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# **REPORT**

## **PETROLEUM TANK RELEASE INVESTIGATION REPORT**

**HAMPTON APARTMENTS  
RICHFIELD, MINNESOTA**

**MPCA LEAK #5236**

**PROJECT NO.: M92-614**

**September 28, 1992**

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S.B. Cummings  
President  
J.E. Findley  
Chief Executive Officer

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DEC 21 1992

MPCA, HAZARDOUS  
WASTE DIVISION

December 18, 1992

Ms. Pat Bilich  
Sage Company  
1712 Hopkins Crossroads  
Minnetonka, Minnesota 55305

RE: GROUND WATER SAMPLING  
HAMPTON PLACE APARTMENTS  
RICHFIELD, MINNESOTA

Dear Ms. Bilich:

This letter is to update you on the recent ground water sampling results from the Hampton Place Apartments in Richfield, Minnesota. Ground water samples were collected on November 23, 1992 as per your written authorization. The ground water samples were submitted to Serco Laboratories for analysis of benzene, ethyl benzene, toluene, xylenes (BETX) and total petroleum hydrocarbons (TPH) as fuel oil in accordance with Minnesota Pollution Control Agency (MPCA) guidelines.

The depth to ground water was measured in each monitoring well prior to ground water sampling. The water table elevation was calculated using survey data collected September 3, 1992. Ground water flow calculations indicate ground water flow is to the southeast, and is consistent with the September 1992 sampling event.

Laboratory analysis results detected petroleum hydrocarbon concentrations in the ground water samples collected from monitoring well MW-1 (benzene, 0.0093 ppm; toluene, 0.0015 ppm; and xylenes, 0.0012 ppm), and MW-2 (benzene, 0.0026 ppm). No BETX compounds were detected in the ground water sample collected from monitoring well MW-3. A summary of the laboratory results is presented in Table 2. A copy of the laboratory report is attached.

We will continue to sample the monitoring wells on a quarterly basis in accordance with MPCA guidelines. If you have any questions, please call me at (612) 448-9393.

Sincerely,

NOVA ENVIRONMENTAL SERVICES, INC.

A handwritten signature in blue ink that reads "Julie K Swanson".

Julie K. Swanson  
Geologist

an equal opportunity employer

**TABLE 1****WATER TABLE ELEVATION SUMMARY**

|      | <u>Ground<br/>Surface</u> | <u>Top of<br/>Riser</u> | <u>Date</u> | <u>Depth to<br/>Ground Water</u> | <u>Water Table<br/>Elevation</u> | <u>Change</u> |
|------|---------------------------|-------------------------|-------------|----------------------------------|----------------------------------|---------------|
| MW-1 | 95.43                     | 96.82                   | 9/03/92     | 21.44                            | 75.38                            | ---           |
|      |                           |                         | 11/23/92    | 21.27                            | 75.55                            | + 0.17        |
| MW-2 | 96.52                     | 97.98                   | 9/03/92     | 22.53                            | 75.45                            | ---           |
|      |                           |                         | 11/23/92    | 22.34                            | 75.64                            | + 0.19        |
| MW-3 | 98.06                     | 99.60                   | 9/03/92     | 23.96                            | 75.64                            | ---           |
|      |                           |                         | 11/23/92    | 23.76                            | 75.84                            | + 0.20        |

**TABLE 2**

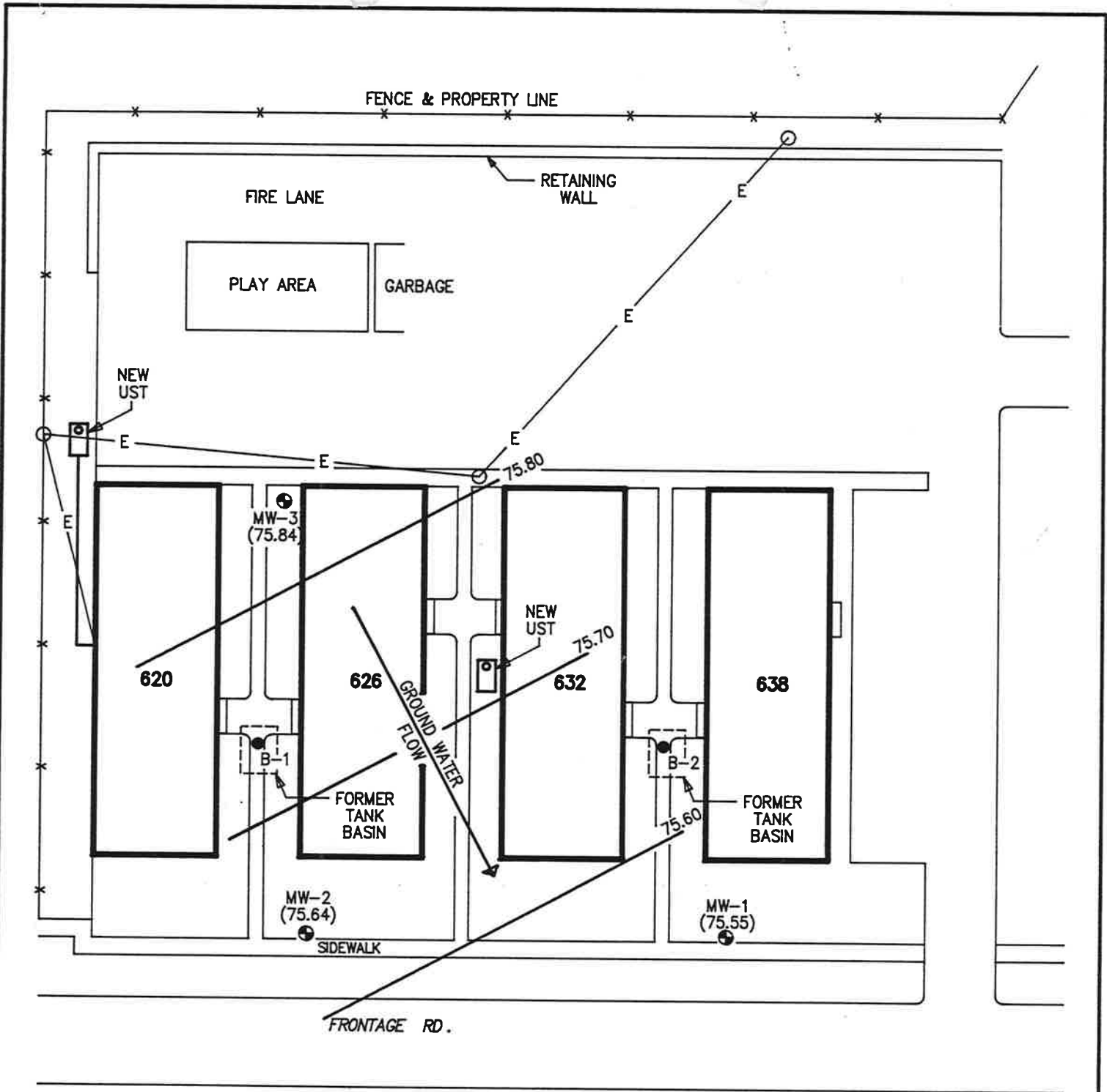
**LABORATORY RESULTS - GROUND WATER**

|                 | Concentrations (ppm) |                 | MDH<br>RAL |
|-----------------|----------------------|-----------------|------------|
|                 | <u>9/03/92</u>       | <u>11/23/92</u> |            |
| <b>MW-1</b>     |                      |                 |            |
| Benzene         | <0.001               | 0.0093          | 0.010      |
| Ethyl benzene   | <0.001               | <0.001          | 0.70       |
| Toluene         | <0.001               | 0.0015          | 1.0        |
| Xylenes         | <0.001               | 0.0012          | 10.0       |
| TPH as fuel oil | <0.002               | <0.10           | N/A        |
| <b>MW-2</b>     |                      |                 |            |
| Benzene         | <0.001               | 0.0026          | 0.010      |
| Ethyl benzene   | <0.001               | <0.001          | 0.70       |
| Toluene         | <0.001               | <0.001          | 1.0        |
| Xylenes         | <0.001               | <0.001          | 10.0       |
| TPH as fuel oil | <0.002               | <0.10           | N/A        |
| <b>MW-3</b>     |                      |                 |            |
| Benzene         | <0.001               | <0.001          | 0.010      |
| Ethyl benzene   | <0.001               | <0.001          | 0.70       |
| Toluene         | <0.001               | <0.001          | 1.0        |
| Xylenes         | <0.001               | <0.001          | 10.0       |
| TPH as fuel oil | <0.002               | <0.10           | N/A        |

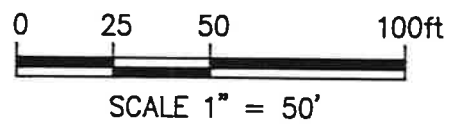
MDH RAL = Minnesota Department of Health Recommended Allowable Limits for Drinking Water Contaminants.

N/A = Not available, RAL based on task and odor criteria.





- KEY**
- SOIL BORING
  - ⊕ MONITORING WELL
  - (75.84) WATER TABLE ELEVATION



GROUND WATER FLOW DIAGRAM  
 SAGE COMPANY  
 HAMPTON PLACE APARTMENTS  
 734 78th STREET  
 RICHFIELD, MINNESOTA

M757/M92-614











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INVESTIGATION REPORT  
HAMPTON PLACE APARTMENTS  
RICHFIELD, MINNESOTA  
MPCA LEAK #5236  
NOVA PROJECT NO.: M92-614**

**September 28, 1992**

**Prepared for:**

**SAGE COMPANY  
1712 HOPKINS CROSSROAD  
MINNETONKA, MINNESOTA 55343**

**Prepared by:**

**NOVA ENVIRONMENTAL SERVICES, INC.  
1107 HAZELTINE BOULEVARD, SUITE 400  
CHASKA, MINNESOTA 55318  
(612) 448-9393**



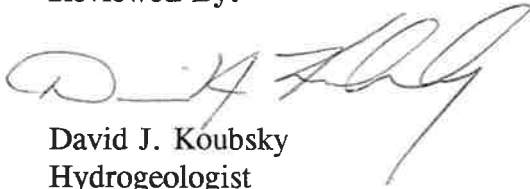
**Prepared By:**

NOVA ENVIRONMENTAL SERVICES, INC.

Handwritten signature of Julie K. Swanson in cursive, followed by the text "for:".

Julie K. Swanson  
environmental Geologist

**Reviewed By:**

Handwritten signature of David J. Koubsky in cursive.

David J. Koubsky  
Hydrogeologist  
Group Manager



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## 1.0 INTRODUCTION

### 1.1 Purpose

Nova Environmental Services, Inc. (Nova) was retained by Sage Company to investigate two petroleum releases at the Hampton Place Apartments located at 734 East 78th Street, Richfield, Minnesota. The purpose of the investigation was to determine the extent of the releases identified during the removal of two 1,000 gallon fuel oil underground storage tanks (USTs), and assess the potential impact on public welfare and the environment.

### 1.2 Scope of Work

The Scope of Services performed by Nova during the investigation consisted of the following:

- A) Observing and monitoring the removal of two 1,000 gallon fuel oil USTs.
- B) Advancing two soil borings in the tank basins to depths of approximately 36 feet;
- C) Collecting split-barrel soil samples for classification, and screen the samples for organic vapors using a photoionization detector (PID);
- D) Submitting selected soil samples for laboratory analysis of benzene, ethyl benzene, toluene and xylene (BETX) and total petroleum hydrocarbons (TPH) as fuel oil;
- E) Installing three ground water monitoring wells;
- F) Developing, stabilizing and sampling the monitoring wells for laboratory analysis of VOCs and TPH as fuel oil;
- G) Surveying well casing elevations and measuring static water table levels to assess local ground water flow direction;
- H) Reviewing and summarizing available geological and historical information; and



- I) Preparing a Petroleum Tank Release Investigation (PTR) report presenting background information, methods and procedures, conclusions and recommendations for corrective action.



## 2.0 BACKGROUND INFORMATION

### 2.1 Site Location

The Hampton Place Apartments are located in Hennepin County in the southwest 1/4 of the southwest ¼ of Section 35, Township 28N, Range 20W (Figure 1). Figure 2 shows the locations of the buildings and the former USTs.

### 2.2 Site Ownership

The site is currently owned by Sage Company. The name and address of the person to contact regarding the site is:

Mr. Jim Agre  
Sage Company  
1712 Hopkins Crossroad  
Minnetonka, Minnesota 55343  
(612) 591-1200

### 2.3 Summary of UST Removal

Two 1,000 gallon fuel oil USTs were removed on May 21 and 26, 1992. A Nova representative was on-site to observe the removal of the tanks and collect soil samples for soil vapor and laboratory analysis. The USTs were removed and disposed of by Griggs, Inc. Evidence of a petroleum release was detected in soil beneath each UST. A total of 75 cubic yards of contaminated soil were removed from the excavation and temporarily stockpiled on-site. Initial field assessment of the extent of contamination indicated that total excavation of impacted soil was not feasible. Impacted soil remained in the excavation beyond the reach of the backhoe. The stockpiled contaminated soil was transported to C.S. McCrossan Construction, Inc. for thermal treatment. A Minnesota Pollution Control Agency (MPCA)





Excavation Report for Petroleum Release Sites has been completed and is included as Appendix A.

Soil below the USTs and within the excavation was monitored for the presence of volatile organic compounds with a photoionization detector (PID). Jar headspace readings from soil encountered beneath the tanks at a depth of 15 feet below grade (Appendix A - Section 5B) ranged from 125 to 132 parts per million (ppm). Jar headspace readings from soil encountered at the 10-12 foot depth on the excavation sidewalls ranged from 16 to 160 ppm.

Laboratory analysis of soil samples collected from the UST excavations detected TPH as fuel oil at a concentration of 3,030 ppm below Tank 1; and 490 ppm below Tank 2. Laboratory results are summarized in Appendix A - Section 5D. Photographic documentation and a copy of the laboratory report are also included in Appendix A.



## 3.0 METHODS AND PROCEDURES

### 3.1 Soil Borings

Two soil borings (B-1, B-2) were drilled on July 20, 1992. Three monitoring wells (MW-1, MW-2, MW-3) were completed on September 2, 1992. Soil boring and monitoring well locations are shown on Figure 2. Exploration Technology, Inc. (ETI) was subcontracted to perform the drilling. Soil borings were advanced with a truck-mounted drill rig using 4 1/4 inch inside diameter (I.D.) hollow-stem auger.

#### 3.1.1 Decontamination of Equipment

Split-barrel samplers were cleaned between samples to minimize risk of cross-contamination. The cleaning procedure consisted of soap and water wash and a water rinse. All downhole drilling equipment and associated tools were steam cleaned before initiating project work and between borings. Fluids used in cleaning the split-barrel sampler and drilling equipment between soil borings were disposed of by landspreading on-site.

#### 3.1.2 Soil Sample Collection and Classification

Soil samples were collected in all soil borings at five foot intervals using a 2 inch diameter split-spoon sampler. In soil borings completed through the former tank basins (B-1 and B-2), split-spoon sampling was initiated at the 14-16 foot interval, corresponding to the base of the excavations. A physical description of the soil from each sampling depth interval was recorded in the field by a geologist. Soil sampling below the water table was hampered by sand re-entering the hollow-stem auger, commonly called "blow-up". Logs of the soil borings are presented in Appendix B.



### 3.1.3 Soil Sample Collection For Organic Vapor Monitoring

A portion of each split-barrel soil sample was placed in a glass container and screened for headspace organic vapors with a PID, in accordance with MPCA guidelines. The PID was equipped with a 10.2 eV bulb and was calibrated to an isobutylene standard. Headspace PID readings are summarized on Table 1 and included on the soil boring logs (Appendix B).

### 3.1.4 Soil Sample Collection for Chemical Analysis

Soil samples were collected for laboratory analysis from the termination depth of soil borings B-1 and B-2, and from the sampling interval nearest the water table from borings MW-1, MW-2 and MW-3. In addition, a sample of ground water was collected from borings B-1 and B-2 through the hollow-stem auger using a disposable polyethylene bailer. Samples of soil and ground water were placed in clean laboratory containers and were preserved in the field and while being transported to the laboratory. Chain-of-Custody forms accompanied the samples during shipment. The samples were submitted to SERCO Laboratories for analysis of BETX and TPH as fuel oil, in accordance with MPCA guidance document entitled "Soil and Ground Water Analysis at Petroleum Release Sites," dated May 1992.

## 3.2 Monitoring Wells

Three monitoring wells (MW-1, MW-2, MW-3) were installed at the locations shown on Figure 2. Well locations were selected based on current and future land accessibility, the former UST locations, and estimated ground water flow direction.



### 3.2.1 Monitoring Well Construction

The monitoring wells are constructed of two inch diameter, schedule 40 PVC riser and 10 foot long, flush threaded, 0.010 slot PVC screen. The monitoring wells were installed with approximately two-thirds of the well screen extended into the saturated zone. The annular space between the borehole and well screen was backfilled with coarse silica sand. The coarse silica sand pack extends approximately two feet above the top of the screen. A two foot bentonite seal was placed above the sand pack. Neat cement grout was used to fill the annular space above the bentonite seal to a depth of two feet below the ground surface. The monitoring wells were completed above grade and are protected by a six inch diameter steel locking stand pipe and three steel posts. Monitoring well construction details are presented in Appendix B.

### 3.2.2 Ground Water Sampling for Chemical Analysis

Ground water samples were collected from each of the monitoring wells on September 3, 1992. Prior to sampling, the depth to ground water in each well was measured with an electronic water level indicator. Following water level measurement a minimum of three well volumes were removed from the monitoring wells. Stabilization of the wells was monitored by measuring the pH, conductivity and temperature of water removed after each well volume (Appendix C).

Ground water samples were collected from the monitoring wells using laboratory cleaned teflon bailers. Samples were transferred into laboratory-cleaned containers and preserved in the field and during transportation to the laboratory. The samples and Chain-of-Custody documentation were submitted to Serco Laboratories on September 3, 1992, for laboratory analysis of VOCs and TPH as fuel oil, in accordance with the MPCA guidance document entitled "Soil and Ground Water Analysis at Petroleum Release Sites," dated May 1992.





### 3.2.3 Water Table Elevation Measurement

An elevation survey was performed on the monitoring well locations on September 3, 1992. The survey procedure included surveying the riser top elevation at each monitoring well. The fire hydrant located on the southwest corner of the property was selected as the survey benchmark and was assigned an elevation of 100.00 feet. The results of the survey and depth to water measurements were used to calculate water table elevations (Table 2), ground water flow direction (Figure 3), and the flow gradient.

### 3.2.4 Hydraulic Conductivity Calculation

A slug test was performed in each of the monitoring wells on September 15, 1992, to assess the hydraulic characteristics of the ground water bearing soil. The procedure consisted of lowering a solid cylinder into the monitoring well below the water table and allowing the water level to stabilize. The solid cylinder was then removed and water levels and elapsed times of recovery were recorded. The water levels recovered instantaneously. Hydraulic conductivity and porosity values were estimated by using average ranges of grain size assigned to sandy soil (Groundwater and Wells, Driscoll). Ground water flow at the site is estimated at 4 -6 feet/year. Ground water flow velocities were calculated using the following formula:

$$V = \frac{Ki}{n}$$

Where: V = ground water flow velocity  
i = hydraulic gradient ( 0.0013 )  
K = hydraulic conductivity ( 1m/day or 3.3 ft/day )  
n = porosity ( 25 - 40% )



## 4.0 SUBSURFACE INVESTIGATION RESULTS

### 4.1 Regional Geology/Hydrogeology

Based on published hydrogeologic maps, surficial material in the vicinity of the site consist of sand, gravelly sand, and loamy sand derived from alluvial terraces. Unconsolidated deposits extend to a depth of approximately 250 feet, where dolostone of the Prairie du Chien Formation occurs. Near surface ground water in the unconsolidated deposits occurs at a depth of 21 to 22 feet below the ground surface. Regional, shallow ground water flow is to the south-southeast.

### 4.2 Local Geology/Hydrogeology

Soil encountered in the borings consisted of fine and fine to coarse grained sand (Appendix B). Static ground water was measured in the borings at depths ranging from 21 to 22.5 feet below ground surface. The direction of ground water flow and the hydraulic gradient were calculated for the site based on water table elevations measured in the monitoring wells (Table 2). Ground water at the site flows to the southeast, as indicated on Figure 3. A hydraulic gradient of approximately 0.0013 was calculated for the site.

### 4.3 Extent of Hydrocarbon Contamination

#### 4.3.1 Organic Vapor Screening

PID measurements taken from the jar headspace of the soil samples indicated the presence of organic vapors in soil borings B-1 and B-2, located in the former tank basins. Organic vapor concentrations above background were detected in soil samples collected from the 14 to 36 foot depths. Sample collection below the water table was hampered by the occurrence of "blow-up", which results when sand re-enters the hollow-stem auger. PID measurements of soil samples collected below the water table may have been influenced (higher from actual values) from lowering the split-spoon sampler through the petroleum impacted ground water.

PID measurements are included on the soil boring logs in Appendix B and are summarized on Table 1.

#### 4.3.2 Soil Analytical Results

Soil boring laboratory results are summarized on Table 3 and included in Appendix D. Soil samples collected from the termination depths (34-36 feet) of soil borings B-1 and B-2 detected 5.0 and 5.4 parts per million (ppm) TPH as fuel oil, respectively. Soil samples collected from the base of tank #1 excavation contained 2.81 ppm ethyl benzene, 16.3 ppm xylenes and 3,030 ppm TPH as fuel oil. The soil sample collected from the base of tank #2 excavation contained 9.27 ppm xylenes and 490 ppm TPH as fuel oil.

Petroleum compounds were not detected in the soil samples collected at the water table during the installation of three ground water monitoring wells.

#### 4.3.3 Ground Water Analytical Results

Laboratory analysis of ground water samples collected from monitoring wells are summarized in Table 2 and included in Appendix D indicate petroleum compounds were not detected in the water samples collected from the monitoring wells September 3, 1992. Ground water samples collected from boreholes B-1 and B-2 contained 470 and 780 ppm TPH as fuel oil, respectively.



## 5.0 POTENTIAL RECEPTOR SURVEY

A receptor survey was conducted to identify potential on-site and off-site receptors of petroleum vapors or impacted ground water associated with the petroleum release. The receptor survey consisted of:

- Reviewing water well records within one mile of the site.
- Evaluating organic vapor impacts to surrounding structures and utilities.

Minnesota Geological Survey (MGS) records of water wells indicate six public and private water supply wells are located within a one-mile radius of the site (Figure 4). The closest water well (MGS #222919) is located approximately 200 feet west of the site. This well is reported as 245 feet deep and is finished in the Shakopee Formation. The closest hydraulically downgradient water well with respect to shallow ground water flow is MGS #204969. Water well #204969 is recorded as 404 feet deep and is finished in the Jordon Sandstone. Two of the water wells identified (MGS #204968 and #204972) are finished in the unconsolidated deposits 47 and 206 feet below ground surface, respectively. The remaining water wells identified (MGS #204970 and #204971) are finished at depths of 389 and 390 feet below ground surface in the St. Lawrence and Jordon Sandstone Formations. Copies of the well logs are included in Appendix E.

No storm or sanitary sewer manholes were observed in the vicinity of the petroleum releases. The apartment buildings on-site consist of three stories, with the lower level approximately four feet below ground surface. No petroleum vapors have been detected in the apartments adjacent to the former tank basins. No basement drain tile sumps or floor drains were observed in the buildings. An MPCA Hydrogeologic Setting and Ground Water Contamination Characterization Worksheet, summarizing the potential risks associated with this release, is included in Appendix F.



## 6.0 DISCUSSION

Petroleum releases were identified below two 1,000 gallon fuel oil USTs removed from the site on May 21 and 26, 1992. Impacted soil was identified at approximately 10 feet and extended beyond the reach of the backhoe (15 to 16 feet) below both tanks. Approximately 75 cubic yards of petroleum impacted soil were removed and thermally treated at C.S. McCrossan Construction Inc. Soil samples collected from the base of the excavations contained 3,030 and 490 ppm TPH as fuel oil.

Soil borings were advanced through the tank basins. Petroleum impacted soil extended to the depth of ground water, which was encountered at a depth of approximately 22 feet. Soil and ground water samples were collected from the boreholes. Petroleum hydrocarbon concentrations of 470 and 780 ppm TPH as fuel oil were detected in the ground water samples. Low concentrations of TPH as fuel oil were detected in soil samples collected from the 34 to 36 foot sampling interval.

In accordance with MPCA guidance documents, three ground water monitoring wells were installed on September 2, 1992. Water table elevations indicate ground water flow is to the southeast. Laboratory analysis did not detect petroleum hydrocarbon compounds in the ground water samples collected on September 3, 1992. Soil samples collected just above the water table did not contain petroleum hydrocarbon compounds.





## 7.0 CONCLUSIONS AND RECOMMENDATIONS

Petroleum releases were detected below two 1,000 gallon fuel oil USTs removed from the Hampton Place Apartments property located at 734 East 78th Street in Richfield, Minnesota. The source of the releases were two 1,000 gallon USTs removed from the site on May 21 and 26, 1992. A total of 75 cubic yards of petroleum-contaminated soil were excavated, and thermally treated at C.S. McCrossan Construction, Inc.

Soil borings and monitoring wells were installed to define the extent of the soil and ground water impacts. PID screening and laboratory analysis results indicate petroleum impacted soil was encountered from the 10 to 31 foot depth in the former tank basins.

Based on the site soil type (sand) and soil sample laboratory results, the extent of soil impacts has been defined and is limited to the vicinity of the former tank basins. On-site structures and utilities have not been impacted by the release based on the shallow depth of the building lower levels, the depth of ground water (22 feet), and the absence of sewer manholes.

Based on the ground water laboratory results, the extent of impacted ground water has been defined and has not migrated to downgradient wells located 50 feet from the tank basins. Petroleum hydrocarbon compounds were not detected in the ground water samples collected from monitoring wells MW-1, MW-2 and MW-3 on September 3, 1992. The wells should be sampled on a quarterly basis for a period of one year as outlined in the MPCA document entitled "Leaking Underground Storage Tank Program Ground Water Monitoring" dated May 1992. No additional investigative or corrective action efforts are warranted at this time.

Excavating 75 yards of heavily impacted soil represents a sufficient corrective action response to this release. Additional soil corrective action is not recommended based on the type of fuel stored in the tanks (fuel oil) and the absence of volatile compounds in the soil samples collected.



This report should be submitted to the Minnesota Pollution Control Agency (MPCA) for review. Upon MPCA concurrence with the conclusions and recommendations contained in this report, Sage Company may be eligible for partial reimbursement of costs for investigative and corrective actions associated with the petroleum release.



**TABLE 1**  
**SOIL BORING PID RESULTS**

| <u>Soil Boring</u> | <u>Sample</u> | <u>Depth (ft)</u> | <u>Jar Headspace PID (ppm)</u> |
|--------------------|---------------|-------------------|--------------------------------|
| <b>B-1</b>         | SS-1          | 14-16             | 55                             |
|                    | SS-2          | 19-21             | 29                             |
|                    | SS-3          | 24-26             | 26                             |
|                    | SS-4          | 29-31             | 13                             |
|                    | SS-5          | 34-36             | 10                             |
| <b>B-2</b>         | SS-1          | 14-16             | 15                             |
|                    | SS-2          | 19-21             | 80                             |
|                    | SS-3          | 24-26             | 16                             |
|                    | SS-4          | 29-31             | 16                             |
|                    | SS-5          | 34-36             | 15                             |
| <b>MW-1</b>        | SS-1          | 4-6               | 0                              |
|                    | SS-2          | 9-11              | 0                              |
|                    | SS-3          | 14-16             | 0                              |
|                    | SS-4          | 19-21             | 0                              |
|                    | SS-5          | 24-26             | 0                              |
| <b>MW-2</b>        | SS-1          | 9-11              | 0                              |
|                    | SS-2          | 14-16             | 0                              |
|                    | SS-3          | 19-21             | 0                              |
|                    | SS-4          | 24-26             | 0                              |
| <b>MW-3</b>        | SS-1          | 4-6               | 0                              |
|                    | SS-2          | 9-11              | 0                              |
|                    | SS-3          | 14-16             | 0                              |
|                    | SS-4          | 19-21             | 0                              |
|                    | SS-5          | 24-26             | 0                              |



**TABLE 2**  
**SURVEY DATA AND WATER TABLE ELEVATIONS**

|                   | <u>Ground Surface</u> | <u>Top of Riser</u> | <u>TO</u><br><u>Date</u> | <u>Depth to Ground Water</u> | <u>Water Table Elevation</u> |
|-------------------|-----------------------|---------------------|--------------------------|------------------------------|------------------------------|
| TOS 78.43<br>MW-1 | 95.43                 | 96.82               | 9/3/92                   | 21.44                        | 75.38                        |
| TOS 79.12<br>MW-2 | 96.52                 | 97.98               | 9/3/92                   | 22.53                        | 75.45                        |
| TOS 79.00<br>MW-3 | 98.06                 | 99.60               | 9/3/92                   | 23.96                        | 75.64                        |

Note: Elevations based on 100.00 foot elevation assigned to top nut of fire hydrant located near southwest corner of property.





**TABLE 3  
LABORATORY RESULTS**

CONCENTRATIONS (ppm)

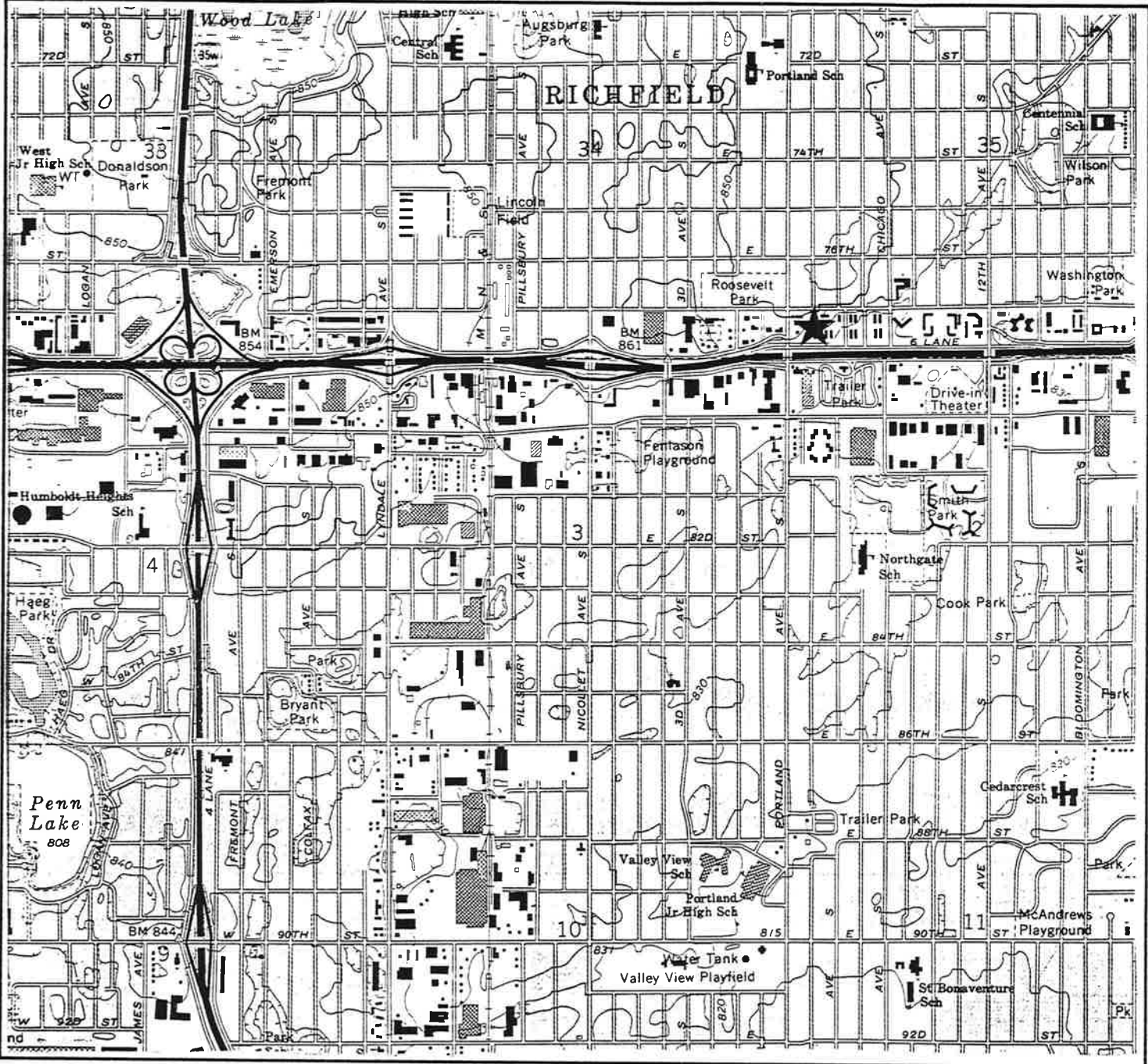
| <u>Soil Sample</u>        | <u>Depth (ft)</u> | <u>Benzene</u> | <u>Ethyl Benzene</u> | <u>Toluene</u> | <u>Xylenes</u> | <u>TPH as Fuel Oil</u> |
|---------------------------|-------------------|----------------|----------------------|----------------|----------------|------------------------|
| S-1 (Soil)<br>Boring B-1  | 34-36             | < 0.005        | < 0.005              | < 0.005        | < 0.005        | 5.0                    |
| S-2 (Soil)<br>Boring B-2  | 34-36             | < 0.005        | < 0.005              | < 0.005        | < 0.005        | 5.4                    |
| W-1 (Water)<br>Boring B-1 | 22                | < 0.05         | < 0.05               | < 0.05         | < 0.05         | 470                    |
| W-2 (Water)<br>Boring B-2 | 21                | < 0.05         | < 0.05               | < 0.05         | < 0.05         | 780                    |
| S-3 (Soil)<br>Boring MW-1 | 19-21             | < 0.005        | < 0.005              | < 0.005        | < 0.005        | < 2.0                  |
| S-4 (Soil)<br>Boring MW-2 | 19-21             | < 0.005        | < 0.005              | < 0.005        | < 0.005        | < 2.0                  |
| S-5 (Soil)<br>Boring MW-3 | 19-21             | < 0.005        | < 0.005              | < 0.005        | < 0.005        | < 2.0                  |
| MW-1 (Water)              | 21                | < 0.001        | < 0.001              | < 0.001        | < 0.001        | < 0.002                |
| MW-2 (Water)              | 22                | < 0.001        | < 0.001              | < 0.001        | < 0.001        | < 0.002                |
| MW-3 (Water)              | 22                | < 0.001        | < 0.001              | < 0.001        | < 0.001        | < 0.002                |

Note: All concentrations recorded in mg/kg or mg/l = parts per million (ppm).

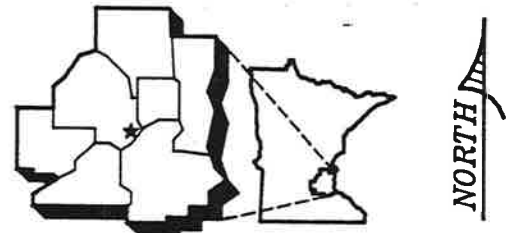




172144 06/01/2016



★ SITE LOCATION



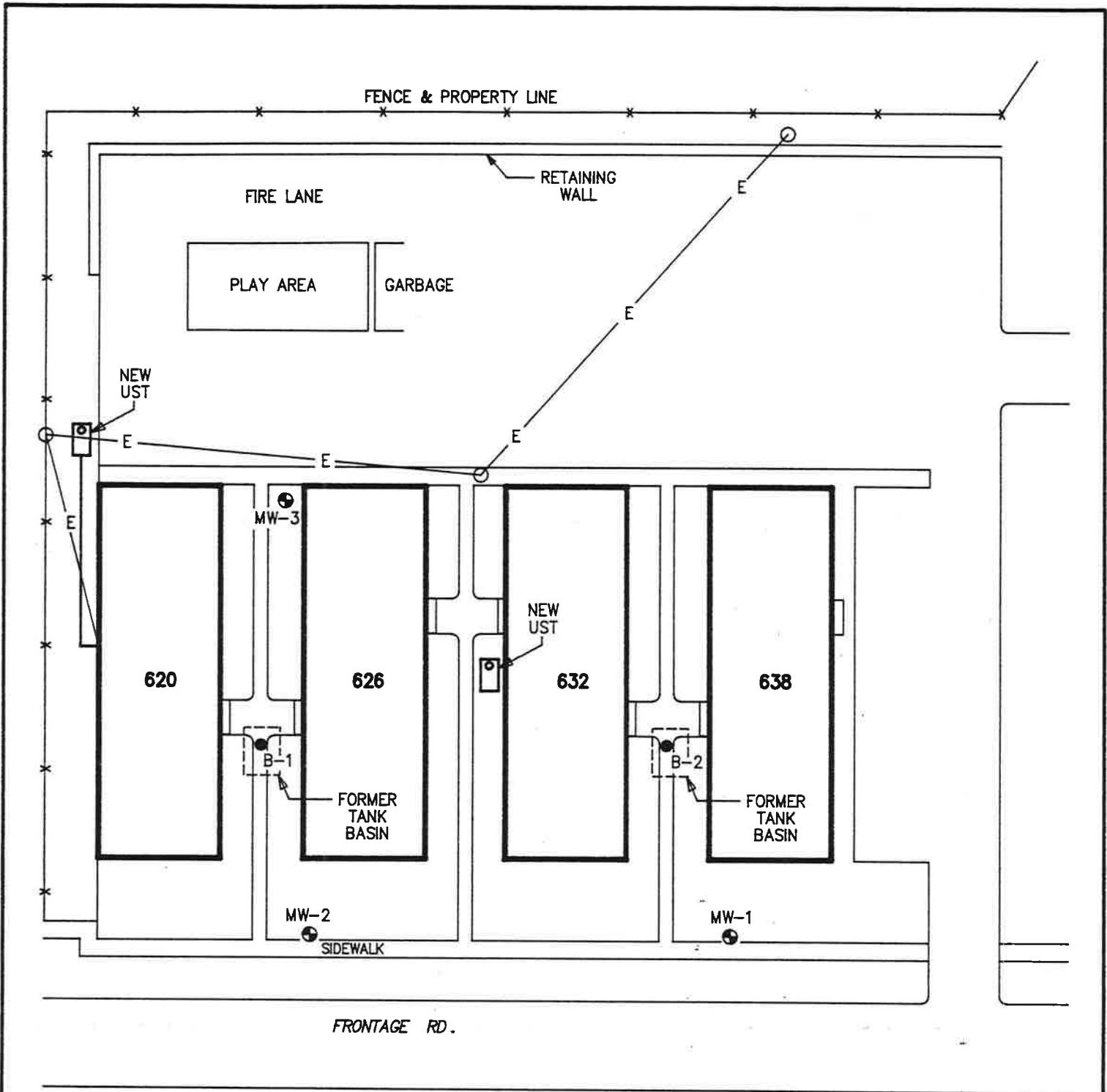
SCALE

SITE LOCATION MAP  
 SAGE COMPANY  
 HAMPTON PLACE APARTMENTS  
 RICHFIELD, MINNESOTA

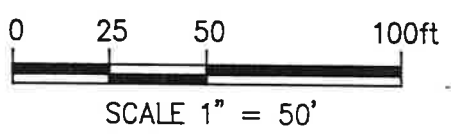


M757/M92-614





- KEY
- SOIL BORING
  - ⊕ MONITORING WELL



SITE DIAGRAM  
 SAGE COMPANY  
 HAMPTON PLACE APARTMENTS  
 734 78th STREET  
 RICHFIELD, MINNESOTA

M757/M92-614

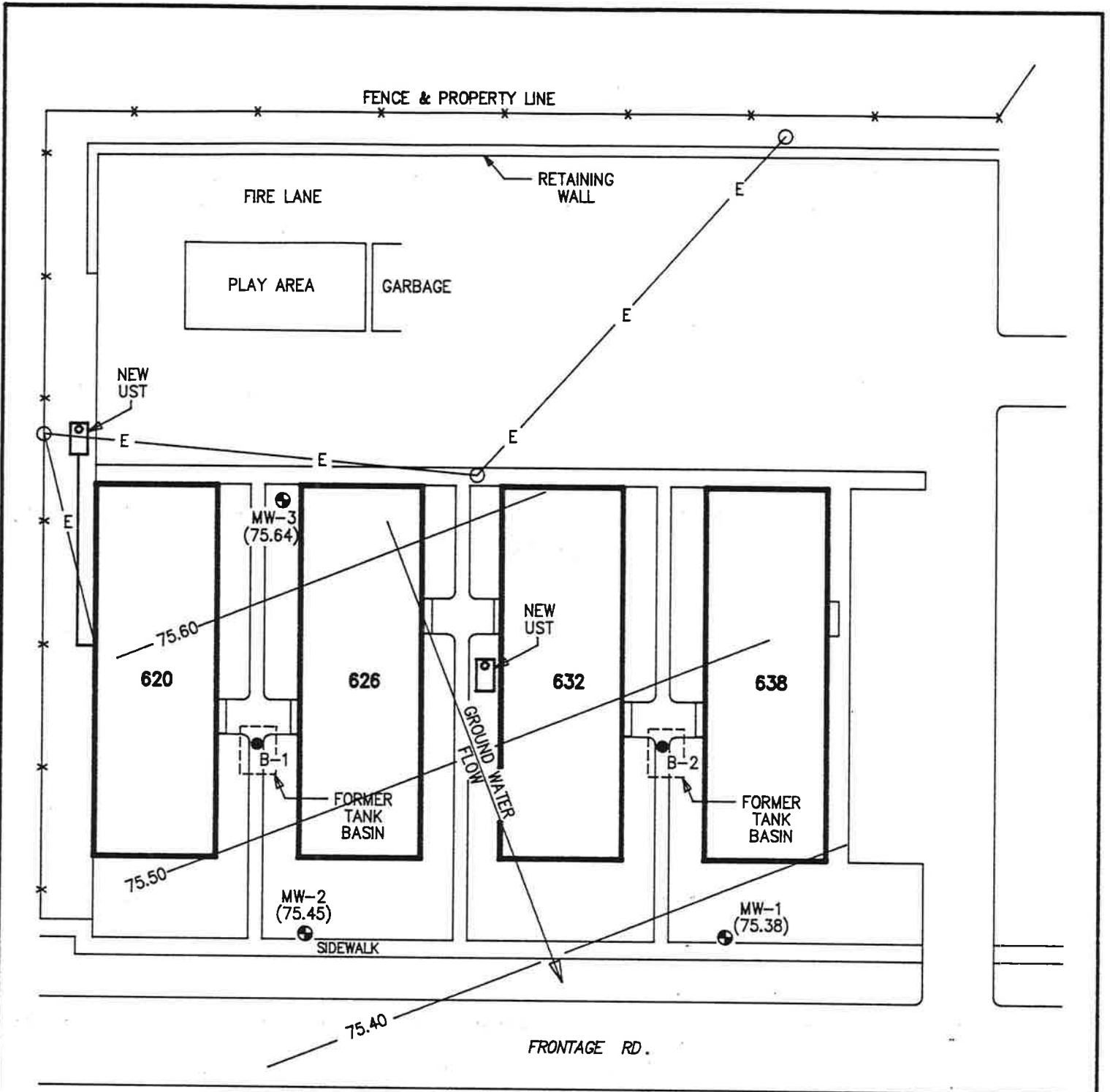


JUN - 92

2







**KEY**

- SOIL BORING
- ⊕ MONITORING WELL

(75.64) WATER TABLE ELEVATION



SCALE 1" = 50'

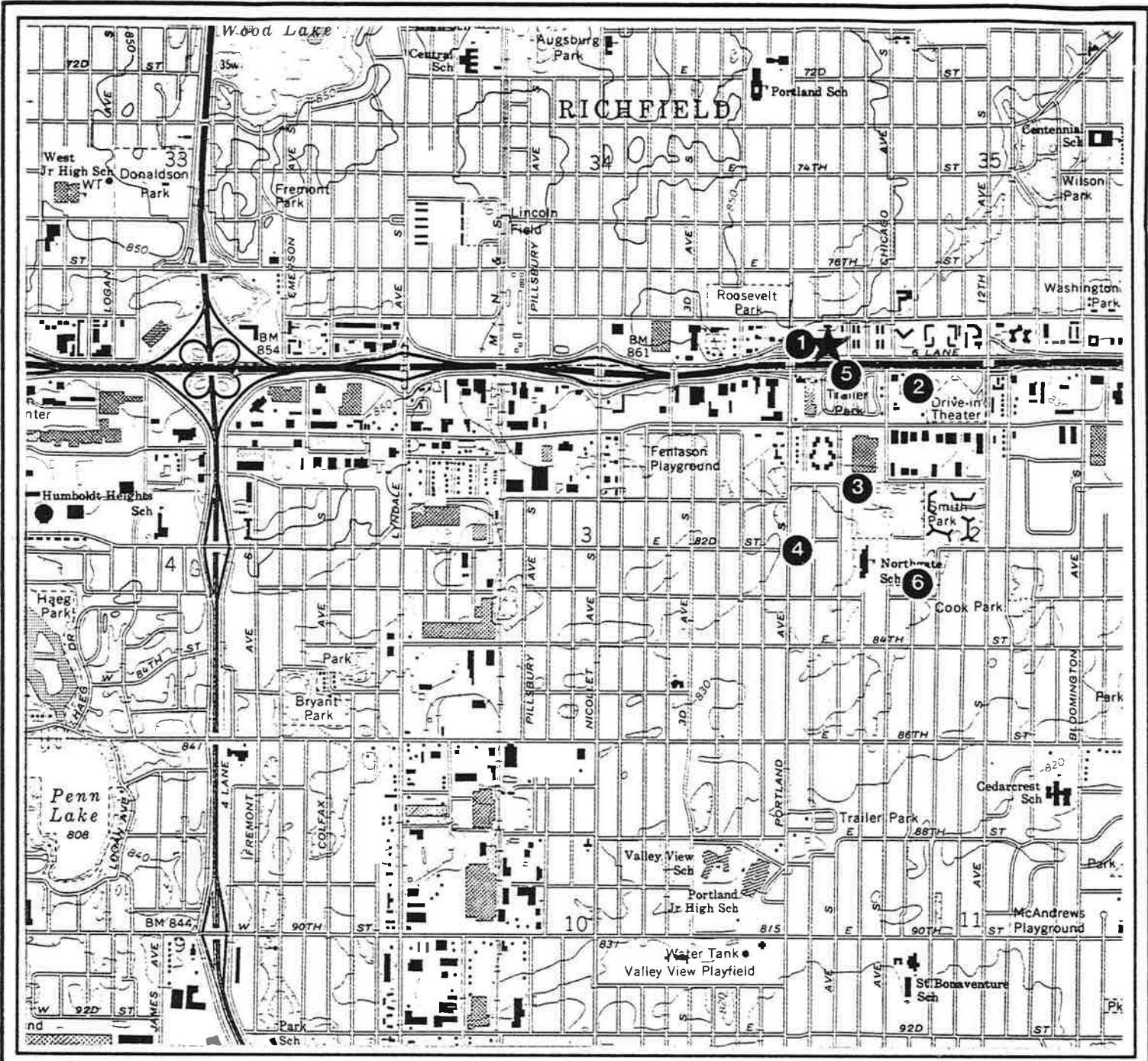
GROUND WATER FLOW DIAGRAM  
 SAGE COMPANY  
 HAMPTON PLACE APARTMENTS  
 734 78th STREET  
 RICHFIELD, MINNESOTA

M757/M92-614



JUN - 92

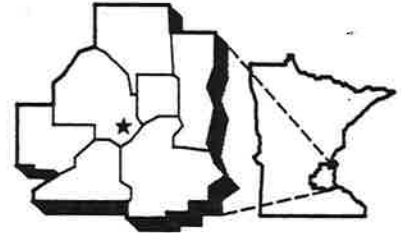




★ SITE LOCATION

UNIQUE WELL NUMBERS AND LOCATIONS:

- 1. 222919
- 2. 204968
- 3. 204970
- 4. 204972
- 5. 204969
- 6. 204971



SCALE

MGS WATER WELL LOCATION MAP  
 HAMPTON PLACE APARTMENTS  
 734 EAST 78th STREET  
 RICHFIELD, MINNESOTA



M757/M92-614







APPENDIX A

MPCA EXCAVATION REPORT FOR PETROLEUM RELEASE SITES





**EXCAVATION REPORT FOR  
PETROLEUM RELEASE SITE  
HAMPTON PLACE APARTMENTS  
734 EAST 78TH STREET  
RICHFIELD, MINNESOTA  
MPCA LEAK NO.: 5236**

**NOVA PROJECT NO.: M92-614**

**August 12, 1992**

**Prepared for:**

**SAGE COMPANY  
1712 HOPKINS CROSSROADS  
MINNETONKA, MINNESOTA**

**Prepared by:**

**NOVA ENVIRONMENTAL SERVICES, INC.  
1107 HAZELTINE BOULEVARD, SUITE 400  
CHASKA, MINNESOTA 55318  
(612) 448-9393**





---

S.B. Cummings  
President  
J.E. Findley  
Chief Executive Officer

August 12, 1992

Mr. Jim Agre  
Sage Company  
1712 Hopkins Crossroads  
Minnetonka, Minnesota 55343

RE: UST EXCAVATION REPORT  
HAMPTON PLACE APARTMENTS  
RICHFIELD, MINNESOTA  
MPCA LEAK NO: 5236

Dear Mr. Agre:

Nova Environmental Services, Inc. (Nova) is submitting the enclosed Excavation Report for Petroleum Release sites for the Hampton Place Apartments located at 734 East 78th Street in Richfield, Minnesota (Figure 1). A representative of Nova was present at this site on May 21 and on May 26, 1992, to observe the removal of two 1,000 gallon underground storage tanks (USTs). The USTs were used to store fuel oil for a backup heating supply and were located between apartment complexes as shown in Figures 2 and 3. Petroleum releases were identified below both USTs.

Soil borings were advanced through the former tank basins on July 20, 1992 to determine the vertical extent of petroleum impacted soil, and if ground water had been impacted. Laboratory results of ground water samples indicate ground water has been impacted by the petroleum releases identified at this site. In accordance with MPCA guidance document "Excavation of Petroleum Impacted Soil" dated May 1992 additional investigative work and ground water monitoring will be required.

M92-614R.001V76

an equal opportunity employer

Suite 400 Hazeltine Gates 1107 Hazeltine Boulevard Chaska, MN 55318  
612/448-9393 FAX 448-9572



## UST REMOVAL

Soil above and around the USTs were removed using a backhoe. Both USTs were in poor condition with heavy corrosion and pitting. Holes were observed on both tanks. In addition, the distribution piping associated with the USTs was in poor condition. Tanks and piping were removed and disposed of by Griggs, Inc. of Shoreview, Minnesota.

## SOIL MONITORING AND SAMPLING

Excavated soil and the soil exposed along the side walls and bottom of the excavations was monitored for the presence of organic vapors using an HNU photoionization detector (PID). The PID was equipped with a 10.2 eV bulb and calibrated to an isobutylene standard. PID monitoring and physical observations indicated that petroleum-impacted soil was present in the tank excavations. Nova contacted the Minnesota Pollution Control Agency (MPCA) on May 21 and 26, 1992, to report the releases.

Approximately 75 cubic yards of petroleum-impacted soil (35 cubic yards from tank #1 and 40 cubic yards from tank #2) were segregated and stockpiled on-site. Visibly impacted soil directly below the tanks was removed, however, due to the restrictions imposed by underground utilities and depth limitations of the backhoe, total excavation of the petroleum-impacted soil was not achieved. The impacted soil was thermally treated at C.S. McCrossan Construction, Inc. in Maple Grove, Minnesota.

Soil samples were collected from directly beneath each tank (fifteen to sixteen feet below ground surface) and from the stockpiled soil. These samples were collected to document hydrocarbon concentrations and verify organic vapor monitoring results. The soil samples were submitted to MVTL Laboratories, Inc. for analysis of benzene, toluene, ethyl benzene, and xylenes (BTEX), and total petroleum hydrocarbons (TPH) as fuel oil. The laboratory results, included with this report, indicate that petroleum hydrocarbons were detected in the



soil samples beneath the USTs and the stockpiled soil. Ground water was not present in the tank excavations.

### SOIL BORINGS

Two soil borings were advanced through the former tank basins to 36 feet below ground surface on July 20, 1992. Exploration Technology Inc. (ETI) was subcontracted to perform the drilling. The soil borings were advanced with a truck-mounted drill rig and 4 1/4 inch inside diameter hollow stem auger.

Soil samples for field screening and laboratory analysis were collected at five foot intervals using a split-spoon sampler. Soil samples were not collected in the upper 14 feet since the soil was recently placed tank backfill material. A physical description of the soil from each sampling interval was recorded by a field geologist. Logs of the borings are attached.

The soil encountered in the soil borings consisted of sand to the termination depth of the borings. A portion of each split-spoon soil sample was screened for organic vapors with a PID using the jar headspace method. Soil vapor screening results are recorded on the boring logs. Soil samples were collected for laboratory analysis from the termination depth of the boring (36 feet). Soil samples were analyzed for BETX, and TPH as fuel oil. Ground water was encountered at a depth of 22 and 21 feet (boring B-1 and B-2 respectively). A sample of ground water was collected from each boring and submitted for laboratory analysis of BETX and TPH as fuel oil.

Laboratory results indicate TPH as fuel oil was detected in the soil and ground water samples in the following concentrations: boring B-1 soil = 5.0 ppm, water = 470 ppm; boring B-2 soil = 5.4 ppm, water = 780 ppm.





## CONCLUSIONS AND RECOMMENDATIONS

Field observations and PID monitoring detected evidence of petroleum releases during the removal of two 1,000 gallon fuel oil USTs at the Hampton Place Apartments in Richfield, Minnesota. Approximately 75 cubic yards of impacted soil were removed from the tank basins. The impacted soil was thermally treated by C.S. McCrossan Construction, Inc. Laboratory analysis results indicate that total excavation of impacted soil was not achieved.

Two soil borings were advanced through the tank basins on July 20, 1992. The soil borings were advanced to a depth of 36 feet. Ground water was encountered at a depth of 21 to 22 feet. Soil and ground water samples were collected from each boring and submitted for laboratory analysis.

Laboratory analysis indicates TPH as fuel oil was detected in the soil at concentrations of 5.0 and 5.4 ppm TPH as fuel oil. The concentrations detected in the soil indicate the petroleum concentrations decrease with depth and are below MPCA action levels at the 34 to 36 foot sampling interval. Soil vapor screening and laboratory results indicate the vertical extent of impacted soil above MPCA action levels is from the 16 foot to the 23 foot depths.

Laboratory analysis detected TPH as fuel oil in the ground water samples collected from each borehole. Ground water has been impacted by the fuel oil releases at this site. Based on MPCA Guidance Document entitled Excavation of Petroleum Contaminated Soil dated May 1992, Remedial Investigation is required if ground water is in contact with petroleum impacted soil. TPH as fuel oil was detected in the water samples at concentrations ranging from 470 to 780 ppm. Based on the hydrocarbon concentrations detected in the ground water samples, the ground water has been moderately impacted. No free product (fuel oil) was detected on the water table.



MPCA Guidance Document entitled "Soil Boring and Monitor Well Installation" dated May 1992 outlines the requirements for ground water monitoring if a petroleum release has impacted ground water. The MPCA requires a sufficient number of wells be installed to "fully" define the impacted ground water. Typically three to four wells are required at each release site to meet the requirements of this document. At sites where several release sites are identified, the total number of wells may be reduced if they can be strategically placed to provide usable information for both release sites. Nova feels we may be able to utilize a number of wells to assist in defining each release site.

MPCA Guidance Document entitled "Ground Water Monitoring" dated May 1992 requires a minimum of two quarterly ground water monitoring results to determine if clean-up will be required. If free product is encountered clean-up is required immediately. If free product is not identified clean-up goals are negotiated on a site specific basis. If no active clean-up is required, ground water monitoring is required on a quarterly basis for one year. Monitoring will be required biannually or annually thereafter until the water quality meets Minnesota Department of Health Recommended Allowable Drinking Water Limits, clean-up goals or a declining petroleum trend is documented for a minimum of three years.

Based on the referenced MPCA guidance documents the following additional investigative, and monitoring efforts are recommended.

- Install a minimum of five ground water monitoring wells to a depth of 30 feet each.
- Sample the wells on a quarterly basis for one year for the following compounds.
  - BETX
  - TPH as fuel oil
- Submit a monitoring report after the second quarterly sampling event which summarizes and evaluates ground water quality and proposes ground water clean-up goals, if needed.



If you have any questions regarding this report, please contact us at (612) 448-9393.

Sincerely,

NOVA ENVIRONMENTAL SERVICES, INC.

Julie K. Swanson  
Environmental Geologist

David J. Koubsky  
Group Manager

MAL\JKS:glb



**EXCAVATION REPORT FOR PETROLEUM RELEASE SITES**

*Minnesota Pollution Control Agency*

*Tanks and Spills Section*

*May 1992*

*Complete the information below and submit to the Minnesota Pollution Control Agency (MPCA) Tanks and Spills Section to document excavation and treatment of petroleum contaminated soil. Excavations must be done in accordance with "Excavation of Petroleum Contaminated Soil" (Guidance Document 6). Please attach any available preliminary site investigation reports to this excavation report.*

*Additional pages may be attached. Please type or print clearly.*

**I. BACKGROUND**

A. *Site:* Hampton Place Apartments

*Street:* 734 East 78th Street

*City, Zip:* Richfield, 55423

*County:* Hennepin

*MPCA Site ID#:* LEAK00005236

C. *Excavating Contractor:* Griggs, Inc.

*Contact:* Tom Ames

*Telephone:* (612) 482-0444

*Tank Contractor*

*Certification Number:* #0018

B. *Tank Owner/Operator:* Sage Company

*Mailing Address:* Mr. Jim Agre

*Street/Box:* 1712 Hopkins Crossroads

*City/Zip:* Minnetonka 55343

*Telephone:* (612) 591-1200

D. *Consultant:* Nova Environmental Services, Inc.

*Contact:* Julie Swanson

*Street/Box:* 1107 Hazeltine Blvd., Suite 400

*City, Zip:* Chaska, MN 55318

*Telephone:* (612) 448-9393

E. *Others on-site during site work (e.g., fire marshal, local officials, MPCA staff, etc.):*

Richfield Fire Officials

*Note: If person other than tank owner and/or operator is conducting the cleanup, provide name, address, and relationship to site on a separate attached sheet.*

**II. DATES**

A. *Date release reported to MPCA:* May 21, 1992

B. *Dates site work performed:*

*Work Performed*

*Date*

Tank Removal UST #1 and excavate impacted soil

May 21, 1992

Tank Removal UST #2 and excavate impacted soil

May 26, 1992

Soil borings in former tank basins

July 20, 1992





**III. RELEASE INFORMATION**

**A. Provide the following information for all removed tanks.**

*Tank 1:* Capacity: 1,000 gallons  
Type: Painted Steel  
Age: Unknown  
Condition: Poor

*Product History:* Fuel Oil

*Approximate quantity of petroleum released, if known:* Not Known

*Cause of release:* Tank and/or piping failure.

*Tank 2:* Capacity: 1,000 gallons  
Type: Painted Steel  
Age: Unknown  
Condition: Poor

*Product History:* Fuel Oil

*Approximate quantity of petroleum released, if known:* Not Known

*Cause of release:* Tank and/or piping failure.

**B. Provide the following information for all existing tanks.**

| <i>Tank Number</i> | <i>Capacity</i> | <i>Contents</i> | <i>Type</i>                                  | <i>Age</i> |
|--------------------|-----------------|-----------------|--|------------|
| 1                  | 1,000 gallons   | Fuel oil        | Painted steel                                | Unknown    |
| 2                  | 1,000 gallons   | Fuel oil        | Painted steel                                | Unknown    |
| 3                  | 1,000 gallons   | Fuel oil        | Single wall steel,<br>Cathodically protected | June 1992  |
| 4                  | 1,000 gallons   | Fuel oil        | Single wall steel,<br>Cathodically protected | June 1992  |

**C. If the release was associated with the lines in dispensers, briefly describe the problem:**

Source of leak not known. No dispenser pump was present at this site.

**D. If the release was a surface spill, briefly describe the problem:**

Not applicable



IV. EXCAVATION

- A. *Dimensions of excavation:* Tank #1: 10' x 12' x 15' deep  
Tank #2: 10' x 12' x 16' deep

B. *Original tank backfill material (sand, gravel, etc.):* Sand

C. *Native soil type (clay, sand, etc.):* Sand

D. *Quantity of contaminated soil removed (cubic yards):* 75 yd<sup>3</sup>

**[Note: If more than 400 cubic yards removed, please attach copy of written approval from MPCA.]**

E. *Was ground water encountered or was there evidence of seasonally high ground water table? At what depth?*

Ground water was not encountered in the tank basins.

F. *If a soil boring was necessary, (as indicated in part VI of "Excavation of Petroleum Contaminated Soil" (Guidance Document 6) for sand and silty sand native soils) describe the soil analytical and soil vapor headspace results. Attach the boring logs and laboratory results to this report.*

Soil borings will be advanced in the former tank basins to assess the vertical extent of the petroleum release. Soil vapor concentrations decreased with depth. Ground water was encountered at a depth of 21 to 22 feet below ground surface. Soil boring logs with soil vapor screening results are attached.

G. *If ground water was encountered or if a soil boring was conducted, was there evidence of ground water contamination? Specify, e.g., free product (specify thickness), product sheen, ground water in contact with petroleum contaminated soil, water analytical results, etc.*

Ground water was encountered in the boreholes at a depth of 21 to 22 feet below ground surface. The water had a rainbow sheen on it. No free product was observed. A ground water sample was collected from each boring and submitted for laboratory analysis of BETX, and TPH as fuel oil. Laboratory analysis detected 470 ppm TPH as fuel oil in water collected from boring B-1, and 780 ppm TPH as fuel oil in water collected from boring B-2.

**[Note: If free product was observed, contact MPCA staff immediately as outlined in "Petroleum Tank Release Reports" (Guidance Document 2).]**

H. *Was bedrock encountered in the excavation? At what depth?*

No

I. *Were other unique conditions associated with this site? If so, explain.*

No



V. SAMPLING

A. Briefly describe the field methods (including use of a photoionization detector) used to distinguish contaminated from uncontaminated soil:

An HNU photoionization detector (PID) was used to screen soil samples using the jar headspace method. The PID was equipped with a 10.2 eV bulb and calibrated to an isobutylene standard. Visual and odor criteria were also used to identify impacted soil.

B. List soil vapor headspace analysis results. Indicate sampling locations using sample codes (with sampling depths in parentheses), e.g., SV-1 (2 feet), SV-2 (10 feet), etc. Samples collected at different depths at the same locations should be labeled SV-1A (2 feet), SV-1B (4 feet), SV-1C (6 feet), etc. These should correspond with the codes on the site map in part VI. If the sample represents soil from the final extent of the excavation indicate "bottom" or "sidewall" in the bottom/sidewall column.

| Excavation Tank #1 |                  |                    | Excavation Tank #2     |                    |                  |                    |                        |
|--------------------|------------------|--------------------|------------------------|--------------------|------------------|--------------------|------------------------|
| <u>Sample Code</u> | <u>Soil Type</u> | <u>Reading ppm</u> | <u>Sample Location</u> | <u>Sample Code</u> | <u>Soil Type</u> | <u>Reading ppm</u> | <u>Sample Location</u> |
| SV-1 (15 ft)       | Sand             | 125                | Bottom                 | SV-1 (16 ft)       | Sand             | 132                | Bottom                 |
| SV-2 (10 ft)       | Sand             | 16                 | N. Sidewall            | SV-2 (12 ft)       | Sand             | 106                | E. Sidewall            |
| SV-3 (12 ft)       | Sand             | 50                 | E. Sidewall            | SV-3 (12 ft)       | Sand             | 80                 | W. Sidewall            |
| SV-4 (12 ft)       | Sand             | 98                 | S. Sidewall            | SV-4 (12 ft)       | Sand             | 75                 | S. Sidewall            |
| SV-5 (12 ft)       | Sand             | 155                | W. Sidewall            | SV-5 (12 ft)       | Sand             | 160                | N. Sidewall            |
| SV-6               | Sand             | 135                | Stockpile              | SV-6               | Sand             | 130                | Stockpile              |

| Soil Boring B-1    |                  |                    | Soil Boring B-2    |                  |                    |
|--------------------|------------------|--------------------|--------------------|------------------|--------------------|
| <u>Sample Code</u> | <u>Soil Type</u> | <u>Reading ppm</u> | <u>Sample Code</u> | <u>Soil Type</u> | <u>Reading ppm</u> |
| SS-1 (14-16 ft)    | Sand             | 55                 | SS-1 (14-16 ft)    | Sand             | 15                 |
| SS-2 (19-21 ft)    | Sand             | 29                 | SS-2 (19-21 ft)    | Sand             | 80                 |
| SS-3 (24-26 ft)    | Sand             | 26                 | SS-3 (24-26 ft)    | Sand             | 16                 |
| SS-4 (29-31 ft)    | Sand             | 13                 | SS-4 (29-31 ft)    | Sand             | 16                 |
| SS-5 (34-36 ft)    | Sand             | 10                 | SS-5 (34-36 ft)    | Sand             | 15                 |

C. Briefly describe the soil sampling and handling procedures used:

Soil samples were "grab" samples collected from freshly exposed soil. Sample locations were selected to best represent soil conditions within the excavation and from the split-spoon samplers, and to comply with MPCA guidelines. The soil samples were collected and stored in clean laboratory glass jars with teflon-lined lids. The samples were kept cool in the field while being transported to the laboratory.



EXCAVATION REPORT FOR PETROLEUM RELEASE SITES

PAGE 5

D. List the appropriate soil sample analytical results from the bottom and sidewalls of the excavation below (refer to "Soil and Ground Water Analysis at Petroleum Release Sites", Guidance Document 11). If the petroleum was not gasoline or fuel oil, attach appropriate analytical results. Code the samples (with sampling depths in parentheses) SS-1 (8 feet), SS-2 (4 feet), etc. These should correspond with the codes on the site map in part VI. Do not include analyses from the stockpiled soils.

| Sample Code         | THC as FO (ppm) | Benzene ppm | Ethyl-Benzene ppm | Toluene ppm | Xylene ppm | MTBE ppm | Lead ppm |
|---------------------|-----------------|-------------|-------------------|-------------|------------|----------|----------|
| Tank Excavations    |                 |             |                   |             |            |          |          |
| S-1 (15 ft)         | 3,030           | BDL         | 2.81              | BDL         | 16.3       | NA       | NA       |
| S-2 (Stockpile)     | 2,690           | BDL         | 1.25              | BDL         | 5.91       | NA       | NA       |
| S-3 (16 ft)         | 490             | BDL         | BDL               | BDL         | 9.27       | NA       | NA       |
| S-4 (Stockpile)     | 589             | BDL         | 0.990             | BDL         | 6.19       | NA       | NA       |
| Soil Borings        |                 |             |                   |             |            |          |          |
| S-1 (B-1, 34-36 ft) | 5.0             | BDL         | BDL               | BDL         | BDL        | NA       | NA       |
| S-2 (B-2, 34-36 ft) | 5.4             | BDL         | BDL               | BDL         | BDL        | NA       | NA       |
| W-1 (B-1, 22 ft)    | 470             | BDL         | BDL               | BDL         | BDL        | NA       | NA       |
| W-2 (B-2, 21 ft)    | 780             | BDL         | BDL               | BDL         | BDL        | NA       | NA       |

NOTE: COPIES OF LABORATORY REPORTS AND CHAIN-OF-CUSTODY FORMS MUST BE INCLUDED.





## VI. FIGURES

Attach the following figures to this report:

1. Site Location Map.
2. Site map(s) drawn to scale illustrating the following:
  - a. Location (or former location) of all present and former tanks, lines, and dispensers;
  - b. location of other structures (buildings, canopies, etc.);
  - c. adjacent city, township, or county roadways;
  - d. final extent of excavation;
  - e. location of soil vapor analyses (e.g., SV-1), soil samples (e.g., SS-1), and soil borings (e.g., SB-1). Also, attach all boring logs; and
  - f. north arrow and map legend.

## VII. SUMMARY

Briefly summarize evidence indicating whether additional investigation is necessary at the site, as discussed in part VI of "Excavation of Petroleum Contaminated Soil" (Guidance Document 6). If no further action is recommended, the MPCA staff will review this report following notification of soil treatment.

Two 1,000 gallon fuel oil USTs were removed on May 21, and 26, 1992 from the Hampton Place Apartments in Richfield, Minnesota. Petroleum-impacted soil was encountered below both USTs. Approximately 75 cubic yards of impacted soil were removed and thermally treated. Laboratory analysis and field screening indicate total excavation was not achieved.

A soil sample collected from the termination depth of the borings (34-36 feet) was submitted for laboratory analysis. The soil samples contained 5.0 and 5.4 ppm TPH as fuel oil in borings B-1 and B-2. The vertical extent of soil impacts appears to be between the 16 and 23 foot depths, based on laboratory and soil vapor screening results.

Two soil borings were advanced through the former tank basins. Petroleum impacted soil was encountered to the depth of ground water (21 to 22 feet). A ground water sample was collected from each borehole. Laboratory analysis of the ground water samples detected TPH as fuel oil in both water samples (470 ppm and 780 ppm in borings B-1 and B-2 respectively).

In accordance with MPCA guidance documents, additional soil borings will be required to determine the horizontal extent of impacted soil. Ground water monitoring wells will be required to determine the horizontal extent of ground water impacts.

## VIII. SOIL TREATMENT INFORMATION

- A. Soil treatment method used (thermal, land application, other). If you choose "other" specify treatment method:

Thermal



B. *Location of treatment site/facility:* C.S. McCrossan, Inc.

C. *Date MPCA approved soil treatment (if thermal treatment was used after May 1, 1991, indicate date that the MPCA permitted thermal treatment facility agreed to accept soil):* June 4, 1992

D. *Identify the location of any stockpiled contaminated soil:*

Excavated soil was stockpiled in corner of firelane in parking lot as per Richfield Fire Department approval.

**IX. CONSULTANT (OR OTHER ) PREPARING THIS REPORT**

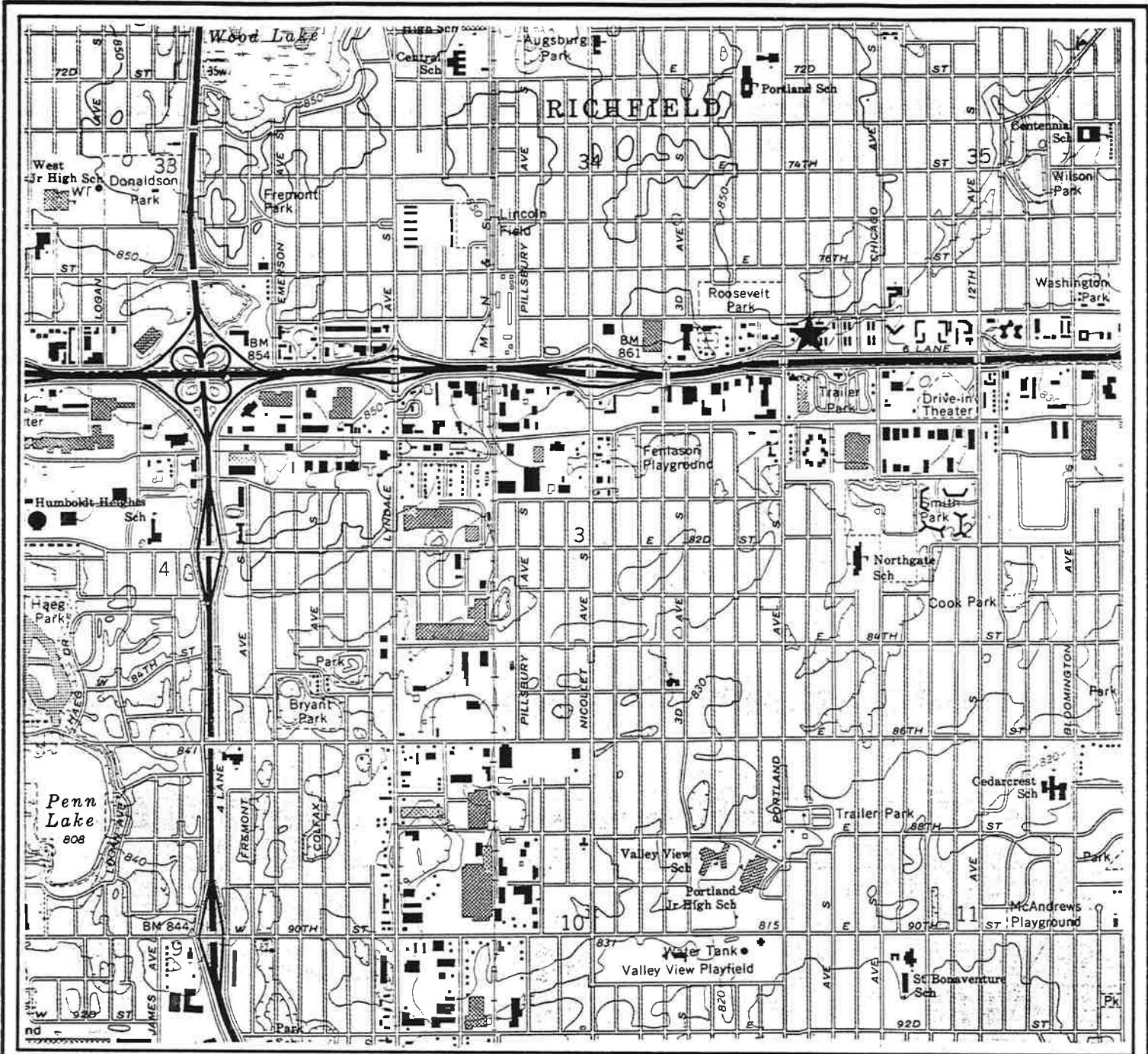
*Company Names:* Nova Environmental Services, Inc.  
*Street/Box:* 1107 Hazeltine Boulevard, Suite 400  
*City/Zip:* Chaska, Minnesota 55318  
*Telephone:* (612) 448-9393  
*Contact:* Julie Swanson

*If additional investigation is not required at the site, please mail this form and all necessary attachments to:*

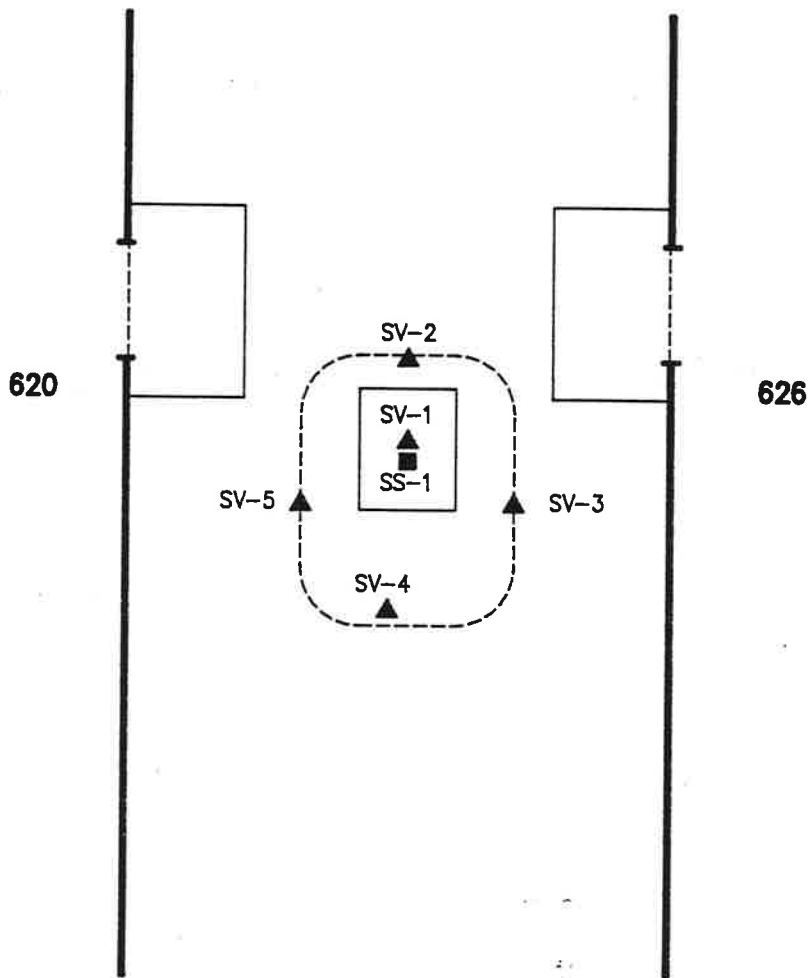
*Chris McLain  
Minnesota Pollution Control Agency  
Hazardous Waste Division  
Tanks and Spills Section  
520 Lafayette Road  
St. Paul, Minnesota 55155*

*If additional investigation is required at the site, include this form as a section in the Remedial Investigation/Corrective Action Design report. Excavation reports indicating a remedial investigation (RI) is necessary, will not be reviewed by MPCA staff until the RI has been completed.*



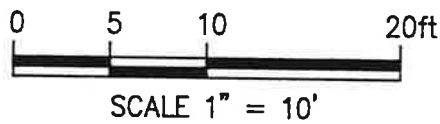






KEY

- ▲ SOIL VAPOR SAMPLE
- SOIL SAMPLE



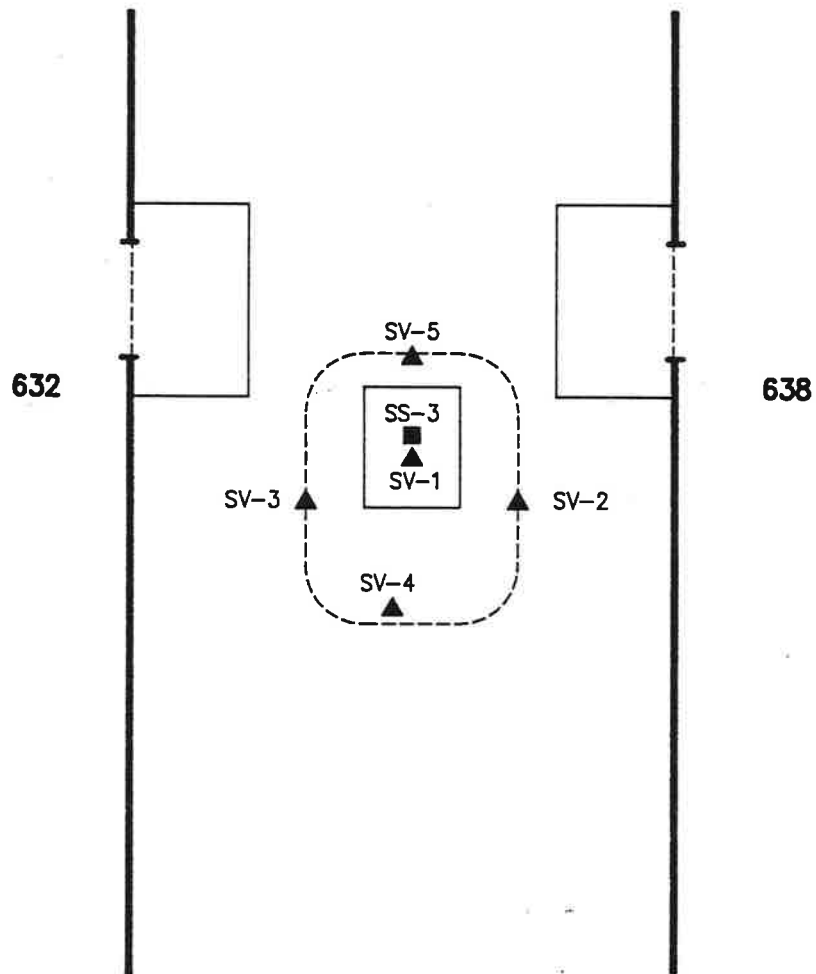
SITE DIAGRAM  
EXCAVATION #1  
HAMPTON PLACE APARTMENTS  
RICHFIELD, MINNESOTA

M757/M92-614

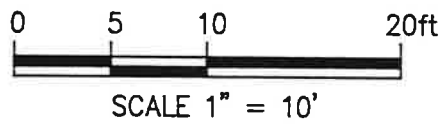








- KEY
- ▲ SOIL VAPOR SAMPLE
  - SOIL SAMPLE

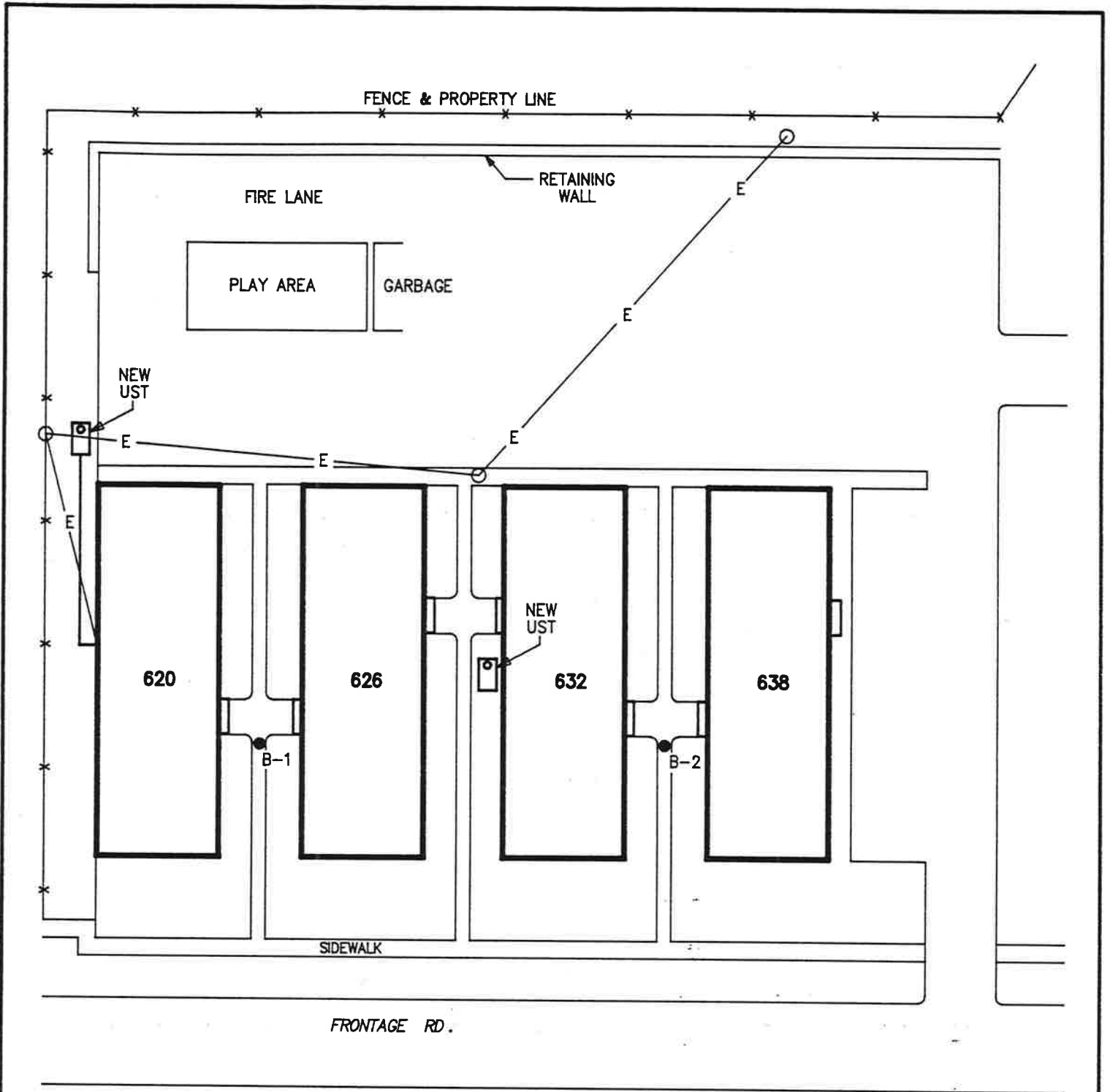


SITE DIAGRAM  
EXCAVATION #2  
HAMPTON PLACE APARTMENTS  
RICHFIELD, MINNESOTA

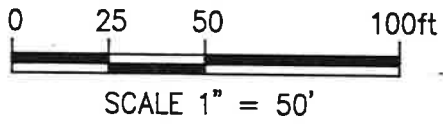
M757/M92-614







KEY  
 ● SOIL BORING



SITE MAP  
 SAGE COMPANY  
 HAMPTON PLACE APARTMENTS  
 734 78th STREET  
 RICHFIELD, MINNESOTA

M757/M92-614





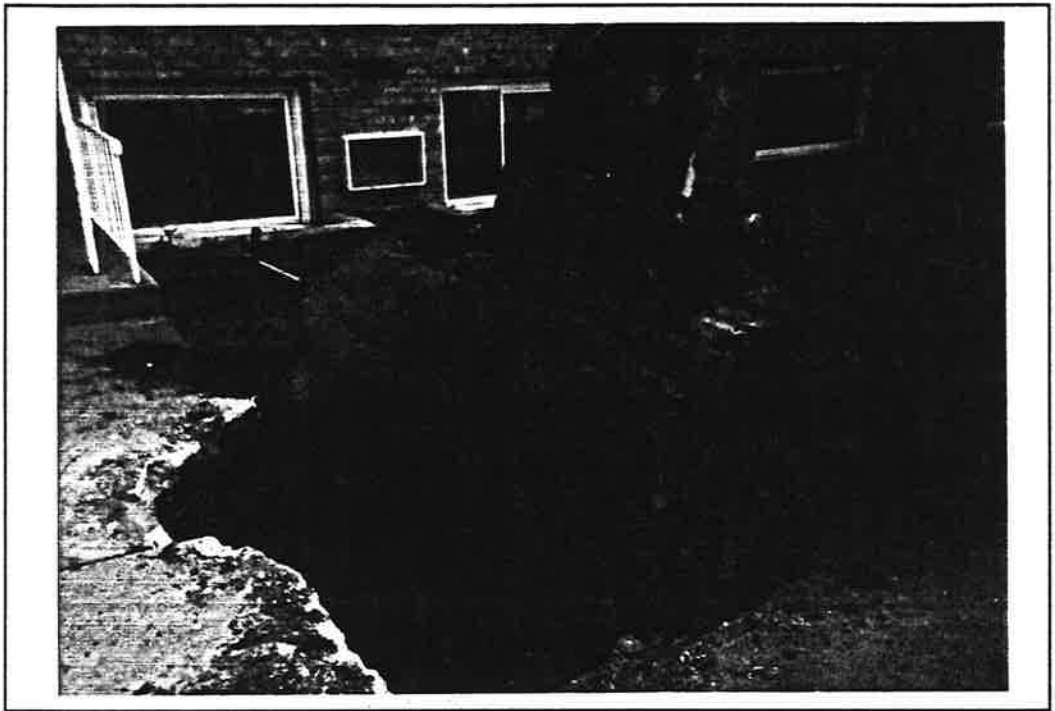


Tank #2 - Excavation.

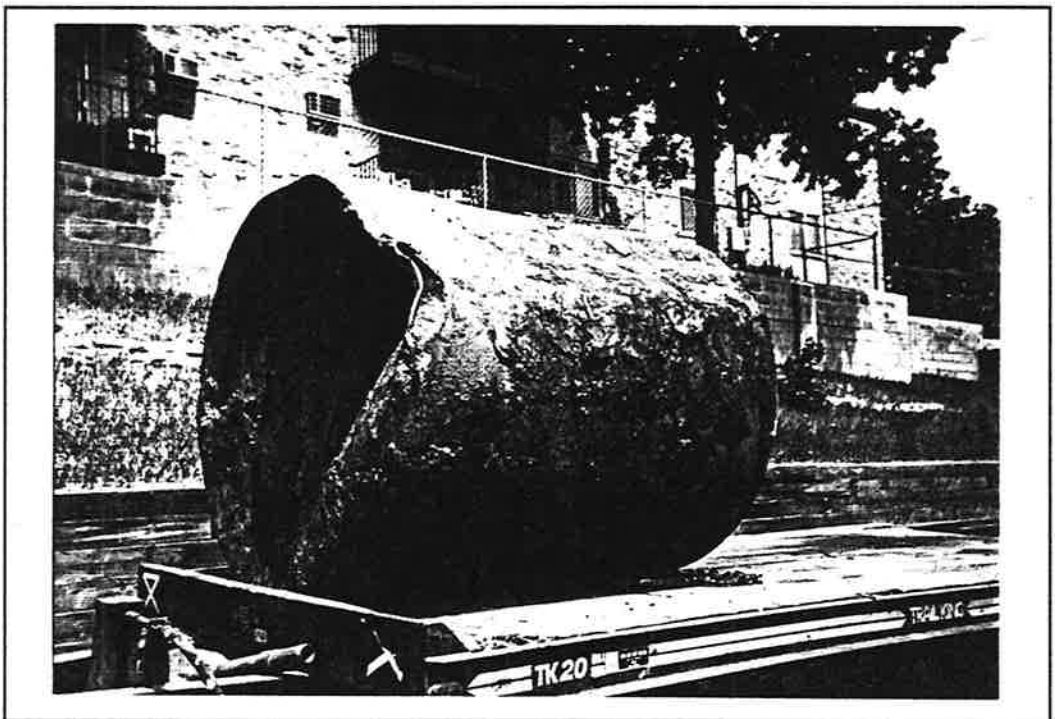


Tank #2 - 1,000 gallon fuel oil UST.





Tank #1 - Excavation.



Tank #1 - 1,000 gallon fuel oil UST.







# LABORATORIES, Inc.

P.O. BOX 249, 1126 N. FRONT STREET  
NEW ULM, MN 56073-0249  
PHONE (507) 354-8517 WATS (800) 782-3557 FAX (507) 359-2890



**WE ARE AN EQUAL OPPORTUNITY EMPLOYER**

Report To: ATTN  
NOVA ENVIRONMENTAL SERVICES  
1107 HAZELTINE BLVD STE 420  
CHASKA MN 55318

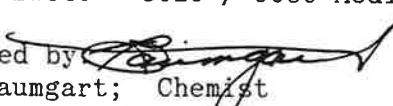
Work Order # : 21-5546  
Date Sampled : 5/21/92  
Date Received : 5/26/92  
Date Analyzed : 6/ 2/92  
Date Reported : 6/ 4/92  
Account Number: 0003017  
RUSH:

Project Name: HAMPTON PLACE APARTMENTS/SAGE CO  
Project Number:

| Log Number | Sample Description      | MTBE<br>(ppb) | Benzene<br>(ppb) | Ethyl-           |                          | Total Purgeable<br>Hydrocarbons |                      |       |
|------------|-------------------------|---------------|------------------|------------------|--------------------------|---------------------------------|----------------------|-------|
|            |                         |               |                  | Toluene<br>(ppb) | Benzene Xylenes<br>(ppb) | As Gas<br>(ppm)                 | As Fuel Oil<br>(ppm) |       |
| 92-Q591    | S-1 BASE OF EXCAVATION  | *****         | BDL              | BDL              | 2810                     | 16300                           | *****                | 3030  |
|            | Minimum Detection Limit | *****         | 2000             | 2000             | 1500                     | 1500                            | *****                | 500.0 |
| 92-Q592    | STOCKPILE S-2           | *****         | BDL              | BDL              | 1250                     | 5910                            | *****                | 2690  |
|            | Minimum Detection Limit | *****         | 1000             | 1000             | 750.0                    | 750.0                           | *****                | 250.0 |

\*\*\*\*\* Analyte Not Requested  
E L Below Detection Limits

Test Method: SW846 - 8020 / 5030 Modified

Report approved by   
Terrance W. Baumgart; Chemist  
and for Minnesota Valley Testing Labs, Inc.









# LABORATORIES, Inc.

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NEW ULM, MN 56073-0249  
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**WE ARE AN EQUAL OPPORTUNITY EMPLOYER**

Report To: ATTN  
NOVA ENVIRONMENTAL SERVICES  
1107 HAZELTINE BLVD STE 420  
CHASKA MN 55318

Work Order # : 21-5564  
Date Sampled : 5/26/92  
Date Received : 5/28/92  
Date Analyzed : 6/ 8/92  
Date Reported : 6/ 9/92  
Account Number: 0003017  
RUSH:

Project Name: HAMPTON PLACE APARTMENTS / SAGE CO  
Project Number:

| Log Number | Sample Description      | MTBE<br>(ppb) | Benzene<br>(ppb) | Toluene<br>(ppb) | Ethyl-           |                  | Total Purgeable<br>Hydrocarbons |                      |
|------------|-------------------------|---------------|------------------|------------------|------------------|------------------|---------------------------------|----------------------|
|            |                         |               |                  |                  | Benzene<br>(ppb) | Xylenes<br>(ppb) | As Gas<br>(ppm)                 | As Fuel Oil<br>(ppm) |
| 92-Q669    | S-3 BASE OF EXC TANK #2 | *****         | BDL              | BDL              | BDL              | 9270             | *****                           | 490.0                |
|            | Minimum Detection Limit | *****         | 500.0            | 500.0            | 375.0            | 375.0            | *****                           | 125.0                |
| 92-Q670    | S-4 STOCKPILE           | *****         | BDL              | BDL              | 990.0            | 6190             | *****                           | 539.0                |
|            | Minimum Detection Limit | *****         | 208.0            | 208.0            | 156.0            | 156.0            | *****                           | 500.0                |

\*\*\*\*\* Analyte Not Requested  
F L Below Detection Limits

Test Method: SW846 - 8020 / 5030 Modified

Report approved by *Terrance W. Baumgart*  
Terrance W. Baumgart; Chemist  
and for Minnesota Valley Testing Labs, Inc.

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.











# SERCO Laboratories

1931 West County Road C2. St. Paul, Minnesota 55113 Phone (612) 636-7173 FAX (612) 636-7178

## LABORATORY ANALYSIS REPORT NO: 22425 07/22/92

PAGE 1

NOVA Environmental Services  
Hazeltine Gates  
1107 Hazeltine Blvd. Suite 420  
Chaska, MN 55318

Attn: Julie Swanson

DATE COLLECTED: 07/20/92  
DATE RECEIVED: 07/21/92  
COLLECTED BY : CLIENT  
DELIVERED BY : CLIENT  
SAMPLE TYPE : SOIL  
GROUNDWATER

SERCO SAMPLE NO: 64202 64212 64222 64232

| SAMPLE DESCRIPTION: | S-1                           | S-2                | W-1                    | W-2                    |
|---------------------|-------------------------------|--------------------|------------------------|------------------------|
|                     | Boring<br>B-1 Soil<br>M92-614 | Boring<br>B-2 Soil | Boring<br>B-1<br>Water | Boring<br>B-2<br>Water |

ANALYSIS:

|                                |        |        |          |          |
|--------------------------------|--------|--------|----------|----------|
| Benzene, mg/L                  | <0.005 | <0.005 | <0.050 A | <0.050 A |
| Ethylbenzene, mg/L             | <0.005 | <0.005 | <0.050 A | <0.050 A |
| Toluene, mg/L                  | <0.005 | <0.005 | <0.050 A | <0.050 A |
| Xylene, mg/L                   | <0.005 | <0.005 | <0.050 A | <0.050 A |
| FID Scan, mg/L, as #2 fuel oil | 5.0    | 5.4    | 470      | 780      |

Water samples received in non-SERCO laboratories containers.  
A: Increased detection limits due to sample matrix.

All analyses were performed using EPA or other accepted methodologies. Samples that may be of an environmentally hazardous nature will be returned to you. Other samples will be stored for 30 days from the date of this report, then disposed of by SERCO Laboratories. Please contact me if other arrangements are needed. This report may not be reproduced, except in its entirety, without prior written approval from SERCO Laboratories.

Report submitted by,

Diane J. Anderson  
Project Manager

< means "not detected at this level". 1 mg = 1000 ug.

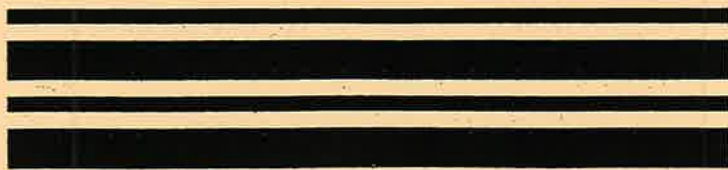


Member











APPENDIX B

SOIL BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS





# BORING LOG

| PROJECT: M92-614   |                |            | DATE: 7/20/92   |     | BORING: B-1           |       |
|--|----------------|------------|---|-----|-----------------------|-------|
| Sage Company<br>Hampton Place Apartments<br>Richfield, Minnesota |                |            | SURFACE ELEVATION:<br><br>N/A   |     | SCALE:<br><br>1" = 6' |       |
| SAMPLE NO.   | DEPTH FEET     | ASTM D2487 | DESCRIPTION - ASTM D2488<br>(See Report & Descr. Terminology)   | "N" | HNU ppm               | NOTES |
|  |                | SM         | Dark brown silty SAND, moist.<br>(Fill in former tank basin).   |     |                       |       |
| 1  | 14<br>15<br>16 |            |   | 13  | 55                    |       |
|  |                |            | Gray fine-medium grained SAND,<br>laminated, medium dense, damp.  |     |                       |       |
| 2  | 19<br>21       |            |   | 23  | 29                    |       |
| 3  | 24<br>26       | SW-<br>SP  | Light brown coarse SAND, trace<br>gravel, medium dense to dense,<br>wet.                                  | 40  | 26                    |       |
| 4  | 29<br>31       |            |   | 18  | 13                    |       |
| 5  | 34<br>36       |            | Brown fine-medium grained SAND,<br>medium dense, wet.   | 26  | 10                    |       |
|  |                |            | END OF BORING = 36 FEET   |     |                       |       |
|  |                |            | Ground water encountered 22 feet<br>below ground surface. Boring<br>backfilled with neat cement<br>grout. |     |                       |       |

**NOVA ENVIRONMENTAL SERVICES, INC.**

M92-614F.001\T&107 Hazeltine Blvd. Suite 400, Chaska, MN 55318 (612) 448-9393



# BORING LOG

| PROJECT: M92-614   |            |            | DATE: 7/20/92   |     | BORING: B-2           |       |
|--|------------|------------|---|-----|-----------------------|-------|
| Sage Company<br>Hampton Place Apartments<br>Richfield, Minnesota |            |            | SURFACE ELEVATION:<br><br>N/A   |     | SCALE:<br><br>1" = 6' |       |
| SAMPLE NO.   | DEPTH FEET | ASTM D2487 | DESCRIPTION - ASTM D2488<br>(See Report & Descr. Terminology)   | "N" | HNU ppm               | NOTES |
|  |            |            |   |     |                       |       |
|  | 14         |            |   |     |                       |       |
| 1  | 15.5       |            | SM Dark brown silty SAND, moist.<br>(Fill in former tank basin).                                      | 4   | 15                    |       |
|  | 16         |            |   |     |                       |       |
|  | 19         |            | Gray and tan fine-medium grained SAND, loose to medium dense, damp.                                   |     |                       |       |
| 2  | 21         |            | Sample wet in tip of split-spoon.   | 14  | 80                    |       |
|  | 24         |            |   |     |                       |       |
| 3  | 26         | SW-SP      |   | 48  | 16                    |       |
|  | 29         |            |   |     |                       |       |
| 4  | 31         |            | Brown coarse SAND, trace gravel, medium dense, wet.   | 24  | 16                    |       |
|  | 34         |            |   |     |                       |       |
| 5  | 36         |            |   | 28  | 15                    |       |
|  |            |            | END OF BORING = 36 FEET   |     |                       |       |
|  |            |            | Ground water encountered 21.4 feet below ground surface.<br>Boring backfilled with neat cement grout. |     |                       |       |

**NOVA ENVIRONMENTAL SERVICES, INC.**

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# BORING LOG

| PROJECT: M92-614   |            |            | DATE: 9/2/92   |     | BORING: MW-1          |       |   |  |
|--|------------|------------|--|-----|-----------------------|-------|---|--|
| Sage Company<br>Hampton Place Apartments<br>Richfield, Minnesota |            |            | SURFACE ELEVATION:<br><br>95.43  |     | SCALE:<br><br>1" = 6' |       |   |  |
| SAMPLE NO.   | DEPTH FEET | ASTM D2487 | DESCRIPTION - ASTM D2488<br>(See Report & Descr. Terminology)                                      | "N" | HNU ppm               | NOTES |   |  |
| 1  | 4          | SP         | Sod and 6" black topsoil underlain by brown fine to medium grained SAND, medium dense, wet at 20'. | 13  | 0                     |       |   |  |
|  | 6          |            |  |     |                       |       |   |  |
|  | 9          |            |  |     |                       |       |   |  |
| 2  | 11         |            |  |     |                       | 14    | 0 |  |
|  | 14         |            |  |     |                       |       |   |  |
| 3  | 16         |            |  |     |                       | 15    | 0 |  |
|  | 19         |            |  |     |                       |       |   |  |
| 4  | 21         |            |  |     |                       | 12    | 0 |  |
|  | 24         |            |  |     |                       |       |   |  |
| 5  | 26         |            |  |     |                       | 16    | 0 |  |
|  | 27         |            |  |     |                       |       |   |  |
|  |            |            | END OF BORING = 27 FEET  |     |                       |       |   |  |
|  |            |            | Ground water encountered at 20 feet below ground surface.  |     |                       |       |   |  |
|  |            |            | Bottom of monitoring well screen set at 27 feet.   |     |                       |       |   |  |

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# BORING LOG

| PROJECT: M92-614   |                |            | DATE: 9/2/92   |   | BORING: MW-2          |       |  |  |
|--|----------------|------------|--|---|-----------------------|-------|--|--|
| Sage Company<br>Hampton Place Apartments<br>Richfield, Minnesota |                |            | SURFACE ELEVATION:<br><br>96.52  |   | SCALE:<br><br>1" = 6' |       |  |  |
| SAMPLE NO.   | DEPTH FEET     | ASTM D2487 | DESCRIPTION - ASTM D2488<br>(See Report & Descr. Terminology)              | "N"   | HNU ppm               | NOTES |  |  |
| 1  | 4<br>6         | SP-SW      | Sod and black topsoil underlain by brown fine to medium SAND, loose, damp. | 17  | 0                     |       |  |  |
| 2  | 9<br>11        |            |  | 8   | 0                     |       |  |  |
| 3  | 14<br>16       |            |  | Brown fine to coarse SAND, loose, damp.                     | 5                     | 0     |  |  |
| 4  | 19<br>21<br>22 |            |  |   | 18                    | 0     |  |  |
| 5  | 24<br>26       |            |  | Brown fine to coarse SAND, trace gravel, medium dense, wet. | 19                    | 0     |  |  |
|  | 28             |            |  |   |                       |       |  |  |
|  |                |            |  | END OF BORING = 28 FEET                                     |                       |       |  |  |
|  |                |            |  | Ground water encountered 21 feet below ground surface.      |                       |       |  |  |
|  |                |            |  | Bottom of monitoring well screen set at 27.4 feet.          |                       |       |  |  |

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# BORING LOG

| PROJECT: M92-614  |            |               | DATE: 9/2/92  |  | BORING: MW-3          |       |   |  |  |
|---|------------|---------------|---|--|-----------------------|-------|---|--|--|
| Sage Company<br>Hampton Place Apartments<br>Richfield, Minnesota      |            |               | SURFACE ELEVATION:<br><br>98.06   |  | SCALE:<br><br>1" = 6' |       |   |  |  |
| SAMPLE NO.  | DEPTH FEET | ASTM D2487    | DESCRIPTION - ASTM D2488<br>(See Report & Descr. Terminology)             | "N"  | HNU ppm               | NOTES |   |  |  |
| 1   | 4<br>6     | SP-<br><br>SW | Black topsoil underlain by brown fine to medium SAND, medium dense, damp. | 15   | 0                     |       |   |  |  |
| 2   | 9<br>11    |               |   | 22   | 0                     |       |   |  |  |
| 3   | 14<br>16   |               |   | 26   | 0                     |       |   |  |  |
| 4   | 19<br>21   |               |   | Brown fine to coarse SAND, trace gravel, medium dense, wet at 22 feet. | 17                    |       | 0 |  |  |
| 5   | 24<br>26   |               |   |  | 23                    |       | 0 |  |  |
|   | 29         |               |   |  |                       |       |   |  |  |
| END OF BORING = 29 FEET   |            |               |   |  |                       |       |   |  |  |
| Ground water encountered at 22 feet below ground surface.             |            |               |   |  |                       |       |   |  |  |
| Bottom of monitoring well screen set at 29 feet below ground surface. |            |               |   |  |                       |       |   |  |  |

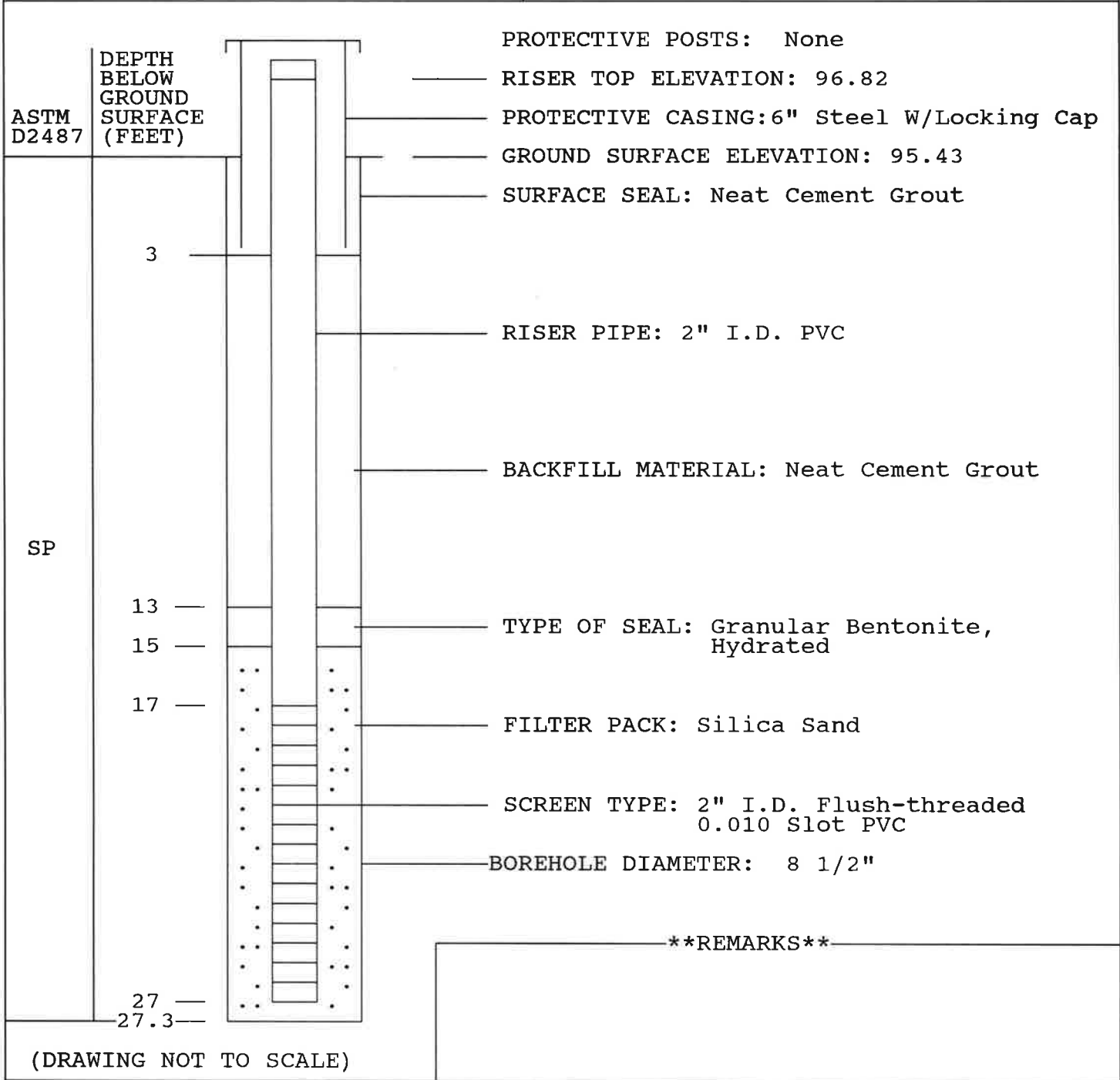
**NOVA ENVIRONMENTAL SERVICES, INC.**

M92-614F.001\T&107 Hazeltine Blvd. Suite 400, Chaska, MN 55318 (612) 448-9393



**MONITORING WELL CONSTRUCTION DIAGRAM**

|   |   |
|---|---|
| PROJECT: M92-614 Sage Company<br>Hampton Place Apartments<br>Richfield, Minnesota | MONITORING WELL NUMBER: MW-1            |
| DATE: 9/2/92  | MINNESOTA UNIQUE WELL NUMBER:<br>480687 |

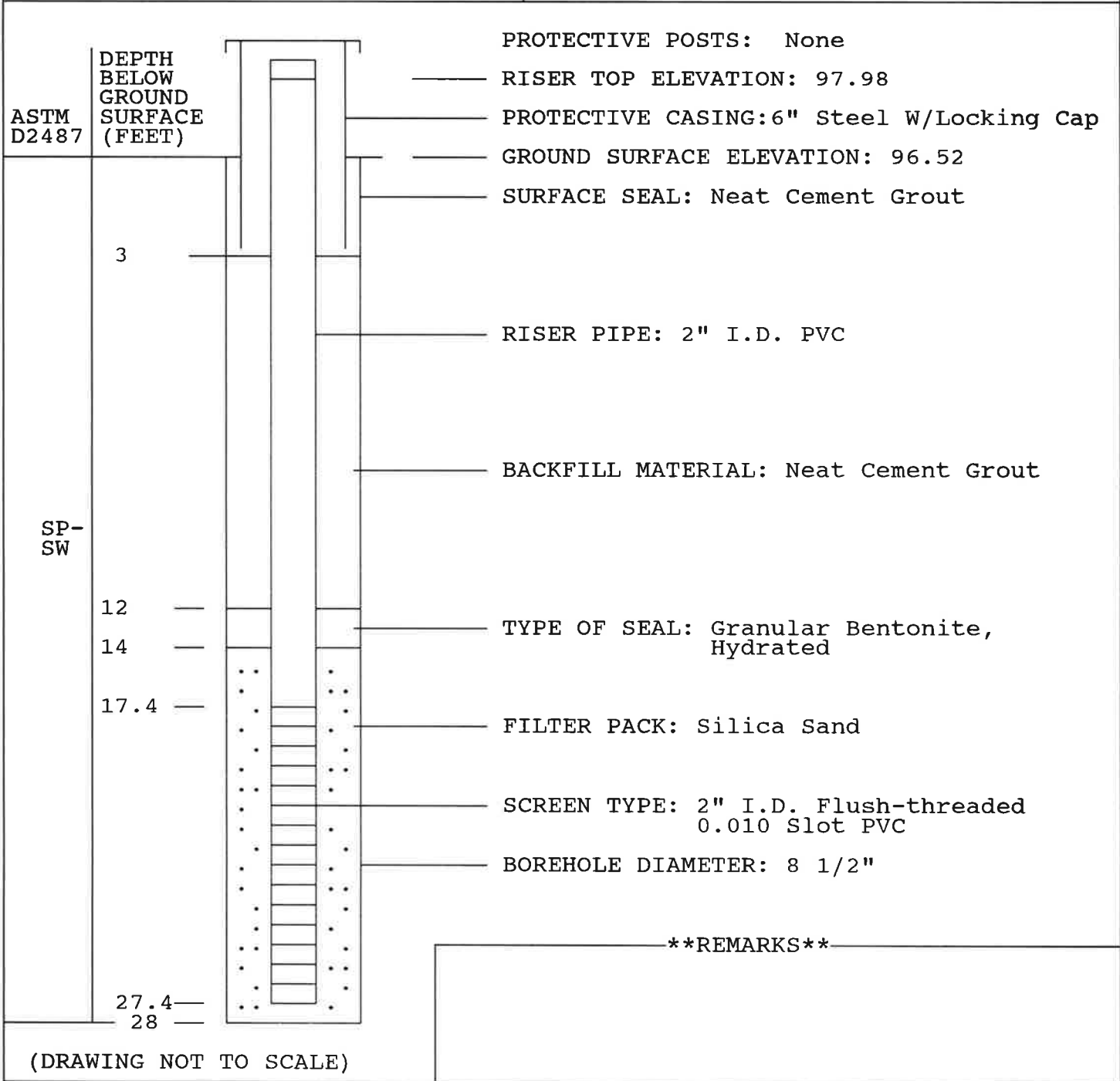


**NOVA ENVIRONMENTAL SERVICES, INC.**  
1107 Hazeltine Blvd. Suite 400, Chaska, MN 55318 (612) 448-9393



# MONITORING WELL CONSTRUCTION DIAGRAM

|  |  |
|--|--|
| <b>PROJECT:</b> M92-614 Sage Company<br>Hampton Place Apartments<br>Richfield, Minnesota | <b>MONITORING WELL NUMBER:</b> MW-2            |
| <b>DATE:</b> 9/2/92  | <b>MINNESOTA UNIQUE WELL NUMBER:</b><br>480688 |



ASTM  
D2487

DEPTH  
BELOW  
GROUND  
SURFACE  
(FEET)

3

SP-  
SW

12

14

17.4

27.4

28

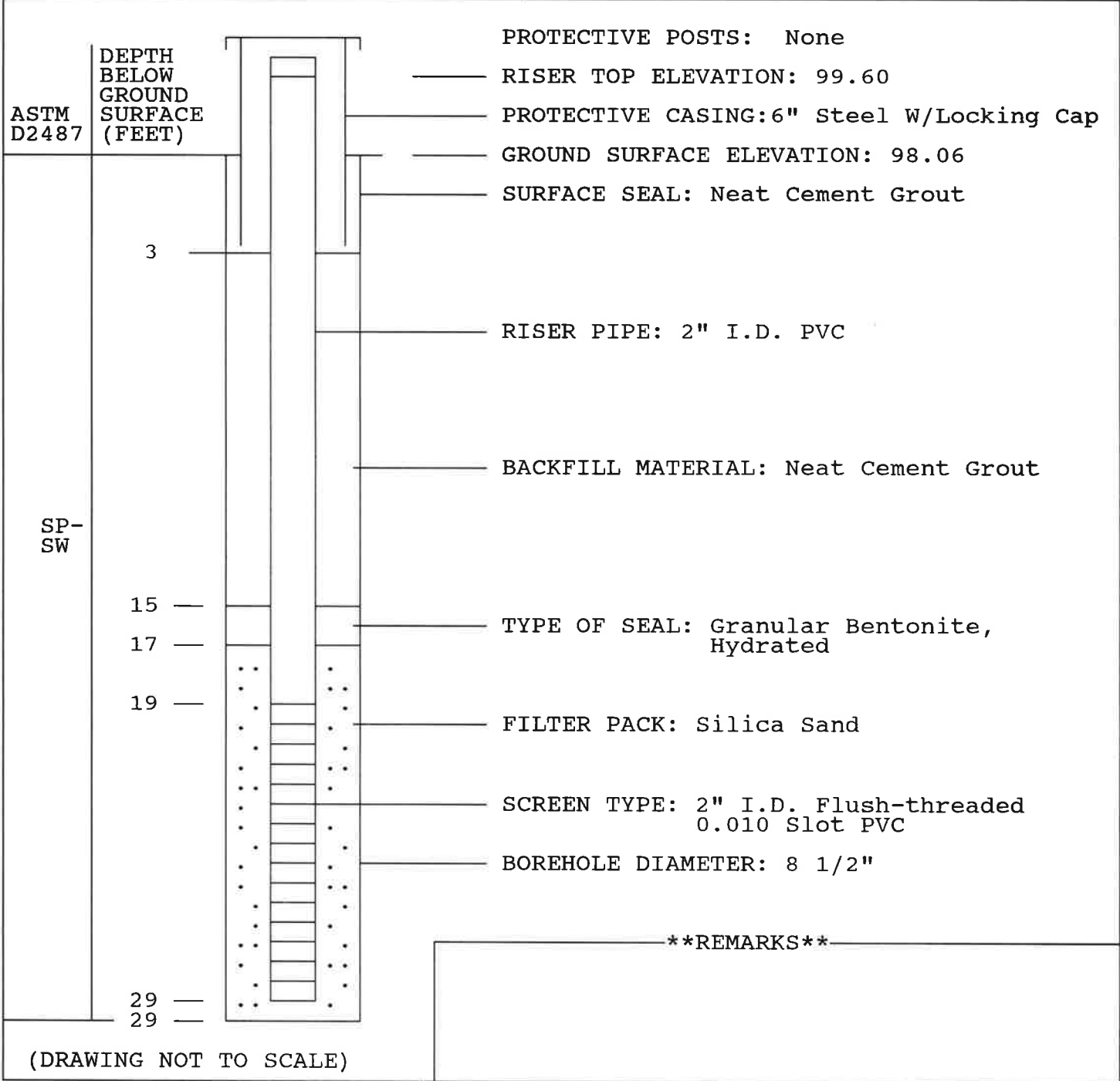
- PROTECTIVE POSTS: None
- RISER TOP ELEVATION: 97.98
- PROTECTIVE CASING: 6" Steel W/Locking Cap
- GROUND SURFACE ELEVATION: 96.52
- SURFACE SEAL: Neat Cement Grout
- RISER PIPE: 2" I.D. PVC
- BACKFILL MATERIAL: Neat Cement Grout
- TYPE OF SEAL: Granular Bentonite, Hydrated
- FILTER PACK: Silica Sand
- SCREEN TYPE: 2" I.D. Flush-threaded  
0.010 Slot PVC
- BOREHOLE DIAMETER: 8 1/2"

\*\*REMARKS\*\*



# MONITORING WELL CONSTRUCTION DIAGRAM

|  |  |
|--|--|
| <b>PROJECT:</b> M92-614 Sage Company<br>Hampton Place Apartments<br>Richfield, Minnesota | <b>MONITORING WELL NUMBER:</b> MW-3            |
| <b>DATE:</b> 9/2/92  | <b>MINNESOTA UNIQUE WELL NUMBER:</b><br>480689 |











APPENDIX C  
MONITORING WELL STABILIZATION DATA



GROUND WATER MONITORING  
DATA SHEET

Nova Environmental Services, Inc.  
1107 Hazeltine Blvd. Suite 400, Chaska, MN 55318  
Phone: (612) 448-9393 Fax: (612) 448-9572

Client Name: Hampton Place Apartments Project Number: M92-614

| Location I.D.: MW-1                  |                      | STABILIZATION TEST |         |        |          |           |       |
|--------------------------------------|----------------------|--------------------|---------|--------|----------|-----------|-------|
| Date: 9/3/92                         | No                   | Hours              | Gallons | Temp°C | SC,umhos | pH, units | Other |
| Chronology: 1                        | 1                    | 9:50               | 9.50    | 12.5   | 720      | 6.8       |       |
| Casing Diameter in.: 2"              | 2                    | 10:03              | 10.50   | 12.5   | 750      | 6.9       |       |
| Static Depth ft.:21.43               | 3                    | 12:12              | 11.50   | 12.4   | 740      | 6.8       |       |
| Casing Length ft.:28.51              | 4                    |                    |         |        |          |           |       |
| Column Length ft.: 7.08              | 5                    |                    |         |        |          |           |       |
| Column Volume gal.:1.15              | 6                    |                    |         |        |          |           |       |
| SAMPLE APPEARANCE                    |                      | 7                  |         |        |          |           |       |
| Color: Brown                         | Maximum Result       |                    |         | 12.5   | 750      | 6.9       |       |
| Phases: None                         | Minimum Result       |                    |         | 12.4   | 720      | 6.8       |       |
| Odor: None                           | Difference           |                    |         | 0.1    | 4%       | 0.1       |       |
| GENERAL APPEARANCE<br>Turbid, brown. | COMMENTS OR DIAGRAMS |                    |         |        |          |           |       |

Completed by: Tim Rogers

Date Completed: 9/3/92



GROUND WATER MONITORING  
DATA SHEET

Nova Environmental Services, Inc.  
1107 Hazeltine Blvd. Suite 400, Chaska, MN 55318  
Phone: (612) 448-9393 Fax: (612) 448-9572

Client Name: Hampton Place Apartments | Project Number: M92-614

Location I.D.: MW-2

STABILIZATION TEST

| Date: 9/3/92             | No             | Hours | Gallons | Temp°C | SC, umhos | pH, units | Other |
|--------------------------|----------------|-------|---------|--------|-----------|-----------|-------|
| Chronology: 2            | 1              | 10:51 | 8.0     | 13.4   | 930       | 7.3       |       |
| Casing Diameter in.: 2"  | 2              | 11:00 | 9.0     | 13.2   | 950       | 7.2       |       |
| Static Depth ft.: 22.54  | 3              | 11:10 | 10.0    | 13.2   | 950       | 7.2       |       |
| Casing Length ft.: 28.71 | 4              |       |         |        |           |           |       |
| Column Length ft.: 6.17  | 5              |       |         |        |           |           |       |
| Column Volume gal.: 1.00 | 6              |       |         |        |           |           |       |
| SAMPLE APPEARANCE        |                | 7     |         |        |           |           |       |
| Color: Brown             | Maximum Result |       |         | 13.4   | 950       | 7.3       |       |
| Phases: None             | Minimum Result |       |         | 13.2   | 930       | 7.2       |       |
| Odor: None               | Difference     |       |         | 0.2    | 2.1%      | 0.1       |       |

GENERAL APPEARANCE  
Turbid, brown.

COMMENTS OR DIAGRAMS

Completed by: Tim Rogers

Date Completed: 9/3/92





|                                       |  |
|---------------------------------------|--|
| GROUND WATER MONITORING<br>DATA SHEET | Nova Environmental Services, Inc.<br>1107 Hazeltine Blvd. Suite 400, Chaska, MN 55318<br>Phone: (612) 448-9393 Fax: (612) 448-9572 |
|---------------------------------------|--|

|                                       |                         |
|---------------------------------------|-------------------------|
| Client Name: Hampton Place Apartments | Project Number: M92-614 |
|---------------------------------------|-------------------------|

|                     |                    |
|---------------------|--------------------|
| Location I.D.: MW-3 | STABILIZATION TEST |
|---------------------|--------------------|

| Date: 9/3/92            | No             | Hours | Gallons | Temp°C | SC, umhos | pH, units | Other |
|-------------------------|----------------|-------|---------|--------|-----------|-----------|-------|
| Chronology: 3           | 1              | 11:57 | 9.0     | 13.1   | 710       | 7.3       |       |
| Casing Diameter in.: 2" | 2              | 12:12 | 10.0    | 13.1   | 700       | 7.2       |       |
| Static Depth ft.:23.97  | 3              | 12:21 | 11.0    | 13.1   | 710       | 7.2       |       |
| Casing Length ft.:30.44 | 4              |       |         |        |           |           |       |
| Column Length ft.: 6.47 | 5              |       |         |        |           |           |       |
| Column Volume gal.:1.05 | 6              |       |         |        |           |           |       |
| SAMPLE APPEARANCE       | 7              |       |         |        |           |           |       |
| Color: Brown            | Maximum Result |       |         | 13.1   | 710       | 7.3       |       |
| Phases: None            | Minimum Result |       |         | 13.1   | 700       | 7.2       |       |
| Odor: None              | Difference     |       |         | 0      | 1.4%      | 0.1       |       |

|                                      |                      |
|--------------------------------------|----------------------|
| GENERAL APPEARANCE<br>Turbid, brown. | COMMENTS OR DIAGRAMS |
|--------------------------------------|----------------------|

|                          |                        |
|--------------------------|------------------------|
| Completed by: Tim Rogers | Date Completed: 9/3/92 |
|--------------------------|------------------------|

APPENDIX D  
LABORATORY REPORTS





# SERCO Laboratories

1931 West County Road C2. St. Paul. Minnesota 55113 Phone (612) 636-7173 FAX (612) 636-7178

## LABORATORY ANALYSIS REPORT NO: 23071 09/14/92

PAGE 1

NOVA Environmental Services  
Hazeltine Gates  
1107 Hazeltine Blvd. Suite 420  
Chaska, MN 55318

DATE COLLECTED: 09/02/92; 09/03/92  
DATE RECEIVED: 09/03/92  
COLLECTED BY : CLIENT  
DELIVERED BY : CLIENT  
SAMPLE TYPE : SOIL  
WATER

Attn: Julie Swanson

| SERCO SAMPLE NO:    | 81342 | 81352 | 81362 | 81372 |
|---------------------|-------|-------|-------|-------|
| SAMPLE DESCRIPTION: | MW-1  | MW-2  | MW-3  | S-3   |

ANALYSIS: M92-614

| ANALYSIS:  | M92-614 |      |      |   |
|--|---------|------|------|---|
| Acetone, ug/L  | <100    | <100 | <100 | - |
| Allyl chloride, ug/L                                 | <0.2    | <0.2 | <0.2 | - |
| Benzene, ug/L  | <1.0    | <1.0 | <1.0 | - |
| Bromobenzene, ug/L                                   | <0.2    | <0.2 | <0.2 | - |
| Bromochloromethane, ug/L                             | <0.4    | <0.4 | <0.4 | - |
| Bromodichloromethane, ug/L                           | <0.2    | <0.2 | <0.2 | - |
| Bromoform, ug/L                                      | <0.5    | <0.5 | <0.5 | - |
| Bromomethane, ug/L (Methyl bromide)                  | <1.0    | <1.0 | <1.0 | - |
| n-Butylbenzene, ug/L                                 | <0.3    | <0.3 | <0.3 | - |
| sec-Butylbenzene, ug/L                               | <0.4    | <0.4 | <0.4 | - |
| tert-Butylbenzene, ug/L                              | <0.5    | <0.5 | <0.5 | - |
| Carbon tetrachloride, ug/L                           | <0.2    | <0.2 | <0.2 | - |
| Chlorobenzene, ug/L                                  | <1.0    | <1.0 | <1.0 | - |
| Chloroethane, ug/L (Ethyl chloride)                  | <0.4    | <0.4 | <0.4 | - |
| Chloroform, ug/L                                     | <0.5    | <0.5 | <0.5 | - |
| Chloromethane, ug/L (Methyl chloride)                | <0.6    | <0.6 | <0.6 | - |
| 2-Chlorotoluene, ug/L (o-Chlorotoluene)              | <0.2    | <0.2 | <0.2 | - |
| 4-Chlorotoluene, ug/L (p-Chlorotoluene)              | <0.2    | <0.2 | <0.2 | - |
| Dibromochloromethane, ug/L<br>(Chlorodibromomethane) | <0.4    | <0.4 | <0.4 | - |
| 1,2-Dibromo-3-chloropropane, ug/L                    | <1.2    | <1.2 | <1.2 | - |
| 1,2-Dibromoethane, ug/L<br>(Ethylene dibromide)      | <0.2    | <0.2 | <0.2 | - |
| 1,2-Dichlorobenzene, ug/L<br>(o-Dichlorobenzene)     | <1.0    | <1.0 | <1.0 | - |
| 1,3-Dichlorobenzene, ug/L<br>(m-Dichlorobenzene)     | <1.0    | <1.0 | <1.0 | - |

< means "not detected at this level". 1 mg = 1000 ug.



MEMBER





# SERCO Laboratories

1931 West County Road C2. St. Paul. Minnesota 55113 Phone (612) 636-7173 FAX (612) 636-7178

LABORATORY ANALYSIS REPORT NO: 23071  
09/14/92

PAGE 2

|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| SERCO SAMPLE NO:    | 81342 | 81352 | 81362 | 81372 |
| SAMPLE DESCRIPTION: | MW-1  | MW-2  | MW-3  | S-3   |

| ANALYSIS:  | M92-614 |      |      |   |
|--|---------|------|------|---|
| 1,4-Dichlorobenzene, ug/L<br>(p-Dichlorobenzene)       | <1.0    | <1.0 | <1.0 | - |
| Dichlorodifluoromethane, ug/L (Freon 12)               | <0.5    | <0.5 | <0.5 | - |
| 1,1-Dichloroethane, ug/L                               | <0.1    | <0.1 | <0.1 | - |
| 1,2-Dichloroethane, ug/L<br>(Ethylene dichloride)      | <0.2    | <0.2 | <0.2 | - |
| 1,1-Dichloroethene, ug/L                               | <0.2    | <0.2 | <0.2 | - |
| cis-1,2-Dichloroethene, ug/L                           | <0.1    | <0.1 | <0.1 | - |
| trans-1,2-Dichloroethene, ug/L                         | <0.1    | <0.1 | <0.1 | - |
| Dichlorofluoromethane, ug/L (Freon 21)                 | <1.2    | <1.2 | <1.2 | - |
| 1,2-Dichloropropane, ug/L                              | <0.1    | <0.1 | <0.1 | - |
| 1,3-Dichloropropane, ug/L                              | <0.2    | <0.2 | <0.2 | - |
| 2,2-Dichloropropane, ug/L                              | <0.2    | <0.2 | <0.2 | - |
| 1,1-Dichloropropene, ug/L                              | <0.2    | <0.2 | <0.2 | - |
| cis-1,3-Dichloropropene, ug/L                          | <1.5    | <1.5 | <1.5 | - |
| trans-1,3-Dichloropropene, ug/L                        | <0.9    | <0.9 | <0.9 | - |
| Ethylbenzene, ug/L                                     | <1.0    | <1.0 | <1.0 | - |
| Ethyl ether, ug/L                                      | <10     | <10  | <10  | - |
| Hexachlorobutadiene, ug/L                              | <0.3    | <0.3 | <0.3 | - |
| Isopropylbenzene, ug/L, (Cumene)                       | <1.0    | <1.0 | <1.0 | - |
| 4-Isopropyltoluene, ug/L<br>(p-Isopropyltoluene)       | <0.5    | <0.5 | <0.5 | - |
| Methyl ethyl ketone, ug/L (2-Butanone)                 | <5.0    | <5.0 | <5.0 | - |
| Methyl isobutyl ketone, ug/L<br>(4-Methyl-2-pentanone) | <5.0    | <5.0 | <5.0 | - |
| Methyl tertiary butyl ether, ug/L                      | <10     | <10  | <10  | - |
| Methylene chloride, ug/L<br>(Dichloromethane)          | <5.0    | <5.0 | <5.0 | - |
| Naphthalene, ug/L                                      | <0.2    | <0.2 | <0.2 | - |
| Styrene, ug/L  | <1.0    | <1.0 | <1.0 | - |

< means "not detected at this level". 1 mg = 1000 ug.



MEMBER







# SERCO Laboratories

1931 West County Road C2, St. Paul, Minnesota 55113 Phone (612) 636-7173 FAX (612) 636-7178

## LABORATORY ANALYSIS REPORT NO: 23071 09/14/92

PAGE 3

|                     |       |       |       |       |
|---------------------|-------|-------|-------|-------|
| SERCO SAMPLE NO:    | 81342 | 81352 | 81362 | 81372 |
| SAMPLE DESCRIPTION: | MW-1  | MW-2  | MW-3  | S-3   |

| ANALYSIS:                                    | M92-614 |       |       |        |
|--|---------|-------|-------|--------|
| -----  | -----   | ----- | ----- | -----  |
| 1,1,1,2-Tetrachloroethane, ug/L              | <0.1    | <0.1  | <0.1  | -      |
| 1,1,2,2-Tetrachloroethane, ug/L              | <0.2    | <0.2  | <0.2  | -      |
| Tetrachloroethene, ug/L                      | <1.5    | <1.5  | <1.5  | -      |
| Tetrahydrofuran, ug/L                        | <5.0    | <5.0  | <5.0  | -      |
| Toluene, ug/L                                | <1.0    | <1.0  | <1.0  | -      |
| 1,2,3-Trichlorobenzene, ug/L                 | <0.2    | <0.2  | <0.2  | -      |
| 1,2,4-Trichlorobenzene, ug/L                 | <0.2    | <0.2  | <0.2  | -      |
| 1,1,1-Trichloroethane, ug/L                  | <5.0    | <5.0  | <5.0  | -      |
| 1,1,2-Trichloroethane, ug/L                  | <0.1    | <0.1  | <0.1  | -      |
| Trichloroethene, ug/L                        | <0.4    | <0.4  | <0.4  | -      |
| Trichlorofluoromethane, ug/L (Freon 11)      | <0.7    | <0.7  | <0.7  | -      |
| 1,2,3-Trichloropropane, ug/L                 | <0.2    | <0.2  | <0.2  | -      |
| 1,1,2-Trichlorotrifluoroethane, ug/L         | <5.0    | <5.0  | <5.0  | -      |
| 1,2,4-Trimethylbenzene, ug/L                 | <0.2    | <0.2  | <0.2  | -      |
| 1,3,5-Trimethylbenzene, ug/L<br>(Mesitylene) | <0.3    | <0.3  | <0.3  | -      |
| Vinyl chloride, ug/L                         | <1.0    | <1.0  | <1.0  | -      |
| Total Xylene, ug/L                           | <1.0    | <1.0  | <1.0  | -      |
| Dibromomethane, ug/L                         | <0.2    | <0.2  | <0.2  | -      |
| FID Scan, mg/L, as #2 fuel oil               | <2.0    | <2.0  | <2.0  | -      |
| Benzene, mg/kg                               | -       | -     | -     | <0.005 |
| Ethylbenzene, mg/kg                          | -       | -     | -     | <0.005 |
| Toluene, mg/kg                               | -       | -     | -     | <0.005 |
| Xylene, mg/kg                                | -       | -     | -     | <0.005 |
| FID Scan, mg/kg, as #2 fuel oil              | -       | -     | -     | <2.0   |

< means "not detected at this level". 1 mg = 1000 ug.



MEMBER





# SERCO Laboratories

1931 West County Road C2. St. Paul, Minnesota 55113 Phone (612) 636-7173 FAX (612) 636-7178

LABORATORY ANALYSIS REPORT NO: 23071  
09/14/92

PAGE 4

|                     |       |       |
|---------------------|-------|-------|
| SERCO SAMPLE NO:    | 81382 | 81392 |
| SAMPLE DESCRIPTION: | S-4   | S-5   |

ANALYSIS:

|                                 |        |        |
|---------------------------------|--------|--------|
| Benzene, mg/kg                  | <0.005 | <0.005 |
| Ethylbenzene, mg/kg             | <0.005 | <0.005 |
| Toluene, mg/kg                  | <0.005 | <0.005 |
| Xylene, mg/kg                   | <0.005 | <0.005 |
| FID Scan, mg/kg, as #2 fuel oil | <2.0   | <2.0   |

Samples received in non-SERCO Laboratories containers.

All analyses were performed using EPA or other accepted methodologies. Samples that may be of an environmentally hazardous nature will be returned to you. Other samples will be stored for 30 days from the date of this report, then disposed of by SERCO Laboratories. Please contact me if other arrangements are needed. This report may not be reproduced, except in its entirety, without prior written approval from SERCO Laboratories.

Report submitted by,



for  
Diane J. Anderson  
Project Manager

< means "not detected at this level". 1 mg = 1000 ug.



MEMBER







APPENDIX E  
MGS WATER WELL LOGS





616 E. 78 St. 222919 53

0-235 drift comm. DEPT E/ 850

235-245 Shakopee 1.1.11

OPRC - DUMT

Agencies: UNKNOWN (NCR)

LOCATED BY \_\_\_\_\_

Address Verification \_\_\_\_\_

Name on Mailbox \_\_\_\_\_

Block \_\_\_\_\_

City Block \_\_\_\_\_

0. From Owner \_\_\_\_\_

0. From Neighbor \_\_\_\_\_

her \_\_\_\_\_

Can't Locate State Why \_\_\_\_\_

28-24-133

28-24-133

28-24-133

28-24-133

838

236

607 DL

1040

20-10316



WELL LOG STATEMENT

204968

File No.

1040

Well No.

2724-2 b a 5

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well

Stadium Bowl

Locate Well on Plat of Section

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

OK A 594

County

City or Town

Sec.

Twp.

Range

Describe Further by Lot, Block, Nearest Highway, Street and Number

E 15 E 78 St

2711

24W

Drilled for:

Driller

Dependable Well Co.

Address

E 15 E 78 St

Address

Date of Completion

REPORT OF FINAL PUMPING TEST

Date of Test

Site

Upland, Valley, Hillside, Etc.

Duration of Test

Hrs.

Min.

Type of Well

Dug, Driven, Bored, Drill

Rate of Pumping

GPM

Drill Rig Used

Solid Tool, Jet, R

Rate of Pumping

Ft.

Diameter: Top

4"

Bottom

Rate of Pumping

Ft.

Depth of Well

47

Drawdown

5

Ft.

Ground Elevation

830

Sea Level Datum or Give Distance Above

Time Required for Recovery

Expected Average Yield

Gal. per day

or Below R. R., Highway, Lake, Etc.

If Other Tests were Made, Give Details on Another Sheet.

Height of Casing Above Ground

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

Quality of Water

(Hard or Soft, Fresh or Salty, Etc.)

Temperature of Water

Was Laboratory Analysis Made?

For What Purpose Will Water Be Used?

Is Well Pumped? Pump Capacity GPM

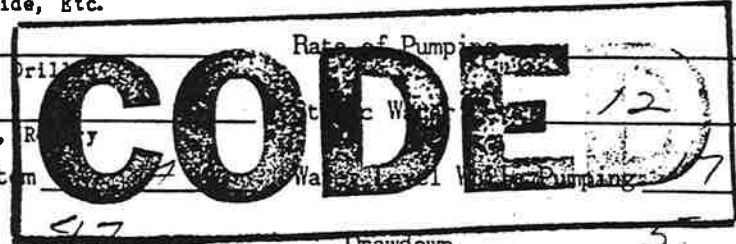
Was Well Sealed on Completion?

Does Well Overflow Without Pumping? Yes or No

Natural Flow GPM

What Pressure, or Head, at Ground Level?

Principal Aquifer Penetrated



818







RECEIVED

MINNESOTA CONSERVATION DEPARTMENT DIVISION OF WATERS

WELL LOG STATEMENT

M-1

ADP 2-7-24-2 BCACBD 968 ELEV. 810±3 AUG 21 1960

204970

El 58 PM

File No. Well No. 27.24.26ca

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well Test Well #1 Hennepin County Bloomington Minn. Ph. 881-5811 81st St & Park Ave. So.

Grid for Locating Well on Plat of Section with Sec., Twp., Range labels.

Owner Bloomington Village Driller Bergerson-Caswell Inc. Address 13120 Wayzata Blvd. Mpls. Minn.

Date of Completion 10-26-59 Date of Test 10-26-59 Site Upland, Valley, Hillside, Etc. Type of Well Drilled Rate of Pumping 500 GPM Drill Rig Used Solid Tool Static Water Level 58 Ft. Diameter: Top 12" Bottom 6" Water Level While Pumping 123 Ft. Depth of Well 389' Drawdown 65 Ft.

Ground Elevation 820 Sea Level Datum or Give Distance Above or Below R. R., Highway, Lake, Etc. Height of Casing Above Ground Casing in hole

CODED

Quality of Water Fresh (Hard or Soft, Fresh or Salty, Etc.) Temperature of Water No. Was Laboratory Analysis Made? No

For What Purpose Will Water Be Used? Test hole Is Well Pumped? No Pump Capacity GPM Was Well Sealed on Completion? Yes Does Well Overflow Without Pumping? No

Administrative tracking table with columns for Director, Deputy, Secretary, Records, Puhl, Library, Permits, Inspection, Drainage, Hydro Stud, Reports, Watchdogs, Ground W., Surface W., Surveys, Printing.

Natural Flow GPM What Pressure, or Head, at Ground Level? Principal Aquifer Penetrated Fresh S.R.

THE DATA CONTAINED HEREIN IS CONFIDENTIAL AND IS TO BE USED FOR SCIENTIFIC STUDY ONLY BY THE DIVISION OF WATERS IN ACCORDANCE WITH M.S.A. 105.51.

2178





WELL LOG

820

| Geologic Formations<br>Kind, Color, Hard or Soft   | Thickness<br>of<br>Formation | Depth in Feet |      | Casing<br>Diam. | Water Conditions Found        |
|--|------------------------------|---------------|------|-----------------|-------------------------------|
|  |                              | From          | To   |                 |                               |
| Fine Sand  | 28                           | 0             | 28   | 12"             | QFUU                          |
| Sand & Gravel  | 25                           | 28            | 53   | {               | QFUU                          |
| Soft Brown Clay  | 12                           | 53            | 65   | {               | QTUB                          |
| Fine Brown Clay  | 10                           | 65            | 75   | {               | QTUB                          |
| Sandy Brown Clay   | 30                           | 75            | 105  | {               | QTUB                          |
| Hard " "   | 87'                          | 105           | 192  | 10"             | QTUB                          |
| Grey Clay (Tough, Sticky)  | 28                           | 192           | 220  | {               | QTUG                          |
| Blue Clay  | 9'                           | 220           | 229  | {               | QTUG                          |
| Tough Grey Clay & Stones   | 18'                          | 229           | 247  | {               | QTUG                          |
| Sand, Gravel & Rocks   | 3                            | 247           | 250  | {               | QFUU                          |
| Clay, Sand Gravel & <del>Cl</del>  | 9                            | 250           | 259  | 8"              | QUUU                          |
| Hard Clay & Rocks  | 1                            | 259           | 260  | {               | QTUU                          |
| Sand & broken L.R.   | 3                            | 260           | 263  | {               | QFUU                          |
| pc Onesta lime Rock  | 34                           | 263           | 297  | 6"              | 557(34) On                    |
| ls Jordan S.R.   | 89                           | 297           | 386  | {               | 573(91) J                     |
| sl St. Lawrence Shale  | 3-                           |               | 389- | {               |                               |
|  |                              |               |      |                 | Y10<br>297<br>573             |
|  |                              |               |      |                 | Ag. Con: UNKNOWN<br>NO RECORD |
| Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development |                              |               |      |                 |                               |

State of Minnesota )  
 ) ss.  
County of \_\_\_\_\_ )

\_\_\_\_\_ being first duly sworn, deposes and says, that the above well was constructed by him or under his supervision, and that he is personally familiar with the data presented in this statement, and that he hereby verifies that it is true and correct.

Subscribed and Sworn To Before Me

(Firm Name) Wagon-Caswell Inc.

This \_\_\_\_\_ Day of \_\_\_\_\_ 19\_\_\_\_

By James W. McKeigh

Title \_\_\_\_\_

Notary Public \_\_\_\_\_ County, Minn.



204972

68  
BLOOM

No. \_\_\_\_\_

# E. H. RENNER & SONS WELL COMPANY

7700 Highway No. 7 St. Louis Park

27-24-2  
6BBBBA  
Elev. 828±5

Richfield  
WELL LOG

INVOICES: (Well) No. 3-18-59 523  
(Pump) No. " " K-25

Date Started March 6, 1959

Date Completed March 20/59 19

Owner or Contractor U. E. Mathews

Address 8201 Portland Avenue South

Job Location 8201 Portland Avenue South

K, N-12, M, 17-18

Lot \_\_\_\_\_ Block \_\_\_\_\_ Twp or city \_\_\_\_\_ County \_\_\_\_\_ State of Minnesota

### Well:

Cased with 3" welded Ft. Total Depth of Well 206' from grade

Feet of Open Hole \_\_\_\_\_ Finished in water sand Water Level 60' grade

Tested at 20 gallons per min. Draw down of 4 feet.

### Screen:

Size 2" x 5' Make Johnson Everdur Slot or Gauge 18 slot Number \_\_\_\_\_  
(Screen has 3' lead pipe with check valve for seal)

### Pump:

Make MYERS OLYMPIAN H.P. 1 Type JET Tank Size 42

Motor Serial No. \_\_\_\_\_ Pump Serial No. \_\_\_\_\_ Drop Pipe 1 1/2 Galv. feet

Size 72' Capacity of pump \_\_\_\_\_ G.P.M. Date Installed March 25/59

| KIND OF FORMATION | COLOR OF FORMATION | STARTED DEPTH | ENDED DEPTH | TOTAL THICKNESS OF FORMATION | REMARKS |
|-------------------|--------------------|---------------|-------------|------------------------------|---------|
| Dry Sand QFUB     | Brown              | 0             | 42          | 42                           |         |
| Clay QTUR         | Red                | 42            | 63          | 21                           | Sticky  |
| Clay QTUG         | Blue               | 63            | 122         | 59                           |         |
| Clay QTUR         | Red                | 122           | 163         | 41                           | Sticky  |
| Clay QTUG         | Blue               | 163           | 175         | 12                           | Sticky  |
| Pack Gravel QFUB  | Brown              | 175           | 200         | 25                           |         |
| Water Sand QFUB   | Brown              | 200           | 206         | 13/622                       |         |

Aq-QBA A

# CODED

828  
206  
622



27-29-2  
BBABX  
Elev. 83±5

MINNESOTA CONSERVATION DEPARTMENT  
DIVISION OF WATERS

204969  
Blomberg

ADP  
1958

WELL LOG STATEMENT

File No. 104D  
Well No. 27/29-2 665

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well

Henn.  
County

Blomington  
City or Town

Locate Well on  
Plan of Section

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Sec. 2  
Twp. 27N  
Range 24W

Describe Further by Lot, Block, Nearest Highway, Street and Number

7820 CHICAGO AVE

Drilled for: Wm T. Collins Nat'l. Park

Driller: Dejeantales

Address

Address

Date of Completion June 26, 1959

REPORT OF FINAL PUMPING TEST  
Date of Test

Site Upland, Valley, Hillside, Etc.

Duration of Test      Hrs.      Min.

Type of Well Drilled  
Dug, Driven, Bored, Drilled

Rate of Pumping 100 GPM

Drill Rig Used Solid Tool, Jet, Rotary

Static Water Level 72 Ft. 76.5

Diameter: Top 6" Bottom     

Water Level While Pumping 77 Ft. 75.8

Depth of Well 409'

Drawdown 5 Ft.

Ground Elevation 830  
Sea Level Datum or Give Distance there

Time Required for Recovery  
Expected Average Yield      Gal. per day

Height of Casing Above Ground       
or Below R. R., Highway, Lake, Etc.

If      Test      Details on Another

Quality of Water       
(Hard or Soft, Fresh or Salty, Etc.)

Well      Near      Water Nearby

Temperature of Water     

Give Details.

**CODED**

Was Laboratory Analysis Made?     

For What Purpose Will Water Be Used?     

Is Well Pumped?      Pump Capacity      GPM

Was Well Sealed on Completion?     

Does Well Overflow Without Pumping?       
Yes or No

Natural Flow      GPM

What Pressure, or Head, at Ground Level?     

Principal Aquifer Penetrated Jordan S.S.



WELL LOG

830

| Geologic Formations<br>Kind, Color, Hard or Soft | Thickness<br>of<br>Formation | Depth in Feet     |     | Casing<br>Diam. | Water Conditions Found         |
|--|------------------------------|-------------------|-----|-----------------|--------------------------------|
|  |                              | From              | To  |                 |                                |
| Red sand & gravel                                | 10                           | 0                 | 10  | 6"              | to 271                         |
| Red sand & gravel                                | 39                           | 10                | 49  | 6" op           | water 271-404                  |
| Bl. clay   | 181                          | 49                | 230 |                 | steady gravel                  |
| Bl. clay & sand                                  | 35                           | 230               | 265 |                 |                                |
| Bl. gravel & s.s.                                | 5                            | 265               | 270 |                 | Coarse water                   |
| Shale & sandstone<br>white to pink L. S.         | 35                           | 270               | 305 | Opp             | S-0540 (35)                    |
| White to pink L. S.                              | 15                           | 305               | 320 | 6"              | JTS 25 (99)                    |
| Jordan<br>Pink white S.S.                        | 50                           | 320               | 370 |                 |                                |
| Pink S.S. & shale                                | 34                           | 370               | 404 | 5"              | St. Lawrence 3/440             |
| Bl. shale  |                              |                   |     |                 | no too high by 20'             |
|  | 830<br>270<br>560            | 830<br>365<br>525 |     |                 | 830<br>370<br>440              |
|  |                              |                   |     |                 | 426                            |
|  |                              |                   |     |                 | Agencies involved<br>No record |
|  |                              |                   |     |                 | OPPC - 050N                    |

Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development

I hereby certify that, to the best of my knowledge, the data presented in this statement is a true and correct representation of conditions encountered in the construction of this well.

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_

(Firm Name) \_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_





RECEIVED

MINNESOTA CONSERVATION DEPARTMENT

DIVISION OF WATERS

AUG 21 1960

P 42 3D

WELL LOG STATEMENT

Bloomington Bloomington File No. M-3

Well No. 27.24.2

DR04971

ST. PAUL 1, MINN.

DIVISION OF WATERS

Location of Well Test Well #3

Locate Well on Plat of Section

|  |  |  |
|--|--|--|
|  |  |  |
|  |  |  |
|  |  |  |

Bloomington  
Sec. \_\_\_\_\_  
Twp. \_\_\_\_\_  
Range. \_\_\_\_\_

Home pin Bloomington, Minnesota  
County City or Town

83rd St at Elliot Avenue, South  
Describe Further by Lot, Block, Nearest Highway, Street and Number.

Owner Village of Bloomington

Driller Bergerson-Coswell Inc.

Address \_\_\_\_\_

Address 13120-43rd St Blvd.

REPORT OF FINAL PUMPING TEST

Date of Completion 1-7-60

Date of Test 12-4-59

Site Upland, Valley, Hillside, Etc.

Duration of Test 6 Hrs. 15 Min.

Type of Well Drilled

Rate of Pumping 475 GPM

Drill Rig Used Solid Tool

Static Water Level 63 Ft. (757)

Diameter: Top 12" Bottom 8"

Water Level While Pumping 110 Ft.

Depth of Well 390'

**CODED**

Ground Elevation 8'  
Sea Level Datum or Five Feet Below

Field \_\_\_\_\_

Height of Casing Above Ground Casing was pulled

If Other Tests \_\_\_\_\_

Quality of Water Not tested  
(Hard or Soft, Fresh or Salty, Etc.)

Detail \_\_\_\_\_

Temperature of Water \_\_\_\_\_

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

Was Laboratory Analysis Made? \_\_\_\_\_

For What Purpose Will Water Be Used? \_\_\_\_\_

|            |  |            |
|------------|--|------------|
| Director   |  | Hydro Stud |
| Deputy     |  |            |
| Secretary  |  |            |
| Recorder   |  |            |
| Public     |  |            |
| Library    |  |            |
| Planning   |  |            |
| Inspection |  |            |
| Finance    |  |            |

Is Well Pumped? No Pump Capacity \_\_\_\_\_ GPM

Was Well Sealed on Completion? Yes

Does Well Overflow Without Pumping? No Yes or No

Natural Flow \_\_\_\_\_ GPM

What Pressure, or Head, at Ground Level? \_\_\_\_\_

Principal Aquifer Penetrated Jordan Sand

THE DATA CONTAINED HEREIN IS

CONFIDENTIAL

NOT TO BE USED FOR OTHER PURPOSES WITHOUT THE WRITTEN CONSENT OF THE DIVISION OF WATERS



WELL LOG

820

| Geologic Formations<br>Kind, Color, Hard or Soft | Thickness<br>of<br>Formation | Depth in Feet |     | Casing<br>Diam. | Water Conditions Found         |
|--|------------------------------|---------------|-----|-----------------|--------------------------------|
|  |                              | From          | To  |                 |                                |
| Sand   | 40'                          | 0             | 40  | 12"             | Artesian W.L. 9'               |
| Sand & Gravel                                    | 5'                           | 40            | 45  | 4"              | ATUG                           |
| Brown Clay                                       | 145                          | 45            | 190 | 10"             | ATUB                           |
| Blue Clay  | 5'                           | 190           | 195 | 4"              | ATUG                           |
| Brown Clay                                       | 15'                          | 195           | 210 | 4"              | ATUB                           |
| Grey Clay  | 32'                          | 210           | 242 | 4"              | ATUG                           |
| Hard Pan   | 24'                          | 242           | 266 | 4"              | ATUB - Oncoata 554(34)         |
| pc Shakinae / Oncoata L.R.                       | 34'                          | 266           | 300 | 8"              | No obvious crevices or feeders |
| Jordan S.R.                                      | 90'                          | 300           | 390 | 4"              | J 520(90)                      |
|  |                              |               |     |                 | 420                            |
|  |                              |               |     |                 | 266                            |
|  |                              |               |     |                 | 560                            |
|  |                              |               |     |                 | 554                            |

Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development

State of Minnesota )  
 ) ss.  
 County of \_\_\_\_\_ )

\_\_\_\_\_ being first duly sworn, deposes and says, that the above well was constructed by him or under his supervision, and that he is personally familiar with the data presented in this statement, and that he hereby verifies that it is true and correct.

Subscribed and Sworn To Before Me

(Firm Name) Bergerson Caswell Inc

This \_\_\_\_\_ Day of \_\_\_\_\_ 19\_\_

By James Maligh  
 Title \_\_\_\_\_



APPENDIX F

HYDROGEOLOGIC SETTING AND GROUND WATER  
CONTAMINATION CHARACTERIZATION WORKSHEET



**Hydrogeologic Setting and Ground Water Contamination Characterization  
Petroleum Release Sites**

Minnesota Pollution Control Agency  
Tanks and Spills Section  
May 1992

Complete this worksheet for all sites with ground water contamination. The worksheet has several purposes. It summarizes remedial investigation (RI) results and conclusions for use by Minnesota Pollution Control Agency (MPCA) staff when reviewing the site to determine whether corrective action will be required to remediate ground water contamination. It also provides supplementary information on investigation, design and reporting requirements (presented in bold type) for sites with ground water contamination. Review this worksheet and all other relevant MPCA documents when developing RI work plans to ensure the investigation meets all RI requirements.

Base answers to the following questions on the results of the ground water receptor survey, RI activities, and published geologic literature. Answer the questions in the space provided, and attach additional sheets if necessary.

1. Identify and describe the geologic units in which ground water has been impacted by the petroleum release. What is the thickness (or estimated thickness) and estimated lateral extent of the impacted unit?

The unconsolidated surficial quaternary deposits have been impacted by the release. The surficial sand unit is approximately 50 feet thick, and is underlain by 130 to 225 feet of clay (refer to MGS well logs, Appendix E). The surficial sand unit extends for several miles in all directions.

At all sites with ground water monitoring wells, the RI must include an estimate of hydraulic conductivity, and provide estimates of the ground water velocity in the impacted unit. Documentation of how you arrived at these estimates must be provided.

2. What is the hydraulic conductivity, effective porosity, horizontal hydraulic gradient, vertical hydraulic gradient, estimated ground water velocity and flow direction in the impacted unit?

K = 1 m/day      porosity = 25-40%      dh/dl = \_\_\_\_\_  
v = 4-6 ft/yr      Flow direction: S-SE      dv/dl = \_\_\_\_\_

3. What is the maximum concentration of benzene and total hydrocarbons detected on the site? (parts per billion (ppb) units)

Benzene <50 Boring B-2      Total Hydrocarbons 780, Boring B-2  
(Well No. \_\_\_\_\_, Date 7/20/92)      (Well No. \_\_\_\_\_, Date 7/20/92)

4. What is the maximum concentration of benzene and total hydrocarbons detected at or beyond the property boundary? (ppb units)

Benzene <1.0      Total Hydrocarbons <2.0  
(Well No. MW-1 MW-2, Date 9/3/92)      (Well No. MW-1, MW-2, Date 7/20/92)

5. Do contaminant concentrations for any compound exceed the Recommended Allowable Limit (RAL), at or beyond the site boundaries? (Yes/No)

6. Do sources of contamination (including contaminated soil) remain at the site? (Yes/No)  
If Yes, briefly describe.

Impacted soil extends from 15 to 31 feet below ground surface in the vicinity of the former tank basins.

7. Is municipal water supply available at the site and within one mile downgradient of the site? (Yes/No)





*Hydrogeologic Setting and Ground Water Characterization*

*Page 2*

*May 1992*

8. *Are there presently any water wells which use the impacted aquifer located within one half mile downgradient of the site, or one mile downgradient of the site if the aquifer material is fractured? (Yes/No)*
9. *Are there any plans for ground water development in the impacted aquifer within one half mile downgradient of the site, or one mile downgradient of the site if the aquifer material is fractured? (Yes/No)*

*If you answered No to questions 8 and 9, please skip to question 10 and continue.*

*If you answered Yes to question 8 or 9, and yes to question 5, corrective action will likely be required to remediate ground water contamination at the site. The RI report should include a proposed Corrective Action Design to meet the following cleanup goal and compliance point.*

*Cleanup Goal: The RAL for VOCs and 1 and part per million total hydrocarbons*

*Compliance Point: At and beyond the site boundaries.*

*At some LUST sites corrective actions may not be technically capable of achieving remediation to RALs. For a discussion of the options which should be considered when designing corrective actions for sites of this type please see the "LUST Program Cleanup Strategy" (Guidance Document 16). document.*

*Stop here if you answered Yes to question 8 or 9.*

10. *Are there nonpotable water supply wells which use the impacted unit downgradient of the site? (Yes/No)*

11. *Does the plume currently discharge to surface water? (Yes/No)*  
*If yes, what is the estimated width of the plume at the shore of the surface water body, and what are the estimated concentrations of the following contaminants at the shore of the surface water body: (The estimation method should be described in the text of the RI report.)*

*Benzene \_\_\_\_\_, Ethyl Benzene \_\_\_\_\_, Toluene \_\_\_\_\_, Xylenes \_\_\_\_\_,  
Total Hydrocarbons \_\_\_\_\_*

*If the answer to question number 11 is Yes, the use category of the surface water body should also be determined, in accordance with Minnesota Rules Chapter 7050, and reported.*

12. *Does the plume have a projected point of entry to surface water? (Yes/No)*  
*If Yes, what is the distance from the downgradient edge of the plume to the surface water body?*

*If you answered Yes to question 12, the RI report should characterize the hydrogeologic conditions and land use between the site and the surface water body, and should assess the potential for the plume to discharge to surface water and the likelihood of future ground water use in the vicinity of the plume.*

13. *Is the impacted unit a bedrock aquifer? (Yes/No)*
14. *Has contamination from the site impacted a quaternary surficial or buried aquifer that is presently used as a drinking water aquifer anywhere within a two mile radius of the site? (Yes/No)*

*Stop here if you answered Yes to question 13 or 14. If you answered No to both questions 13 and 14, please continue.*



15. *Identify and describe the uppermost drinking water aquifer in the site vicinity. What is the depth to the top of the uppermost drinking water aquifer? What is the water level in the uppermost drinking aquifer?*
16. *Is there a confining unit between the impacted unit and the uppermost drinking water aquifer? What is its thickness and extent?*
17. *Is the uppermost drinking water aquifer a karst unit or a sole source aquifer?*
18. *Are there any existing or abandoned wells within approximately 1,000 feet downgradient of the site?*
19. *Are there any other site specific conditions which increase the risk of cross contamination from the impacted unit to a drinking water aquifer?*
20. *Based on the answers to questions 14 through 18 and any other site specific information available, summarize and assess the risk of cross contamination from the impacted unit to the uppermost drinking water aquifer.*



