	8	7	0	16	15		
U7		7	4	5	3	7	9	0	19	18		
U11		0	7	7	2	8	8	0	22.5	22		
					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	18.45						
W 328	Water Level	12.80						

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	14.06	DNAPL =	—
Oil =	-	DNAPL =	79.72	Water =	6.23
				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:

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 2-2-2017
Technician: PWS
Quarter: (1st) 2nd 3rd 4th

JLB2 Contacted upon arrival and departure from site. - Email

Recovery Well	Meter Readings (Gal.)	Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	6 8 2 6 8 5 0 0	46	42		ON
U1A	— 0		~~0 -> 10~~		off
U2A	9 5 2 5 7 6 0	20	22		ON
W253	4 0 1 0 1 3 0	off	0 -> 5		off
U5	3 9 2 2 5 6 0	1	6		ON
U4	9 7 9 7 7 0 0	16	16		ON
U8 / U1	— 0		~~0~~		off
W255	3 6 9 1 9 0 0	6.5	0 -> 5		ON
U6	3 3 9 4 0 6 0	16	15		ON
U7	8 4 6 0 9 4 0	19	18		ON
U11	1 9 5 5 6 5 0	21	22		ON
	Total		**146**		

Product / Water Levels:

			Time			Time
W 253	Water Level	15.90 On/Off		Water Level	On/Off	
W 255	Water Level	43.68 On/Off		Water Level	On/Off	
W 300spn	Water Level	18.82				
W 328	Water Level	13.41				

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 14.45	DNAPL = —
Oil = —	DNAPL = 7993	Water = 6.30
		depth=

Is the float operating Y / N Does the float indicate water present between tanks Y / N NA
Is caulking on the vault in good condition Y / N NA

West Area Inspection

Is the west area fence secure (Y) / N Has there been any evidence of trespassing Y / (N) — 1 tree on fence.
Sketch on Back any areas of concern with the West Area, or fence

Other issues: Control panel inspected for Hot spots or Discolored wires. - None found.

MARCH

BARR

Monthly Readings 4 WEEKLY
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 3/21/17
Technician: SDI
Quarter (1st) 2nd 3rd 4th

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	7	1	2	3	6	7	0	0	40	42		
U1A	[redacted]							0	0	0 -> 10		OFF
U2A	[redacted]	0	7	8	3	3	8	0	18	22		
W253	[redacted]	4	0	6	6	1	5	0	5.5	0 -> 5		
U5	[redacted]	3	9	8	5	7	9	0	1	6		
U4	[redacted]	0	9	2	7	8	5	0	13.5	16		
U8 / U1	[redacted]							0	0	0		OFF
W255	[redacted]	4	0	6	9	8	3	0	0	0 -> 5		OFF
U6	[redacted]	4	4	3	1	0	2	0	16	15		
U7	[redacted]	4	7	2	8	7	6	0	18	18		
U11	[redacted]	3	3	9	0	3	9	0	21	22		
					Total					**146**		

Product / Water Levels:

				Time				Time
W 253	Water Level	Below 60'	On/Off		Water Level		On/Off	
W 255	Water Level	16.71	On/Off		Water Level		On/Off	
W 300spn	Water Level	18.90						
W 328	Water Level	13.33						

Tank Effluent Sample (Y) N pH 6.91 Temp 9.00 Cond 749 D.O. 3.89 EH -71.4 TURB. 1.11

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	14.63	DNAPL =	—
Oil =	—	DNAPL =	79.80	Water =	6.30
				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:

APRIL

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 4/21/17
Technician: SDF
Quarter 1st (2nd) 3rd 4th

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	7	3	0	7	0	9	0	0	42	42		
U1A								0	0	0 -> 10		off
U2A		1	6	0	4	8	8	0	18	22		
W253		4	1	6	9	9	1	0	0	0 -> 5		off
U5		4	0	2	7	4	2	0	1	6		
U4		1	5	8	7	2	5	0	18	16		
U8 / U1								0	0	0		off
W255		4	2	4	0	5	1	0	6.5	0 -> 5		
U6		5	1	1	6	0	4	0	16	15		
U7		0	5	6	4	4	2	0	20	18		
U11		4	1	4	4	1	2	0	0	22		off
					Total					**146**		

Product / Water Levels:

				Time				Time
W 253	Water Level	15.73	On/Off		Water Level		On/Off	
W 255	Water Level	Below 59'	On/Off		Water Level		On/Off	
W 300spn	Water Level	18.70						
W 328	Water Level	13.08						

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	14.28	DNAPL =	—
Oil =	—	DNAPL =	79.78	Water = depth=	6.30

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:

MAY

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 5/26/17
Technician: SDI
Quarter 1st (2nd) 3rd 4th

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	7	5	0	3	1	6	0	0	45	42		
U1A	[redacted]							0	0	0 -> 10		off
U2A	[redacted]	2	5	2	0	9	4	0	18.5	22		
W253	[redacted]	4	1	6	9	9	1	0	0	0 -> 5		off
U5	[redacted]	4	0	7	7	1	4	0	1	6		
U4	[redacted]	2	4	5	2	9	8	0	18	16		
U8 / U1	[redacted]							0	0	0		off
W255	[redacted]	4	5	7	4	8	5	0	6.5	0 -> 5		
U6	[redacted]	5	8	9	2	0	4	0	16	15		
U7	[redacted]	1	5	1	4	6	4	0	19	18		
U11	[redacted]	5	2	4	8	6	8	0	23	22		
					Total					146		

Product / Water Levels:

				Time			Time
W 253	Water Level	14.92	On/(Off)		Water Level	On/Off	
W 255	Water Level	Below 59'	On/Off		Water Level	On/Off	
W 300spn	Water Level	17.90					
W 328	Water Level	12.31					

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 13.36	DNAPL = -
Oil = X	DNAPL = 79.80	Water = 5.10
		depth=

* LOTS OF RAIN THIS MONTH.

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:

JUNE

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 6/28/17
Technician: SDL
Quarter 1st (2nd) 3rd 4th

Recovery Well	Meter Readings (Gal.)	Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	7 6 9 3 2 7 0 0	40	42		
U1A	6 7 5 3 1 9 0	0	0 -> 10		off
U2A	3 2 6 6 5 2 0	21.5	22		
W253	4 1 6 9 9 1 0	0	0 -> 5		off
U5	4 1 2 3 2 8 0	1	6		
U4	3 2 4 0 4 6 0	18	16		
U8 / U1	0	0	0		off
W255	4 8 6 9 5 4 0	8	0 -> 5		
U6	6 5 7 6 1 5 0	15	15		
U7	2 3 5 2 2 1 0	19	18		
U11	6 2 2 4 3 3 0	21	22		
	Total		**146**		

Product / Water Levels:

			Time			Time
W 253	Water Level	15.03 On/Off		Water Level	On/Off	
W 255	Water Level	Below 59' On/Off		Water Level	On/Off	
W 300spn	Water Level	18.58				
W 328	Water Level	12.95				

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 = X	Water Level 13.75	DNAPL =
Oil = X	DNAPL = 79.77	Water =
		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:

+ FLOW READINGS COLLECTED 6/26/17 BY JWJ.

JULY

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 7-31-17
Technician: SDJ
Quarter 1st (2nd) 3rd 4th

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	7	8	6	2	2	2	0	0	40	42		
U1A		—	—	—	—	—	—	0	0	0 -> 10		off
U2A		4	3	3	2	3	8	0	21	22		
W253		4	1	6	9	9	1	0	0	0 -> 5		off
U5		4	1	7	1	2	7	0	1	6		
U4		4	2	1	7	9	9	0	18	16		
U8 / U1		—	—	—	—	—	—	0	0	0		off
W255		5	1	9	0	3	5	0	8	0 -> 5		
U6		7	3	1	9	6	3	0		15		
U7		3	2	6	7	7	3	0		18		
U11		7	2	1	7	2	2	0		22		
					Total					**146**		

Product / Water Levels:

				Time			Time
W 253	Water Level	16.00	On/Off		Water Level	On/Off	
W 255	Water Level	Below 59'	On/Off		Water Level	On/Off	
W 300spn	Water Level	19.10					
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 14.30	DNAPL =
Oil = X	DNAPL = 79.75	Water = X
		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:

Aug

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 8/31/17
Technician: SD1
Quarter 1st 2nd 3rd 4th

Recovery Well	Meter Readings (Gal.)	Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	7 9 6 6 0 0 0 0	40	42		
U1A	[redacted] 6 7 5 3 1 9 0	0	0 -> 10		OFF
U2A	[redacted] 5 0 1 8 6 0 0	23	22		
W253	[redacted] 4 1 6 8 9 1 0	0	0 -> 5		OFF
U5	[redacted] 4 2 0 6 9 5 0	1	6		
U4	[redacted] 4 9 2 4 3 7 0	19	16		
U8 / U1	[redacted] 0	0	0		OFF
W255	[redacted] 5 4 2 9 6 9 0	6	0 -> 5		
U6	[redacted] 7 8 7 5 4 3 0	15	15		
U7	[redacted] 3 9 5 0 6 5 0	19	18		
U11	[redacted] 7 9 0 4 9 9 0	19	22		
	Total		146		

Product / Water Levels:

			Time			Time
W 253	Water Level	15.45 On/Off		Water Level	On/Off	
W 255	Water Level	Below 54' On/Off		Water Level	On/Off	
W 300spn	Water Level	18.51				
W 328	Water Level	12.83				

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 Water = Oil = X	Total depth = 83 feet Water Level 13.90 DNAPL = 79.77	Total depth = 7.70 DNAPL = Water = X 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: W253 TURNED ON, W255 SHUT OFF FOR SEPT.

FLOW READING COLLECTED ON 8/25/17 BY PWS.

SEPT.

BARR

WEEKLY AND Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 10/4/17
Technician: SDF
Quarter 1st 2nd (3rd) 4th

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	8	1	7	5	2	6	0	0	32	42		
U1A		6	7	5	3	1	9	0	0	0 -> 10		OFF
U2A		6	3	5	2	2	4	0	22	22		
W253		4	4	5	9	8	1	0	6	0 -> 5		
U5		4	2	2	2	3	4	0	1	6		
U4		5	9	6	8	8	9	0	18	16		
U8 / U1								0	0	0		OFF
W255		5	4	8	4	8	3	0	0	0 -> 5		OFF
U6		8	7	5	1	0	1	0	16	15		
U7		5	0	2	6	7	9	0	18	18		
U11		9	0	7	6	8	5	0	19	22		
					Total					146		

10

TURNED OFF 253 - ON 255.

Product / Water Levels:

				Time			Time
W 253	Water Level	Below 60'	On/Off		Water Level	On/Off	
W 255	Water Level	16.44	On/Off		Water Level	On/Off	
W 300spn	Water Level	18.63					
W 328	Water Level	13.03					

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~~	10.66	Total depth = 83 feet		Total depth = ~~7.70~~	8.60
Water =	—	Water Level	14.04	DNAPL =	—
Oil =	10.40	DNAPL =	80.00	Water = depth=	8.35

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:
4 GAS READINGS - Befor fan
CO - 0 LEL - 0 H_2S - 0 ~~O2~~ O2 20.7

WITH Fan Running
CO - 0 LEL - 0 H_2S - 0 O2 - ~~20.9~~ 21.3

OCT.

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 11-3-17
Technician: SDJ
Quarter 1st 2nd 3rd (4th)

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	8	2	9	3	0	0	0	0	40	42		
U1A								0	0	0 -> 10		OFF
U2A		7	1	5	4	4	4	0	22	22		
W253		4	4	6	0	3	7	0	0	0 -> 5		OFF
U5		4	2	2	2	3	6	0	6	6		
U4		4	6	3	4	0	8	0	16	16		
U8 / U1								0	0	0		OFF
W255		5	7	4	0	4	4	0	7	0 -> 5		
U6		9	3	4	3	4	8	0	16	15		
U7		5	7	5	7	1	5	0	19	18		
U11		9	8	2	9	6	4	0	21	22		
					Total					146		

*

Product / Water Levels:

				Time			Time
W 253	Water Level	15.83	On/Off		Water Level	On/Off	
W 255	Water Level	Below 59'	On/Off		Water Level	On/Off	
W 300spn	Water Level	18.73					
W 328	Water Level	13.07					

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~~	10.66	Total depth = 83 feet		Total depth = ~~7.70~~	8.60
Water =	-	Water Level	14.21	DNAPL =	P
Oil =	10.57	DNAPL =	79.53	Water =	DRY
				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:

* FLOW READINGS COLLECTED ON 10-31-17 BY PWS.

NOV.

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 12/4/17
Technician: SDJ
Quarter 1st 2nd 3rd (4th)

Recovery Well	Meter Readings (Gal.)								Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	8	4	6	5	1	7	0	0	30	42		
U1A								0	0	0 -> 10		off
U2A		8	2	1	4	4	2	0	21	22		
W253		4	4	6	0	3	6	0	0	0 -> 5		off
U5		4	3	2	6	4	6	0	2	6		
U4		7	4	8	8	7	6	0	16	16		
U8 / U1								0	0	0		off
W255		6	0	6	6	2	4	0	7	0 -> 5		
U6		0	0	8	5	8	9	0	15	15		
U7		6	6	7	3	6	4	0	18	18		
U11		0	7	2	8	4	4	0	18	22		
					Total					**146**		

Product / Water Levels:

				Time			Time
W 253	Water Level	16.00	On/Off		Water Level	On/Off	
W 255	Water Level	Below 59'	On/Off		Water Level	On/Off	
W 300spn	Water Level	18.91					
W 328	Water Level	13.40					

Tank Effluent Sample Y / N pH _____ Temp _____ Cond _____ D.O. _____ EH _____

DNAPL System Monitoring

DNAPL Tank Manhole	W251	Vault Manhole
Total Depth ~~8.60 feet~~ 10.66	Total depth = 83 feet	Total depth = ~~7.70~~ 8.60
Water = —	Water Level 14.45	DNAPL = —
Oil = 10.55	DNAPL = 79.50	Water = —
		depth= —

Dry

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:

DEC

BARR

Monthly Readings
Former Joslyn Manufacturing Site
Brooklyn Center, Minnesota

Date: 1-5-18
Technician: SDI
Quarter 1st 2nd 3rd (4th)

Recovery Well	Meter Readings (Gal.)	Actual Flow Rate GPM	Design Flow Rate GPM	Comments	
U12	8591290 0	26	42		
U1A	— 0	0	0 -> 10		OFF
U2A	907854 0	19	22		
W253	446036 0	0	0 -> 5		off
U5	442154 0	2	6		
U4	816007 0	17	16		
U8 / U1	— 0	0	0		OFF
W255	635592 0	7	0 -> 5		
U6	045751 0	8	15		
U7	748513 0	18	18		
U11	843607 0	15	22		
	Total		146		

Product / Water Levels:

			Time			Time
W 253	Water Level	16.15 On/Off		Water Level	On/Off	
W 255	Water Level	Below 59' On/Off		Water Level	On/Off	
W 300spn	Water Level	19.15				
W 328	Water Level	13.60				

Tank Effluent Sample Y / N pH _____ Temp _____ Cond _____ D.O. _____ EH _____

DNAPL System Monitoring

DNAPL Tank Manhole	W251	Vault Manhole
Total Depth ~~6.00 feet~~ 10.66	Total depth = 83 feet	Total depth = ~~7.70~~ 8.60
Water = —	Water Level 14.81	DNAPL =
Oil = 10.55	DNAPL = 79.48	Water =
		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: * FLOW READING COLLECTED BY PWS ON 1-3-18.

Quarterly Sampling and Water Levels

WATER LEVEL SUMMARY

Project: Joslyn

Project Number: 2327110

Environmental Technician: SDI

Date: 3/21/17

Monitoring Location	Measuring point elevation	Water level depth	Total well depth	Static water elevation	Comments
S1A		21.63			
W6N		16.39			
W7		13.41			
W101		4.79			
W104		9.07			
W129		4.40			
W130		17.87			
W132		17.41			
U1		16.00			
TWIN LK		18.15			
OIL/WATER SEP.		NONE -	LNAPL	CHECK	

Barr Engineering Company
Field Log Data Sheet

Client: Joslyn	Monitoring Point: U1
Location:	Date: 3/21/17
Project #: 2327110	Sample Time: 0930

GENERAL DATA	
Barr lock:	M
Casing diameter:	8
Total well depth:*	33.8
Static water level:*	16.00
Water depth:*	17.8
Well volume: (gal)	46
Purge method:	1.5 (C)
Sample method:	Grab
Start time:	-
Stop time:	-
Duration (minutes):	-
Rate, gpm:	~4
Volume, purged:	138 gl.
Duplicate collected?	-
Sample collection by:	SDI

STABILIZATION TEST

Time/ Volume	Temp °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
46	13.00	1207	7.27	-149.7	1.32	-
92	12.97	1216	7.23	-143.6	1.37	-
138 gl.	12.95	1220	7.21	-142.1	1.39	

Odor: N4

Purge Appearance: cloudy → 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:

(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: JOSLYN	Monitoring Point: TANK EFF
Location:	Date: 3/21/17
Project #: 2327110	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:	SDJ

STABILIZATION TEST

Time/ Volume	Temp °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
	9.00	749	6.91	-71.4	3.89	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: pump out wells

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 ☐ MO ☐ WI ☐ MI ☐ ND Other: ☐ MN ☐ SD

COC Number: 52234

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

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	Analysis Requested: Water SVOC	Water General	Water O&G	Water COD	Soil	% Solids	Preservative Code	Field Filtered Y/N	Comments
									A	A	B	D					
									N	N	N	N					
1. UI				3/21/2017	0930	GW		2									TABLE 3-13
2. TANK EFF.				↓	1100	↓		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: SDI
Barr Proj. Manager: JLB
Barr DQ Manager: TAO
Lab Name: CAS
Lab Location: Kelso, WA

Relinquished by: S/ DB — On Ice? (Y) N — Date 3/22/17 — Time (1200)
Received by: — Date — Time

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

Water Level Data Sheet

WATER LEVEL DATA SHEET

Project: JOSLYN
Project Number: 232701110
Environmental Staff: KMJ2

Date: 6/27/16

Monitoring Location	Measuring Point Elevation	Water Level Depth 21.21	Total Well Depth	Static Water Elevation	Comments
S1A	~~21.21~~	~~32.72~~	32.72		
U1		19.99	34.91		
W132		17.41	26.50		
W101		4.64	14.38		
W130		17.99	25.89		
W104		9.49	10.72		
W129		4.56	15.34		
W6N		16.35	~~15.28~~	21.79	
W7		13.28	25.26		
TWIN LAKE		18.22			

Barr Engineering Company
Field Log Data Sheet

Client: Josh	Monitoring Point: U1
Location:	Date: 6-28-17
Project #: 2327110	Sample Time: 0840

GENERAL DATA	
Barr lock:	N
Casing diameter:	8
Total well depth:*	33.8
Static water level:*	15.45
Water depth:*	18.4
Well volume: (gal)	47
Purge method:	1.5(E)
Sample method:	Grab
Start time:	0800
Stop time:	0836
Duration (minutes):	36
Rate, gpm:	4
Volume, purged:	144 gl.
Duplicate collected?	-
Sample collection by:	SD1
Others present:	-

STABILIZATION TEST

Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
0812	12.47	1089	7.83	-29.4	.23	-
0824	12.40	1070	7.80	-31.4	.21	-
0836	12.39	1071	7.79	-33.9	.21	11.7

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:

(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: Joslyn	**Monitoring Point:** MW6N
Location:	**Date:** 6/28/17
Project #: 23271110	**Sample Time:** 0910

GENERAL DATA		STABILIZATION TEST						
Barr lock:	Y							
Casing diameter:	2	Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Total well depth:*	22	3 gal	10.30	891	7.61	31.1	1.89	—
Static water level:*	16.20	4	10.30	887	7.57	33.0	1.90	—
Water depth:*	5.8	5	10.30	887	7.55	34.7	1.90	1.51
Well volume: (gal)	1							
Purge method:	Peristo							
Sample method:	"							
Start time:	—	Odor: YES						
Stop time:	—	Purge Appearance: Clear						
Duration (minutes):	—	Sample Appearance: "						
Rate, gpm:	1	Comments:						
Volume, purged:	5 gal							
Duplicate collected?	—							
Sample collection by:	SDJ	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: Josh	**Monitoring Point:** W7
Location:	**Date:** 6-28-17
Project #: 23271110	**Sample Time:** 0940

GENERAL DATA	
Barr lock:	4
Casing diameter:	2
Total well depth:*	25.0
Static water level:*	13.20
Water depth:*	11.8
Well volume: (gal)	2
Purge method:	Pump
Sample method:	"
Start time:	—
Stop time:	—
Duration (minutes):	—
Rate, gpm:	1
Volume, purged:	10 gl.
Duplicate collected?	—
Sample collection by:	SDJ
Others present:	—

STABILIZATION TEST

Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
6	10.04	986	8.00	-115.1	.30	—
8	10.02	985	8.02	-116.1	.31	—
10	10.02	989	8.00	-117.4	.30	27.7

Odor: YES

Purge Appearance: CLOUDY

Sample Appearance: CLOUDY

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:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC- semi-volatile- ✓ 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	Monitoring Point: TANK EFF.
Location:	Date: ~~6-28-17~~ 6/29/17
Project #: 23271110	Sample Time: ~~1030~~ 0800

GENERAL DATA		STABILIZATION TEST						
Barr lock:		Time/ Volume	Temp °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Casing diameter:			11.21	717	7.20	-71.4	2.49	4.11
Total well depth:*								
Static water level:*								
Water depth:*								
Well volume: (gal)								
Purge method:	DBD.							
Sample method:	GRAB							
Start time:		Odor: YES						
Stop time:		Purge Appearance:						
Duration (minutes):		Sample Appearance: CLEAR						
Rate, gpm:		Comments:						
Volume, purged:								
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 Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☒ MN ☐ ND ☐ SD Other: _____

COC Number: 51784

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

	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	Analysis Requested: Water: SVOC; SO4 (Ca); GENERAL; COD	Soil: % Solids	Preservative Code	Field Filtered Y/N
										A B A D			
										N N N N			
1.	U1				6/28/2017	0840	GW		2			TABLE 3-13	
2.	W6N				↓	0910	↓		2			↓	
3.	W7				↓	0940	↓		2			↓	
4.	TANK EFF.				6/29/2017	0800	↓		2 1 1 1			TABLE 3-4	
5.													
6.													
7.													
8.													
9.													
10.													

BARR USE ONLY

Sampled by: SDJ
Barr Proj. Manager: JLB
Barr DQ Manager: TAO
Lab Name: ALS
Lab Location: KELSO, WA

Relinquished by: SKD — On Ice? (Y) N — Date 6/29/17 — Time 1400 — Received by: — Date — Time

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.

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JOSLYN
3rd QTR
2017

WATER LEVEL SUMMARY

Project: JOSLYN

Project Number: 2327110

Environmental Technician: SDI

Date: 9/12/17

Monitoring Location	Measuring point elevation	Water level depth	Total well depth	Static water elevation	Comments
S1A	21.22				
W6N	16.21				
W7	13.25				
W101	4.68				
W104	9.77				
W125	4.38				
W130	18.35				
W132	17.60				
41	15.62				
TWIN LK.	18.40				
OIL/WATER	SPONNER	- NO LNAPL - NONE			

Barr Engineering Company
Field Log Data Sheet

Client: Joslyn	Monitoring Point: U1
Location:	Date: 9/12/17
Project #: 2327110	Sample Time: 0940

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	0912	13.87	1119	7.80	-157.1	.98	-
Static water level:*	15.62	0924	13.80	1110	7.81	-150.4	.95	-
Water depth:*	18.2	0936	13.79	1107	7.83	-147.9	.93	4.50
Well volume: (gal)	48							
Purge method:	1.5(C)							
Sample method:	Grab							
Start time:	0900	Odor:	SLIGHT					
Stop time:	0936	Purge Appearance:	CLOUDY → CLEAR					
Duration (minutes):	36	Sample Appearance:	CLEAR					
Rate, gpm:	4	Comments:						
Volume, purged:	144 gl.							
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- 2 semi-volatile- 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	Monitoring Point: TANK OFF
Location:	Date: 9-12-17
Project #: 23827110	Sample Time: 1030

GENERAL DATA		STABILIZATION TEST						
Barr lock:		Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Casing diameter:			11.17	747	7.07	-81.3	3.07	3.00
Total well depth:*								
Static water level:*								
Water depth:*								
Well volume: (gal)								
Purge method:	DED.							
Sample method:	Grab							
Start time:		Odor: YES						
Stop time:		Purge Appearance: CLOUDY						
Duration (minutes):		Sample Appearance: " "						
Rate, gpm:		Comments:						
Volume, purged:								
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 wal 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 ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD

COC Number: NO 49182

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

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	Analysis Requested: Water: SVOC	040	GENERAL	COD	Soil: % Solids	Preservative Code	Field Filtered Y/N
									A	B	A	D			
									N	N	N	N			
1. U1	/	/	/	9/12/2017	0940	GW		2						TABLE 3-13	
2. TANK EFF.	/	/	/	↓	1030	↓		2	1	1	1			TABLE 3-4	
3.															
4.															
5.															
6.															
7.															
8.															
9.															
10.															

BARR USE ONLY

Sampled by: SDI

Barr Proj. Manager: SLB

Barr DQ Manager: TAO

Lab Name: CAS

Lab Location: KELSO, WA.

Relinquished by: Steve I — On Ice? (Y) N — Date: 9/13/17 — Time: 0900

Received by: — Date — Time

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.

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WATER LEVEL SUMMARY

Project: JOSLYN

Project Number: 232710

Date: 10/11/17

Environmental Technician: SDI

Monitoring Location	Measuring point elevation	Water level depth	Total well depth	Static water elevation	Comments
S1A		21.20			
W2N		11.55			
W6N		16.88			
W7		13.32			
W10		33.73			
W101		4.52			
W104		8.90			
W125N		17.43			
W126		10.50			
W127N		15.62			
W129		5.00			
W130		18.50			
W132		17.10			
U1		15.45			
U1A		20.00			
U2A		29.60			
U4N		28.90			
U5		33.85			
U6N		26.81			
U8		14.95			
U11		23.70			
U12		26.95			
W201		4.71			
S2		20.76			
W252 N		14.14			
W253		15.90			
W254		20.11			
47N		13.52			

WATER LEVEL SUMMARY

Project: JOSLYN

Project Number: 2327110

Environmental Technician: SDI

Date: 10/11/17

Monitoring Location	Measuring point elevation	Water level depth	Total well depth	Static water elevation	Comments
W255		BELOW 59'			
W300 SPW		18.60			
W328		12.90			
S3		26.90			
W251		14.37			
TWIN LK.		18.55			
W301		4.70			
OIL/WATER	SUPERNATANT	LNAPL =	NONE		

Barr Engineering Company
Field Log Data Sheet

Client: JOSLYN	Monitoring Point: S3
Location:	Date: 10-11-17
Project #: 23 27110	Sample Time: 1010

GENERAL DATA		STABILIZATION TEST						
Barr lock:	Y							
Casing diameter:	2	Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Total well depth:*	144.6	0943	11.39	712	8.57	-200.1	.82	—
Static water level:*	26.90	0956	11.33	714	8.50	-197.3	.80	—
Water depth:*	117.7	1009	11.30	714	8.47	-195.1	.78	200
Well volume: (gal)	19							
Purge method:	1.5 (L)							
Sample method:	Bailer							
Start time:	0930	Odor: NA						
Stop time:	1009	Purge Appearance: CLEAR → CLOUDY						
Duration (minutes):	39	Sample Appearance: CLOUDY						
Rate, gpm:	1.5	Comments: well draws down						
Volume, purged:	58.5 gl.							
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 wel 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: Joslyn	Monitoring Point: S1A
Location:	Date: 10-11-17
Project #: 2327110	Sample Time: 1040

GENERAL DATA		STABILIZATION TEST						
Barr lock:	Y							
Casing diameter:	2	Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Total well depth:*	32.8	1031	12.99	1108	7.52	-180.1	.72	-
Static water level:*	21.20	1033	12.99	1109	7.48	-177.3	.76	-
Water depth:*	11.6	1035	13.00	1110	7.45	-174.9	.80	1.55
Well volume: (gal)	2							
Purge method:	1.5 sub.							
Sample method:	B.L							
Start time:	1025	Odor: NA						
Stop time:	1035	Purge Appearance: CLOUDY RED → CLEAR						
Duration (minutes):	10	Sample Appearance: CLEAR						
Rate, gpm:	1	Comments:						
Volume, purged:	10gl.							
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 wel SW: surface water SE: sediment other:

VOC- semi-volatile- 2 general- nutient- 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	Monitoring Point: S2
Location:	Date: 10-11-17
Project #: 2327110	Sample Time: 1115

GENERAL DATA		STABILIZATION TEST						
Barr lock:	N							
Casing diameter:	2	Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Total well depth:*	37.6	1104	12.94	1048	8.00	-117.9	.81	-
Static water level:*	20.76	1107	12.93	1045	8.03	-121.3	.78	-
Water depth:*	16.9	1110	12.94	1045	8.01	-125.4	.75	2.00
Well volume: (gal)	2.8							
Purge method:	1.5 SUB							
Sample method:	Bailer Grab					--		
Start time:	1055	Odor: NA						
Stop time:	1110	Purge Appearance: DARK → CLEAR						
Duration (minutes):	15	Sample Appearance: CLEAR						
Rate, gpm:	1	Comments:						
Volume, purged:	15gl.							
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 wel 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: JOSLYN	Monitoring Point: W132
Location:	Date: 10-11-17
Project #: 2327110	Sample Time: 1205

GENERAL DATA		STABILIZATION TEST						
Barr lock:	Y							
Casing diameter:	2	Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Total well depth:*	27.2	1152	15.83	1288	7.25	-6.7	3.40	—
Static water level:*	17.10	1156	15.77	1300	7.20	1.9	3.45	—
Water depth:*	10.1	1200	15.74	1311	7.17	3.4	3.41	.87
Well volume: (gal)	1.6							
Purge method:	15 SUB.							
Sample method:	BAIL							
Start time:	1140	Odor: NA						
Stop time:	1200	Purge Appearance: CLEAR						
Duration (minutes):	20	Sample Appearance: CLEAR						
Rate, gpm:	.5	Comments:						
Volume, purged:	10 gl.							
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: Joslyn	**Monitoring Point:** W127N
Location:	**Date:** 10-11-17
Project #: 23271110	**Sample Time:** 1240

GENERAL DATA	
Barr lock:	Y
Casing diameter:	2
Total well depth:*	22.6
Static water level:*	15.62
Water depth:*	7
Well volume: (gal)	1
Purge method:	1.5 SUB
Sample method:	Bail
Start time:	1225
Stop time:	1235
Duration: (minutes)	10
Rate, gpm:	.5
Volume, purged:	5gl.
Duplicate collected?	-
Sample collection by:	SDI

STABILIZATION TEST

Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
1231	14.75	812	7.47	-8.9	2.65	—
1233	14.74	809	7.44	-7.3	2.70	—
1235	14.75	808	7.43	-6.7	2.71	.61

Odor: NA

Purge Appearance: CLOUDY RED → CLEAR

Sample Appearance: CLEAR

Comments:

CO2- Mn2- Fe(T)- Fe2-

Others present: -

Well Condition:

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: Joslyn		**Monitoring Point:** W130	
Location:		**Date:** 10-12-17	
Project #: 23 27110		**Sample Time:** ~~1000~~ 1030	

GENERAL DATA		STABILIZATION TEST						
Barr lock:	Y							
Casing diameter:	2	Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Total well depth:*	25.5	6 gl.	13.35	1291	7.03	-113.1	2.16	—
Static water level:*	18.50	8	13.36	1296	7.04	-113.0	2.16	—
Water depth:*	7	10	13.37	1286	7.04	-112.3	2.21	.86
Well volume: (gal)	1.5							
Purge method:	1.5 SUB.							
Sample method:	Bail							
Start time:	—	Odor: YES						
Stop time:	—	Purge Appearance: CLOUDY → CLEAR						
Duration: (minutes)	—	Sample Appearance: CLEAR						
Rate, gpm:	—	Comments: MW-1, FB-1						
Volume, purged:	10 gl.							
Duplicate collected?	MW-1							
Sample collection by:	SDI	CO2- Mn2- Fe(T)- Fe2-						
Others present:	—	Well Condition: OK						

MW: 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:	Josh	**Monitoring Point:**	W6N
Location:		**Date:**	10-12-17
Project #:	23 27110	**Sample Time:**	1110

GENERAL DATA	
Barr lock:	Y
Casing diameter:	2
Total well depth:*	22.0
Static water level:*	16.88
Water depth:*	5.2
Well volume: (gal)	.8
Purge method:	1.5 SUB
Sample method:	Bail
Start time:	—
Stop time:	—
Duration: (minutes)	—
Rate, gpm:	—
Volume, purged:	5 gal.
Duplicate collected?	—
Sample collection by:	SDI
Others present:	—

STABILIZATION TEST

Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
3	12.53	817	7.01	-10.8	2.13	—
4	12.53	815	6.98	-8.6	2.19	—
5	12.54	815	6.98	-7.8	2.19	.83

Odor: NA

Purge Appearance: CLEAR

Sample Appearance: CLEAR

Comments:

CO2- Mn2- Fe(T)- Fe2-

Well Condition: OK

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:	Joslyn	Monitoring Point:	W10
Location:		Date:	10-12-17
Project #:	2327110	Sample Time:	1200

GENERAL DATA		STABILIZATION TEST						
Bail lock:	Y							
Casing diameter:	4	Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Total well depth:*	38.5	~10gl.	11.15	911	7.00	-282.1	1.00	141
Static water level:*	33.73							
Water depth:*	4.8							
Well volume: (gal)	3							
Purge method:	1.5 sub.							
Sample method:	Bail							
Start time:	-	Odor: YES						
Stop time:	-	Purge Appearance: CLOUDY						
Duration (minutes):	-	Sample Appearance: N A						
Rate, gpm:	-	Comments: well purges DRY						
Volume, purged:	~10gl.							
Duplicate collected?	-							
Sample collection by:	SDJ	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: JOSLYN	Monitoring Point: W 300 SPW
Location:	Date: 10/13/17
Project #: 23 27 110	Sample Time: 0920

GENERAL DATA		STABILIZATION TEST						
Barr lock:	Y							
Casing diameter:	2	Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
Total well depth:*	135.2	0900	10.76	697	7.45	-191.6	.64	—
Static water level:*	18.60	0910	10.75	695	7.47	-190.1	.65	-
Water depth:*	116.6	0920	10.74	690	7.47	-187.3	.67	11.9
Well volume: (gal)	19							
Purge method:	1.5 SUB							
Sample method:	Bail							
Start time:	0850	Odor: NA						
Stop time:	0920	Purge Appearance: CLEAR						
Duration (minutes):	30	Sample Appearance: CLEAR						
Rate, gpm:	2	Comments:						
Volume, purged:	60 gl.							
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: Joslyn	Monitoring Point: U1
Location:	Date: 10/13/17
Project #: 23271110	Sample Time: 1030

GENERAL DATA	
Barr lock:	N
Casing diameter:	8
Total well depth:*	33.8
Static water level:*	15.45
Water depth:*	18.4
Well volume: (gal)	48
Purge method:	1.5 (E)
Sample method:	Bail
Start time:	0950
Stop time:	1026
Duration (minutes):	36
Rate, gpm:	4
Volume, purged:	144
Duplicate collected?	-
Sample collection by:	SDI

STABILIZATION TEST

Time/ Volume	Temp °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
1002	13.31	1068	7.17	-165.1	.99	-
1014	13.30	1060	7.14	-160.3	.93	-
1026	13.30	1057	7.13	-159.1	.90	2.18

Odor: yes

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 Engineering Company
Field Log Data Sheet

Client: JOSLYN	Monitoring Point: U1A
Location:	Date: 10/13/17
Project #: 2327110	Sample Time: 1135

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:	1100
Stop time:	1130
Duration (minutes):	30
Rate, gpm:	4
Volume, purged:	120
Duplicate collected?	M-2
Sample collection by:	SDI

STABILIZATION TEST

Time/ Volume	Temp.°C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
1110	13.04	1095	7.18	-165.9	.66	—
1120	13.00	1090	7.21	-161.3	.64	—
1130	13.01	1087	7.22	-160.4	.64	7.77

Odor: YES

Purge Appearance: CLEAR

Sample Appearance: CLEAR

Comments: M-2

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- 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	Monitoring Point: W254
Location:	Date: 10/18/17
Project #: 2327110	Sample Time: 1115

GENERAL DATA	
Barr lock:	Y
Casing diameter:	4
Total well depth:*	82.5
Static water level:*	20.11
Water depth:*	62.4
Well volume: (gal)	40
Purge method:	2" SUB
Sample method:	PUMP
Start time:	1040
Stop time:	1110
Duration (minutes):	30
Rate, gpm:	4
Volume, purged:	120 gl.
Duplicate collected?	—
Sample collection by:	SDJ
Others present:	—

STABILIZATION TEST

Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
1050	11.46	703	7.42	-200.1	.38	—
1100	11.43	700	7.40	-193.4	.35	—
1110	11.43	701	7.40	-192.3	.35	5.00

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:

(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: JOSLYN	Monitoring Point: W252N
Location:	Date: 10-18-17
Project #: 2327110	Sample Time: 1240

GENERAL DATA	
Barr lock:	Y
Casing diameter:	4
Total well depth:*	82.0
Static water level:*	14.14
Water depth:*	67.9
Well volume: (gal)	44
Purge method:	2" SUB.
Sample method:	Bail
Start time:	1130
Stop time:	1236
Duration (minutes):	66
Rate, gpm:	2
Volume, purged:	132 gl.
Duplicate collected?	-
Sample collection by:	JDL
Others present:	-

STABILIZATION TEST

Time/ Volume	Temp.°C	Cond. @ 25	pH	-231.1 Eh	D.O.	Turbidity Appearance
1152	15.77	507	8.00	[illegible]	.26	-
1214	15.70	515	7.93	-221.3	.37	-
1236	15.68	520	7.90	-217.1	.41	4.09

Odor: YES

Purge Appearance: CLOUDY

Sample Appearance: CLOUDY

Comments: well draws down

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:

(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: JOSLYN	Monitoring Point: W7
Location:	Date: 10-18-17
Project #: 2327110	Sample Time: 1315

GENERAL DATA	
Barl lock:	Y
Casing diameter:	2
Total well depth:*	25.0
Static water level:*	13.32
Water depth:*	11.7
Well volume: (gal)	2
Purge method:	1.5 sub
Sample method:	Bail
Start time:	—
Stop time:	—
Duration (minutes):	—
Rate, gpm:	—
Volume, purged:	10 gl.
Duplicate collected?	—
Sample collection by:	SDI
Others present:	—

STABILIZATION TEST

Time/ Volume	Temp °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
6 gl.	11.70	1131	6.35	-156.4	1.21	—
8	11.69	1130	6.36	-157.9	1.19	—
10	11.69	1127	6.37	-154.2	1.17	3.19

Odor: YES

Purge Appearance:

Sample Appearance:

Comments: FB-2

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:

(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

JOSLYN 2327110 SDI

10/20/17

		Temp	COND	pH	ORP	DO	TURB.
U12	1100	9.13	800	7.21	-61.3	2.47	1.11
U2A	1110	9.10	857	6.97	-57.3	2.07	1.37
W253	1120	9.21	401	7.17	-49.3	1.83	4.47
U4N	1130	9.00	817	6.77	-39.4	1.80	.97
W255	1140	9.37	747	7.09	-51.4	1.47	1.51
U6N	1150	9.30	651	6.81	-66.3	2.51	2.11
U7N	1200	9.07	847	7.07	-47.1	2.13	4.01
U11	1210	9.19	900	7.00	-59.1	2.87	3.07
TANK OFF	1220	9.11	761	6.91	-33.1	1.47	2.91
12/4/17							
U5	0800	9.07	847	7.51	-87.3	1.32	3.11

Barr Engineering Company
Field Log Data Sheet

Client: Xcel	Monitoring Point: W328
Location:	Date: 12/4/17
Project #: 23271110	Sample Time: 0930

GENERAL DATA	
Barl lock:	Y
Casing diameter:	4
Total well depth:*	125.0
Static water level:*	12.90
Water depth:*	112.1
Well volume: (gal)	73
Purge method:	DED
Sample method:	Grab
Start time:	0845
Stop time:	
Duration (minutes):	
Rate, gpm:	5
Volume, purged:	
Duplicate collected?	-
Sample collection by:	SDI
Others present:	-

STABILIZATION TEST

Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
0900	12.09	658	7.97	-171.0	1.01	-
0915	12.00	663	8.01	-173.4	.97	-
0930	12.01	664	8.03	-174.3	.94	7.11

Odor: NONE

Purge Appearance: CLOUDY → CLEAR

Sample Appearance: CLEAR

Comments: 5gpm is MAX rate.

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:

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: JOSLYN	Monitoring Point: W 301
Location:	Date: 12/4/17
Project #: 23 27110	Sample Time: 1045

GENERAL DATA	
Barr lock:	Y
Casing diameter:	4
Total well depth:*	139.0
Static water level:*	4.70
Water depth:*	134
Well volume: (gal)	87
Purge method:	DED
Sample method:	Grab
Start time:	—
Stop time:	—
Duration (minutes):	—
Rate, gpm:	—
Volume, purged:	?
Duplicate collected?	—
Sample collection by:	SDJ
Others present:	—

STABILIZATION TEST

Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
?	9.00	831	7.67	-67.3	4.07	167

Odor: SWAMP

Purge Appearance: CLOUDY

Sample Appearance: " "

Comments: well draws down to pump intake. purged several times.

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:

(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: Joslyn	Monitoring Point: W 104
Location:	Date: 12/4/17
Project #: 2327110	Sample Time: 1100

GENERAL DATA	
Barr lock:	Y
Casing diameter:	2
Total well depth:*	17.9
Static water level:*	8.90
Water depth:*	9
Well volume: (gal)	1.5
Purge method:	Bail
Sample method:	"
Start time:	-
Stop time:	-
Duration (minutes):	-
Rate, gpm:	-
Volume, purged:	n/gl.
Duplicate collected?	-
Sample collection by:	SDI

STABILIZATION TEST

Time/ Volume	Temp. °C	Cond. @ 25	pH	Eh	D.O.	Turbidity Appearance
n/gl.	11.00	763	7.97	-101.4	2.46	49.7

Odor: YES

Purge Appearance: CLOUDY

Sample Appearance: " "

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- 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 Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD _____

COC Number: 52987

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: 23270110.03 0413270

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	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	Field Filtered Y/N
1. S3				10/11/2017	1010	GW			2		TABLE 3-13	
2. S1A					1040							
3. S2					1115							
4. W132					1205							
5. W127N					1240							
6. W130				10/12/2017	1030							
7. W6N					1110							
8. W10					1200							
9. M-1 (130)					—							
10. FB-1					—	O						

BARR USE ONLY	Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Sampled by:							
Barr Proj. Manager:	Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Barr DQ Manager:	Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☐ Other: _____				Air Bill Number:		
Lab Name:							
Lab Location:	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 ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☒ MN ☐ ND ☐ SD Other: _____

COC Number: 52976

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: 23270110.030413 270

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	Analysis Requested: Water SVOC	Water A	Water N	Soil % Solids	Preservative Code	Field Filtered Y/N
1. W300SPN				10/13/2017	0920	GW			2				TABLE 3-13	
2. U1					1030				2					
3. U1A					1135				2					
4. M-2					—				2					
5. FB-1				10/12/2017	—	O			2					
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: JLB

Barr DQ Manager: TAO TIL

Lab Name: ALS

Lab Location: KELSO, WA

Relinquished by: Steve Ferguson — On Ice? Y (O) N — Date 10/13/17 — Time 1400

Received by: — Date — Time

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.

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Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☒ MN ☐ ND ☐ SD Other: _____

COC Number: 52716

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: 23270110.03 0013 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	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	% Solids	Preservative Code	Field Filtered Y/N
									SUOC		A	N
1. W254				10/18/2017	1115	GW			2			TABLE 3-13
2. W252N					1240				2			
3. W7					1315				2			
4. FB-2					—	O			2			
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 J	⊗ Y N	10/19/17	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.

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Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☒ MN ☐ ND ☐ SD Other: _____

COC Number: 52721

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: 23270110.30413270

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	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; 0&G; General; COD	Analysis Requested: Soil: % Solids	Preservative Code	Field Filtered Y/N
1. U12				10/20/2017	1100	GW			2		TABLE: 3-13	
2. U2A					1110							
3. W253					1120							
4. U4					1130							
5. W255					1140							
6. U6					1150							
7. U7					1200							
8. U11					1210							
9. TANK EFF.					1220				2 1 1		; 3-4	
10.												

BARR USE ONLY

Sampled by: SDI

Barr Proj. Manager: JLBIII

Barr DQ Manager: TAO

Lab Name: ALS

Lab Location: KELSO, WA.

Relinquished by: Steve I — On Ice? (Y) N — Date: 10/20/17 — Time: 1500

Received by: — Date — Time

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.

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Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☒ MN ☐ ND ☐ SD Other: _____

COC Number: 52602

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: 23270110.030413 270

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	Analysis Requested: Water SVOC	Water A	Water N	Soil % Solids	Preservative Code	Field Filtered Y/N
1. U5				12/4/2017	0800	GW			2				TABLE 3-13	
2. W328					0930				2					
3. W301					1045				2					
4. W104					1100				2					
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: JLB III

Barr DQ Manager: TAO

Lab Name: ALS

Lab Location: KELSO WA

Relinquished by: Steve J — On Ice? Y (N) — Date 12/4/17 — Time

Relinquished by: — On Ice? Y N — Date — Time

Received by: — 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

2017 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

February 15, 2017 **Analytical Report for Service Request No:** K1700620

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn Pigging/Sampling / 23270110.03 OU13 100

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory January 20, 2017
For your reference, these analyses have been assigned our service request number **K1700620.**

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

Chris Leaf
Project Manager

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
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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. *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. *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. *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.

Chain of Custody

ALS Environmental—Kelso Laboratory
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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

K17A0620

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD

COC Number: 51238

COC 1 of 1

REPORT TO	INVOICE TO
Company: BARR	Company:
Address:	Address:
Name:	Name:
email:	email:
Copy to: datamgt@barr.com	P.O.
Project Name: Joslyn Pigging / Sampling	Barr Project No: 23270110.03 0013 100

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	Analysis Requested: Soil	% Solids	Preservative Code	Field Filtered Y/N
1. U12				1/18/2017	1425	GW		2	X	X		NONE	N
2. U11					1005			2	X	X			
3. U2A					1105			2	X	X			
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

1. ~~SAMPLE~~ pH 7.38
2. 7.66
3. 7.72

BARR USE ONLY

Sampled by: SLNR / JWS

Barr Proj. Manager: JLB3

Barr DQ Manager: TAO

Lab Name: ~~ACCUTEST~~ ALS Kelso

Lab Location: ~~ST PAUL, MN~~ Kelso

Relinquished by: _____ On Ice? Y / N: Y Date: 1/19/17 Time: 0800 Received by: Jeremy _____ Date: 1/19/17 Time: 08:00

Relinquished by: Jeremy _____ On Ice? Y / N: N Date: 1/19/17 Time: 14:32 Received by: _____ Date: 1/20/17 Time: 0930

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)

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.

PC 0V

Cooler Receipt and Preservation Form

Client Bar Service Request K17 0620

Received: 1/20/17 Opened: 1/20/17 By: S Unloaded: 1/20/17 By: S

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
0.0	-0.1	1.7	1.6	-0.1	375		7060 3332 4174	

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: _____

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:**	K1700620
Project:	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Collected:**	01/18/17
Sample Matrix:	Ground Water	**Date Received:**	01/20/17
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	K1700620-001	**193000**	1000	1	01/25/17 13:25	
U11	K1700620-002	**37900**	330	1	01/25/17 13:25	
U2A	K1700620-003	**10400**	330	1	01/25/17 13:25	
Method Blank	K1700620-MB1	ND U	5.0	1	01/25/17 13:25	
Method Blank	K1700620-MB2	ND U	5.0	1	01/25/17 13:25	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1700620
Project	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
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	K1700013-030DUP	5.0	10.5	11.0	10.8	5	10	01/25/17
Batch QC	K1700657-002DUP	5.0	74.5	77.5	76.0	4	10	01/25/17

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:**	K1700620
Project:	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Analyzed:**	01/25/17
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:	532393

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1700620-LCS1	424	429	99	85-115

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1700620
Project:	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Collected:**	01/18/17
Sample Matrix:	Ground Water	**Date Received:**	01/20/17
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	K1700620-001	**63**	50	1	01/24/17 17:00	
U11	K1700620-002	**3570**	100	2	02/03/17 17:30	
U2A	K1700620-003	**50**	50	1	01/24/17 17:00	
Method Blank	K1700620-MB1	ND U	50	1	01/24/17 17:00	
Method Blank	K1700620-MB2	ND U	50	1	01/24/17 17:00	
Method Blank	K1700620-MB3	ND U	50	1	02/03/17 17:30	

Client:	Barr Engineering Company	**Service Request:**	K1700620
Project	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
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	K1700490-001DUP	200	980	980	984	<1	20	01/24/17
Batch QC	K1700801-002DUP	50	413	387	400	6	20	02/03/17

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:**	K1700620
Project:	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Collected:**	N/A
Sample Matrix:	Ground Water	**Date Received:**	N/A
		Date Analyzed:	01/24/17
		Date Extracted:	NA

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1700490-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

Matrix Spike
K1700490-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen Demand (COD)	980	4840	4000	96	80-128

Results flagged with an asterisk (*) indicate values outside control criteria.

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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:**	K1700620
Project:	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Collected:**	N/A
Sample Matrix:	Ground Water	**Date Received:**	N/A
		Date Analyzed:	02/3/17
		Date Extracted:	NA

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1700801-002	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

Matrix Spike
K1700801-002MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen Demand (COD)	413	1590	1000	118	80-128

Results flagged with an asterisk (*) indicate values outside control criteria.

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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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1700620
Project:	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Analyzed:**	01/24/17
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:	532229

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1700620-LCS1	250	242	103	83-117

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1700620
Project:	Joslyn Pigging/Sampling/23270110.03 OU13 100	**Date Analyzed:**	02/03/17
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:	533555

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1700620-LCS2	229	242	95	83-117

ALS Environmental
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www.alsglobal.com

April 13, 2017

Analytical Report for Service Request No: K1702817

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory March 23, 2017
For your reference, these analyses have been assigned our service request number **K1702817.**

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

Chris Leaf
Project Manager

ALS Environmental
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Kelso, WA 98626
T : +1 360 577 7222
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Table of Contents

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ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
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CAS Number	Chemical Abstract Service registry Number
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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
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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
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Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
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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.

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E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
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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. *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	**Service Request No.:**	K1702817
Project:	Joslyn/ 23270110	**Date Received:**	03/23/17
Sample Matrix:	Ground Water and 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 03/23/17. 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

Lab Control Sample Exceptions:
The upper control criterion was exceeded for Benzo(b)fluoranthene in Laboratory Control Sample (LCS) KWG1702437-1. The analyte in question was not detected in the associated field sample. The error associated with elevated recovery indicated a slight high bias. The sample data was not significantly affected. No further corrective action was appropriate.

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

K1702817

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD

COC Number: 52234
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

	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 5100	Water GENERAL	Water 046	Water C&D	Soil	% Solids	Preservative Code	Field Filtered Y/N	
										A	A	B	D					
										N	N	N	N					
1.	U1	/	/	/	3/21/2017	0930	GW		2									TABLE 3-13
2.	TANK EFF.	/	/	/	↓	1100	↓		2	1	1	1						TABLE 3-4
3.																		
4.																		
5.																		
6.																		
7.																		
8.																		
9.																		
10.																		

BARR USE ONLY		Relinquished by	On Ice?	Date	Time	Received by	Date	Time
Sampled by:	SDI	SL DE	☐ N	3/22/17	1200		3/23/17	0956
Barr Proj. Manager:	JLB	Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Barr DQ Manager:	TAO	Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:				Air Bill Number:		
Lab Name:	CAS						Requested Due Date: ☐ Standard Turn Around Time ☐ Rush (mm/dd/yyyy)	
Lab Location:	KELSO, WA	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	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

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.

PC CV

Cooler Receipt and Preservation Form

Client Baer Service Request K17 02817

Received: 3/23/17 Opened: 3/23/17 By: [illegible] Unloaded: 3/23/17 By: [illegible]

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
5.9	5.5	—	—	0	328		7060 3332 6280	

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: _____

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	3/21/2017
Sample Matrix:	Water	**Date Received:**	3/23/2017

Oil and Grease, Total (HEM)

Prep Method:	Method	Units:	mg/L
Analysis Method:	1664A	Basis:	NA
Test Notes:			

Sample Name	Lab Code	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tank Effluent	K1702817-002	5.0	1	3/30/2017	3/30/2017	ND	
Method Blank	K1702817-MB	5.0	1	3/30/2017	3/30/2017	ND	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	3/30/2017

Matrix Spike Summary
Inorganic Parameters

Sample Name:	Batch QC	Units:	mg/L
Lab Code:	K1702755-003MS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Oil and Grease, Total (HEM)	Method	1664A	5.0	115	3.2J	104	88	78-114	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	3/30/2017
		Date Analyzed:	3/30/2017

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary
Inorganic Parameters

Sample Name:	Dup Lab Control Sample	Units:	mg/L
Lab Code:	K1702817-LCS, K1702817-DLCS	Basis:	NA
Test Notes:			

			Percent Recovery							
			True Value		Result				CAS	Relative
	Prep	Analysis							Acceptance	Percent
Analyte	**Method**	**Method**	LCS	DLCS	LCS	DLCS	LCS	DLCS	Limits	**Difference**
Oil and Grease, Total (HEM)	Method	1664A	120	120	107	103	89	86	78-114	4

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	03/21/17
Sample Matrix:	Water	**Date Received:**	03/23/17
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	K1702817-002	ND U	5.0	1	03/24/17 14:17	
Method Blank	K1702817-MB1	ND U	1.7	1	03/24/17 14:17	
Method Blank	K1702817-MB2	ND U	5.0	1	03/24/17 14:17	

ALS Group USA, Corp.

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project	Joslyn/23270110	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	03/24/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1702806-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1702806-001DUP Result	Average	RPD	RPD Limit
Solids, Total Suspended (TSS)	SM 2540 D	5.0	22.5	23.5	23.0	4	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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Analyzed:**	03/24/17
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:	539361

	Lab Control Sample K1702817-LCS2			Duplicate Lab Control Sample K1702817-DLCS2					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Solids, Total Suspended (TSS)	35.7	35.8	100	35.5	35.8	99	85-115	<1	20

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	03/21/17
Sample Matrix:	Water	**Date Received:**	03/23/17
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	K1702817-002	**13.5**	5.0	1	03/31/17 16:30	
Method Blank	K1702817-MB1	ND U	5.0	1	03/31/17 16:30	
Method Blank	K1702817-MB2	ND U	5.0	1	03/31/17 16:30	

ALS Group USA, Corp.

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project	Joslyn/23270110	**Date Collected:**	03/21/17
Sample Matrix:	Water	**Date Received:**	03/23/17
		Date Analyzed:	03/31/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Tank Effluent	**Units:**	mg/L
Lab Code:	K1702817-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1702817-002DUP Result	Average	RPD	RPD Limit
Chemical Oxygen Demand (COD)	SM 5220 C	5.0	13.5	13.1	13.3	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.

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dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	03/21/17
Sample Matrix:	Water	**Date Received:**	03/23/17
		Date Analyzed:	03/31/17
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Tank Effluent	**Units:**	mg/L
Lab Code:	K1702817-002	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

		Matrix Spike K1702817-002MS			Duplicate Matrix Spike K1702817-002DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chemical Oxygen Demand (COD)	13.5	121	100	107	118	100	104	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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Analyzed:**	03/31/17
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:	540288

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1702817-LCS1	116	121	96	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:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	03/21/2017
Sample Matrix:	Water	**Date Received:**	03/23/2017

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Tank Effluent	**Units:**	ug/L
Lab Code:	K1702817-002	**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	03/28/17	04/06/17	KWG1702438	
2-Methylnaphthalene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Acenaphthylene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Acenaphthene	**30**		10	1	03/28/17	04/06/17	KWG1702438	
Fluorene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Phenanthrene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Anthracene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Pentachlorophenol	**250**	D	50	2	03/28/17	04/06/17	KWG1702438	
Fluoranthene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Pyrene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Benz(a)anthracene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Chrysene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Benzo(b)fluoranthene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Benzo(k)fluoranthene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Benzo(a)pyrene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Indeno(1,2,3-cd)pyrene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Dibenz(a,h)anthracene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	
Benzo(g,h,i)perylene	ND	U	10	1	03/28/17	04/06/17	KWG1702438	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorobiphenyl	87	49-109	04/06/17	Acceptable
2,4,6-Tribromophenol	88	36-129	04/06/17	Acceptable
Terphenyl-d14	92	29-136	04/06/17	Acceptable

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**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:	KWG1702438-3	**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	03/28/17	04/06/17	KWG1702438	
2-Methylnaphthalene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Acenaphthylene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Acenaphthene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Fluorene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Phenanthrene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Anthracene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Pentachlorophenol	ND	U	24	1	03/28/17	04/06/17	KWG1702438	
Fluoranthene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Pyrene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Benz(a)anthracene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Chrysene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Benzo(b)fluoranthene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Benzo(k)fluoranthene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Benzo(a)pyrene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Indeno(1,2,3-cd)pyrene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Dibenz(a,h)anthracene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	
Benzo(g,h,i)perylene	ND	U	9.5	1	03/28/17	04/06/17	KWG1702438	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorobiphenyl	82	49-109	04/06/17	Acceptable
2,4,6-Tribromophenol	77	36-129	04/06/17	Acceptable
Terphenyl-d14	91	29-136	04/06/17	Acceptable

Comments:

QA/QC Report

Client: Barr Engineering Company **Service Request:** K1702817
Project: Joslyn/23270110
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	K1702817-002	87	88	92
Method Blank	KWG1702438-3	82	77	91
Lab Control Sample	KWG1702438-1	79	82	88
Duplicate Lab Control Sample	KWG1702438-2	84	87	91

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
Project: Joslyn/23270110
Sample Matrix: Water

Service Request: K1702817
Date Extracted: 03/28/2017
Date Analyzed: 04/06/2017

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: KWG1702438

	Lab Control Sample KWG1702438-1 Lab Control Spike			Duplicate Lab Control Sample KWG1702438-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	86.1	100	86	84.9	100	85	64-98	1	30
2-Methylnaphthalene	85.9	100	86	87.3	100	87	66-101	2	30
Acenaphthylene	92.7	100	93	93.0	100	93	69-105	0	30
Acenaphthene	89.0	100	89	89.4	100	89	69-108	0	30
Fluorene	92.6	100	93	91.5	100	92	65-113	1	30
Phenanthrene	93.3	100	93	97.8	100	98	67-113	5	30
Anthracene	96.0	100	96	99.9	100	100	69-114	4	30
Pentachlorophenol	72.5	100	73	78.1	100	78	60-113	7	30
Fluoranthene	101	100	101	110	100	110	69-123	8	30
Pyrene	93.7	100	94	94.6	100	95	61-121	1	30
Benz(a)anthracene	95.8	100	96	97.3	100	97	72-117	2	30
Chrysene	97.0	100	97	97.4	100	97	71-113	0	30
Benzo(b)fluoranthene	95.5	100	95	92.1	100	92	72-116	4	30
Benzo(k)fluoranthene	95.1	100	95	92.8	100	93	71-113	2	30
Benzo(a)pyrene	91.5	100	92	91.7	100	92	72-115	0	30
Indeno(1,2,3-cd)pyrene	104	100	104	97.0	100	97	70-120	7	30
Dibenz(a,h)anthracene	100	100	100	96.0	100	96	68-120	4	30
Benzo(g,h,i)perylene	100	100	100	94.9	100	95	67-120	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

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	03/21/2017
Sample Matrix:	Ground water	**Date Received:**	03/23/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U1	**Units:**	ug/L
Lab Code:	K1702817-001	**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	**0.0050**		0.0034	1	03/28/17	04/05/17	KWG1702437	
2-Methylnaphthalene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Acenaphthylene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Acenaphthene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Fluorene	**0.0064**		0.0034	1	03/28/17	04/05/17	KWG1702437	
Phenanthrene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Anthracene	**0.016**		0.0034	1	03/28/17	04/05/17	KWG1702437	
Fluoranthene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Pyrene	**0.0080**		0.0034	1	03/28/17	04/05/17	KWG1702437	
Benz(a)anthracene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Chrysene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Benzo(b)fluoranthene†	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	*
Benzo(k)fluoranthene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Benzo(a)pyrene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Dibenz(a,h)anthracene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Benzo(g,h,i)perylene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Pentachlorophenol	ND	U	0.30	1	03/28/17	04/05/17	KWG1702437	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	72	28-125	04/05/17	Acceptable
Fluoranthene-d10	92	39-123	04/05/17	Acceptable
2,4,6-Tribromophenol	58	10-136	04/05/17	Acceptable
Terphenyl-d14	86	22-127	04/05/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1702817
Project:	Joslyn/23270110	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1702437-3	**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	0.0034	1	03/28/17	04/05/17	KWG1702437	
2-Methylnaphthalene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Acenaphthylene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Acenaphthene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Fluorene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Phenanthrene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Anthracene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Fluoranthene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Pyrene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Benz(a)anthracene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Chrysene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Benzo(b)fluoranthene†	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	*
Benzo(k)fluoranthene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Benzo(a)pyrene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Dibenz(a,h)anthracene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Benzo(g,h,i)perylene	ND	U	0.0034	1	03/28/17	04/05/17	KWG1702437	
Pentachlorophenol	ND	U	0.30	1	03/28/17	04/05/17	KWG1702437	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	28-125	04/05/17	Acceptable
Fluoranthene-d10	93	39-123	04/05/17	Acceptable
2,4,6-Tribromophenol	53	10-136	04/05/17	Acceptable
Terphenyl-d14	81	22-127	04/05/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

QA/QC Report

Client: Barr Engineering Company **Service Request:** K1702817
Project: Joslyn/23270110
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	K1702817-001	72	92	58	86
Method Blank	KWG1702437-3	74	93	53	81
Lab Control Sample	KWG1702437-1	72	96	58	88
Duplicate Lab Control Sample	KWG1702437-2	75	98	60	83

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/23270110
Sample Matrix: Ground water

Service Request: K1702817
Date Extracted: 03/28/2017
Date Analyzed: 04/05/2017

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: KWG1702437

	Lab Control Sample KWG1702437-1 Lab Control Spike				Duplicate Lab Control Sample KWG1702437-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**		**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.377	0.500	75		0.390	0.500	78	59-95	4	30
2-Methylnaphthalene	0.402	0.500	80		0.414	0.500	83	42-108	3	30
Acenaphthylene	0.370	0.500	74		0.416	0.500	83	61-102	12	30
Acenaphthene	0.380	0.500	76		0.407	0.500	81	58-98	7	30
Fluorene	0.387	0.500	77		0.408	0.500	82	59-97	5	30
Phenanthrene	0.415	0.500	83		0.430	0.500	86	61-100	4	30
Anthracene	0.367	0.500	73		0.442	0.500	88	65-98	19	30
Fluoranthene	0.442	0.500	88		0.453	0.500	91	63-106	2	30
Pyrene	0.355	0.500	71		0.421	0.500	84	64-104	17	30
Benz(a)anthracene	0.415	0.500	83		0.454	0.500	91	67-96	9	30
Chrysene	0.453	0.500	91		0.464	0.500	93	67-105	2	30
Benzo(b)fluoranthene	0.535	0.500	107	*	0.468	0.500	94	69-104	13	30
Benzo(k)fluoranthene	0.508	0.500	102		0.464	0.500	93	68-108	9	30
Benzo(a)pyrene	0.378	0.500	76		0.434	0.500	87	68-107	14	30
Indeno(1,2,3-cd)pyrene	0.497	0.500	99		0.474	0.500	95	61-115	5	30
Dibenz(a,h)anthracene	0.545	0.500	109		0.463	0.500	93	54-118	16	30
Benzo(g,h,i)perylene	0.451	0.500	90		0.430	0.500	86	61-110	5	30
Pentachlorophenol	2.25	2.50	90		2.18	2.50	87	10-123	3	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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April 12, 2017

Analytical Report for Service Request No: K1703035

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: JOSLYN / 23/27-110

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory March 29, 2017
For your reference, these analyses have been assigned our service request number **K1703035.**

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

Chris Leaf
Project Manager

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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. *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. *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. *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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ALS ENVIRONMENTAL

Client:	Barr Engineering Company	**Service Request No.:**	K1703035
Project:	JOSLYN/ 23/27-110	**Date Received:**	03/29/17
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 03/29/17. 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 matrix spike recovery for sample U11 was outside control criteria because of suspected matrix interference. As a result of the interference, the results for this analyte contained a potential low bias. No further corrective action was taken.

No other anomalies associated with the analysis of these samples were observed.

Approved by_____

Chain of Custody

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V17030135

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☐ ~~Minneapolis~~

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☐ ~~MN~~ ☐ SD

COC Number: No 49906

COC 1 of 1

REPORT TO	INVOICE TO
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Copy to: datamgt@barr.com	P.O.
Project Name: SoSMN	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

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	Analysis Requested Water: TSS	Water: COD	Soil: % Solids	Preservative Code	Field Filtered Y / N	
1. U2A				3/28/17	1030	W	N	2	1	1				Field pH 6.87
2. U12				↓	1125	↓	N	2	1	1				Field pH 6.98
3. U11				↓	1215	↓	N	2	1	1				Field pH 6.88
4.														
5.														
6.														
7.														
8.														
9.														
10.														

BARR USE ONLY

Sampled by: PWS

Barr Proj. Manager: JLB3

Barr DQ Manager: TAO

Lab Name: ALS

Lab Location:

Relinquished by: [signature] On Ice? (Y) N Date 3/28/17 Time 1300

Received by: [signature] Date 3/28/17 Time 13:00

Relinquished by: [signature] On Ice? (Y) N Date 3/28/17 Time 15:00

Received by: [signature] Date 3/29/17 Time 0950

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)

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.

PC CL

Cooler Receipt and Preservation Form

Client Barr Service Request K17 03035

Received: 3/29/17 Opened: 3/29/17 By: KO Unloaded: 3/29/17 By: KO

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
-.5	-.4	1.2	1.1	-.1	356	49906	7060 3332 6431	

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* X (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: * Cannot tell what color the pH due to sludge (?)

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:**	K1703035
Project:	JOSLYN/23/27-110	**Date Collected:**	03/28/17
Sample Matrix:	Water	**Date Received:**	03/29/17
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
U2A	K1703035-001	**84700**	500	1	04/03/17 13:50	
U12	K1703035-002	**3600**	200	1	04/03/17 13:50	
U11	K1703035-003	**140000**	1000	1	04/03/17 13:50	
Method Blank	K1703035-MB1	ND U	4.0	1	04/03/17 13:50	
Method Blank	K1703035-MB2	ND U	4.0	1	04/03/17 13:50	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1703035
Project	JOSLYN/23/27-110	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	04/03/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1703173-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1703173-001DUP 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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1703035
Project:	JOSLYN/23/27-110	**Date Analyzed:**	04/03/17
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:	540422

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1703035-LCS1	420	429	98	85-115

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1703035
Project:	JOSLYN/23/27-110	**Date Collected:**	03/28/17
Sample Matrix:	Water	**Date Received:**	03/29/17
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
U2A	K1703035-001	**870**	200	4	03/31/17 17:00	
U12	K1703035-002	**710**	200	4	03/31/17 17:00	
U11	K1703035-003	**9700**	500	10	04/11/17 11:15	
Method Blank	K1703035-MB1	ND U	50	1	03/31/17 17:00	
Method Blank	K1703035-MB2	ND U	50	1	03/31/17 17:00	
Method Blank	K1703035-MB3	ND U	50	1	04/11/17 11:15	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1703035
Project	JOSLYN/23/27-110	**Date Collected:**	03/28/17
Sample Matrix:	Water	**Date Received:**	03/29/17
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
U11	K1703035-003DUP	500	9700	9920	9810	2	20	04/11/17
Batch QC	K1703062-001DUP	100	1250	1320	1280	5	20	03/31/17

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:**	K1703035
Project:	JOSLYN/23/27-110	**Date Collected:**	03/28/17
Sample Matrix:	Water	**Date Received:**	03/29/17
		Date Analyzed:	04/11/17
		Date Extracted:	NA

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	U11	**Units:**	mg/L
Lab Code:	K1703035-003	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

Matrix Spike
K1703035-003MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen Demand (COD)	9700	15900	10000	62 *	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:**	K1703035
Project:	JOSLYN/23/27-110	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	03/31/17
		Date Extracted:	NA

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1703062-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

Matrix Spike
K1703062-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen Demand (COD)	1250	3280	2000	101	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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1703035
Project:	JOSLYN/23/27-110	**Date Analyzed:**	03/31/17
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:	540298

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1703035-LCS1	237	242	98	83-117

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1703035
Project:	JOSLYN/23/27-110	**Date Analyzed:**	04/11/17
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:	540819

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1703035-LCS2	230	242	95	83-117

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June 02, 2017

Analytical Report for Service Request No: K1705023

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110.03 OU13 100

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory May 18, 2017
For your reference, these analyses have been assigned our service request number **K1705023.**

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

Chris Leaf
Project Manager

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.

Chain of Custody

ALS Environmental—Kelso Laboratory
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K1705023

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☒ MN ☐ MI ☐ ND ☐ SD Other: ____

COC Number: 51682

COC 1 of 1

REPORT TO	INVOICE TO
Company: BARR	Company: BARR
Address: 4300 MARKET POINTE	Address:
~~Name~~: EDINA MN 55435	Name:
email: TAO@BARR	email:
Copy to: datamgt@barr.com	P.O.
Project Name: JOSLYN	Barr Project No: 23270110.03 0013 100

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 TSS	Water COD	Water pH	Water	Water	Water	Soil	Soil	Soil	% Solids	Preservative Code	Field Filtered Y/N
1. U2A				5/17/17	0940	WW	-	2	X	X	X									Field pH 7.12
2. U12					1050			2	X	X	X									Field pH 6.95
3. U11					1150			2	X	X	X									Field pH 6.80
4.																				
5.																				
6.																				
7.																				
8.																				
9.																				
10.																				

Container Supply Number 79556

BARR USE ONLY							
Sampled by: PWS	Relinquished by:	On Ice? Y N	Date 5/17/17	Time 1300	Received by:	Date 5/7/17	Time 13:00
Barr Proj. Manager: SLB3	Relinquished by:	On Ice? Y N	Date 5/17/17	Time 14:17	Received by: ALS KELSO	Date 5/18/17	Time 1010
Barr DQ Manager: TAO	Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☐ Other:				Air Bill Number:		
Lab Name: ALS	Lab WO:	Temperature on Receipt (°C):			Custody Seal Intact? ☐ Y ☐ N ☐ None		
Lab Location: Kelso, WA							

Requested Due Date: ☐ Standard Turn Around Time ☐ Rush ____ (mm/dd/yyyy)

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.

PC CL

Cooler Receipt and Preservation Form

Client Barr Service Request K17 05023

Received: May 18, 2017 Opened: 5/18 By: SD Unloaded: 5/18 By: SD

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
0.1	0.2	1.4	1.5	+0.1	302	31682	7307 2223 3573	

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
VZA	250mL Plastic				X	H_2SO_4	.5mL	1003-GENP-001	SD	1055
VI2	↓				X	↓	5mL	↓	SD	1055
VII	↓				X	↓	.5mL	↓	SD	1055

Notes, Discrepancies, & Resolutions:

* VZA & VI2 pH was not corrected.

SHORT HOLD TIME

General Chemistry

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1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1705023
Project:	Joslyn/23270110.03 OU13 100	**Date Collected:**	05/17/17
Sample Matrix:	Wastewater	**Date Received:**	05/18/17
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
U2A	K1705023-001	**38700**	200	1	05/24/17 22:30	
U12	K1705023-002	**98300**	330	1	05/24/17 22:30	
U11	K1705023-003	**25800**	330	1	05/24/17 22:30	
Method Blank	K1705023-MB1	ND U	5.0	1	05/24/17 22:30	
Method Blank	K1705023-MB2	ND U	5.0	1	05/24/17 22:30	

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1705023
Project	Joslyn/23270110.03 OU13 100	**Date Collected:**	NA
Sample Matrix:	Wastewater	**Date Received:**	NA
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	K1705025-002DUP	5.0	8.5	9.0	8.75	6	10	05/24/17

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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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1705023
Project:	Joslyn/23270110.03 OU13 100	**Date Analyzed:**	05/24/17
Sample Matrix:	Wastewater	**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:	547147

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1705023-LCS	424	429	99	85-115

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1705023
Project:	Joslyn/23270110.03 OU13 100	**Date Collected:**	05/17/17
Sample Matrix:	Wastewater	**Date Received:**	05/18/17
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
U2A	K1705023-001	**920**	500	10	05/31/17 09:50	
U12	K1705023-002	**7190**	500	10	05/31/17 09:50	
U11	K1705023-003	**8900**	500	10	05/31/17 09:50	
Method Blank	K1705023-MB1	ND U	50	1	05/31/17 09:50	
Method Blank	K1705023-MB2	ND U	50	1	05/31/17 09:50	

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1705023
Project	Joslyn/23270110.03 OU13 100	**Date Collected:**	NA
Sample Matrix:	Wastewater	**Date Received:**	NA
		Date Analyzed:	05/31/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1705312-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1705312-001DUP Result	Average	RPD	RPD Limit
Chemical Oxygen Demand (COD)	SM 5220 C	100	1540	1500	1520	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.

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1705023
Project:	Joslyn/23270110.03 OU13 100	**Date Collected:**	N/A
Sample Matrix:	Wastewater	**Date Received:**	N/A
		Date Analyzed:	05/31/17
		Date Extracted:	NA

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1705312-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

Matrix Spike
K1705312-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen Demand (COD)	1540	3410	2000	94	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.

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dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1705023
Project:	Joslyn/23270110.03 OU13 100	**Date Analyzed:**	05/31/17
Sample Matrix:	Wastewater	**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:	547795

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1705023-LCS	235	242	97	83-117

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July 21, 2017

Analytical Report for Service Request No: K1706897
Revised Service Request No: K1706897.01

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110

Dear Terri,

Enclosed is the revised report for the sample(s) submitted to our laboratory June 30, 2017
For your reference, these analyses have been assigned our service request number **K1706897.**

The PAH data for sample W7 was revised.

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

for Chris Leaf
Project Manager

REVISED
9:08 am, Jul 21, 2017

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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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ALS ENVIRONMENTAL

Client:	Barr Engineering Company	**Service Request No.:**	K1706897
Project:	Joslyn/23270110	**Date Received:**	06/30/17
Sample Matrix:	Ground Water and 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

Four water samples were received for analysis at ALS Environmental on 06/30/17. 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 other anomalies associated with the analysis of these samples were observed.

Semivolatile Organic Compounds by EPA Method 8270/SVO-SIM

Surrogate Exceptions:
The control criteria for Fluoranthene-d10 and 2,4,6-Tribromophenol in sample W7 were not applicable. The analysis of the sample required a dilution, which resulted in a surrogate concentration below the reporting limit. No further corrective action was appropriate.

Lab Control Sample Exceptions:
The upper control criterion was exceeded for Benz(a)anthracene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene in replicate Laboratory Control Samples (LCS/DLCS) KWG1705571-1 and KWG1705571-2. 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.

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.

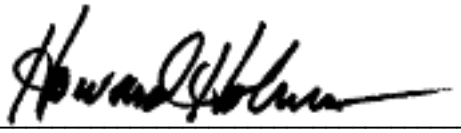
The results reported for Naphthalene in sample W6N may contain a slight bias. The chromatogram indicated the presence of non-target background components. The matrix interference may have resulted in a slight high bias in the affected samples. The results were flagged with "X" to indicate the issue.

The results reported for Naphthalene, 2-Methylnaphthalene, and Benzo(b)fluortanthene in sample W7 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 samples. The results were flagged with "X" to indicate the issue.

Approved by_____

Elevated Detection Limits:
Sample W6N and W7 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

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www.alsglobal.com

K1106897

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD

COC Number: 51784

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

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	Analysis Requested: Water: 5VOC	Water: 04G	Water: GENERAL	Water: COD	Soil	% Solids	Preservative Code	Field Filtered Y/N
									A	B	A	D				
									N	N	N	N				
1. U1				6/28/2017	0840	GW		2							TABLE 3-13	
2. W6N					0910			2								
3. W7					0940			2								
4. TANK EFF.				6/29/2017	0800			2	1	1	1				TABLE 3-4	
5.																
6.																
7.																
8.																
9.																
10.																

BARR USE ONLY		Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Sampled by:	SDI						6/30/17	
Barr Proj. Manager:	JLD	Relinquished by:	On Ice? Y N	Date	Time	Received by: Cody Cravens	Date 6/30/17	Time 1310
Barr DQ Manager:	TAD	Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:				Air Bill Number:		
Lab Name:	ALS							
Lab Location:	KELSO, WA	Lab WO:	Temperature on Receipt (°C):			Custody Seal Intact? ☐ Y ☐ N ☐ None		

Requested Due Date: ☐ Standard Turn Around Time ☐ Rush _____ (mm/dd/yyyy)

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	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

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.

PC CL

Cooler Receipt and Preservation Form

Client Barr Engineering Service Request K1706897

Received: 06/30/17 Opened: 06/30/17 By: JW Unloaded: 06/30/17 By: JW

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
2.9	2.7	—	—	-0.2	374			

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

General Chemistry

ALS Environmental—Kelso Laboratory
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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	06/29/17
Sample Matrix:	Water	**Date Received:**	06/30/17
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	K1706897-004	ND U	5.0	1	07/11/17 21:30	7/11/17	
Method Blank	K1706897-MB	ND U	5.0	1	07/11/17 21:30	7/11/17	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Analyzed:**	07/11/17
Sample Matrix:	Water	**Date Extracted:**	07/11/17

Duplicate Lab Control Sample Summary
General Chemistry Parameters

Analysis Method:	1664A	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	553471

	Lab Control Sample K1706897-LCS2			Duplicate Lab Control Sample K1706897-DLCS2					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Oil and Grease, Total (HEM)	105	120	87	105	120	88	78-114	<1	20

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	06/29/17
Sample Matrix:	Water	**Date Received:**	06/30/17
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	K1706897-004	ND U	5.0	1	07/06/17 12:30	
Method Blank	K1706897-MB	ND U	1.0	1	07/06/17 12:30	

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project	Joslyn/23270110	**Date Collected:**	06/29/17
Sample Matrix:	Water	**Date Received:**	06/30/17
		Date Analyzed:	07/06/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Tank Effluent	**Units:**	mg/L
Lab Code:	K1706897-004	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1706897-004DUP Result	Average	RPD	RPD Limit
Solids, Total Suspended (TSS)	SM 2540 D	5.0	ND U	7.0	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:**	K1706897
Project:	Joslyn/23270110	**Date Analyzed:**	07/06/17
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:	552590

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1706897-LCS1	388	429	90	85-115

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	06/29/17
Sample Matrix:	Water	**Date Received:**	06/30/17
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 Effluent	K1706897-004	**7.41**	-	1	06/30/17 17:27	H

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project	Joslyn/23270110	**Date Collected:**	06/29/17
Sample Matrix:	Water	**Date Received:**	06/30/17
		Date Analyzed:	06/30/17

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	Tank Effluent	**Units:**	pH Units
Lab Code:	K1706897-004	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1706897-004DUP Result	Average	RPD	RPD Limit
pH	SM 4500-H+ B	-	7.41	7.37	7.39	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

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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:**	K1706897
Project:	Joslyn/23270110	**Date Analyzed:**	06/30/17
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:	552141

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1706897-LCS1	7.67	7.70	100	85-115

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	06/29/17
Sample Matrix:	Water	**Date Received:**	06/30/17
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	K1706897-004	**30.8**	5.0	1	07/06/17 10:45	
Method Blank	K1706897-MB	ND U	5.0	1	07/06/17 10:45	

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project	Joslyn/23270110	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	07/06/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1706823-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1706823-001DUP Result	Average	RPD	RPD Limit
Chemical Oxygen Demand (COD)	SM 5220 C	5.0	14.4	16.4	15.4	12	20

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	07/6/17
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1706823-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

		Matrix Spike K1706823-001MS			Duplicate Matrix Spike K1706823-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chemical Oxygen Demand (COD)	14.4	116	100	101	112	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:**	K1706897
Project:	Joslyn/23270110	**Date Analyzed:**	07/06/17
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:	552478

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1706897-LCS1	116	121	96	83-117

Polynuclear Aromatic Hydrocarbons

ALS Environmental—Kelso Laboratory
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REVISED
9:09 am, Jul 21, 2017

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	06/28/2017
Sample Matrix:	Ground water	**Date Received:**	06/30/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U1	**Units:**	ug/L
Lab Code:	K1706897-001	**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	**0.0042**		0.0034	1	07/05/17	07/07/17	KWG1705571	
2-Methylnaphthalene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Acenaphthylene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Acenaphthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Fluorene	**0.0074**	X	0.0034	1	07/05/17	07/07/17	KWG1705571	
Phenanthrene	**0.018**		0.0034	1	07/05/17	07/07/17	KWG1705571	
Anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Fluoranthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Pyrene	**0.011**		0.0034	1	07/05/17	07/07/17	KWG1705571	
Benz(a)anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Chrysene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(b)fluoranthene†	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(k)fluoranthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(a)pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Benzo(g,h,i)perylene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Pentachlorophenol	ND	U	0.30	1	07/05/17	07/07/17	KWG1705571	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	28-125	07/07/17	Acceptable
Fluoranthene-d10	90	39-123	07/07/17	Acceptable
2,4,6-Tribromophenol	67	10-136	07/07/17	Acceptable
Terphenyl-d14	105	22-127	07/07/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	06/28/2017
Sample Matrix:	Ground water	**Date Received:**	06/30/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W6N	**Units:**	ug/L
Lab Code:	K1706897-002	**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	**0.019**	X	0.0034	1	07/05/17	07/07/17	KWG1705571	
2-Methylnaphthalene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Acenaphthylene	**0.0046**		0.0034	1	07/05/17	07/07/17	KWG1705571	
Acenaphthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Fluorene	**0.022**		0.0034	1	07/05/17	07/07/17	KWG1705571	
Phenanthrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Anthracene	**0.10**		0.0034	1	07/05/17	07/07/17	KWG1705571	
Fluoranthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benz(a)anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Chrysene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(b)fluoranthene†	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(k)fluoranthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(a)pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Benzo(g,h,i)perylene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Pentachlorophenol	**17**	D	5.9	20	07/05/17	07/10/17	KWG1705571	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	28-125	07/07/17	Acceptable
Fluoranthene-d10	87	39-123	07/07/17	Acceptable
2,4,6-Tribromophenol	66	10-136	07/07/17	Acceptable
Terphenyl-d14	97	22-127	07/07/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	06/28/2017
Sample Matrix:	Ground water	**Date Received:**	06/30/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W7	**Units:**	ug/L
Lab Code:	K1706897-003	**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	**0.28**	X	0.0034	1	07/05/17	07/07/17	KWG1705571	
2-Methylnaphthalene	**0.028**	X	0.0034	1	07/05/17	07/07/17	KWG1705571	
Acenaphthylene	ND	U	0.34	100	07/05/17	07/10/17	KWG1705571	
Acenaphthene	ND	U	0.34	100	07/05/17	07/10/17	KWG1705571	
Fluorene	**3.0**	D	0.34	100	07/05/17	07/10/17	KWG1705571	
Phenanthrene	**1.8**	D	0.34	100	07/05/17	07/10/17	KWG1705571	
Anthracene	**0.34**	D	0.34	100	07/05/17	07/10/17	KWG1705571	
Fluoranthene	ND	U	0.34	100	07/05/17	07/10/17	KWG1705571	
Pyrene	ND	U	0.34	100	07/05/17	07/10/17	KWG1705571	
Benz(a)anthracene	ND	U	0.34	100	07/05/17	07/10/17	KWG1705571	*
Chrysene	ND	U	0.34	100	07/05/17	07/10/17	KWG1705571	
Benzo(b)fluoranthene†	**0.0093**	X	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(k)fluoranthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(a)pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Indeno(1,2,3-cd)pyrene	**0.0035**		0.0034	1	07/05/17	07/07/17	KWG1705571	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Benzo(g,h,i)perylene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Pentachlorophenol	**2400**	D	1200	4000	07/05/17	07/10/17	KWG1705571	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	112	28-125	07/10/17	Acceptable
Fluoranthene-d10	133	39-123	07/10/17	Outside Control Limits
2,4,6-Tribromophenol	330	10-136	07/10/17	Outside Control Limits
Terphenyl-d14	135	22-127	07/10/17	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:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1705571-3	**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	0.0034	1	07/05/17	07/07/17	KWG1705571	
2-Methylnaphthalene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Acenaphthylene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Acenaphthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Fluorene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Phenanthrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Fluoranthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benz(a)anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Chrysene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(b)fluoranthene†	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(k)fluoranthene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Benzo(a)pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Benzo(g,h,i)perylene	ND	U	0.0034	1	07/05/17	07/07/17	KWG1705571	*
Pentachlorophenol	ND	U	0.30	1	07/05/17	07/07/17	KWG1705571	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	28-125	07/07/17	Acceptable
Fluoranthene-d10	91	39-123	07/07/17	Acceptable
2,4,6-Tribromophenol	63	10-136	07/07/17	Acceptable
Terphenyl-d14	96	22-127	07/07/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

QA/QC Report

Client: Barr Engineering Company **Service Request:** K1706897
Project: Joslyn/23270110
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	K1706897-001	75	90	67	105
W6N	K1706897-002	75	87	66	97
W7	K1706897-003	112 D	133 D *	330 D *	135 D *
Method Blank	KWG1705571-3	73	91	63	96
Lab Control Sample	KWG1705571-1	75	93	66	93
Duplicate Lab Control Sample	KWG1705571-2	76	98	68	97

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
Project: Joslyn/23270110
Sample Matrix: Ground water

Service Request: K1706897
Date Extracted: 07/05/2017
Date Analyzed: 07/07/2017 - 07/10/2017

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: KWG1705571

	Lab Control Sample KWG1705571-1 Lab Control Spike			Duplicate Lab Control Sample KWG1705571-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.393	0.500	79	0.411	0.500	82	59-95	4	30
2-Methylnaphthalene	0.408	0.500	82	0.427	0.500	85	42-108	5	30
Acenaphthylene	0.451	0.500	90	0.462	0.500	92	61-102	2	30
Acenaphthene	0.425	0.500	85	0.436	0.500	87	58-98	2	30
Fluorene	0.442	0.500	88	0.455	0.500	91	59-97	3	30
Phenanthrene	0.464	0.500	93	0.480	0.500	96	61-100	3	30
Anthracene	0.425	0.500	85	0.427	0.500	85	65-98	1	30
Fluoranthene	0.482	0.500	96	0.501	0.500	100	63-106	4	30
Pyrene	0.475	0.500	95	0.501	0.500	100	64-104	5	30
Benz(a)anthracene	0.505	0.500	101 *	0.528	0.500	106 *	67-96	4	30
Chrysene	0.512	0.500	102	0.510	0.500	102	67-105	0	30
Benzo(b)fluoranthene	0.509	0.500	102	0.518	0.500	104	69-104	2	30
Benzo(k)fluoranthene	0.490	0.500	98	0.500	0.500	100	68-108	2	30
Benzo(a)pyrene	0.479	0.500	96	0.487	0.500	97	68-107	2	30
Indeno(1,2,3-cd)pyrene	0.616	0.500	123 *	0.654	0.500	131 *	61-115	6	30
Dibenz(a,h)anthracene	0.638	0.500	128 *	0.666	0.500	133 *	54-118	4	30
Benzo(g,h,i)perylene	0.560	0.500	112 *	0.575	0.500	115 *	61-110	3	30
Pentachlorophenol	2.47	2.50	99	2.84	2.50	114	10-123	14	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.

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:**	K1706897
Project:	Joslyn/23270110	**Date Collected:**	06/29/2017
Sample Matrix:	Water	**Date Received:**	06/30/2017

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Tank Effluent	**Units:**	ug/L
Lab Code:	K1706897-004	**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	**53**		9.9	1	07/05/17	07/08/17	KWG1705570	
2-Methylnaphthalene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Acenaphthylene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Acenaphthene	**51**		9.9	1	07/05/17	07/08/17	KWG1705570	
Fluorene	**20**		9.9	1	07/05/17	07/08/17	KWG1705570	
Phenanthrene	**9.9**		9.9	1	07/05/17	07/08/17	KWG1705570	
Anthracene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Pentachlorophenol	**210**	D	50	2	07/05/17	07/10/17	KWG1705570	
Fluoranthene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Pyrene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Benz(a)anthracene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Chrysene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Benzo(b)fluoranthene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Benzo(k)fluoranthene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Benzo(a)pyrene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Indeno(1,2,3-cd)pyrene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Dibenz(a,h)anthracene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	
Benzo(g,h,i)perylene	ND	U	9.9	1	07/05/17	07/08/17	KWG1705570	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorobiphenyl	77	49-109	07/08/17	Acceptable
2,4,6-Tribromophenol	95	36-129	07/08/17	Acceptable
Terphenyl-d14	108	29-136	07/08/17	Acceptable

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1706897
Project:	Joslyn/23270110	**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:	KWG1705570-3	**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	9.9	1	07/05/17	07/07/17	KWG1705570	
2-Methylnaphthalene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Acenaphthylene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Acenaphthene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Fluorene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Phenanthrene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Anthracene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Pentachlorophenol	ND	U	25	1	07/05/17	07/07/17	KWG1705570	
Fluoranthene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Pyrene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Benz(a)anthracene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Chrysene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Benzo(b)fluoranthene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Benzo(k)fluoranthene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Benzo(a)pyrene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Indeno(1,2,3-cd)pyrene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Dibenz(a,h)anthracene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	
Benzo(g,h,i)perylene	ND	U	9.9	1	07/05/17	07/07/17	KWG1705570	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorobiphenyl	69	49-109	07/07/17	Acceptable
2,4,6-Tribromophenol	79	36-129	07/07/17	Acceptable
Terphenyl-d14	103	29-136	07/07/17	Acceptable

Comments:

QA/QC Report

Client: Barr Engineering Company **Service Request:** K1706897
Project: Joslyn/23270110
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	K1706897-004	77	95	108
Method Blank	KWG1705570-3	69	79	103
Lab Control Sample	KWG1705570-1	82	95	96
Duplicate Lab Control Sample	KWG1705570-2	74	94	88

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:**	K1706897
Project:	Joslyn/23270110	**Date Extracted:**	07/05/2017
Sample Matrix:	Water	**Date Analyzed:**	07/07/2017

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:	KWG1705570

	Lab Control Sample KWG1705570-1 Lab Control Spike			Duplicate Lab Control Sample KWG1705570-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	78.4	100	78	69.4	100	69	64-98	12	30
2-Methylnaphthalene	78.9	100	79	70.9	100	71	66-101	11	30
Acenaphthylene	89.2	100	89	82.2	100	82	69-105	8	30
Acenaphthene	89.7	100	90	80.8	100	81	69-108	10	30
Fluorene	97.1	100	97	91.1	100	91	65-113	6	30
Phenanthrene	98.2	100	98	95.7	100	96	67-113	3	30
Anthracene	96.6	100	97	92.6	100	93	69-114	4	30
Pentachlorophenol	89.1	100	89	95.2	100	95	60-113	7	30
Fluoranthene	79.6	100	80	76.0	100	76	69-123	5	30
Pyrene	107	100	107	98.7	100	99	61-121	8	30
Benz(a)anthracene	100	100	100	98.7	100	99	72-117	2	30
Chrysene	102	100	102	95.9	100	96	71-113	6	30
Benzo(b)fluoranthene	103	100	103	102	100	102	72-116	2	30
Benzo(k)fluoranthene	101	100	101	98.8	100	99	71-113	2	30
Benzo(a)pyrene	98.8	100	99	95.2	100	95	72-115	4	30
Indeno(1,2,3-cd)pyrene	99.7	100	100	96.4	100	96	70-120	3	30
Dibenz(a,h)anthracene	99.6	100	100	101	100	101	68-120	1	30
Benzo(g,h,i)perylene	99.7	100	100	98.0	100	98	67-120	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.

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September 12, 2017 **Analytical Report for Service Request No:** K1709114

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110.03.OU13 100

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory August 29, 2017
For your reference, these analyses have been assigned our service request number **K1709114.**

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

Chris Leaf
Project Manager

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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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ALS ENVIRONMENTAL

Client:	Barr Engineering Company	**Service Request No.:**	K1709114
Project:	Joslyn/ 23270110.03.OU13 100	**Date Received:**	08/29/17
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 08/29/17. 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
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K1709114

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☐ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☑ MN ☐ SD

COC Number: 51589

COC ____ of ____

REPORT TO	INVOICE TO
Company: BARR ENG.	Company: SAME
Address:	Address:
Name:	Name:
email:	email:
Copy to: datamgt@barr.com	P.O.
Project Name: SOSLAN	Barr Project No: 23270110.03 0013 100

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	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	% Solids	Preservative Code	Field Filtered Y/N
1. U2A				8/25/17	1330	W	M2	1 1				Field pH	7.48
2. U11				↓	1450	↓		1 1				↓	7.40
3. U12				↓	1410	↓		1 1				↓	7.41
4.													
5.													
6.													
7.													
8.													
9.													
10.													

BARR USE ONLY

Sampled by: PWS

Barr Proj. Manager: SLB3

Barr DQ Manager: TAD

Lab Name: ALS

Lab Location:

Relinquished by: On Ice? N Date 8/28/17 Time 0700 Received by: Date 8/28/17 Time 07:00

Relinquished by: On Ice? N Date 8/28/17 Time 14:21 Received by: Date 8/29/17 Time 0920

Sample 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.

PC CL

Cooler Receipt and Preservation Form

Client Bazr Eng. Service Request *K17* 09164

Received: 8/29/17 Opened: 8/29/17 By: BR Unloaded: 8/29/17 By: BR

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
7.2	7.1	6.1	6.0	-0.1	328		7307 2223 7075	

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
U2A	1 of 250ml				X	H2SO4	.5ml	Eng-1-25-S	BR	1350
U11	"				X	"	"	"	"	"
U12	"				X	"	"	"	"	"

Notes, Discrepancies, & Resolutions: _____

General Chemistry

ALS Environmental—Kelso Laboratory
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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1709114
Project:	Joslyn/23270110.03.OU13 100	**Date Collected:**	08/25/17
Sample Matrix:	Water	**Date Received:**	08/29/17
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
U2A	K1709114-001	**89700**	500	1	08/31/17 10:40	
U11	K1709114-002	**44000**	500	1	08/31/17 10:40	
U12	K1709114-003	**32800**	500	1	08/31/17 10:40	
Method Blank	K1709114-MB1	ND U	5.0	1	08/31/17 10:40	
Method Blank	K1709114-MB2	ND U	5.0	1	08/31/17 10:40	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1709114
Project	Joslyn/23270110.03.OU13 100	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	08/31/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1709141-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1709141-001DUP 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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1709114
Project:	Joslyn/23270110.03.OU13 100	**Date Analyzed:**	08/31/17
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:	559992

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1709114-LCS	418	429	97	85-115

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Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1709114
Project:	Joslyn/23270110.03.OU13 100	**Date Collected:**	08/25/17
Sample Matrix:	Water	**Date Received:**	08/29/17
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
U2A	K1709114-001	**2040**	500	10	09/07/17 14:00	
U11	K1709114-002	**1740**	500	10	09/07/17 14:00	
U12	K1709114-003	**1550**	500	10	09/07/17 14:00	
Method Blank	K1709114-MB1	ND U	50	1	09/07/17 14:00	
Method Blank	K1709114-MB2	ND U	50	1	09/07/17 14:00	

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1709114
Project	Joslyn/23270110.03.OU13 100	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	09/07/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1709306-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1709306-001DUP Result	Average	RPD	RPD Limit
Chemical Oxygen Demand (COD)	SM 5220 C	50	698	693	695	<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.

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1709114
Project:	Joslyn/23270110.03.OU13 100	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	09/7/17
		Date Extracted:	NA

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1709306-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

Matrix Spike
K1709306-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen Demand (COD)	698	1620	1000	93	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.

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1709114
Project:	Joslyn/23270110.03.OU13 100	**Date Analyzed:**	09/07/17
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:	560756

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1709114-LCS	237	242	98	83-117

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December 22, 2017

Analytical Report for Service Request No: K1709738
Revised Service Request No: K1709738.02

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: 23/27-110

Dear Terri,

Enclosed is the revised report for the samples submitted to our laboratory September 14, 2017 For your reference, these analyses have been assigned our service request number **K1709738.**

The case narrative has been updated to denote the 8270D SIM PAH data for Sample U1 has been confirmed with re-analysis. This revision supersedes the report dated November 17. 2017.

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
12:59 pm, Dec 22, 2017

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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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REVISED
12:59 pm, Dec 22, 2017

ALS ENVIRONMENTAL

Client:	Barr Engineering Company	**Service Request No.:**	K1709738
Project:	23/27-110	**Date Received:**	09/14/17
Sample Matrix:	Ground Water and 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 09/14/17. 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.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270-SIM/SVO/SIM

Sample Notes and Discussion:
The results reported for one or more analytes in most samples 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 samples. The results were flagged with "X" to indicate the issue.

Method Blank Exceptions:
The Method Blank KWG1708312-3 contained low level concentrations of some compounds above the Method Reporting Limit (MRL). In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated. The samples were re-extracted and re-analyzed past the recommended holding time. The re-analysis confirmed the original results. No further corrective action was taken. The results from the original analysis are included in this report.

Lab Control Sample Exceptions:
The spike recovery of Benzo(a)pyrene and Indeno(1,2,3-cd)pyrene for Duplicate Laboratory Control Sample (DLCS) KWG1709431-2 from the re-extraction batch was outside the lower control criterion. The error associated with reduced recovery indicated a potential low bias. The data was flagged to indicate the problem.

No other anomalies associated with the analysis of these samples were observed.

Semivolatile Organic Compounds by EPA Method 8270

Elevated Detection Limits:
The sample required dilution due to the presence of elevated levels of target analyte. 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
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Barr Engineering Co. Chain of Custody

2170 9738

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD

COC Number: № 49182

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

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	Analysis Requested Water: SVOC	O&G	General	COD	Soil: % Solids	Preservative Code	Field Filtered Y/N
									A	B	A	D			
									N	N	N	N			
1. U1	/	/	/	9/12/2017	0940	GW		2						TABLE 3-13	
2. TANK EFF.	/	/	/	↓	1030	↓		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: SDI	Relinquished by: Steve I	On Ice? (Y) N	Date 9/13/17	Time 0900	Received by:	Date 9/14/17	Time 0940
Barr Proj. Manager: JLB	Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Barr DQ Manager: TAO	Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:				Air Bill Number:	Requested Due Date: ☐ Standard Turn Around Time ☐ Rush (mm/dd/yyyy)	
Lab Name: CAS							
Lab Location: KELSO, WA.	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
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	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

PC CV

Cooler Receipt and Preservation Form

Client Barr Service Request K17 09738

Received: 9/14/17 Opened: 9/14/17 By: Unloaded: 9/14/17 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
4.0	4.2	—	—	+0.2	379		7304 2223 8575	

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
5. 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
3. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
). Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
0. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
1. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
2. 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

otes, Discrepancies, & Resolutions: _____

General Chemistry

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1709738
Project:	23/27-110	**Date Collected:**	09/12/17
Sample Matrix:	Water	**Date Received:**	09/14/17
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.	K1709738-002	ND U	4.0	1	10/10/17 22:30	10/10/17	
Method Blank	K1709738-MB1	ND U	5.0	1	10/10/17 22:30	10/10/17	

Client:	Barr Engineering Company	**Service Request:**	K1709738
Project:	23/27-110	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	10/10/17
		Date Extracted:	10/10/17

Matrix Spike Summary
Oil and Grease, Total (HEM)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1710350-001	**Basis:**	NA
Analysis Method:	1664A		
Prep Method:	Method		

Matrix Spike
K1710350-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Oil and Grease, Total (HEM)	1.1 J	107	120	88	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:**	K1709738
Project:	23/27-110	**Date Analyzed:**	10/10/17
Sample Matrix:	Water	**Date Extracted:**	10/10/17

Duplicate Lab Control Sample Summary
General Chemistry Parameters

Analysis Method:	1664A	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	565282

	Lab Control Sample K1709738-LCS2			Duplicate Lab Control Sample K1709738-DLCS2					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Oil and Grease, Total (HEM)	102	120	85	105	120	88	78-114	3	20

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1709738
Project:	23/27-110	**Date Collected:**	09/12/17
Sample Matrix:	Water	**Date Received:**	09/14/17
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.	K1709738-002	ND U	5.0	1	09/19/17 22:00	
Method Blank	K1709738-MB1	ND U	5.0	1	09/19/17 22:00	
Method Blank	K1709738-MB2	ND U	5.0	1	09/19/17 22:00	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1709738
Project	23/27-110	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
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	K1709645-002DUP	5.0	ND U	5.0	NC	NC	10	09/19/17
Batch QC	K1709798-002DUP	5.0	5.0	ND U	NC	NC	10	09/19/17

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:**	K1709738
Project:	23/27-110	**Date Analyzed:**	09/19/17
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:	562315

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1709738-LCS1	414	429	97	85-115

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1709738
Project:	23/27-110	**Date Collected:**	09/12/17
Sample Matrix:	Water	**Date Received:**	09/14/17
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.	K1709738-002	**11.6**	5.0	1	09/21/17 16:20	
Method Blank	K1709738-MB1	ND U	5.0	1	09/21/17 16:20	

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1709738
Project	23/27-110	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	09/21/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1709723-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1709723-001DUP Result	Average	RPD	RPD Limit
Chemical Oxygen Demand (COD)	SM 5220 C	5.0	11.6	10	10.8	15	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:**	K1709738
Project:	23/27-110	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	09/21/17
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1709723-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

		Matrix Spike K1709723-001MS			Duplicate Matrix Spike K1709723-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chemical Oxygen Demand (COD)	11.6	115	100	103	111	100	99	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:**	K1709738
Project:	23/27-110	**Date Analyzed:**	09/21/17
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:	562690

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1709738-LCS1	116	121	96	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:**	K1709738
Project:	23/27-110	**Date Collected:**	09/12/2017
Sample Matrix:	Ground water	**Date Received:**	09/14/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U1	**Units:**	ug/L
Lab Code:	K1709738-001	**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	**0.0054**	X	0.0033	1	09/19/17	10/09/17	KWG1708312	
2-Methylnaphthalene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Acenaphthylene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Acenaphthene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Fluorene	**0.010**	X	0.0033	1	09/19/17	10/09/17	KWG1708312	
Phenanthrene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Anthracene	**0.015**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Fluoranthene	**0.0054**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Pyrene	**0.012**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Benz(a)anthracene	**0.0044**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Chrysene	**0.0037**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Benzo(b)fluoranthene†	**0.0050**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Benzo(k)fluoranthene	**0.0049**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Benzo(a)pyrene	**0.0058**	B	0.0033	1	09/19/17	10/09/17	KWG1708312	
Indeno(1,2,3-cd)pyrene	**0.0073**	B	0.0033	1	09/19/17	10/09/17	KWG1708312	
Dibenz(a,h)anthracene	**0.0062**	B	0.0033	1	09/19/17	10/09/17	KWG1708312	
Benzo(g,h,i)perylene	**0.0081**	B	0.0033	1	09/19/17	10/09/17	KWG1708312	
Pentachlorophenol	ND	U	0.29	1	09/19/17	10/09/17	KWG1708312	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	69	28-125	10/09/17	Acceptable
Fluoranthene-d10	80	39-123	10/09/17	Acceptable
2,4,6-Tribromophenol	54	10-136	10/09/17	Acceptable
Terphenyl-d14	79	22-127	10/09/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1709738
Project:	23/27-110	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1708312-3	**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	09/19/17	10/09/17	KWG1708312	
2-Methylnaphthalene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Acenaphthylene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Acenaphthene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Fluorene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Phenanthrene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Anthracene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Fluoranthene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Pyrene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Benz(a)anthracene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Chrysene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Benzo(b)fluoranthene†	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Benzo(k)fluoranthene	ND	U	0.0033	1	09/19/17	10/09/17	KWG1708312	
Benzo(a)pyrene	**0.0036**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Indeno(1,2,3-cd)pyrene	**0.0043**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Dibenz(a,h)anthracene	**0.0039**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Benzo(g,h,i)perylene	**0.0051**		0.0033	1	09/19/17	10/09/17	KWG1708312	
Pentachlorophenol	ND	U	0.29	1	09/19/17	10/09/17	KWG1708312	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	28-125	10/09/17	Acceptable
Fluoranthene-d10	71	39-123	10/09/17	Acceptable
2,4,6-Tribromophenol	51	10-136	10/09/17	Acceptable
Terphenyl-d14	76	22-127	10/09/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

QA/QC Report

Client: Barr Engineering Company **Service Request:** K1709738
Project: 23/27-110
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	K1709738-001	69	80	54	79
Method Blank	KWG1708312-3	64	71	51	76
Lab Control Sample	KWG1708312-1	71	77	58	81
Duplicate Lab Control Sample	KWG1708312-2	64	73	52	75

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
Project: 23/27-110
Sample Matrix: Ground water

Service Request: K1709738
Date Extracted: 09/19/2017
Date Analyzed: 10/09/2017

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: KWG1708312

	Lab Control Sample KWG1708312-1 Lab Control Spike			Duplicate Lab Control Sample KWG1708312-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.383	0.500	77	0.338	0.500	68	59-95	12	30
2-Methylnaphthalene	0.381	0.500	76	0.342	0.500	68	42-108	11	30
Acenaphthylene	0.410	0.500	82	0.366	0.500	73	61-102	11	30
Acenaphthene	0.469	0.500	94	0.412	0.500	82	58-98	13	30
Fluorene	0.404	0.500	81	0.365	0.500	73	59-97	10	30
Phenanthrene	0.413	0.500	83	0.389	0.500	78	61-100	6	30
Anthracene	0.433	0.500	87	0.405	0.500	81	65-98	7	30
Fluoranthene	0.417	0.500	83	0.400	0.500	80	63-106	4	30
Pyrene	0.421	0.500	84	0.388	0.500	78	64-104	8	30
Benz(a)anthracene	0.466	0.500	93	0.435	0.500	87	67-96	7	30
Chrysene	0.446	0.500	89	0.419	0.500	84	67-105	6	30
Benzo(b)fluoranthene	0.483	0.500	97	0.444	0.500	89	69-104	8	30
Benzo(k)fluoranthene	0.474	0.500	95	0.442	0.500	88	68-108	7	30
Benzo(a)pyrene	0.457	0.500	91	0.429	0.500	86	68-107	6	30
Indeno(1,2,3-cd)pyrene	0.503	0.500	101	0.471	0.500	94	61-115	7	30
Dibenz(a,h)anthracene	0.469	0.500	94	0.450	0.500	90	54-118	4	30
Benzo(g,h,i)perylene	0.458	0.500	92	0.441	0.500	88	61-110	4	30
Pentachlorophenol	2.27	2.50	91	1.98	2.50	79	10-123	14	30

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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:**	K1709738
Project:	23/27-110	**Date Collected:**	09/12/2017
Sample Matrix:	Water	**Date Received:**	09/14/2017

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Tank Eff.	**Units:**	ug/L
Lab Code:	K1709738-002	**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	09/18/17	09/23/17	KWG1708261	
2-Methylnaphthalene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Acenaphthylene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Acenaphthene	**29**		10	1	09/18/17	09/23/17	KWG1708261	
Fluorene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Phenanthrene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Anthracene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Pentachlorophenol	**330**	D	50	2	09/18/17	09/25/17	KWG1708261	
Fluoranthene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Pyrene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Benz(a)anthracene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Chrysene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Benzo(b)fluoranthene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Benzo(k)fluoranthene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Benzo(a)pyrene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Indeno(1,2,3-cd)pyrene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Dibenz(a,h)anthracene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	
Benzo(g,h,i)perylene	ND	U	10	1	09/18/17	09/23/17	KWG1708261	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorobiphenyl	73	49-109	09/23/17	Acceptable
2,4,6-Tribromophenol	87	36-129	09/23/17	Acceptable
Terphenyl-d14	88	29-136	09/23/17	Acceptable

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1709738
Project:	23/27-110	**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:	KWG1708261-5	**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	9.7	1	09/18/17	09/22/17	KWG1708261	
2-Methylnaphthalene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Acenaphthylene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Acenaphthene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Fluorene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Phenanthrene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Anthracene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Pentachlorophenol	ND	U	25	1	09/18/17	09/22/17	KWG1708261	
Fluoranthene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Pyrene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Benz(a)anthracene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Chrysene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Benzo(b)fluoranthene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Benzo(k)fluoranthene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Benzo(a)pyrene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Indeno(1,2,3-cd)pyrene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Dibenz(a,h)anthracene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	
Benzo(g,h,i)perylene	ND	U	9.7	1	09/18/17	09/22/17	KWG1708261	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorobiphenyl	80	49-109	09/22/17	Acceptable
2,4,6-Tribromophenol	78	36-129	09/22/17	Acceptable
Terphenyl-d14	90	29-136	09/22/17	Acceptable

Comments:

QA/QC Report

Client: Barr Engineering Company **Service Request:** K1709738
Project: 23/27-110
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.	K1709738-002	73	87	88
Batch QC	K1709799-014	74	78	83
Method Blank	KWG1708261-5	80	78	90
Batch QCMS	KWG1708261-1	77	90	92
Batch QCDMS	KWG1708261-2	73	85	89
Lab Control Sample	KWG1708261-3	76	92	91
Duplicate Lab Control Sample	KWG1708261-4	79	86	92

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:**	K1709738
Project:	23/27-110	**Date Extracted:**	09/18/2017
Sample Matrix:	Water	**Date Analyzed:**	09/22/2017

Matrix Spike/Duplicate Matrix Spike Summary
Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K1709799-014	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D	**Extraction Lot:**	KWG1708261

		Batch QCMS KWG1708261-1 Matrix Spike			Batch QCDMS KWG1708261-2 Duplicate Matrix Spike					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	ND	79.2	99.0	80	76.2	99.0	77	64-98	4	30
2-Methylnaphthalene	ND	82.1	99.0	83	78.1	99.0	79	66-101	5	30
Acenaphthylene	ND	85.2	99.0	86	82.1	99.0	83	69-105	4	30
Acenaphthene	ND	87.1	99.0	88	82.4	99.0	83	69-108	5	30
Fluorene	ND	87.6	99.0	88	85.5	99.0	86	65-113	2	30
Phenanthrene	ND	91.4	99.0	92	86.5	99.0	87	67-113	5	30
Anthracene	ND	89.7	99.0	91	83.0	99.0	84	69-114	8	30
Pentachlorophenol	ND	92.1	99.0	93	85.2	99.0	86	60-113	8	30
Fluoranthene	ND	102	99.0	103	98.1	99.0	99	69-123	4	30
Pyrene	ND	96.4	99.0	97	94.0	99.0	95	61-121	2	30
Benz(a)anthracene	ND	95.4	99.0	96	88.9	99.0	90	72-117	7	30
Chrysene	ND	92.1	99.0	93	91.2	99.0	92	71-113	1	30
Benzo(b)fluoranthene	ND	93.2	99.0	94	89.1	99.0	90	72-116	4	30
Benzo(k)fluoranthene	ND	93.0	99.0	94	87.8	99.0	89	71-113	6	30
Benzo(a)pyrene	ND	90.5	99.0	91	87.0	99.0	88	72-115	4	30
Indeno(1,2,3-cd)pyrene	ND	97.1	99.0	98	89.3	99.0	90	70-120	8	30
Dibenz(a,h)anthracene	ND	96.2	99.0	97	92.2	99.0	93	68-120	4	30
Benzo(g,h,i)perylene	ND	92.4	99.0	93	87.4	99.0	88	67-120	6	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.

Client: Barr Engineering Company
Project: 23/27-110
Sample Matrix: Water

Service Request: K1709738
Date Extracted: 09/18/2017
Date Analyzed: 09/22/2017

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: KWG1708261

	Lab Control Sample KWG1708261-3 Lab Control Spike			Duplicate Lab Control Sample KWG1708261-4 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	81.7	100	82	83.8	100	84	64-98	3	30
2-Methylnaphthalene	84.3	100	84	86.8	100	87	66-101	3	30
Acenaphthylene	90.1	100	90	89.8	100	90	69-105	0	30
Acenaphthene	90.0	100	90	90.5	100	90	69-108	0	30
Fluorene	92.5	100	92	89.5	100	89	65-113	3	30
Phenanthrene	93.3	100	93	88.6	100	89	67-113	5	30
Anthracene	91.9	100	92	88.1	100	88	69-114	4	30
Pentachlorophenol	79.5	100	80	78.0	100	78	60-113	2	30
Fluoranthene	102	100	102	100	100	100	69-123	2	30
Pyrene	99.4	100	99	98.0	100	98	61-121	1	30
Benz(a)anthracene	91.7	100	92	94.8	100	95	72-117	3	30
Chrysene	95.3	100	95	94.2	100	94	71-113	1	30
Benzo(b)fluoranthene	90.7	100	91	93.8	100	94	72-116	3	30
Benzo(k)fluoranthene	96.7	100	97	94.5	100	94	71-113	2	30
Benzo(a)pyrene	92.4	100	92	93.2	100	93	72-115	1	30
Indeno(1,2,3-cd)pyrene	101	100	101	97.9	100	98	70-120	3	30
Dibenz(a,h)anthracene	97.7	100	98	96.5	100	97	68-120	1	30
Benzo(g,h,i)perylene	93.8	100	94	94.8	100	95	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.

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November 17, 2017

Analytical Report for Service Request No: K1711121
Revised Service Request No: K1711121.01

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110.03 OU13270

Dear Terri,

Enclosed is the revised report for the sample(s) submitted to our laboratory October 13, 2017 For your reference, these analyses have been assigned our service request number **K1711121.**

The case narrative has been updated to denote the data flag associated with sample W6N results.

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
2:17 pm, Nov 17, 2017

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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
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REVISED
2:17 pm, Nov 17, 2017

ALS ENVIRONMENTAL

Client:	Barr Engineering Company	**Service Request No.:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Received:**	10/13/17
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

Ten ground water samples were received for analysis at ALS Environmental on 10/13/17. The samples were received in good condition and consistent with the accompanying chain of custody form, except where noted on the cooler receipt and preservation form included in this report. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270

Matrix Spike Recovery Exceptions:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Method Blank Exceptions:
The Method Blank KWG1709431-3 contained low levels 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 were flagged as estimated. The samples were not re-extracted and re-analyzed past the holding time.

Elevated Detection Limits:
Sample W10 required dilution due to the presence of elevated levels of target analyte. The reporting limits were adjusted to reflect the dilution.

Sample Notes and Discussion:
The results reported for Naphthalene in sample W6N 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 samples. The results were flagged with "X" to indicate the issue.

Duplicate Lab Control Sample Exceptions:
The spike recovery of Benzo(a)pyrene and Indeno(1,2,3-cd)pyrene for Duplicate Laboratory Control Sample (LCS) KWG1709431-2 was outside the lower control criterion. The DLCS is for the Relative Percent Difference (RPD) evaluation. The RPD was outside criterion. The error associated with reduced recovery may indicate a potential bias in precision. No further corrective action was appropriate.

No other anomalies associated with the analysis of these samples were observed.

Approved by_____

Chain of Custody

ALS Environmental—Kelso Laboratory
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IC1711121

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD

COC Number: 52987

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: 23270110.03 0013270

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	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	Water A	Water N	Soil % Solids	Preservative Code	Field Filtered Y/N
1. S3				10/11/2017	1010	GW		2					TABLE 3-13	
2. S1A					1040									
3. S2					1115									
4. W132					1205									
5. W127N					1240									
6. W130				10/12/2017	1030									
7. W6N					1110									
8. W10					1200									
9. M-1					—									
10. FB-1					—	O								

BARR USE ONLY	Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Sampled by:							
Barr Proj. Manager:	Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Barr DQ Manager:	Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☐ Other:				Air Bill Number:	Requested Due Date: ☐ Standard Turn Around Time ☐ Rush _____ (mm/dd/yyyy)	
Lab Name:							
Lab Location:	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.

KI 71121

Table 3-13

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

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

PC CC

Cooler Receipt and Preservation Form

Client Barr Service Request K17 11121

Received: 10/13/17 Opened: 10/13/17 By: km Unloaded: 10/13/17 By: km

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? Custody Tape.
   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
1.4		4.7		—	381	292	4618757696 99	
1.3	1.4	4.7	4.8	+0.1		182	" " 9688	

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: COC not relinquished by Client.
Rec'd (2) 1L Ambers labeled FB-1 that are empty.
~~(2)~~ (2) 1L Ambers rec'd empty are on COC as ~~Containers~~ Containers

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
www.alsglobal.com

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/11/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	S3	**Units:**	ug/L
Lab Code:	K1711121-001	**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	**0.022**	B	0.0033	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Fluorene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	**0.0053**		0.0033	1	10/18/17	10/26/17	KWG1709431	
Anthracene	**0.013**		0.0033	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	**0.0041**		0.0033	1	10/18/17	10/26/17	KWG1709431	
Pyrene	**0.0089**		0.0033	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Chrysene	**0.0034**		0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	ND	U	0.29	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	28-125	10/26/17	Acceptable
Fluoranthene-d10	62	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	56	10-136	10/26/17	Acceptable
Terphenyl-d14	45	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/11/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	S1A	**Units:**	ug/L
Lab Code:	K1711121-002	**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	**0.0080**	B	0.0034	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	**0.0052**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluorene	**0.0090**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Anthracene	**0.016**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pyrene	**0.0035**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	ND	U	0.30	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	61	28-125	10/26/17	Acceptable
Fluoranthene-d10	70	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	49	10-136	10/26/17	Acceptable
Terphenyl-d14	74	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/11/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	S2	**Units:**	ug/L
Lab Code:	K1711121-003	**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	**0.0075**	B	0.0034	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluorene	**0.011**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Anthracene	**0.016**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	ND	U	0.30	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	28-125	10/26/17	Acceptable
Fluoranthene-d10	75	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	53	10-136	10/26/17	Acceptable
Terphenyl-d14	81	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/11/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W132	**Units:**	ug/L
Lab Code:	K1711121-004	**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	**0.0088**	B	0.0034	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluorene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Anthracene	**0.043**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	**0.33**		0.30	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	28-125	10/26/17	Acceptable
Fluoranthene-d10	76	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	56	10-136	10/26/17	Acceptable
Terphenyl-d14	83	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/11/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W127N	**Units:**	ug/L
Lab Code:	K1711121-005	**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	**0.0060**	B	0.0034	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluorene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Anthracene	**0.0038**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	ND	U	0.30	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	72	28-125	10/26/17	Acceptable
Fluoranthene-d10	78	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	57	10-136	10/26/17	Acceptable
Terphenyl-d14	84	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/12/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W130	**Units:**	ug/L
Lab Code:	K1711121-006	**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	**0.0067**	B	0.0034	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluorene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Anthracene	**0.015**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	ND	U	0.30	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	28-125	10/26/17	Acceptable
Fluoranthene-d10	73	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	59	10-136	10/26/17	Acceptable
Terphenyl-d14	84	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/12/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W6N	**Units:**	ug/L
Lab Code:	K1711121-007	**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	**0.039**	BX	0.0033	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	**0.0043**		0.0033	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Fluorene	**0.020**		0.0033	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Anthracene	**0.078**		0.0033	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Pyrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	**11**	D	5.8	20	10/18/17	10/28/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	28-125	10/26/17	Acceptable
Fluoranthene-d10	79	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	53	10-136	10/26/17	Acceptable
Terphenyl-d14	80	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/12/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W10	**Units:**	ug/L
Lab Code:	K1711121-008	**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	**8.8**	D	0.34	100	10/18/17	10/28/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Acenaphthylene	**0.89**	D	0.34	100	10/18/17	10/28/17	KWG1709431	
Acenaphthene	**42**	D	0.34	100	10/18/17	10/28/17	KWG1709431	
Fluorene	**19**	D	0.34	100	10/18/17	10/28/17	KWG1709431	
Phenanthrene	**3.9**	D	0.34	100	10/18/17	10/28/17	KWG1709431	
Anthracene	**0.70**	D	0.34	100	10/18/17	10/28/17	KWG1709431	
Fluoranthene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Pyrene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Benz(a)anthracene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Chrysene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.34	100	10/18/17	10/28/17	KWG1709431	
Pentachlorophenol	**100**	D	30	100	10/18/17	10/28/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	97	28-125	10/28/17	Acceptable
Fluoranthene-d10	80	39-123	10/28/17	Acceptable
2,4,6-Tribromophenol	72	10-136	10/28/17	Acceptable
Terphenyl-d14	100	22-127	10/28/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/12/2017
Sample Matrix:	Ground water	**Date Received:**	10/13/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	M-1	**Units:**	ug/L
Lab Code:	K1711121-009	**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	**0.0084**	B	0.0034	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluorene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Anthracene	**0.015**		0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	ND	U	0.30	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	28-125	10/26/17	Acceptable
Fluoranthene-d10	76	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	61	10-136	10/26/17	Acceptable
Terphenyl-d14	82	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	10/12/2017
Sample Matrix:	Ground water	**Date Received:**	10/14/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	FB-1	**Units:**	ug/L
Lab Code:	K1711121-010	**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	**0.0055**	B	0.0034	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluorene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	ND	U	0.30	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	28-125	10/26/17	Acceptable
Fluoranthene-d10	62	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	48	10-136	10/26/17	Acceptable
Terphenyl-d14	81	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711121
Project:	Joslyn/23270110.03 OU13270	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1709431-3	**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	**0.0036**		0.0033	1	10/18/17	10/26/17	KWG1709431	
2-Methylnaphthalene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Acenaphthylene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Acenaphthene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Fluorene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Phenanthrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Anthracene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Fluoranthene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Pyrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benz(a)anthracene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Chrysene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(b)fluoranthene†	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(k)fluoranthene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(a)pyrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	*
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	*
Dibenz(a,h)anthracene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Benzo(g,h,i)perylene	ND	U	0.0033	1	10/18/17	10/26/17	KWG1709431	
Pentachlorophenol	ND	U	0.29	1	10/18/17	10/26/17	KWG1709431	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	28-125	10/26/17	Acceptable
Fluoranthene-d10	81	39-123	10/26/17	Acceptable
2,4,6-Tribromophenol	55	10-136	10/26/17	Acceptable
Terphenyl-d14	86	22-127	10/26/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Client: Barr Engineering Company **Service Request:** K1711121
Project: Joslyn/23270110.03 OU13270
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
S3	K1711121-001	68	62	56	45
S1A	K1711121-002	61	70	49	74
S2	K1711121-003	67	75	53	81
W132	K1711121-004	73	76	56	83
W127N	K1711121-005	72	78	57	84
W130	K1711121-006	73	73	59	84
W6N	K1711121-007	67	79	53	80
W10	K1711121-008	97 D	80 D	72 D	100 D
M-1	K1711121-009	73	76	61	82
FB-1	K1711121-010	68	62	48	81
Method Blank	KWG1709431-3	75	81	55	86
Lab Control Sample	KWG1709431-1	69	80	54	82
Duplicate Lab Control Sample	KWG1709431-2	71	78	57	84

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
Project: Joslyn/23270110.03 OU13270
Sample Matrix: Ground water

Service Request: K1711121
Date Extracted: 10/18/2017
Date Analyzed: 10/26/2017 - 10/28/2017

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: KWG1709431

	Lab Control Sample KWG1709431-1 Lab Control Spike			Duplicate Lab Control Sample KWG1709431-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.356	0.500	71	0.418	0.500	84	59-95	16	30
2-Methylnaphthalene	0.370	0.500	74	0.361	0.500	72	42-108	2	30
Acenaphthylene	0.395	0.500	79	0.390	0.500	78	61-102	1	30
Acenaphthene	0.387	0.500	77	0.393	0.500	79	58-98	1	30
Fluorene	0.384	0.500	77	0.382	0.500	76	59-97	0	30
Phenanthrene	0.394	0.500	79	0.381	0.500	76	61-100	3	30
Anthracene	0.413	0.500	83	0.364	0.500	73	65-98	13	30
Fluoranthene	0.432	0.500	86	0.414	0.500	83	63-106	4	30
Pyrene	0.422	0.500	84	0.407	0.500	81	64-104	4	30
Benz(a)anthracene	0.430	0.500	86	0.416	0.500	83	67-96	3	30
Chrysene	0.449	0.500	90	0.441	0.500	88	67-105	2	30
Benzo(b)fluoranthene	0.462	0.500	92	0.402	0.500	80	69-104	14	30
Benzo(k)fluoranthene	0.475	0.500	95	0.465	0.500	93	68-108	2	30
Benzo(a)pyrene	0.478	0.500	96	0.319	0.500	64 *	68-107	40 *	30
Indeno(1,2,3-cd)pyrene	0.472	0.500	94	0.271	0.500	54 *	61-115	54 *	30
Dibenz(a,h)anthracene	0.448	0.500	90	0.363	0.500	73	54-118	21	30
Benzo(g,h,i)perylene	0.440	0.500	88	0.356	0.500	71	61-110	21	30
Pentachlorophenol	1.99	2.50	79	2.20	2.50	88	10-123	10	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 17, 2017

Analytical Report for Service Request No: K1711193
Revised Service Request No: K1711193.01

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 2327011D.30413 270

Dear Terri,

Enclosed is the revised report for the samples submitted to our laboratory October 16, 2017
For your reference, these analyses have been assigned our service request number **K1711193.**

The data qualifier flags have been updated on the 8270D SIM PAH Method Blank report. This revision supersedes the report dated November 03, 2017.

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
2:47 pm, Nov 17, 2017

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.:**	K1711193
Project:	Joslyn/2327011D.30413 270	**Date Received:**	10/16/17
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

Four ground water samples were received for analysis at ALS Environmental on 10/16/17. 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

Matrix Spike Recovery Exceptions:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Duplicate Lab Control Sample Exceptions:
The spike recovery of Benz(a)anthracene and Indeno(1,2,3-cd)pyrene for Duplicate Laboratory Control Sample (LCS) KWG1709525-2 was outside the lower control criterion. The DLCS is for the Relative Percent Difference (RPD) evaluation. The RPD was within criterion. The error associated with reduced recovery may indicate a potential bias. No further corrective action was appropriate.

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for Pentachlorophenol in the replicate matrix spike analyses of the laboratory control sample was outside control criteria. All spike recoveries in the 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.

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

KI711193

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD

COC Number: 52976

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: 23270 1D.030413 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	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	Water A	Water N	Soil % Solids	Preservative Code	Field Filtered Y/N
1. W300SPN				10/13/2017	0920	GW		2					TABLE 3-13	
2. U1					1030			2						
3. U1A					1135			2						
4. M-2					—			2						
5. FB-1				10/12/2017	—	O		2						
6.														
7.														
8.														
9.														
10.														

BARR USE ONLY		Relinquished by	On Ice? Y N	Date	Time	Received by	Date	Time
Sampled by:	SDI	Steve E	Y	10/13/17	1400		10/14/17	0900
Barr Proj. Manager:	JLB	Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Barr DQ Manager:	TAD III	Samples Shipped VIA: ☐ Courier ☒ Federal Express ☐ Sampler ☐ Other:		Air Bill Number:		Requested Due Date: ☐ Standard Turn Around Time ☐ Rush (mm/dd/yyyy)		
Lab Name:	ALS							
Lab Location:	KELSO, WA	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	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

PC CK

Cooler Receipt and Preservation Form

Client BARR Service Request K17 11193

Received: 10/14/17 Opened: 10/14/17 By: CCS Unloaded: 10/14/17 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?_____
   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
4.2	4.1	3.5	3.4	-0.1	371	52976	4098 7516 9725	

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: _____

Polynuclear Aromatic Hydrocarbons

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Phone (360)577-7222 Fax (360)636-1068
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REVISED
2:47 pm, Nov 17, 2017

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711193
Project:	Joslyn/2327011D.30413 270	**Date Collected:**	10/13/2017
Sample Matrix:	Ground water	**Date Received:**	10/16/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W300SPN	**Units:**	ug/L
Lab Code:	K1711193-001	**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	10/19/17	10/27/17	KWG1709525	
2-Methylnaphthalene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthylene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluorene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Phenanthrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluoranthene	**0.0040**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benz(a)anthracene	**0.0042**		0.0034	1	10/19/17	10/27/17	KWG1709525	*
Chrysene	**0.0038**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(b)fluoranthene†	**0.0070**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(k)fluoranthene	**0.0073**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(a)pyrene	**0.0081**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Indeno(1,2,3-cd)pyrene	**0.011**		0.0034	1	10/19/17	10/27/17	KWG1709525	*
Dibenz(a,h)anthracene	**0.0087**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(g,h,i)perylene	**0.015**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Pentachlorophenol	ND	U	0.30	1	10/19/17	10/27/17	KWG1709525	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-125	10/27/17	Acceptable
Fluoranthene-d10	78	39-123	10/27/17	Acceptable
2,4,6-Tribromophenol	59	10-136	10/27/17	Acceptable
Terphenyl-d14	90	22-127	10/27/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711193
Project:	Joslyn/2327011D.30413 270	**Date Collected:**	10/13/2017
Sample Matrix:	Ground water	**Date Received:**	10/16/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U1	**Units:**	ug/L
Lab Code:	K1711193-002	**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**		0.0034	1	10/19/17	10/27/17	KWG1709525	
2-Methylnaphthalene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthylene	**0.0037**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthene	**0.0055**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluorene	**0.0076**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Phenanthrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Anthracene	**0.017**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluoranthene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Pyrene	**0.0093**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Benz(a)anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	*
Chrysene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(a)pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Indeno(1,2,3-cd)pyrene	**0.0040**		0.0034	1	10/19/17	10/27/17	KWG1709525	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(g,h,i)perylene	**0.0047**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Pentachlorophenol	ND	U	0.30	1	10/19/17	10/27/17	KWG1709525	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	65	28-125	10/27/17	Acceptable
Fluoranthene-d10	73	39-123	10/27/17	Acceptable
2,4,6-Tribromophenol	51	10-136	10/27/17	Acceptable
Terphenyl-d14	78	22-127	10/27/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711193
Project:	Joslyn/2327011D.30413 270	**Date Collected:**	10/13/2017
Sample Matrix:	Ground water	**Date Received:**	10/16/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U1A	**Units:**	ug/L
Lab Code:	K1711193-003	**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	**0.011**		0.0034	1	10/19/17	10/27/17	KWG1709525	
2-Methylnaphthalene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthylene	**0.0085**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthene	**0.20**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluorene	**0.0062**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Phenanthrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Anthracene	**0.034**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluoranthene	**0.0070**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Pyrene	**0.016**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Benz(a)anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	*
Chrysene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(a)pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Pentachlorophenol	ND	U	0.30	1	10/19/17	10/27/17	KWG1709525	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	28-125	10/27/17	Acceptable
Fluoranthene-d10	74	39-123	10/27/17	Acceptable
2,4,6-Tribromophenol	52	10-136	10/27/17	Acceptable
Terphenyl-d14	80	22-127	10/27/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711193
Project:	Joslyn/2327011D.30413 270	**Date Collected:**	10/13/2017
Sample Matrix:	Ground water	**Date Received:**	10/16/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	M-2	**Units:**	ug/L
Lab Code:	K1711193-004	**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	**0.014**		0.0034	1	10/19/17	10/27/17	KWG1709525	
2-Methylnaphthalene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthylene	**0.0081**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthene	**0.21**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluorene	**0.0065**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Phenanthrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Anthracene	**0.036**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluoranthene	**0.0076**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Pyrene	**0.016**		0.0034	1	10/19/17	10/27/17	KWG1709525	
Benz(a)anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	*
Chrysene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(a)pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Pentachlorophenol	ND	U	0.30	1	10/19/17	10/27/17	KWG1709525	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	28-125	10/27/17	Acceptable
Fluoranthene-d10	77	39-123	10/27/17	Acceptable
2,4,6-Tribromophenol	53	10-136	10/27/17	Acceptable
Terphenyl-d14	85	22-127	10/27/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711193
Project:	Joslyn/2327011D.30413 270	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1709525-3	**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	0.0034	1	10/19/17	10/27/17	KWG1709525	
2-Methylnaphthalene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthylene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Acenaphthene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluorene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Phenanthrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Fluoranthene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benz(a)anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	*
Chrysene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(a)pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	*
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/19/17	10/27/17	KWG1709525	
Pentachlorophenol	ND	U	0.30	1	10/19/17	10/27/17	KWG1709525	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	28-125	10/27/17	Acceptable
Fluoranthene-d10	62	39-123	10/27/17	Acceptable
2,4,6-Tribromophenol	40	10-136	10/27/17	Acceptable
Terphenyl-d14	93	22-127	10/27/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

REVISED
2:47 pm, Nov 17, 2017

QA/QC Report

Client: Barr Engineering Company
Project: Joslyn/2327011D.30413 270
Sample Matrix: Ground water

Service Request: K1711193

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
W300SPN	K1711193-001	76	78	59	90
U1	K1711193-002	65	73	51	78
U1A	K1711193-003	64	74	52	80
M-2	K1711193-004	67	77	53	85
Method Blank	KWG1709525-3	68	62	40	93
Lab Control Sample	KWG1709525-1	74	72	53	85
Duplicate Lab Control Sample	KWG1709525-2	60	60	39	81

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
Project: Joslyn/2327011D.30413 270
Sample Matrix: Ground water

Service Request: K1711193
Date Extracted: 10/19/2017
Date Analyzed: 10/27/2017 - 10/28/2017

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: KWG1709525

	Lab Control Sample KWG1709525-1 Lab Control Spike			Duplicate Lab Control Sample KWG1709525-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.381	0.500	76	0.297	0.500	59	59-95	25	30
2-Methylnaphthalene	0.392	0.500	78	0.316	0.500	63	42-108	21	30
Acenaphthylene	0.411	0.500	82	0.330	0.500	66	61-102	22	30
Acenaphthene	0.415	0.500	83	0.328	0.500	66	58-98	24	30
Fluorene	0.413	0.500	83	0.332	0.500	66	59-97	22	30
Phenanthrene	0.399	0.500	80	0.332	0.500	66	61-100	18	30
Anthracene	0.431	0.500	86	0.383	0.500	77	65-98	12	30
Fluoranthene	0.393	0.500	79	0.324	0.500	65	63-106	19	30
Pyrene	0.437	0.500	87	0.411	0.500	82	64-104	6	30
Benz(a)anthracene	0.388	0.500	78	0.302	0.500	60 *	67-96	25	30
Chrysene	0.458	0.500	92	0.487	0.500	97	67-105	6	30
Benzo(b)fluoranthene	0.416	0.500	83	0.373	0.500	75	69-104	11	30
Benzo(k)fluoranthene	0.516	0.500	103	0.465	0.500	93	68-108	10	30
Benzo(a)pyrene	0.436	0.500	87	0.386	0.500	77	68-107	12	30
Indeno(1,2,3-cd)pyrene	0.310	0.500	62	0.256	0.500	51 *	61-115	19	30
Dibenz(a,h)anthracene	0.366	0.500	73	0.340	0.500	68	54-118	7	30
Benzo(g,h,i)perylene	0.396	0.500	79	0.368	0.500	74	61-110	7	30
Pentachlorophenol	1.48	2.50	59	1.05	2.50	42	10-123	34 *	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 13, 2017

Analytical Report for Service Request No: K1711422

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110.03 OU13 270

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory October 20, 2017
For your reference, these analyses have been assigned our service request number **K1711422.**

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

Chris Leaf
Project Manager

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.:**	K1711422
Project:	Joslyn/23270110.03 OU13 270	**Date Received:**	10/20/17
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

Four ground water samples were received for analysis at ALS Environmental on 10/20/17. 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

Elevated Detection Limits:
SampleW7 required dilution due to the presence of elevated levels of target analyte. 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

K1711422

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☒ MN ☐ SD

COC Number: 52716

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: 23270110.03 0013 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	Analysis Requested: Soil	Analysis Requested: % Solids	Preservative Code	Field Filtered Y/N
								A	SUOC				
								N					
1. W254				10/18/2017	1115	GW		2				TABLE 3-13	
2. W252N					1240			2					
3. W7					1315			2					
4. FB-2					—	O		2					
5.													
6.													
7.													
8.													
9.													
10.													

BARR USE ONLY

Sampled by: SOI

Barr Proj. Manager: JLBIII

Barr DQ Manager: TAO

Lab Name: CAS

Lab Location: KELSO, WA.

Relinquished by: Steve I — On Ice? Y (N) — Date: 10/19/17 — Time: 1400 — Received by: BMORGAN — Date: 10/20/17 — Time: 0930

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.

Table 3-13

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

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

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*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 *K17* 11422

Received: 10/20/17 Opened: 10/20/17 By: [illegible] Unloaded: 10/20/17 By: [illegible]

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? Custody tape

   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
2.2	—	2.1		0	374	52716	409875170464	

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: _____

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:**	K1711422
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	10/18/2017
Sample Matrix:	Ground water	**Date Received:**	10/20/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W254	**Units:**	ug/L
Lab Code:	K1711422-001	**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	10/25/17	10/31/17	KWG1709678	
2-Methylnaphthalene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Acenaphthylene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Acenaphthene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Fluorene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Phenanthrene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Anthracene	**0.0042**		0.0034	1	10/25/17	10/31/17	KWG1709678	
Fluoranthene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Pyrene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benz(a)anthracene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Chrysene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benzo(a)pyrene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Pentachlorophenol	ND	U	0.30	1	10/25/17	10/31/17	KWG1709678	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	28-125	10/31/17	Acceptable
Fluoranthene-d10	80	39-123	10/31/17	Acceptable
2,4,6-Tribromophenol	63	10-136	10/31/17	Acceptable
Terphenyl-d14	81	22-127	10/31/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711422
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	10/18/2017
Sample Matrix:	Ground water	**Date Received:**	10/20/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W252N	**Units:**	ug/L
Lab Code:	K1711422-002	**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	**0.065**		0.0033	1	10/25/17	10/31/17	KWG1709678	
2-Methylnaphthalene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Acenaphthylene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Acenaphthene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Fluorene	**0.0056**		0.0033	1	10/25/17	10/31/17	KWG1709678	
Phenanthrene	**0.0082**		0.0033	1	10/25/17	10/31/17	KWG1709678	
Anthracene	**0.0044**		0.0033	1	10/25/17	10/31/17	KWG1709678	
Fluoranthene	**0.0043**		0.0033	1	10/25/17	10/31/17	KWG1709678	
Pyrene	**0.0047**		0.0033	1	10/25/17	10/31/17	KWG1709678	
Benz(a)anthracene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Chrysene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Benzo(b)fluoranthene†	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Benzo(k)fluoranthene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Benzo(a)pyrene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Dibenz(a,h)anthracene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Benzo(g,h,i)perylene	ND	U	0.0033	1	10/25/17	10/31/17	KWG1709678	
Pentachlorophenol	ND	U	0.29	1	10/25/17	10/31/17	KWG1709678	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	71	28-125	10/31/17	Acceptable
Fluoranthene-d10	77	39-123	10/31/17	Acceptable
2,4,6-Tribromophenol	62	10-136	10/31/17	Acceptable
Terphenyl-d14	79	22-127	10/31/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711422
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	10/18/2017
Sample Matrix:	Ground water	**Date Received:**	10/20/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W7	**Units:**	ug/L
Lab Code:	K1711422-003	**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	**0.47**	D	0.065	20	10/25/17	10/31/17	KWG1709678	
2-Methylnaphthalene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Acenaphthylene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Acenaphthene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Fluorene	**1.5**	D	0.065	20	10/25/17	10/31/17	KWG1709678	
Phenanthrene	**0.78**	D	0.065	20	10/25/17	10/31/17	KWG1709678	
Anthracene	**0.24**	D	0.065	20	10/25/17	10/31/17	KWG1709678	
Fluoranthene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Pyrene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Benz(a)anthracene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Chrysene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Benzo(b)fluoranthene†	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Benzo(k)fluoranthene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Benzo(a)pyrene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Indeno(1,2,3-cd)pyrene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Dibenz(a,h)anthracene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Benzo(g,h,i)perylene	ND	U	0.065	20	10/25/17	10/31/17	KWG1709678	
Pentachlorophenol	**450**	D	120	400	10/25/17	10/31/17	KWG1709678	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	84	28-125	10/31/17	Acceptable
Fluoranthene-d10	94	39-123	10/31/17	Acceptable
2,4,6-Tribromophenol	68	10-136	10/31/17	Acceptable
Terphenyl-d14	93	22-127	10/31/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711422
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	10/18/2017
Sample Matrix:	Ground water	**Date Received:**	10/20/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	FB-2	**Units:**	ug/L
Lab Code:	K1711422-004	**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	0.0034	1	10/25/17	10/31/17	KWG1709678	
2-Methylnaphthalene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Acenaphthylene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Acenaphthene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Fluorene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Phenanthrene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Anthracene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Fluoranthene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Pyrene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benz(a)anthracene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Chrysene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benzo(b)fluoranthene†	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benzo(k)fluoranthene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benzo(a)pyrene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Dibenz(a,h)anthracene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Benzo(g,h,i)perylene	ND	U	0.0034	1	10/25/17	10/31/17	KWG1709678	
Pentachlorophenol	ND	U	0.30	1	10/25/17	10/31/17	KWG1709678	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	28-125	10/31/17	Acceptable
Fluoranthene-d10	81	39-123	10/31/17	Acceptable
2,4,6-Tribromophenol	60	10-136	10/31/17	Acceptable
Terphenyl-d14	84	22-127	10/31/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711422
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1709678-3	**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	10/25/17	10/30/17	KWG1709678	
2-Methylnaphthalene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Acenaphthylene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Acenaphthene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Fluorene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Phenanthrene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Anthracene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Fluoranthene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Pyrene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Benz(a)anthracene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Chrysene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Benzo(b)fluoranthene†	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Benzo(k)fluoranthene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Benzo(a)pyrene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Dibenz(a,h)anthracene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Benzo(g,h,i)perylene	ND	U	0.0033	1	10/25/17	10/30/17	KWG1709678	
Pentachlorophenol	ND	U	0.29	1	10/25/17	10/30/17	KWG1709678	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	28-125	10/30/17	Acceptable
Fluoranthene-d10	78	39-123	10/30/17	Acceptable
2,4,6-Tribromophenol	51	10-136	10/30/17	Acceptable
Terphenyl-d14	91	22-127	10/30/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

QA/QC Report

Client: Barr Engineering Company **Service Request:** K1711422
Project: Joslyn/23270110.03 OU13 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
W254	K1711422-001	74	80	63	81
W252N	K1711422-002	71	77	62	79
W7	K1711422-003	84 D	94 D	68 D	93 D
FB-2	K1711422-004	73	81	60	84
Method Blank	KWG1709678-3	75	78	51	91
Lab Control Sample	KWG1709678-1	73	74	57	79
Duplicate Lab Control Sample	KWG1709678-2	72	76	57	80

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
Project: Joslyn/23270110.03 OU13 270
Sample Matrix: Ground water

Service Request: K1711422
Date Extracted: 10/25/2017
Date Analyzed: 10/30/2017

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: KWG1709678

	Lab Control Sample KWG1709678-1 Lab Control Spike			Duplicate Lab Control Sample KWG1709678-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.373	0.500	75	0.378	0.500	76	59-95	1	30
2-Methylnaphthalene	0.384	0.500	77	0.396	0.500	79	42-108	3	30
Acenaphthylene	0.403	0.500	81	0.409	0.500	82	61-102	1	30
Acenaphthene	0.406	0.500	81	0.406	0.500	81	58-98	0	30
Fluorene	0.415	0.500	83	0.415	0.500	83	59-97	0	30
Phenanthrene	0.387	0.500	77	0.402	0.500	80	61-100	4	30
Anthracene	0.438	0.500	88	0.438	0.500	88	65-98	0	30
Fluoranthene	0.417	0.500	83	0.426	0.500	85	63-106	2	30
Pyrene	0.415	0.500	83	0.420	0.500	84	64-104	1	30
Benz(a)anthracene	0.423	0.500	85	0.423	0.500	85	67-96	0	30
Chrysene	0.454	0.500	91	0.458	0.500	92	67-105	1	30
Benzo(b)fluoranthene	0.479	0.500	96	0.479	0.500	96	69-104	0	30
Benzo(k)fluoranthene	0.507	0.500	101	0.502	0.500	100	68-108	1	30
Benzo(a)pyrene	0.505	0.500	101	0.506	0.500	101	68-107	0	30
Indeno(1,2,3-cd)pyrene	0.461	0.500	92	0.477	0.500	95	61-115	3	30
Dibenz(a,h)anthracene	0.484	0.500	97	0.492	0.500	98	54-118	2	30
Benzo(g,h,i)perylene	0.460	0.500	92	0.472	0.500	94	61-110	2	30
Pentachlorophenol	1.69	2.50	68	1.68	2.50	67	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.

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December 14, 2017

Analytical Report for Service Request No: K1711464
Revised Service Request No: K1711464.01

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110.30413270

Dear Terri,

Enclosed the revised report for the the sample(s) submitted to our laboratory October 21, 2014 For your reference, these analyses have been assigned our service request number **K1711464.**

The case narrative has been revised to a format that follows historical trends. This revision supersedes the report dated November 28, 2017.

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
5:01 pm, Dec 14, 2017

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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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REVISED
5:01 pm, Dec 14, 2017

ALS ENVIRONMENTAL

Client:	Barr Engineering Company	**Service Request No.:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Received:**	10/21/17
Sample Matrix:	Ground Water and 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

Eight ground water and one water samples were received for analysis at ALS Environmental on 10/21/17. 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

No anomalies were noted during the analysis of these samples.

Semi-Volatile Organic Compounds by Method 8270

Calibration Verification Exceptions:
The following analyte was flagged as outside the control criterion for Continuing Calibration Verification (CCV) MS07\1031F020: Pentachlorophenol. In accordance with the EPA Method, 80% or more of the CCV analytes must have passed within 20% of the true value. The remaining analytes are allowed a 40% difference as per the ALS SOP. The data was flagged to indicate the issue. No further corrective action was taken.

Lab Control Sample Exceptions:
The control criterion was exceeded for Chrysene in the replicate Laboratory Control Samples (LCS/DLCS) KWG1709794-1 and KWG1709794-2 by 3% and 1%, respectively. This compound is normally an advisory compound for this analysis; however, because this service request required fewer than 20 compounds, each compound is treated as a control compound. The recovery of Chrysene in the LCS/DLCS indicates a slight potential low bias for this analyte in this batch. The results are reported as per client instruction. No further corrective action was taken.

Elevated Detection Limits:
Sample Tank Eff. required dilution due to the presence of elevated levels of Pentachlorophenol. The reporting limits were adjusted to reflect the dilution.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD) with this sample batch. A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for this sample.

No other anomalies were noted during the analysis of this sample.

Approved by_____

Polynuclear Aromatic Hydrocarbons by Method 8270

Matrix Spike Recovery Exceptions:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Elevated Detection Limits:
Several samples required dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

Sample Notes and Discussion:
Method 8270D: The results reported for Acenaphthylene in sample W253 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 samples. The results were flagged with "X" to indicate the issue.

Surrogate Exceptions:
The control criteria were exceeded for Fluoranthene-d10 in sample W255 due to matrix interference. The presence of background components prevented adequate resolution of the surrogate. Accurate quantitation was not possible. No further corrective action was appropriate.

Calibration Verification Exceptions:
The following analyte was flagged as outside the control criterion for the Continuing Calibration Verification (CCV): Benzo(k)fluoranthene and Pentachlorophenol. In accordance with the EPA Method, 80% or more of the CCV analytes must have passed within 20% of the true value. The remaining analytes are allowed a 40% difference as per the ALS SOP. The data was flagged to indicate the issue. No further corrective action was taken.

No other anomalies were noted during the analysis of these sample.

Approved by 

Chain of Custody

ALS Environmental—Kelso Laboratory
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K1711464

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☒ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☒ MN ☐ ND ☐ SD Other: _____

COC Number: 52721

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: 23270110.30013270

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: 8260 Ethanol	Water: COD	Soil: % Solids	Preservative Code	Field Filtered Y/N
1.	U12				10/20/2017	1100	GW		2					TABLE: 3-13	
2.	U2A					1110									
3.	W253					1120									
4.	U4					1130									
5.	W255					1140									
6.	U6					1150									
7.	U7					1200									
8.	U11					1210									
9.	TANK EFF.					1220			2	1	1			3-4	
10.															

BARR USE ONLY		Relinquished by	On Ice? Y N	Date	Time	Received by	Date	Time
Sampled by:	SDI	Steve F	Y	10/20/17	1500		10/21/17	1000
Barr Proj. Manager:	JLB III	Relinquished by:	On Ice? Y N	Date	Time	Received by:	Date	Time
Barr DQ Manager:	TAO							
Lab Name:	ALS	Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☐ Other: _____				Air Bill Number:		
Lab Location:	KELSO, WA.	Lab WO:	Temperature on Receipt (°C):			Custody Seal Intact? ☐ Y ☐ N ☐ None		

Requested Due Date: ☐ Standard Turn Around Time ☐ Rush _____ (mm/dd/yyyy)

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.

PC CC

Cooler Receipt and Preservation Form

Client BARR Service Request K1711464

Received: 10/21/17 Opened: 10/21/17 By: CG Unloaded: 10/21/17 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
1.9	2.1	2.6	2.8	+0.2	298		4098 7517 0534	
2.5	2.5	2.0	2.0	0.0	385		0523	

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: _____

General Chemistry

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/17
Sample Matrix:	Water	**Date Received:**	10/21/17
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.	K1711464-009	**5.0**	4.8	1	11/13/17 15:20	11/13/17	
Method Blank	K1711464-MB1	ND U	5.0	1	11/13/17 15:20	11/13/17	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	11/13/17
		Date Extracted:	11/13/17

Matrix Spike Summary
Oil and Grease, Total (HEM)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1711479-001	**Basis:**	NA
Analysis Method:	1664A		
Prep Method:	Method		

Matrix Spike
K1711479-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Oil and Grease, Total (HEM)	8.5	123	115	99	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:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Analyzed:**	11/13/17
Sample Matrix:	Water	**Date Extracted:**	11/13/17

Duplicate Lab Control Sample Summary
General Chemistry Parameters

Analysis Method:	1664A	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	569852

	Lab Control Sample K1711464-LCS1			Duplicate Lab Control Sample K1711464-DLCS1					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Oil and Grease, Total (HEM)	106	120	88	107	120	90	78-114	2	20

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/17
Sample Matrix:	Water	**Date Received:**	10/21/17
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.	K1711464-009	ND U	5.0	1	10/26/17 23:30	
Method Blank	K1711464-MB1	ND U	4.0	1	10/26/17 23:30	
Method Blank	K1711464-MB2	ND U	4.0	1	10/26/17 23:30	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project	Joslyn/23270110.30413270	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	10/26/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1711584-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1711584-001DUP 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.

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dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Analyzed:**	10/26/17
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:	567691

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1711464-LCS2	408	429	95	85-115

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/17
Sample Matrix:	Water	**Date Received:**	10/21/17
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.	K1711464-009	**7.27**	-	1	10/21/17 17:57	H

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project	Joslyn/23270110.30413270	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	10/20/17

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	pH Units
Lab Code:	K1711425-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1711425-001DUP Result	Average	RPD	RPD Limit
pH	SM 4500-H+ B	-	7.31	7.26	7.29	<1	20

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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:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Analyzed:**	10/20/17
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:	566860

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1711464-LCS2	8.45	8.41	100	85-115

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/17
Sample Matrix:	Water	**Date Received:**	10/21/17
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.	K1711464-009	**14.0**	5.0	1	11/04/17 11:45	
Method Blank	K1711464-MB1	ND U	5.0	1	11/04/17 11:45	

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project	Joslyn/23270110.30413270	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	11/04/17

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1711639-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1711639-001DUP Result	Average	RPD	RPD Limit
Chemical Oxygen Demand (COD)	SM 5220 C	5.0	24.3	23.8	24.0	2	20

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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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	11/4/17
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1711639-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

		Matrix Spike K1711639-001MS			Duplicate Matrix Spike K1711639-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chemical Oxygen Demand (COD)	24.3	124	100	100	121	100	97	80-128	2	20

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Analyzed:**	11/04/17
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:	568820

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1711464-LCS2	116	121	96	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:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Water	**Date Received:**	10/21/2017

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Tank Eff.	**Units:**	ug/L
Lab Code:	K1711464-009	**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	9.9	1	10/27/17	11/01/17	KWG1709794	
2-Methylnaphthalene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Acenaphthylene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Acenaphthene	**40**		9.9	1	10/27/17	11/01/17	KWG1709794	
Fluorene	**12**		9.9	1	10/27/17	11/01/17	KWG1709794	
Phenanthrene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Anthracene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Pentachlorophenol	**240**	D	50	2	10/27/17	11/01/17	KWG1709794	*
Fluoranthene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Pyrene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Benz(a)anthracene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Chrysene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	*
Benzo(b)fluoranthene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Benzo(k)fluoranthene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Benzo(a)pyrene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Indeno(1,2,3-cd)pyrene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Dibenz(a,h)anthracene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Benzo(g,h,i)perylene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorobiphenyl	73	49-109	11/01/17	Acceptable
2,4,6-Tribromophenol	79	36-129	11/01/17	Acceptable
Terphenyl-d14	85	29-136	11/01/17	Acceptable

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**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:	KWG1709794-3	**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	9.9	1	10/27/17	11/01/17	KWG1709794	
2-Methylnaphthalene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Acenaphthylene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Acenaphthene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Fluorene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Phenanthrene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Anthracene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Pentachlorophenol	ND	U	25	1	10/27/17	11/01/17	KWG1709794	*
Fluoranthene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Pyrene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Benz(a)anthracene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Chrysene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	*
Benzo(b)fluoranthene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Benzo(k)fluoranthene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Benzo(a)pyrene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Indeno(1,2,3-cd)pyrene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Dibenz(a,h)anthracene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	
Benzo(g,h,i)perylene	ND	U	9.9	1	10/27/17	11/01/17	KWG1709794	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorobiphenyl	83	49-109	11/01/17	Acceptable
2,4,6-Tribromophenol	68	36-129	11/01/17	Acceptable
Terphenyl-d14	96	29-136	11/01/17	Acceptable

Comments:

QA/QC Report

Client: Barr Engineering Company
Project: Joslyn/23270110.30413270
Sample Matrix: Water

Service Request: K1711464

Surrogate Recovery Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method: EPA 3520C
Analysis Method: 8270D

Units: Percent
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
Tank Eff.	K1711464-009	73	79	85
Method Blank	KWG1709794-3	83	68	96
Lab Control Sample	KWG1709794-1	87	79	93
Duplicate Lab Control Sample	KWG1709794-2	86	79	88

Surrogate Recovery Control Limits (%)

Sur1	=	2-Fluorobiphenyl	49-109
Sur2	=	2,4,6-Tribromophenol	36-129
Sur3	=	Terphenyl-d14	29-136

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Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: Barr Engineering Company
Project: Joslyn/23270110.30413270
Sample Matrix: Water

Service Request: K1711464
Date Extracted: 10/27/2017
Date Analyzed: 11/01/2017

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: KWG1709794

	Lab Control Sample KWG1709794-1 Lab Control Spike				Duplicate Lab Control Sample KWG1709794-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**		**Result**	**Spike Amount**	**%Rec**		**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	86.1	100	86		86.2	100	86		64-98	0	30
2-Methylnaphthalene	89.5	100	89		93.1	100	93		66-101	4	30
Acenaphthylene	90.1	100	90		86.5	100	86		69-105	4	30
Acenaphthene	94.3	100	94		93.2	100	93		69-108	1	30
Fluorene	88.7	100	89		88.8	100	89		65-113	0	30
Phenanthrene	93.1	100	93		90.9	100	91		67-113	2	30
Anthracene	95.4	100	95		92.4	100	92		69-114	3	30
Pentachlorophenol	77.7	100	78		77.7	100	78		60-113	0	30
Fluoranthene	108	100	108		104	100	104		69-123	4	30
Pyrene	95.7	100	96		90.9	100	91		61-121	5	30
Benz(a)anthracene	95.1	100	95		95.3	100	95		72-117	0	30
Chrysene	68.4	100	68	*	69.6	100	70	*	71-113	2	30
Benzo(b)fluoranthene	90.6	100	91		90.8	100	91		72-116	0	30
Benzo(k)fluoranthene	99.2	100	99		98.7	100	99		71-113	1	30
Benzo(a)pyrene	99.9	100	100		102	100	102		72-115	2	30
Indeno(1,2,3-cd)pyrene	90.7	100	91		90.2	100	90		70-120	0	30
Dibenz(a,h)anthracene	91.5	100	92		92.1	100	92		68-120	1	30
Benzo(g,h,i)perylene	88.5	100	89		89.0	100	89		67-120	1	30

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Polynuclear Aromatic Hydrocarbons

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Ground water	**Date Received:**	10/21/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U12	**Units:**	ug/L
Lab Code:	K1711464-001	**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	**1.0**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
2-Methylnaphthalene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthylene	**0.74**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthene	**65**	D	0.17	50	10/27/17	11/03/17	KWG1709796	
Fluorene	**26**	D	0.17	50	10/27/17	11/03/17	KWG1709796	
Phenanthrene	**0.46**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Anthracene	**0.66**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Fluoranthene	**4.5**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Pyrene	**2.4**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Benz(a)anthracene	**0.025**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Chrysene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(a)pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	**5.5**	D	1.5	5	10/27/17	11/02/17	KWG1709796	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	72	28-125	11/02/17	Acceptable
Fluoranthene-d10	84	39-123	11/02/17	Acceptable
2,4,6-Tribromophenol	53	10-136	11/02/17	Acceptable
Terphenyl-d14	76	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Ground water	**Date Received:**	10/21/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U2A	**Units:**	ug/L
Lab Code:	K1711464-002	**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	**0.084**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
2-Methylnaphthalene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthylene	**0.031**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthene	**2.2**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Fluorene	**0.17**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Phenanthrene	**0.034**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Anthracene	**0.098**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Fluoranthene	**0.20**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Pyrene	**0.10**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Benz(a)anthracene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Chrysene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(a)pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	**120**	D	30	100	10/27/17	11/03/17	KWG1709796	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	28-125	11/02/17	Acceptable
Fluoranthene-d10	80	39-123	11/02/17	Acceptable
2,4,6-Tribromophenol	56	10-136	11/02/17	Acceptable
Terphenyl-d14	80	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Ground water	**Date Received:**	10/21/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W253	**Units:**	ug/L
Lab Code:	K1711464-003	**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	**0.077**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
2-Methylnaphthalene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthylene	**0.058**	DX	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthene	**8.2**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Fluorene	**0.43**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Phenanthrene	**0.040**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Anthracene	**0.032**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Fluoranthene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benz(a)anthracene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Chrysene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(a)pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	ND	U	1.5	5	10/27/17	11/02/17	KWG1709796	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-125	11/02/17	Acceptable
Fluoranthene-d10	71	39-123	11/02/17	Acceptable
2,4,6-Tribromophenol	57	10-136	11/02/17	Acceptable
Terphenyl-d14	79	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Ground water	**Date Received:**	10/21/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U4	**Units:**	ug/L
Lab Code:	K1711464-004	**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	**0.37**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
2-Methylnaphthalene	**0.56**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthylene	**0.38**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthene	**37**	D	0.17	50	10/27/17	11/04/17	KWG1709796	
Fluorene	**9.1**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Phenanthrene	**3.7**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Anthracene	**0.54**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Fluoranthene	**0.98**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Pyrene	**0.42**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Benz(a)anthracene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Chrysene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(a)pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	**0.056**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	**120**	D	15	50	10/27/17	11/04/17	KWG1709796	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	61	28-125	11/02/17	Acceptable
Fluoranthene-d10	94	39-123	11/02/17	Acceptable
2,4,6-Tribromophenol	47	10-136	11/02/17	Acceptable
Terphenyl-d14	78	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Ground water	**Date Received:**	10/21/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W255	**Units:**	ug/L
Lab Code:	K1711464-005	**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	**2900**	D	17	5000	10/27/17	11/10/17	KWG1709796	
2-Methylnaphthalene	**93**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Acenaphthylene	**4.2**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Acenaphthene	**220**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Fluorene	**110**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Phenanthrene	**150**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Anthracene	**8.5**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Fluoranthene	**70**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Pyrene	**48**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Benz(a)anthracene	**17**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Chrysene	**7.7**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	**13**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	**2.8**	D	0.033	10	10/27/17	11/02/17	KWG1709796	*
Benzo(a)pyrene	**8.2**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	**3.5**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	**0.92**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	**2.8**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	**8.9**	D	2.9	10	10/27/17	11/02/17	KWG1709796	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	95	28-125	11/02/17	Acceptable
Fluoranthene-d10	191	39-123	11/02/17	Outside Control Limits
2,4,6-Tribromophenol	51	10-136	11/02/17	Acceptable
Terphenyl-d14	81	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Ground water	**Date Received:**	10/21/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U6	**Units:**	ug/L
Lab Code:	K1711464-006	**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	**0.70**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
2-Methylnaphthalene	**0.33**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Acenaphthylene	**0.52**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Acenaphthene	**35**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Fluorene	**16**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Phenanthrene	**18**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Anthracene	**3.1**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Fluoranthene	**28**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Pyrene	**21**	D	3.3	1000	10/27/17	11/04/17	KWG1709796	
Benz(a)anthracene	**9.2**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Chrysene	**5.3**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	**10**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	**2.7**	D	0.033	10	10/27/17	11/02/17	KWG1709796	*
Benzo(a)pyrene	**6.5**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	**3.0**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	**0.89**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	**2.8**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	**940**	D	290	1000	10/27/17	11/04/17	KWG1709796	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	87	28-125	11/02/17	Acceptable
Fluoranthene-d10	112	39-123	11/02/17	Acceptable
2,4,6-Tribromophenol	51	10-136	11/02/17	Acceptable
Terphenyl-d14	78	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Ground water	**Date Received:**	10/21/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U7	**Units:**	ug/L
Lab Code:	K1711464-007	**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	**22**	D	0.17	50	10/27/17	11/04/17	KWG1709796	
2-Methylnaphthalene	**1.5**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthylene	**0.55**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Acenaphthene	**86**	D	0.17	50	10/27/17	11/04/17	KWG1709796	
Fluorene	**22**	D	0.17	50	10/27/17	11/04/17	KWG1709796	
Phenanthrene	**14**	D	0.17	50	10/27/17	11/04/17	KWG1709796	
Anthracene	**1.1**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Fluoranthene	**9.7**	D	0.17	50	10/27/17	11/04/17	KWG1709796	
Pyrene	**5.3**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Benz(a)anthracene	**0.13**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Chrysene	**0.043**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	**0.047**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	**0.018**	D	0.017	5	10/27/17	11/02/17	KWG1709796	*
Benzo(a)pyrene	**0.029**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	**0.024**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	ND	U	0.017	5	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	**0.019**	D	0.017	5	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	**52**	D	15	50	10/27/17	11/04/17	KWG1709796	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	71	28-125	11/02/17	Acceptable
Fluoranthene-d10	85	39-123	11/02/17	Acceptable
2,4,6-Tribromophenol	51	10-136	11/02/17	Acceptable
Terphenyl-d14	73	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	10/20/2017
Sample Matrix:	Ground water	**Date Received:**	10/21/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U11	**Units:**	ug/L
Lab Code:	K1711464-008	**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	**2.4**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
2-Methylnaphthalene	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Acenaphthylene	**0.96**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Acenaphthene	**15**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Fluorene	**0.34**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Phenanthrene	**0.081**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Anthracene	**0.46**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Fluoranthene	**3.3**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Pyrene	**1.2**	D	0.033	10	10/27/17	11/02/17	KWG1709796	
Benz(a)anthracene	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Chrysene	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(a)pyrene	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	ND	U	0.033	10	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	**570**	D	290	1000	10/27/17	11/10/17	KWG1709796	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	28-125	11/02/17	Acceptable
Fluoranthene-d10	102	39-123	11/02/17	Acceptable
2,4,6-Tribromophenol	50	10-136	11/02/17	Acceptable
Terphenyl-d14	80	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1709796-3	**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	10/27/17	11/02/17	KWG1709796	
2-Methylnaphthalene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Acenaphthylene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Acenaphthene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Fluorene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Phenanthrene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Anthracene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Fluoranthene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Pyrene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Benz(a)anthracene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Chrysene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Benzo(b)fluoranthene†	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Benzo(k)fluoranthene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Benzo(a)pyrene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Dibenz(a,h)anthracene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Benzo(g,h,i)perylene	ND	U	0.0033	1	10/27/17	11/02/17	KWG1709796	
Pentachlorophenol	ND	U	0.29	1	10/27/17	11/02/17	KWG1709796	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	77	28-125	11/02/17	Acceptable
Fluoranthene-d10	80	39-123	11/02/17	Acceptable
2,4,6-Tribromophenol	58	10-136	11/02/17	Acceptable
Terphenyl-d14	86	22-127	11/02/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

QA/QC Report

Client: Barr Engineering Company
Project: Joslyn/23270110.30413270
Sample Matrix: Ground water

Service Request: K1711464

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
U12	K1711464-001	72 D	84 D	53 D	76 D
U2A	K1711464-002	63 D	80 D	56 D	80 D
W253	K1711464-003	76 D	71 D	57 D	79 D
U4	K1711464-004	61 D	94 D	47 D	78 D
W255	K1711464-005	95 D	191 D *	51 D	81 D
U6	K1711464-006	87 D	112 D	51 D	78 D
U7	K1711464-007	71 D	85 D	51 D	73 D
U11	K1711464-008	63 D	102 D	50 D	80 D
Method Blank	KWG1709796-3	77	80	58	86
Lab Control Sample	KWG1709796-1	73	76	57	81
Duplicate Lab Control Sample	KWG1709796-2	72	76	56	81

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:**	K1711464
Project:	Joslyn/23270110.30413270	**Date Extracted:**	10/27/2017
Sample Matrix:	Ground water	**Date Analyzed:**	11/02/2017

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:	KWG1709796

	Lab Control Sample KWG1709796-1 Lab Control Spike			Duplicate Lab Control Sample KWG1709796-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.379	0.500	76	0.362	0.500	72	59-95	4	30
2-Methylnaphthalene	0.398	0.500	80	0.369	0.500	74	42-108	7	30
Acenaphthylene	0.404	0.500	81	0.391	0.500	78	61-102	3	30
Acenaphthene	0.407	0.500	81	0.395	0.500	79	58-98	3	30
Fluorene	0.408	0.500	82	0.397	0.500	79	59-97	3	30
Phenanthrene	0.389	0.500	78	0.368	0.500	74	61-100	6	30
Anthracene	0.427	0.500	85	0.424	0.500	85	65-98	1	30
Fluoranthene	0.414	0.500	83	0.411	0.500	82	63-106	1	30
Pyrene	0.422	0.500	84	0.416	0.500	83	64-104	1	30
Benz(a)anthracene	0.419	0.500	84	0.409	0.500	82	67-96	2	30
Chrysene	0.455	0.500	91	0.448	0.500	90	67-105	2	30
Benzo(b)fluoranthene	0.463	0.500	93	0.451	0.500	90	69-104	3	30
Benzo(k)fluoranthene	0.507	0.500	101	0.500	0.500	100	68-108	1	30
Benzo(a)pyrene	0.471	0.500	94	0.464	0.500	93	68-107	2	30
Indeno(1,2,3-cd)pyrene	0.396	0.500	79	0.353	0.500	71	61-115	12	30
Dibenz(a,h)anthracene	0.483	0.500	97	0.461	0.500	92	54-118	5	30
Benzo(g,h,i)perylene	0.424	0.500	85	0.401	0.500	80	61-110	6	30
Pentachlorophenol	1.69	2.50	67	1.65	2.50	66	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.

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November 16, 2017

Analytical Report for Service Request No: K1711908

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110-030013100

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory November 02, 2017
For your reference, these analyses have been assigned our service request number **K1711908.**

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

Chris Leaf
Project Manager

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.

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

Barr Engineering Co. Chain of Custody

BARR ☐ Ann Arbor ☐ Bismarck ☐ Duluth ☐ Hibbing ☐ Jefferson City ☑ Minneapolis

Sample Origination State: ☐ KS ☐ MO ☐ WI ☐ MI ☐ ND Other: ☑ MN ☐ SD

COC Number: 51096

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 - 03 0013 104

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	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	% Solids	Preservative Code	Field Filtered Y/N
1. U12				10/31/17	1120	NW		2	X X			Field pH	6.94
2. U2A					1210			2	X X				6.89
3. U11					1300			2	X X				6.63
4.													
5.													
6.													
7.													
8.													
9.													
10.													

BARR USE ONLY							
Sampled by: PWS	Relinquished by:	On Ice? Y N	Date 10/31/17	Time 1330	Received by:	Date 10/31/17	Time
Barr Proj. Manager: SLB3	Relinquished by:	On Ice? Y N	Date 10/31/17	Time 1573	Received by: AMorrow ALS	Date 11-2-17	Time 0930
Barr DQ Manager: TAO	Samples Shipped VIA: ☐ Courier ☐ Federal Express ☐ Sampler ☐ Other:				Air Bill Number:	Requested Due Date: ☐ Standard Turn Around Time ☐ Rush (mm/dd/yyyy)	
Lab Name: ALS							
Lab Location:	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.

PC_____

Cooler Receipt and Preservation Form

Client Barr Engineering Service Request K17

Received: 11-2-17 Opened: 11-2-17 By: [signature] Unloaded: 11-2-17 By: [signature]

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? Custody Tape
   If present, were custody seals intact? (Y) N If present, were they signed and dated? N/A 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	–	2.9	–	0	384	51096	4098 7517 1004	

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
All Samples	125 pl.				X	H2SO4	1mL.	GenP/1-1-T	[signature]	1156

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:**	K1711908
Project:	Joslyn/23270110-030013100	**Date Collected:**	10/31/17
Sample Matrix:	Wastewater	**Date Received:**	11/2/17
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	K1711908-001	**117000**	330	1	11/03/17 10:04	
U2A	K1711908-002	**60600**	330	1	11/03/17 10:04	
U11	K1711908-003	**74900**	330	1	11/03/17 10:04	
Method Blank	K1711908-MB1	ND U	5.0	1	11/03/17 10:04	
Method Blank	K1711908-MB2	ND U	5.0	1	11/03/17 10:04	

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dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711908
Project	Joslyn/23270110-030013100	**Date Collected:**	NA
Sample Matrix:	Wastewater	**Date Received:**	NA
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	K1711850-001DUP	5.0	10.0	11.0	10.5	10	10	11/03/17
Batch QC	K1711910-001DUP	5.0	ND U	ND U	NC	NC	10	11/03/17

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:**	K1711908
Project:	Joslyn/23270110-030013100	**Date Analyzed:**	11/03/17
Sample Matrix:	Wastewater	**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:	568721

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1711908-LCS1	432	429	101	85-115

Analytical Report

Client:	Barr Engineering Company	**Service Request:**	K1711908
Project:	Joslyn/23270110-030013100	**Date Collected:**	10/31/17
Sample Matrix:	Wastewater	**Date Received:**	11/2/17
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	K1711908-001	**505**	50	1	11/14/17 16:30	
U2A	K1711908-002	**362**	50	1	11/14/17 16:30	
U11	K1711908-003	**16700**	500	10	11/10/17 15:30	
Method Blank	K1711908-MB1	ND U	50	1	11/10/17 15:30	
Method Blank	K1711908-MB2	ND U	50	1	11/14/17 16:30	
Method Blank	K1711908-MB3	ND U	50	1	11/14/17 16:30	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711908
Project	Joslyn/23270110-030013100	**Date Collected:**	10/31/17
Sample Matrix:	Wastewater	**Date Received:**	11/02/17
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	K1711877-001DUP	200	1320	1470	1400	11	20	11/10/17
U12	K1711908-001DUP	50	505	505	505	<1	20	11/14/17

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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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711908
Project:	Joslyn/23270110-030013100	**Date Collected:**	N/A
Sample Matrix:	Wastewater	**Date Received:**	N/A
		Date Analyzed:	11/10/17
		Date Extracted:	NA

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1711877-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

Matrix Spike
K1711877-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen Demand (COD)	1320	5150	4000	96	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.

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QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711908
Project:	Joslyn/23270110-030013100	**Date Collected:**	10/31/17
Sample Matrix:	Wastewater	**Date Received:**	11/02/17
		Date Analyzed:	11/14/17
		Date Extracted:	NA

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name:	U12	**Units:**	mg/L
Lab Code:	K1711908-001	**Basis:**	NA
Analysis Method:	SM 5220 C		
Prep Method:	None		

Matrix Spike
K1711908-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen Demand (COD)	505	1470	1000	97	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.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711908
Project:	Joslyn/23270110-030013100	**Date Analyzed:**	11/10/17
Sample Matrix:	Wastewater	**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:	569670

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1711908-LCS1	249	242	103	83-117

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dba ALS Environmental

QA/QC Report

Client:	Barr Engineering Company	**Service Request:**	K1711908
Project:	Joslyn/23270110-030013100	**Date Analyzed:**	11/14/17
Sample Matrix:	Wastewater	**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:	570014

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1711908-LCS2	242	242	100	83-117

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December 20, 2017 **Analytical Report for Service Request No:** K1713055

Terri Olson
Barr Engineering
4300 Market Pointe Drive, Suite 200
Minneapolis, MN 55435

RE: Joslyn / 23270110.03 OU13 270

Dear Terri,

Enclosed are the results of the sample(s) submitted to our laboratory December 05, 2017
For your reference, these analyses have been assigned our service request number **K1713055.**

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

Chris Leaf
Project Manager

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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. *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. *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. *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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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

Client: Barr Engineering Company
Project: Joslyn
Sample Matrix: Ground Water

Service Request: K1713055
Date Received: 12/05/2017

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:

Four ground water samples were received for analysis at ALS Environmental on 12/05/2017. 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.

Semivolatiles by GC/MS:

Method 8270D SIM :
Sample U5 required dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

The control criteria were exceeded for Fluoranthene-d10 in sample U5 due to matrix interference. 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 _____ Date 12/20/2017

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

K17J3059

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: 52602

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: 23270110.030013 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	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 5VOC	Soil % Solids	Preservative Code	Field Filtered Y/N
									A	N			
1.	U5				12/4/2017	0800	GW			2		TABLE 3-13	
2.	W328					0930				2			
3.	W301					1045				2			
4.	W104					1100				2			
5.													
6.													
7.													
8.													
9.													
10.													

BARR USE ONLY

Sampled by: SDI

Barr Proj. Manager: JLB III

Barr DQ Manager: TAO

Lab Name: ALS

Lab Location: KELSO, WA

Relinquished by: Steve T — On Ice? Y ☒ N ☐ — Date 12/4/17 — Time

Received by: [signature] — Date 12/5/17 — Time 0945

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.

Table 3-13

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

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

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*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 K17 13055

Received: 12/5/17 Opened: 12/5/17 By: CG Unloaded: 12/5/17 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	0.4	1.1	1.3	+0.2	323		4098 7517 2515	

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: _____

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:**	K1713055
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	12/04/2017
Sample Matrix:	Ground water	**Date Received:**	12/05/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	U5	**Units:**	ug/L
Lab Code:	K1713055-001	**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	**2.1**	D	0.33	100	12/11/17	12/14/17	KWG1710914	
2-Methylnaphthalene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Acenaphthylene	**3.8**	D	0.33	100	12/11/17	12/14/17	KWG1710914	
Acenaphthene	**110**	D	0.33	100	12/11/17	12/14/17	KWG1710914	
Fluorene	**8.4**	D	0.33	100	12/11/17	12/14/17	KWG1710914	
Phenanthrene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Anthracene	**0.98**	D	0.33	100	12/11/17	12/14/17	KWG1710914	
Fluoranthene	**19**	D	0.33	100	12/11/17	12/14/17	KWG1710914	
Pyrene	**10**	D	0.33	100	12/11/17	12/14/17	KWG1710914	
Benz(a)anthracene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Chrysene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Benzo(b)fluoranthene†	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Benzo(k)fluoranthene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Benzo(a)pyrene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Indeno(1,2,3-cd)pyrene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Dibenz(a,h)anthracene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Benzo(g,h,i)perylene	ND	U	0.33	100	12/11/17	12/14/17	KWG1710914	
Pentachlorophenol	**210**	D	29	100	12/11/17	12/14/17	KWG1710914	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	111	28-125	12/14/17	Acceptable
Fluoranthene-d10	124	39-123	12/14/17	Outside Control Limits
2,4,6-Tribromophenol	75	10-136	12/14/17	Acceptable
Terphenyl-d14	104	22-127	12/14/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1713055
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	12/04/2017
Sample Matrix:	Ground water	**Date Received:**	12/05/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W328	**Units:**	ug/L
Lab Code:	K1713055-002	**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	**0.012**		0.0033	1	12/11/17	12/14/17	KWG1710914	
2-Methylnaphthalene	**0.011**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Acenaphthylene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Acenaphthene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Fluorene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Phenanthrene	**0.0079**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Anthracene	**0.0071**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Fluoranthene	**0.0044**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Pyrene	**0.0047**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Benz(a)anthracene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Chrysene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(b)fluoranthene†	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(k)fluoranthene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(a)pyrene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Dibenz(a,h)anthracene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(g,h,i)perylene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Pentachlorophenol	ND	U	0.29	1	12/11/17	12/14/17	KWG1710914	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	70	28-125	12/14/17	Acceptable
Fluoranthene-d10	71	39-123	12/14/17	Acceptable
2,4,6-Tribromophenol	57	10-136	12/14/17	Acceptable
Terphenyl-d14	66	22-127	12/14/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1713055
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	12/04/2017
Sample Matrix:	Ground water	**Date Received:**	12/05/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W301	**Units:**	ug/L
Lab Code:	K1713055-003	**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	**0.024**		0.0033	1	12/11/17	12/14/17	KWG1710914	
2-Methylnaphthalene	**0.012**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Acenaphthylene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Acenaphthene	**0.0034**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Fluorene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Phenanthrene	**0.017**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Anthracene	**0.0058**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Fluoranthene	**0.022**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Pyrene	**0.019**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Benz(a)anthracene	**0.0095**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Chrysene	**0.013**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(b)fluoranthene†	**0.014**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(k)fluoranthene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(a)pyrene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Dibenz(a,h)anthracene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(g,h,i)perylene	**0.0052**		0.0033	1	12/11/17	12/14/17	KWG1710914	
Pentachlorophenol	ND	U	0.29	1	12/11/17	12/14/17	KWG1710914	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	28-125	12/14/17	Acceptable
Fluoranthene-d10	68	39-123	12/14/17	Acceptable
2,4,6-Tribromophenol	55	10-136	12/14/17	Acceptable
Terphenyl-d14	56	22-127	12/14/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1713055
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	12/04/2017
Sample Matrix:	Ground water	**Date Received:**	12/05/2017

Polynuclear Aromatic Hydrocarbons

Sample Name:	W104	**Units:**	ug/L
Lab Code:	K1713055-004	**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	**0.047**		0.0034	1	12/11/17	12/14/17	KWG1710914	
2-Methylnaphthalene	**0.013**		0.0034	1	12/11/17	12/14/17	KWG1710914	
Acenaphthylene	**0.028**		0.0034	1	12/11/17	12/14/17	KWG1710914	
Acenaphthene	**0.011**		0.0034	1	12/11/17	12/14/17	KWG1710914	
Fluorene	**0.024**		0.0034	1	12/11/17	12/14/17	KWG1710914	
Phenanthrene	**0.012**		0.0034	1	12/11/17	12/14/17	KWG1710914	
Anthracene	**2.7**	D	0.017	5	12/11/17	12/18/17	KWG1710914	
Fluoranthene	**0.013**		0.0034	1	12/11/17	12/14/17	KWG1710914	
Pyrene	ND	U	0.0034	1	12/11/17	12/14/17	KWG1710914	
Benz(a)anthracene	ND	U	0.0034	1	12/11/17	12/14/17	KWG1710914	
Chrysene	**0.029**		0.0034	1	12/11/17	12/14/17	KWG1710914	
Benzo(b)fluoranthene†	ND	U	0.017	5	12/11/17	12/18/17	KWG1710914	
Benzo(k)fluoranthene	ND	U	0.017	5	12/11/17	12/18/17	KWG1710914	
Benzo(a)pyrene	ND	U	0.017	5	12/11/17	12/18/17	KWG1710914	
Indeno(1,2,3-cd)pyrene	ND	U	0.017	5	12/11/17	12/18/17	KWG1710914	
Dibenz(a,h)anthracene	ND	U	0.017	5	12/11/17	12/18/17	KWG1710914	
Benzo(g,h,i)perylene	ND	U	0.017	5	12/11/17	12/18/17	KWG1710914	
Pentachlorophenol	**0.39**		0.30	1	12/11/17	12/14/17	KWG1710914	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	56	28-125	12/14/17	Acceptable
Fluoranthene-d10	66	39-123	12/14/17	Acceptable
2,4,6-Tribromophenol	40	10-136	12/14/17	Acceptable
Terphenyl-d14	66	22-127	12/14/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

Analytical Results

Client:	Barr Engineering Company	**Service Request:**	K1713055
Project:	Joslyn/23270110.03 OU13 270	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1710914-3	**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	12/11/17	12/14/17	KWG1710914	
2-Methylnaphthalene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Acenaphthylene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Acenaphthene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Fluorene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Phenanthrene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Anthracene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Fluoranthene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Pyrene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benz(a)anthracene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Chrysene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(b)fluoranthene†	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(k)fluoranthene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(a)pyrene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Indeno(1,2,3-cd)pyrene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Dibenz(a,h)anthracene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Benzo(g,h,i)perylene	ND	U	0.0033	1	12/11/17	12/14/17	KWG1710914	
Pentachlorophenol	ND	U	0.29	1	12/11/17	12/14/17	KWG1710914	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	79	28-125	12/14/17	Acceptable
Fluoranthene-d10	87	39-123	12/14/17	Acceptable
2,4,6-Tribromophenol	56	10-136	12/14/17	Acceptable
Terphenyl-d14	89	22-127	12/14/17	Acceptable

† Analyte Comments

Benzo(b)fluoranthene	This analyte cannot be separated from Benzo(j)fluoranthene.

Comments:

QA/QC Report

Client: Barr Engineering Company **Service Request:** K1713055
Project: Joslyn/23270110.03 OU13 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
U5	K1713055-001	111 D	124 D *	75 D	104 D
W328	K1713055-002	70	71	57	66
W301	K1713055-003	67	68	55	56
W104	K1713055-004	56	66	40	66
Method Blank	KWG1710914-3	79	87	56	89
Lab Control Sample	KWG1710914-1	80	90	60	85
Duplicate Lab Control Sample	KWG1710914-2	80	87	59	81

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:**	K1713055
Project:	Joslyn/23270110.03 OU13 270	**Date Extracted:**	12/11/2017
Sample Matrix:	Ground water	**Date Analyzed:**	12/14/2017

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:	KWG1710914

	Lab Control Sample KWG1710914-1 Lab Control Spike			Duplicate Lab Control Sample KWG1710914-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.388	0.500	78	0.384	0.500	77	59-95	1	30
2-Methylnaphthalene	0.391	0.500	78	0.378	0.500	76	42-108	3	30
Acenaphthylene	0.418	0.500	84	0.407	0.500	81	61-102	3	30
Acenaphthene	0.414	0.500	83	0.404	0.500	81	58-98	3	30
Fluorene	0.409	0.500	82	0.407	0.500	81	59-97	0	30
Phenanthrene	0.410	0.500	82	0.409	0.500	82	61-100	0	30
Anthracene	0.445	0.500	89	0.437	0.500	87	65-98	2	30
Fluoranthene	0.446	0.500	89	0.439	0.500	88	63-106	2	30
Pyrene	0.471	0.500	94	0.459	0.500	92	64-104	3	30
Benz(a)anthracene	0.448	0.500	90	0.439	0.500	88	67-96	2	30
Chrysene	0.469	0.500	94	0.454	0.500	91	67-105	3	30
Benzo(b)fluoranthene	0.479	0.500	96	0.477	0.500	95	69-104	0	30
Benzo(k)fluoranthene	0.491	0.500	98	0.483	0.500	97	68-108	1	30
Benzo(a)pyrene	0.480	0.500	96	0.472	0.500	94	68-107	2	30
Indeno(1,2,3-cd)pyrene	0.417	0.500	83	0.425	0.500	85	61-115	2	30
Dibenz(a,h)anthracene	0.382	0.500	76	0.380	0.500	76	54-118	1	30
Benzo(g,h,i)perylene	0.410	0.500	82	0.424	0.500	85	61-110	3	30
Pentachlorophenol	1.78	2.50	71	1.66	2.50	66	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.