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Second Five-Year Review Report
Reilly Tar & Chemical Company
St. Louis Park, Minnesota
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SECOND FIVE-YEAR REVIEW REPORT

REILLY TAR & CHEMICAL COMPANY

I. Introduction

The Minnesota Pollution Control Agency (MPCA) conducted this Five-Year Review of the remedial actions (RA) implemented as part of the 1984 and 1986 Records of Decision (RODs) at the Reilly Tar Superfund Site (Site), St. Louis Park, Minnesota, on behalf of the United States Environmental Protection Agency (EPA). A previous Five-Year Review was completed March 28, 1996. This report documents the results of the review. The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify any deficiencies found during the review and identify recommendations to address them.

This review is required by statute. EPA must implement five-year reviews consistent with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substance Contingency Plan (NCP). CERCLA § Section 121(c), as amended states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulation (CFR) states:

If a remedial action is selected that results in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the second five-year review for the Reilly Tar Superfund site. The triggering action for this review is the completion of the first five-year review on March 28, 1996. Due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unrestricted use and unlimited exposure, another five-year review is required.

II. Site Background and Chronology

Between 1917 and 1972, Reilly Industries (Reilly) operated a coal tar distillation and wood preserving plant, known as the Republic Creosoting Company (Republic). See attached Site Location and Site Photo maps. The bulk of the plant's operations took place in the south-central and southeastern portions of the Site. These areas contained the coal tar distillation still, wood-treating building, and the aboveground and underground storage tanks (for creosote, tars, pitch and fuel oils).

In 1972, the plant was dismantled and the land sold to the City of St. Louis Park (City). In 1973, a storm water runoff collection system was built which fed into a lined pond on the Site. The pond on the Site discharges into a drain that is routed to another pond off-site before it eventually discharges into Minnehaha Creek. The City monitors the discharge into the creek. Construction of a block of condominiums on the northern part of the Site began in 1976. Louisiana Avenue construction was done during 1991 and 1992.

Waste Disposal Practices

From about 1917 to 1939, wastes containing coal tar and its distillation by-products were discharged, as a matter of disposal practice, overland into a ditch that ran the length of the Site and then emptied into a peat bog south of the Site. A thick accumulation of tar was present on the sides and bottom of the ditch. The waste was milky, and contained floating oil, emulsified oil and settled tar. The road ditch between Walker Street and the plant contained a tar accumulation of about six inches. Oily water extended over the surface of the bog and much of the vegetation and peat was covered by tar. A 1938 report by L.L. Kemps, Assistant Public Health Engineer, noted that 6,000 gallons per week of effluent (coal tar distillates and wood treating waste) were discharged into the swamp with observed flow rates of 150-200 gallons per minute (gpm).

In 1940-41, a wastewater treatment facility was installed, but the effluent continued to be discharged into the bog. The values of both phenols and oil and grease in the discharge water varied typically from 100 to 1000 micrograms per liter (ug/l). This discharge into the bog continued for the duration of the facility's operation.

Chemical contaminants may have also been released from a waste pond located in the main coal tar distilling/wood preserving area in the southeast corner of the Site. Soil contamination with coal tar and creosote also occurred throughout the Site during its operational history via drips from leaky piping, precipitation wash off from stockpiled treated lumber, and spills of process materials.

Wells

The Minnesota Sugar Beet Company was located on the Site prior to 1917. They used a large well (Sugar Beet Well), which was not abandoned before Republic purchased the

property. The well was reportedly completed in the Mt. Simon-Hinckley sandstone to a depth of 955 feet with a 16-inch casing to 58-feet, and 12 inch casing to 150-feet. Apparently, the well driller's tools were lost in the hole when it was drilled in 1898. The well must have been accessible since children habitually dropped things down the hole. In 1917, Republic cleaned out the Sugar Beet Well and added a 10-inch casing to 150 feet.

There were 12 additional wells on the Site from the time of the sugar beet factory, some of which were 50-60 feet deep, and others 100-200 feet deep. Based on the clogging information, the wells were probably located in the middle and lower drift aquifers. These wells were apparently not abandoned by Republic. Investigations to locate and seal these wells have been completed.

An additional deep well, (W23) was drilled by Republic in 1918, 909 feet into the Mt. Simon-Hinckley sandstone. In 1933, 10-inch casing was added to a depth of 73 feet, 8 inch casing to 260 feet and 4.5 inch casing to 373 feet. Waste materials were apparently dumped into or flowed into this well. One document from the 1930s stated that Reilly had a waste well into which they ran their refuse oil. A letter from McCarthy Well Company stated that two old abandoned wells were found at the Republic Plant that were being used to drain creosote down to the ground. A 1940 letter states that this well water was never used for drinking purposes due to taste and odor.

Ground Water Contamination

The creosote and waste products resulting from the processes polluted the surface of the Site and four aquifers. The deep aquifers were polluted by direct migration of contaminants within the aquifers via W23. Consequently, many private wells and eventually municipal supplies became contaminated with polynuclear aromatic hydrocarbons (PAHs).

By 1932, water in the Prairie du Chien-Jordan Aquifer, the region's source of ground water, was contaminated 3,500 feet from the facility. The City drilled its first municipal well, W112, in 1932, to the Prairie du Chien-Jordan Aquifer at 393 feet (and cased the entire depth). The water in the well had a "very pronounced creosote taste and odor", so the City extended the well down another 150 feet through the St. Lawrence confining bed. This did not alleviate the taste problem, however, and a trace of phenol was reported. This well was closed within two weeks of its startup. One of the two deep wells at the Reilly plant was discussed as being the source of the contamination of W112. Also at this time, the Reilly facility cased W23 to 373 feet.

During the 1930s and 1940s, several private wells near the Site complained of contamination in water drawn from the Drift-Platteville Aquifer. The first written complaint from a resident in the vicinity, about a phenol taste in his well water, occurred in 1938. Users of commercial wells in the St. Peter and Prairie du Chien-Jordan also commented on the presence of phenolic tastes in their well water.

St. Louis Park (SLP) well-10 and SLP-15, which are contiguous, were closed in November 1978 due to elevated levels of PAHs in the untreated water. SLP-7 and SLP-9 were also closed due to their proximity to the contaminated plume and due to the concern that, with SLP-10 and SLP-15 shut down, the hydraulic gradient would be controlled by SLP-7 and SLP- 9 and thus, those wells would quickly become more contaminated. In December 1979, SLP- 4 and SLP-5 were also closed due to elevated PAH concentrations. The amount of water supply lost to the City due to the closure of six wells was approximately 35% of the capacity existing prior to 1978. Consequently, the City instituted a water conservation program during the summer, increased pumping rates at uncontaminated wells, and drilled SLP-17 to the deeper Mt. Simon-Hinckley Aquifer. The City also purchased a limited amount of water from the neighboring city of Plymouth. Since, 1978 the Reilly and the City have constructed treatment plants for wells SLP4, SLP10, and SLP15. Water from these wells is now treated and added to the distribution system so that special conservation measures are normally no longer necessary.

In 1979, 28 multi-aquifer wells were abandoned or reconstructed to prevent the spread of contamination. A plan for a gradient control well system was drawn up in 1981. The Consent Decree (CD) was issued on September 5, 1986 along with a CD RAP.

In 1998 Reilly Tar and Chemical Company began asking the MPCA and EPA about changing the Financial Responsibility reporting criteria in Part Z of the Consent Order through an amendment. The concern was that the existing language did not allow Reilly to take into account the intangible assets in determining its Net Worth. This restricted the Total Liabilities vs. Net Worth Ratio and restricted Reilly's ability to leverage its assets for growth. MPCA and EPA agreed to the changes and on November 8, 1999, an amendment to the Consent Decree was filed.

III. Remedial Actions

A. Remedy Selection

The Site has been broken up into five operable units. Operable Unit 1 consists of the RA selected in the June 6, 1984, ROD. Operable Unit 2 consists of 11 RAs contained in the May 30, 1986, Enforcement Decision Document (EDD). Two of the RAs in the EDD called for additional Remedial Investigation/Feasibility Study (RI/FS) work in portions of the Drift/Platteville and St. Peter Aquifers. This RI/FS work resulted in three additional Operable Units. RAs for Operable Unit 3 were contained in a ROD issued September 30, 1992. RAs for Operable Unit 4 were contained in a ROD issued September 30, 1990. RAs for Operable Unit 5 were contained in a ROD issued June 30, 1995.

B. Remedial Action Objectives

Operable Unit 1

Restoration of drinking water supply to St. Louis Park

Operable Unit 2

1. Containment or treatment of ground water in contaminated aquifers
2. Source control of the bog and contaminated soil at the Site. Because of the large volume of soils remaining at the site, this source could not be cost effectively addressed. The focus of the RA has been the maintenance of a site soil cover and containment and removal of contaminated ground water.

Operable Unit 3

The interception and containment of contaminants by use of gradient control wells which will prevent the further spread of contaminated ground water in the Northern Area of the Drift Aquifer. Continued water level and water quality monitoring of the aquifer.

Operable Unit 4

The interception and containment of contaminants by pumping well number W410 in the St. Peter Aquifer. Continued water level and water quality monitoring of the aquifer.

Operable Unit 5

The interception and containment of contaminants by use of a gradient control well which will prevent the further spread of contaminated ground water in the Northern Area of the Platteville Aquifer. Continued water level and water quality monitoring of the aquifer.

C. Remedy Implementation

Operable Unit 1 RA

1. Restoration of the drinking water supply and water quality by construction of a Granulated Activated Carbon (GAC) treatment system for SLP-10 and SLP-15.

On December 27, 1985, Calgon Corporation, under contract to Reilly, completed the construction of the GAC treatment plant to filter contaminants from water from SLP-10 and SLP-15. The plant began full operation on July 9, 1986 treating water obtained from the Prairie du Chien Aquifer.

The City analyzes the quality of the water being discharged to the water supply on a quarterly basis. If the analyses should indicate that the concentration of the chemicals or

groups of chemicals listed in Table 1 are exceeded, or are approaching the drinking water criteria, sampling frequency is increased to confirm the need for replacing the GAC and the change is ordered. Based on past usage, the City changes the carbon once a year.

Operable Unit 2 RA

1. Monitoring and contingency treatment of the Mt. Simon-Hinckley Aquifer to maintain drinking water quality.

Under the requirements of the CD/Response Action Plan (RAP) section 5, the City is required to monitor the water quality in the Mt. Simon-Hinckley Aquifer and to provide contingent remediation if the aquifer becomes contaminated. The City currently monitors four wells screened in this aquifer: SLP-11, -12, -13 and -17. These are all water supply production wells. In addition, the City is required to monitor any new wells developed in this aquifer within one mile of the Site. No significant contamination has been detected in this aquifer. The location of the St. Louis Park wells in this aquifer are shown on Figure 1.

2. Monitoring, pumping and treatment of the Ironton-Galesville Aquifer to protect the deeper Mt. Simon-Hinckley Aquifer.

The well used by the Minnesota Sugar Beet Company was called the Sugar Beet Well, or W105. In 1991, the City requested that pumping cease and on December 4, 1991, the EPA and the MPCA approved the request and pumping was terminated on December 31, 1991.

The location of the area of contamination in the Ironton-Galesville Aquifer is shown on Figure 2.

3. Monitoring, pumping and treatment of the Prairie du Chien-Jordan Aquifer until such time that drinking water quality is uniformly established within the area of gradient control.

Twenty-six wells are presently included in this RA. These include municipal production wells in Edina, Hopkins, Minnetonka, and St. Louis Park (including wells SLP-10 and SLP-15 discussed elsewhere in this document); source control wells to remove contamination beneath and in the vicinity of the Site; and gradient control wells in the vicinity of the Site installed to prevent the further migration of contaminated ground water.

The location of the area of contamination in the Prairie du Chien-Jordan Aquifer is shown on Figure 3.

Reilly used at least one well for disposal of process wastes (W23). During the environmental investigation of the Site, W23 was found to be partly filled with coal tar.

When drilled in 1917, it was 909 feet deep and may have permitted the flow of water out of the Prairie du Chien-Jordan Aquifer and into the underlying Ironton-Galesville and Mount Simon-Hinckley Aquifers. In 1981, the MPCA cleaned out both W23, to a depth of 866 feet, and W-105 (the Sugar Beet Well).

The CD/RAP requires that W23 be pumped at an average 50 gpm and to continue for at least five years and continue pumping until concentrations in the well water decline to less than 10,000 parts per trillion (ppt) total PAH. Well W23 continues to be pumped with total PAHs regularly exceeding 10,000 ppt total PAH.

The CD/RAP requires that SLP-4 be pumped at 900 gpm as a gradient control well until water quality in this well and monitoring wells in the vicinity are each less than the drinking water standard. Pumping of this well began in August 1992. Currently, concentrations are still slightly above the total PAH criteria for drinking water The treatment plant for SLP4 is operated similarly to the SLP10/SLP15 plant W48, the Methodist Hospital well, which was a component of the gradient control system, is no longer pumping because the hospital does not use it anymore as a source of cooling water. The City and MPCA are currently evaluating the need to retain this well as a gradient control well. Groundwater modeling may provide simulations that could help support decisions on whether pumping strategies may help in this area. A monitoring well is being considered to verify the possible flow of contaminants toward the Edina monitoring wells located south of the site.

4. Monitoring and contingent action for the maintenance of drinking water quality in the St. Peter Aquifer.

Additional details concerning the remedial action in the St. Peter Aquifer are provided below under the sections pertaining to Operable Unit 4.

Twelve wells are used to meet the requirements of this RA. Municipal well SLP-3 and well W410 are pumping wells. Most of the wells are monitoring wells installed as a result of the RI work performed in 1988. Only one well is used as a gradient control well, W410.

Since 1988 samples for PAH compounds have been collected from selected monitoring wells in the St. Peter Aquifer. During each round of sampling, water level measurements are also collected. The RI work confirms the presence of contaminants in several wells above the CD drinking water criteria.

The location of the area of contamination in the St. Peter Aquifer is shown on Figure 4.

5. Monitoring, pumping and treatment of the Drift and Platteville Aquifers to protect the downgradient use of the aquifer and the deeper St. Peter Aquifer.

The purpose of this RA is to control migration of contaminants in the Drift and Platteville Aquifers outside the Northern Area. Remedial actions taken in the Northern Area are discussed below under Operable Unit 3, Drift Aquifer of the Northern Area, and Operable Unit 5, Platteville Aquifer of the Northern Area. The contaminants in the Drift and Platteville Aquifers may have originated from Site discharges to surface water bodies which then migrated to the underlying soil and Platteville. In addition, downgradient migration of contaminants to the southeast from the Drift and Platteville could result in contamination of the St. Peter via an erosional trough (also known as a buried valley) through the Platteville and Glenwood Shale which normally protects the St. Peter from the downward migration of contaminants.

The location of the area of contamination in the Drift and Platteville Aquifers is shown on Figure 5.

This RA consists of a gradient control well in the Drift Aquifer, W422, and a source control well, W420. The Platteville Aquifer has a source control well, W421. These wells have been monitored quarterly since 1987 when pumping began. These wells continue to operate as designed with discharge amounts published in the Annual Progress Report.

The ground water treatment system for these three wells includes prefiltering with a continuous backwashing sand filter. Periodically, the sand filter is aerated by hand to enhance iron and manganese removal. A small portion (about 10 to 15 gallons per minute, gpm) of the raw water is diverted from the sand filter to the sanitary sewer without carbon treatment. This water meets sanitary sewer water quality standards while reducing treatment costs. The remainder of the water, about 120 gpm, is treated and discharged to the storm sewer and is required under an National Pollutant Discharge Elimination System (NPDES) permit to meet drinking water criteria. Wastewater from sand filter backwashing is recycled through the system and settled iron sludge is discharged to the sanitary sewer.

The City has initiated a contingent action to protect the St. Peter Aquifer by preventing the migration of contaminated ground water in the Drift and Platteville into the buried valley southeast of the site. Contaminants entering the buried valley, which is filled with drift deposits, could migrate downward and laterally into the St. Peter Aquifer. This contingent remedial action consists of the installation of a gradient control well, W434, in the Platteville Aquifer. This well discharges to the sanitary sewer.

6. Monitoring, pumping and treatment of the source material in the Glacial Drift Aquifer and in well W23 in the Prairie du Chien-Jordan Aquifer.

An evaluation of well W23, which is located in the Prairie du Chien-Jordan Aquifer, is discussed under Operable Unit 2 item 3.

A discussion of the RA for the Glacial Drift Aquifer is included above under Operable Unit 2 item 5. A discussion of the RA for the Northern Area of the Glacial Drift Aquifer is included under the Operable Unit 5 section below.

7. Capping and filling of exposed hazardous wastes in the vicinity of the bog, south of the Site, in accordance with the U.S. Fish and Wildlife and EPA regulations.

The bog and wetland areas are located adjacent to the southeast corner of the Site, south of Walker Street and north of Highway 7. A U.S. Fish and Wildlife Service biologist inspected the area in question on January 6, 1987, and determined that requirements of the RAP and Work Plan for the wetlands had been met. The Work Plan for this project had been prepared in accordance with Sections 11.3.1 and 11.3.1.3 of the CD/RAP and had been approved by the MPCA, EPA, and the Department of the Interior.

The location of the wetland filling areas are shown on Figure 6.

8. Discharge of hazardous wastes to a sanitary sewer for any contaminated material excavated and dewatered for the purposes of construction of an intersection in the vicinity of the bog.

A memorandum of understanding (MOU) between the Minnesota Department of Transportation, MDH and MPCA was entered into in 1978 to prevent construction of the intersection at Highway 7 and Louisiana Avenue, because construction would interfere with the RI. The MOU was redrafted in 1984 to allow for construction of the intersection subject to the following restrictions: 1) the peat should be surcharged to permit it to support a roadway, in lieu of massive excavation of peat; 2) water removed from the peat during surcharging should be collected and discharged to the sanitary sewer; 3) any contaminated soil which is excavated must be handled in accordance with State and federal hazardous waste rules and regulations, if applicable; and 4) monitoring wells and piezometers which are in the path of construction must be closed in accordance with MDH requirements, and other monitoring wells and piezometers located near the proposed roadway must be either properly closed or protected, as directed by MPCA and MDH staff.

In 1991 and 1992 the road construction work was completed. As a result of this work, 400 cubic yards of contaminated soil was generated. This soil was disposed of at the U.S. Pollution Control Inc. landfill in Rosemount, Minnesota.

No information was located indicating that contaminated water was generated during this work.

9. Further subsurface investigation in the vicinity of the Site, to implement deed restrictions for current and future land use in the areas of contamination.

The purpose of this RA was to investigate soil conditions in the vicinity of the Site in order to identify areas of contamination that may affect future development near the Site and to provide a basis for institutional controls that may be necessary if and when development occurs. The work consisted of at least 20 borings to minimum depth of 35 feet in an area bounded by Lake Street on the north, Monitor Street and an imaginary line connecting Monitor Street and Methodist Hospital on the east, Minnehaha Creek on the south, and Taft Avenue and an imaginary line connecting Taft Avenue and Minnehaha Creek on the west. The location of this area is the shaded area on Figure 6.

10. Further RI/FS to determine the areal extent of, and remedy for, the contamination in the Northern Area of the Glacial Drift Aquifer adjacent to the Site.

In the past, the Drift and Platteville aquifers were considered to be part of the same aquifer system, and were treated as such in the CD/RAP. However, further investigations have shown that the Drift and Platteville aquifers have distinctly different hydrogeologic properties. The MPCA and EPA have determined that, for purposes of remediation, the two aquifers should be considered separately. For this reason, the goals and alternatives defined in the CD/RAP for the Drift-Platteville aquifer are now applied independently to the two aquifers and have been organized into separate operable Units. Operable Unit 3 is the Northern Area Drift Aquifer and Operable Unit 5 is the Northern Area Platteville Aquifer. The remaining areas of the Drift and Platteville aquifers are covered by Operable Unit 2.

The CD/RAP required an investigation and response action in the Drift and Platteville Aquifers in the northern area. The CD/RAP called for six monitoring wells in this area and an evaluation of the need for gradient and source control of contaminants. The Northern Area of the Drift-Platteville Aquifer is an area east of the Site, bounded by west 32nd Street to the north, Alabama Avenue to the east, Highway 7 to the south, and Louisiana Avenue to the west.

RI work plans for the Northern Area of the Drift-Platteville Aquifer were first submitted in 1986. The RI/FS was completed in 1992. On October 12, 1994, the FS for the Northern Area Platteville Aquifer was approved. The RAP for the Northern Area Drift Aquifer was approved on January 3, 1995.

The results of remedial actions performed in the Northern Area are discussed below in Section VI Assessment, of this 5-year review for Operable Unit 3 for the Northern Area Drift Aquifer and for Operable Unit 5 for the Platteville Aquifer.

Operable Unit 3 RA

The Northern Area of the Drift Aquifer represents one operable unit (OU3) within the overall site strategy. This remedy addresses only the Northern Area of the Drift Aquifer, and is intended to contain the spread of PAH contaminated ground water in this area within the Drift Aquifer.
The major components of the selected remedy include:

- The interception and containment of contaminants by use of gradient control wells which will prevent the further spread of contaminated ground water in the Northern Area of the Drift Aquifer.

- The discharge from the wells will initially be routed to the sanitary sewer for treatment at the Metropolitan Council Environmental Services wastewater treatment plant to remove contaminants from the collected ground water.

- Continued water level and water quality monitoring of the ground water contaminant plume during remediation activities.

- The MPCA anticipates that the water quality of the ground water will improve sufficiently to meet National Pollutant Discharge Elimination System (NPDES) limits without treatment. This would allow the City to route the ground water pumped from the gradient control wells to a storm sewer for eventual discharge to Minnehaha Creek.

The Drift aquifer lies between zero and 90 feet below the surface. There are no wells in the area that use the Drift for drinking water. However, the contamination in this aquifer has the potential to spread to other drinking water supplies and/or aquifers. This remedial action is intended to limit the further spread of contamination in an area called the Northern Area of the Drift aquifer. The Northern Area of the Drift Aquifer is an area east of the Site, bounded by west 32nd Street to the north, Alabama Avenue to the east, Highway 7 to the south, and Louisiana Avenue to the west.

Section 9 of the CD/RAP specifies the installation and operation of one or more gradient control wells to prevent the further spread of ground water in the Northern Area exceeding the drinking water criteria defined in Section 2.2 of the RAP. The gradient control well will capture ground water flow from the source and limit the spread of contamination.

A ROD was issued in September 1992 which called for one gradient control well, well 439. The gradient control system design for the Northern Area Drift Aquifer was approved by the agencies on January 3, 1995. Well W439 was screened in the lower one-third of the Drift aquifer, to maximize available drawdown.

Operable Unit 4 RA

The St. Peter Aquifer represents one operable unit (OU4) within the overall site strategy. This remedy addresses only the St. Peter Aquifer, and is intended to contain the spread of PAH contaminated ground water in this aquifer.
The major components of the selected remedy include:

- The interception and containment of contaminants by pumping well number W410 at a rate of 65 to 100 gallons per minute.

- The discharge to the well will initially be routed to the sanitary sewer for treatment at the Metropolitan Council Environmental Services Wastewater Treatment Plant to remove contaminants from the collected ground water.

- Continued water level and water quality monitoring of the ground water contaminant plume during pumping remediation activities. This is not only to document the effectiveness of the remedy but also to determine the need for on-site treatment.

- The MPCA anticipates that the water quality of the ground water pumped from W410 will improve sufficiently to meet NPDES limits without treatment . This would allow the City to route the ground water pumped from W410 to a storm sewer for eventual discharge to Minnehaha Creek.

The results of the RI indicated that a gradient control well was needed, and, after a ROD was issued in September 1990, monitoring well W410 was reconstructed and placed into service on May 30, 1991. This well is required to pump at a rate of 65 to 100 gpm. Since 1991, this well has been pumped at an average monthly rate of at least 70 gpm. The water from well W410 is discharged to the sanitary sewer. The location of the area of contamination in the St. Peter Aquifer is shown on Figure 4.

Well SLP-3 is the only municipal well in the St. Peter Aquifer. It is used only occasionally during high demand for municipal drinking water. Therefore, it only discharges to the distribution system when it is in operation. Historically, SLP-3 has shown good ground water quality.

Operable Unit 5 RA

The Northern Area of the Platteville Aquifer, Operable Unit 5

The Northern Area of the Platteville Aquifer represents one operable unit (OU5) within the overall site strategy. This area is east of the Site, bounded by West 32nd Street to the north, Alabama Avenue to the east, Highway 7 to the south, and Louisiana Avenue to the west. This remedy addresses only the Northern Area of the Platteville Aquifer, and is intended to contain the spread of contaminated ground water in this aquifer.

The major components of the selected remedy include:

- The interception and containment of contaminants by use of a gradient control well which will prevent the further spread of contaminated ground water in the Northern Area of the Platteville Aquifer.

- The discharge from the new well is initially routed to the sanitary sewer for treatment at the Metropolitan Council Environmental Services wastewater treatment plant to remove contaminants from the collected ground water.

- Continued water level and water quality monitoring of the ground water contaminant plume during remediation activities.

- The MPCA anticipates that the water quality of the extracted ground water will improve sufficiently to meet NPDES limits without treatment. This would allow the City to route the ground water pumped from the gradient control well to a storm sewer for eventual discharge to Minnehaha Creek.

Contamination in the Northern Area of the Platteville Aquifer exists in the form of dissolved concentrations of PAHs in the ground water. The Platteville aquifer lies between 70 and 100 feet below the surface. There are no wells in the area that use the Platteville for drinking water. However, the contamination in this aquifer has the potential to spread to other drinking water supplies and/or aquifers.

Section 9 of the CD/RAP specifies the installation and operation of one or more gradient control wells to prevent the further spread of ground water in the Northern Area of the Platteville Aquifer exceeding the drinking water criteria defined in Section 2.2 of the RAP. The gradient control well will capture ground water flow from the source and limit the spread of contamination.

On October 12, 1994 the Agencies approved an amended Feasibility Study for the Northern Area Platteville Aquifer and a ROD was signed on June 30, 1995. The ROD called for the drilling of a gradient control well, W440, and pump and control equipment was intended to be installed in an existing building.

Well W440 was installed and tested in July 1996. Subsequent pumping tests determined that the well could not achieve sufficient drawdown to establish gradient control. Since this location was considered the best potential location for a gradient control well in the Northern area, it was determined that the Northern area would not have a gradient control well. An Explanation of Significant Differences (ESD) was issued in March 1997 to select an alternative remedy. The alternative remedy was to use Well W434, which is located immediately south of the Northern area, as a substitute gradient control well. Well W434 was originally installed to capture contamination before it entered the buried bedrock valley southeast of the site. It was determined that Well W434 should also be

able to provide reasonable gradient control for the Northern area of the Platteville Aquifer.

D. System Operations

Listed below are the Operations and Maintenance costs incurred by the City of St. Louis Park while implementing the CD-RAP. The Costs have been quite stable except for consulting fees, which varies depending on what work is being completed. The year 2000 costs were higher than previous years as work on a Feasibility Study to replace W48, the hospital well took place.

City of St. Louis Park Reilly CD-RAP Expenses

	1996	**1997**	**1998**	**1999**	**2000**
Personnel	$18,727	$18,207	$15,510	$16,327	$18,088
Administration	$436	$461	$2,628	$918	$2,240
Capital Expense		$18,373			
O & M	$1,032	$5,553	$6,836	$2,676	$10,482
Utilities		$16,410	$13,291	$18,087	$17,820
Permit Sampling	$1,462	$1,745	$700	$1,655	$1,222
MCES &MPCA	$145,289	$177,284	$168,383	$113,699	$131,097
MCES add on	$46,817	$43,198	$57,590	$66,432	$26,640
GAC/carbon	$32,552	$53,171	$26,078	$60,075	$41,732
Consultants	$99,901	$94,825	$105,743	$143,144	$167,256
Shipping	$11,353	$14,191	$12,874	$9,736	$12,448
Sampling (Quanterra)	$170,950	$168,425	$127,450	$129,680	$103,560
TOTAL	**$528,519**	**$611,843**	**$537,083**	**$562,429**	**$532,584**

The City is concerned that Capital expenses will increase as the system ages. Wells and pumps are in need of replacement. While not showing up here, during the summer of 2001 the City had to replace a well which resulted in a short sprinkling ban.
The city performs CD-RAP compliance monitoring in accordance with a yearly monitoring plan which is submitted and reviewed the Agencies prior to implementation. The City is exploring ways to reduce sampling costs, such as use of a local laboratory to reduce shipping. However, Quanaterra appears to be one of the few laboratories to perform testing which will comply with the CD-RAP.

Experience has shown that it takes approximately one year for all of the carbon to be used up. Therefore, carbon replacement is scheduled for once a year.

E. Progress Since the Last Five-Year Review

Operable Unit 1

Routine visits to the GAC treatment system site and vicinity and annual reporting indicate that this remedial action is effective. The City operated the GAC system for pumped wells SLP10/15 without incident during the year 2000 with the exception of January, when the system went down for repairs. However, the reduction in pumping in January was made up during the rest of the year and 277 million gallons were pumped, exceeding the CD-RAP minimum of 200 million gallons (per year).

Operable Unit 2

The Mt. Simon-Hinckley Aquifer is continually monitored and the remedial action is effective in maintaining drinking water quality. There have been no occurrences of the city providing water exceeding drinking water standards.

The monitoring, pumping and treatment of the Ironton-Galesville Aquifer well W105 to protect the deeper Mt. Simon-Hinckley Aquifer was discontinued after having met the cleanup levels or cessation criteria specified in the CD/RAP. Based on annual monitoring data submitted by the City, the cessation criteria are still being met.

The Prairie du Chien-Jordan Aquifer continues to be pumped and treated until such time that drinking water quality is uniformly established within the area of gradient control. An evaluation of the possible spread of contaminants in the Prairie du Chien has been ongoing and is discussed in further detail in the Section VII Recommendations and Follow-up Actions.

Monitoring of the St. Peter Aquifer wells has reported ground water above drinking water standards in samples from wells W133, W412, and W122 since the last 5-Year Review. However, these samples have shown a recent decrease in PAH concentrations and none of the three wells have shown exceedances in the past year. Routine visits to the site and vicinity and annual reporting indicate that this remedial action is functional.

The Drift and Platteville Aquifers are monitored and pumped to protect the downgradient use of the aquifer and the deeper St. Peter Aquifer. The gradient control well, W422, was shut off in October 2000 after EPA and MPCA determined cessation criteria had been met. A source control well, W420, continues operating in the Drift Aquifer. The Platteville Aquifer has a source control well, W421.

Contaminated ground water moving to the southeast in the Drift/Platteville Aquifer could discharge into the St. Peter Aquifer as the ground water emerges from the aquifer at the edge of the buried valley. Ground water contamination remains relatively high in the monitoring wells and has shown no definite increase or decrease during the period of monitoring.

Operable Unit 3

Northern Area Drift Aquifer Site Conditions, Operable Unit 3

Data could be interpreted to show a slight decreasing trend in contaminant levels since pumping began.

Operable Unit 4

St. Peter Site Conditions, Operable Unit 4

A review of PAH concentrations found in samples of the St. Peter monitoring wells collected from 1991 through 2000 indicate that the PAH concentrations in most of the wells have remained relatively stable. Samples from W409 have shown increases since 1991, which probably reflects the effect of drawing ground water toward the pumping in well W410. Therefore the gradient control well is helping to control a significant portion of the contamination.

Operable Unit 5

The Northern Area of the Platteville Aquifer Site Conditions, Operable Unit 5

The PAH and phenol results of ground water monitoring since 1988 show that, near the source of contamination, PAH concentrations in ground water are consistently in the range of several hundred nanograms per liter to high micrograms per liter. Contaminant levels have fluctuated since sampling began.

Nearby Site Status

The following adjacent or nearby sites have had excavation or development activities that resulted in reporting activities or requesting information or Voluntary Investigation and Cleanup Program (VIC) correspondence from the MPCA in the last 5 years.

1. Oak Park Village Apartments, August 1999. Gazebo excavation found 5 cubic yards of impacted soils that were transported to Rosemount Landfill for disposal. Located on and procedure handled as part of the Reilly site.
2. Soils excavated from Twin Lakes Wetland and park, April 1997. 15,000 cubic yards of soil were disposed of onsite and covered with 6 inches of topsoil.

3. Sommerset Oaks Site. VIC issued a No Association Determination on January 15, 1998 for financing. Located on and procedure handled as part of the Reilly site.

4. Frauenshuh Development March 1999. This site is located at the southwest corner of Louisiana Avenue and Highway 7, a former wetland. A slab-on-grade medical office building has been proposed. The Remedial Investigation (RI) and Response Action

Plan (RAP) are approved and a No Association Determination was issued in February, 1999. Construction will begin when a tenant is found.

5. The Mill City Plywood site is located at a former wetland at the northwest corner of Louisiana Avenue and Highway 7. A slab on grade apartment complex was begun in 1999 with construction nearing completion. An RI and RAP were approved. Approximately 8,000 cubic yards of soil were excavated and thermally treated during Summer 2000. The building will be completed in 2001. The Property has a deed restriction in place.

6. Newport on 7 Apartments, 2000. Owners requested and received a No Association Determination, on June 27th, 2001. A Deed restriction is pending.

7. A Sprint PCS tower for cell phones was constructed in summer 2000 on the southeast corner of Louisiana Avenue and Highway 7, right next to the building for extraction wells W420 and W421. This tower is also located on the site of the former wetland.

8. Eller Media billboard site east along the northeast corner of Highway 7 and Louisiana Avenue, June 2001. Eller Media intends to purchase site and is currently seeking an Off-site Source Determination.

Other properties near the site would be expected to be developed in the future.

IV. Applicable or Relevant and Appropriate Requirements (ARARs)

The RAs implemented at this Site must meet all identified ARARs. Specifically, the remedy must be evaluated to determine that it meets any newly promulgated or modified federal and state environmental laws. The ARARs that generally apply to this Site are listed below:

Drinking Water Supply

1. Safe Drinking Water Act, 40 CFR Parts 141-143. Establishes maximum contaminant levels.

2. Minnesota Rules chapter 4720. Minnesota public water supply code. Establishes standards for construction, treatment, and monitoring of public water supplies.

3. Minnesota Rules chapter 4725. Water well code. Establishes standards for the construction, maintenance and sealing of wells.

4. Minnesota Rules pts. 4717.7100 - 4717.7650. Establishes Minnesota Health Risk Limits (HRLs).

5. Resource Conservation and Recovery Act. Applies to disposal of carbon used to treat contaminated ground water prior to discharge of the treated water to the City's distribution system.

Ground Water Remedial Action and Monitoring

1. Minnesota Rules 4725. Water well code. Establishes standards for the construction, maintenance and sealing of wells.

2. Minnesota Statutes Section 115.063. Establishes protecting ground water as a potable water source.

3. Minnesota Statutes Section 115.44. Classifies surface waters of the state.

4. Minnesota Rules 7001.050. Establishes terms and conditions of NPDES permits.

Other ARARs

1. Clean Water Act. Applies to NPDES permit for surface water discharge and pretreatment requirements for Publicly Owned Treatment Works

2. Resource Conservation and Recovery Act. Applies to disposal of carbon used to treat contaminated ground water prior to discharge of the treated water to the sanitary sewer system or to surface water.

Operable Unit 1

The following ARAR analysis applies to restoration of the drinking water supply and water quality by construction of a GAC treatment system for SLP-10 and -15.

1. Evaluation of Drinking Water ARARs

This remedy meets all ARARs listed. Table 1 lists the original drinking water criteria listed in the CD and compares them to the new State of Minnestoa Health Risk Limits (HRLs) for drinking water and Federal MCLs, where available .

TABLE 1
Drinking Water Criteria

	CD/RAP/ROD	HRLs	MCLs
Sum of Benz(a)pyrene and dibenzo(a,h)anthracene	5.6 ng/l	NONE	None
Carcinogenic PAHs	28.0 ng/l	50 ng/l	200ng/l*
Other PAHs	280.0 ng/l	300,000 ng/l	None

ng/l = nanograms/liter
*Benzo(a) pyrene

A comparison of the values in Table 1 indicates that the remedy will meet the HRL and MCL requirements, established after the site RODs were issued, for total carcinogenic and other PAHs. However, since there is no HRL for dibenzo(a, h)anthracene, it is not possible to compare the new sum for these two carcinogenic compounds with the CD criteria. The MDH has established a calculation for the additive effects of chemicals when there is exposure to more than one compound. The MPCA toxicologist compared the criteria above with the additive calculation and determined the site cleanup standards are protective.

2. Evaluation of Surface Water Quality ARARs

At times when water pumped from Municipal wells SLP-10 and -15 cannot be discharged to the drinking water distribution system due to contaminant concentrations which approach or exceed drinking water criteria, it is discharged to surface water. Water continues to pass through the GAC before it is discharged to surface water. Although the quality of the discharge water may exceed drinking water standards, contaminant concentrations are well below surface water standards. The standards in existence at the time of the CD, as was the case of the drinking water criteria, were incorporated into the CD. Table 2 lists the surface water discharge criteria in section 2.5 of the CD/RAP. Current requirements for discharge to surface waters are established under NPDES permits issued by the MPCA Division of Water Quality (DWQ). The discharge from treatment of water from SLP10/15 (Plant 1) is managed under permit number MN 0045489. Table 3 lists the discharge standards for general permit MN G640084 which governs discharge of filter backwash water.

TABLE 2
Consent Decree Surface Water Criteria

	Daily Max.	30 day Avg.
Carcinogenic PAHs	none	0.311 ug/l
Other PAHs	34 ug/l	17 ug/l
Phenanthrene	2 ug/l	1 ug/l
Phenolics	none	10 ug/l

ug/l = micrograms per liter

TABLE 3
Effluent Limitations

Total Suspended Solids (TSS)	30 mg/l monthly average
PH	between 6 and 9

mg/l = milligrams per liter

Comparison of concentrations from analyses of grab samples of treated water with the daily maximum column in Table 2 indicate whether daily maximum concentrations have been exceeded. The MPCA DWQ staff evaluated well water quality data for the discharge from the GAC plant submitted by the City and have determined that the discharge has met the standards imposed by the NPDES permit.

3. Evaluation of RCRA ARARs

Treatment of the well water using granular activated carbon results in the generation of spent carbon when the absorption capacity of the carbon is reached. The carbon is regenerated at an off-site facility and is not disposed of in a land disposal facility and therefore would not be required to meet RCRA land disposal restrictions.

Operable Unit 2

1. Monitoring and contingency treatment of the Mt. Simon-Hinckley Aquifer to maintain drinking water quality.

Drinking Water and other ARARs for this response action are being met. Review of the most recent available annual monitoring report indicates that ground water quality remains suitable for drinking.

2. Monitoring, pumping and treatment of the Ironton-Galesville Aquifer to protect the deeper Mt. Simon-Hinckley Aquifer.

The agencies have agreed to allow cessation of pumping of well W105. Therefore, there are no applicable ARARs to meet with respect to discharges from this well.

3. Monitoring, pumping and treatment of the Prairie du Chien-Jordan Aquifer until such time that drinking water quality is uniformly established within the area of gradient control.

Of the 26 wells monitored as part of this RA, four have exceeded drinking water criteria during 2000 sampling. However, no municipal drinking water was affected by these exceedances since the water is treated by carbon filtration. A detailed analysis of drinking water and surface water ARARs for the Prairie du Chien Aquifer is included in Operable Unit 1 above. Well water used to backwash sand filters is discharged to surface water. Surface water discharges are managed under an NPDES permit. Sand filter backwash sludges are being discharged to municipal sewage treatment plants which eventually discharge to surface water. All discharges have been in compliance with their respective permits.

Spent carbon from the treatment of well water is shipped to a facility permitted for the regeneration of hazardous spent carbon and thus would not be required to meet RCRA land disposal restrictions.

4. Monitoring and contingent action for the maintenance of drinking water quality in the St. Peter Aquifer.

Drinking water ARARs apply to well SLP-3. The City during peak demand occasionally uses this well for drinking water. Available monitoring data indicates that the water quality from this well is suitable for drinking when mixed with water from Prairie du Chien wells. There is no discharge from this well to surface water or to the sanitary sewer.

Other wells in the St. Peter Aquifer remain above drinking water criteria, although some are showing decreasing concentration trends. Most of these wells are within the capture of the gradient control well W410. Well W410 discharges to the sanitary sewer.

5. Monitoring, pumping and treatment of the Drift and Platteville Aquifers to protect the downgradient use of the aquifer and the deeper St. Peter Aquifer.

There are four wells currently used as gradient control or source control wells in these two aquifers outside the Northern Area. The discharges for these wells are treated and discharged to surface water under standards established under NPDES permit number MN 0045489. The new permit was issued on November 27, 2000 and includes well

SLP6 as an approved discharge location should it be necessary to use it as a barrier well. The current permit effluent limitations are listed in Table 4 below.

A fourth gradient control well (W434) discharges to the sanitary sewer under an MCES permit.

TABLE 4
Effluent Limitations for Treated Water from Wells W23, W420, W421

PARAMETER	QUARTERLY AVERAGE	MONTHLY AVERAGE
Total Carcinogenic PAHs	0.070	0.311
Total Other PAHs	12.0	17.0
Phenanthrene	1.0	2.0
Phenols, total	10.0	--
Iron	1000	--
Manganese	1000	--
pH	--	between 6 and 9

All values in micrograms per liter

The MPCA DWQ staff evaluated well water quality data for the discharge from the treatment of these wells submitted by the City and have determined that the discharge has met the standards imposed by the NPDES permit. MCES discharge requirements have also been met.

Some of the wells in the Drift and Platteville aquifers exceed drinking water criteria established in the CD/RAP. Most of these wells are within the influence of existing or planned gradient control or source control wells. The recommendations below will address those wells which may be outside the control of these pumping wells.

There are also some monitoring wells in the Drift and Platteville Aquifers that are no longer needed and do not meet the standards of the water well code, Minnesota Rules 4725. These wells have been abandoned or will be abandoned in the future.

6. Monitoring, pumping and treatment of the source material in the Glacial Drift Aquifer and in well W23 in the Prairie du Chien-Jordan Aquifer.

An evaluation of well W23 in the Prairie du Chien-Jordan Aquifer was done under Operable Unit 2, item 5. This well is used as a source control well and is required to be pumped until the total PAH concentration in the well water is reduced to 10 micrograms per liter. Discharge from this well is treated and is required to meet standards established under an NPDES permit described under item 5 above.

A discussion of the Glacial Drift Aquifer ARARs is included under Operable Unit 2 item 5.

Additional ARARs that apply to this RA include only those MDH well code ARARs involving test borings. Test borings were sealed immediately after soil samples were retrieved. This work was completed according to MDH requirements in effect at the time of the investigation.

7. Capping and filling of exposed hazardous wastes in the vicinity of the bog, south of the Site, in accordance with the U.S. Fish and Wildlife regulations.

The ARARs that apply to this RA are regulations of the U.S. Fish and Wildlife Service. These ARARs were satisfied by the completion of this RA.

8. Discharge of hazardous wastes to a sanitary sewer for any contaminated material excavated and dewatered for the purposes of construction of an intersection in the vicinity of the bog.

Approximately 400 cubic yards of soil were excavated but were determined by Toxicity Characteristic Leaching Procedure testing not to be hazardous. The most contaminated soils were, however, disposed of in a RCRA landfill. The remaining soils were disposed of in an industrial containment facility in Rosemount, Minnesota.

9. Further subsurface investigation in the vicinity of the Site, to implement deed restrictions for current and future land use in the areas of contamination.

The ARARs that apply to this RA include only those MDH well code ARARs involving test borings. Test borings were sealed immediately after soil samples were retrieved. This work was completed according to MDH requirements in effect at the time of the investigation.

Operable Unit 3 ARARs

The ARARs that apply to this operable unit are the SDWA (CD drinking water criteria), CWA, and MN Rules 4717 (MN drinking water criteria, HRLs). The Consent Decree drinking water criteria are more restrictive than the SDWA MCLs or the MN HRLs, so the CD criteria remain protective. The water discharged from the gradient control well is not used. It is discharged to the sanitary sewer. Cessation of pumping at this well (well W439) may be granted when it is no longer needed to prevent the spread of contamination in the Northern Area Drift Aquifer.

The water from gradient control well W439 is discharged to the sanitary sewer and is required to meet the MCES discharge limitations. There is no surface water discharge from this well. Surface water discharge criteria specified in the CD/RAP or a specific NPDES permit would apply in the event that the discharge is diverted to a surface water body or the storm sewer.

Operable Unit 4 ARARs

The ARARs that apply to this operable unit are the SDWA (CD drinking water criteria), CWA, and MN Rules 4717 (MN drinking water criteria, HRLs). The Consent Decree drinking water criteria are more restrictive than the SDWA Maximum Contaminant Levels (MCLs) or the MN HRLs, so the CD criteria remain protective. The water discharged from the gradient control well is not used. It is discharged to the sanitary sewer. At the present time the drinking water criteria are only used to determine when pumping of well W410 could be discontinued, assuming that cessation of pumping is based on achieving the drinking water criteria established in the CD/RAP. The water from gradient control well W410 is discharged to the sanitary sewer and is required to meet the MCES discharge limitations of no floating oil. There is no surface water discharge from this well.

Drinking water ARARs apply to SLP-3 since it is occasionally discharged to the distribution system. The water from this well must meet the drinking water criteria established in the Consent Decree. Review of annual monitoring records for the past few years indicate that the water contains concentrations of PAHs, but the concentrations have been below the drinking water criteria.

Operable Unit 5 ARARs

The ARARs that apply to this operable unit are the SDWA (CD drinking water criteria), CWA, and MN Rules 4717 (MN drinking water criteria, HRLs). The Consent Decree drinking water criteria are more restrictive than the SDWA Maximum Contaminant Levels (MCLs) or the MN HRLs, so the CD criteria remain protective .

V. Five-Year Review Process

The Reilly Tar five-year review was led by James Seaberg, MPCA Hydrogeologist. The following team members assisted in the review:

Nile Fellows, MPCA Project Manager

Paul Bulger, MPCA Hydrologist

Darryl Owens, EPA Remedial Project Manager

This five-year review consisted of the following activities: a review of relevant documents (see attachment 1); interviews with local government officials and representatives of the operations and maintenance systems; and a site inspection. The completed report is available in the information repository. Notice of its completion will be mailed to local contacts.

Site Inspection

Although MPCA staff periodically visit the site, James Seaberg and Nile Fellows performed a site inspection of the Reilly Tar Superfund site on August 28, 2001as part of the 5-year review process. Mike Reardon and Scott Anderson from the City of St. Louis Park participated in the inspection.

The carbon treatment facilities are clean and well run. Carbon replacement is scheduled for once a year based on past experience. With experience the City has identified what works best for operating the gradient control system. Therefore, at SLP4 the sand filters are no longer used. The City will continue to refine its efforts to efficiently operate its pump out wells.

The Reilly, site which was covered with soils, is used as a park and in particular, soccer fields. Over time erosion and weathering has exposed some debris, but not the tar substances.

The City of St. Louis Park Parks Department is planning on changes to the Reilly site. They intend to bring in an estimated 2 feet of clean fill over the existing cap during 2002. Plans indicate that this soil will be evenly distributed to provide level playing fields and good drainage. Plans also include installation of lights so any excavation of contaminated soils to install the light towers will need to be dealt with in accordance with the CD-RAP. The city does not intend to disturb the mound on the West side of the site.

VI. Assessment

Operable Unit 1

Restoration of the drinking water supply and water quality by the GAC treatment system for SLP-10 and –15 was completed December 27, 1985. The treatment plant is located near SLP-10 and -15, north of Minnetonka Boulevard, between Idaho and Jersey Streets. Routine visits to the site and vicinity and annual reporting indicate that this remedial action is effective.

The City operated the GAC system for pumped wells SLP10/15 without incident during the year 2000 with the exception of January, when the system went down for repairs. However, the reduction in pumping in January was made up during the rest of the year and 277 million gallons were pumped, exceeding the CD-RAP minimum of 200 million gallons (per year).

Operable Unit 2

1. Monitoring and contingency treatment of the Mt. Simon-Hinckley Aquifer to maintain drinking water quality.

The RA consists of four wells located at widely separated locations in St. Louis Park. The subsurface conditions are described under the Site conditions discussion for Operable Unit 1.

Routine visits to the site and vicinity and annual reporting indicate that this remedial action is effective. There have been no occurrences of the city providing water exceeding drinking water standards.

2. Monitoring, pumping and treatment of the Ironton-Galesville Aquifer to protect the deeper Mt. Simon-Hinckley Aquifer.

W105 is located on the Site. This well has been used to remove contaminated ground water from this aquifer.

As previously indicated, this well was shut off after EPA and MPCA agreed that the cleanup levels or cessation criteria specified in the CD/RAP had been met. Based on annual monitoring data submitted by the City, the cessation criteria are still being met.

3. Monitoring, pumping and treatment of the Prairie du Chien-Jordan Aquifer until such time that drinking water quality is uniformly established within the area of gradient control.

W23 is located on the Site and is one of the key sources of gradient control. Other wells used for gradient control or monitoring are located southeast of the Site in St. Louis Park. The Prairie du Chien-Jordan Aquifer is an important aquifer in the region. The subsurface conditions are described under Operable Unit 1.

An evaluation of the possible spread of contaminants in the Prairie du Chien has been ongoing. The City, MPCA, and the MDH are currently working on the development of a regional ground water flow model. This model will be used to help predict whether or not a pump out well should be installed in the area of W48 and, whether contamination would be contained by existing pumping control efforts.

4. Monitoring and contingent action for the maintenance of drinking water quality in the St. Peter Aquifer.

Subsurface conditions are described above under Operable Unit 1. Routine visits to the site and vicinity and annual reporting indicate that this remedial action is functional.

SLP-3 is located northeast of the Site and the gradient control well, W410, is located southeast of the Site. Other St. Peter monitoring wells are located east and southeast of the Site.

Contaminated ground water above drinking water standards has been reported in samples from wells W133, W412, and W122 since the last 5-Year Review. However, these samples have shown a recent decrease in PAH concentrations and none of the three wells have shown exceedances in the past year

5. Monitoring, pumping and treatment of the Drift and Platteville Aquifers to protect the downgradient use of the aquifer and the deeper St. Peter Aquifer.

The Drift and Platteville aquifer source and gradient control wells are located southeast of the Site. The gradient control well, W422, was shut off in October 2000 after EPA and MPCA determined cessation criteria had been met. A source control well, W420, continues operating in the Drift Aquifer. The Platteville Aquifer has a source control well, W421. These wells have been monitored quarterly since 1987 when pumping began. There is also a Platteville gradient control well, W434, installed as a contingency at the request of the City, to prevent migration of contamination in the Platteville into the buried valley and thence into the St. Peter Aquifer.

In most areas the drift deposits are hydraulically connected to the Platteville Aquifer. This means that contaminated ground water can flow from the drift aquifers downward into the underlying Platteville Aquifer. The Platteville is a bedrock deposit consisting of limestone and dolomite and is underlain by the Glenwood Shale, a confining bed. In the Platteville, ground water (and contaminants) will move horizontally and vertically through fractures and cavities in the rock. Ground water in the Platteville is under a head difference such that water in the Platteville will move vertically downward through the Glenwood Shale into the St. Peter Sandstone Aquifer by leaking directly through the shale or through uncased wells or wells that have holes in their casings.

An additional potential for release of contaminants to the St. Peter Aquifer is the buried valley in the Platteville aquifer. About one-half mile southeast of the former Reilly site, within the City of St. Louis Park, the Platteville and Glenwood bedrock units have been removed by erosion, and the drift directly overlies the St. Peter Aquifer. Contaminated ground water moving to the southeast in the Drift/Platteville Aquifer could discharge into the St. Peter Aquifer as the ground water emerges from the aquifer at the edge of the buried valley. Ground water contamination remains relatively high in the monitoring wells and has shown no definite increase or decrease during the period of monitoring.

6. Monitoring, pumping and treatment of the source material in the Glacial Drift Aquifer and in well W23 in the Prairie du Chien-Jordan Aquifer.

An evaluation of well W23 is done above under Operable Unit 2 item 3.

A discussion of the response action for the Glacial Drift Aquifer is included above under Operable Unit 2 item 5 and under Operable Unit 3, discussed below.

7. Capping and filling of exposed hazardous wastes in the vicinity of the bog, south of the Site, in accordance with the U.S. Fish and Wildlife and EPA regulations.

The bog and wetland areas are located adjacent to the southeast corner of the Site, south of Walker St. and north of Highway 7.

A Site visit was conducted by U.S. Department of Interior officials on January 6, 1987. Their visit confirmed that the requirements of the RAP and an approved wetland filling work plan had been met. MPCA inspection of the Site had been completed in 1986.

9. Discharge of hazardous wastes to a sanitary sewer for any contaminated material excavated and dewatered for the purposes of construction of an intersection in the vicinity of the bog.

The road construction work performed occurred immediately south of the Site between Walker Street and Highway 7. The characterization and disposal of contaminated soils was conducted in accordance with guidance provided by the MPCA. A Site inspection was completed in 1992.

10. Further subsurface investigation in the vicinity of the Site, to implement deed restrictions for current and future land use in the areas of contamination.

This area is defined as follows: Lake Street on the north, Monitor Street and an imaginary line connecting Monitor Street and Methodist Hospital on the east, Minnehaha Creek on the south, and Taft Avenue and an imaginary line connecting Taft Avenue and Minnehaha Creek on the west. Fifteen soil borings were installed in this area. Traces of contamination were found in soil samples below the water table in two borings. This contamination was attributable to ground water contamination which had passed through this area and impacted soils below the water table.

A Site inspection was conducted in 1989 and MPCA personnel determined that the area was relatively free of hazards and agreed that no further work was necessary to fulfill the requirements of the CD/RAP. Notices in deed for property owners in this area were made by the City.

Operable Unit 3

Northern Area Drift Aquifer Site Conditions, Operable Unit 3

Gradient control by Well 434 to prevent further spread of the plume is the prescribed remedial action for OU3. Groundwater monitoring indicates that low levels of

contamination are being captured at this time which is down from higher levels a few years ago. The well appears to aid in halting further spread of the plume.

Operable Unit 4

St. Peter Site Conditions, Operable Unit 4

A description of the St. Peter Aquifer is included above under the Operable Unit 1 site conditions. This aquifer is a significant source of ground water in the Twin Cities, although the Prairie du Chien is the primary source of drinking water in the vicinity of the site.

A review of PAH concentrations found in samples of the St. Peter monitoring wells collected from 1991 through 2000 indicate that the PAH concentrations in most of the wells have remained relatively stable. Samples from W409 have shown increases since 1991, which probably reflects the effect of drawing ground water toward the pumping in well W410. Therefore the gradient control well, W410, is helping to control a significant portion of the contamination. Contaminated ground water above drinking water standards was found in samples of water from wells W133, W412, and W122 which may not be under the control of well W410. These wells appear to be outside the cone of influence of well W410. Proposed actions to address this condition are presented below in the recommendation section.

Operable Unit 5

The Northern Area of the Platteville Aquifer Site Conditions, Operable Unit 5

A description of the Northern Area Drift Aquifer is included above under the Operable Unit 1 site conditions and under the Operable Unit 5 RA description.

There are approximately nine monitoring wells that have been used to periodically sample the Platteville Aquifer in the Northern Area.

Gradient control is provided by well W 439 which captures ground water from both the Platteville and Drift aquifers. The PAH and phenol results of ground water monitoring since 1988 show that, near the source of contamination, PAH concentrations in ground water are consistently in the range of several hundred nanograms per liter to high micrograms per liter. Contaminant levels have fluctuated since sampling began. Based on historical ground water monitoring, the extent of contamination in the Northern Area of the Platteville Aquifer is shown in Figure 7.

An area exceeding the drinking water criteria appears to be centered on wells W100 and W1 with PAH levels in the Platteville. This could be the result of SLP-3, a St. Peter Aquifer drinking water supply well, drawing contamination from the Platteville to the north. SLP-3 is only used as an emergency backup supply well.

VII. RECOMMENDATIONS and FOLLOWUP ACTIONS

Operable Unit 1

MPCA staff recommends that the City continue with the operation and maintenance of this system that treats water pumped from SLP 10/15. Based on the January 17, 1996, inspection, it appears that the remedy is functional and operational. Ground water contaminant concentrations are still well above drinking water criteria established in the CD and require treatment prior to distribution.

MPCA Water Quality Division staff monitor and evaluate discharges from the treatment plant under an NPDES permit. The WQD staff indicated that the discharges have met all standards.

The system overall works fine and lowers PAH levels below the criteria. Samples are collected as they are required by the CD/RAP and show effective treatment. The RA activities are discussed in the Annual Performance Report for each year.

Operable Unit 2

1. Monitoring and contingency treatment of the Mt. Simon-Hinckley Aquifer to maintain drinking water quality.

It is recommended that the City continue monitoring ground water in the Mt. Simon-Hinckley Aquifer.

2. Monitoring, pumping and treatment of the Ironton-Galesville Aquifer to protect the deeper Mt. Simon-Hinckley Aquifer.

It is recommended that the City continue monitoring ground water from W105 to ensure that the well will not have to resume pumping.

3. Monitoring, pumping and treatment of the Prairie du Chien-Jordan Aquifer until such time that drinking water quality is uniformly established within the area of gradient control.

A Prairie du Chien-Jordan groundwater model was run in 1995/1996 by Jim Piegat (Hennepin County) and Justin Blum (MDH) on behalf of the Agencies. Using an older version of the MLAEM (multi layer analytic element method) model, they simulated regional groundwater flow, which included pumping municipal wells for the whole 5 county metropolitan area. The model's application was prompted by shutting off Methodist Hospital well W48 in 1991. The primary concern is that the PAH plume will cross the city border and enter the Edina well field. The model predicted that it is possible for part of the plume to escape if well SLP6 or another gradient control well is not pumping.

In a May 4, 1998 letter, the MPCA requested the City to perform a Feasibility Study (FS) for Prairie du Chien-Jordan aquifer gradient control. The City did not prepare an FS in response to this request. The FS was effectively put on hold while the City, Reilly, MPCA, EPA and Department of Justice (DOJ) worked to determine if the CD/RAP could be revised to establish new PAH cleanup criteria, using the best available toxicology data. It was ultimately decided it was too burdensome to revise the CD/RAP. In February 1999, the City informed PCA staff they were no longer requesting a revised CD/RAP.

The Agencies responded to the City in a November 2, 1999, letter requesting the City to perform the previously requested FS to address plume flow to the south to ensure the City of Edina well field is not contaminated in the future. The City submitted an FS on February 16, 2000, and an amended FS was subsequently submitted on March 27, 2000. The Agencies approved the FS on April 19, 2000. The selected alternative includes: 1) construction of an additional sentry well to monitor groundwater movement and quality and 2). A provision that if drinking water concentrations are exceeded in any one of the sentry wells for two consecutive quarters, SLP6 will be operated as an extraction well and will discharge to Minnehaha Creek.
In July 2000, after the Agencies approval of the FS, Meadowbrook Golf Course inquired about renewing pumping of W119 as an irrigation well. Since this could impact the selected alternative, implementation of this action has been postponed.

The MPCA is working on a flow model (Metro Model) that will ideally help guide a decision about pumping W119. The City of Minneapolis (Meadowbrook Golf Course) recently contacted MPCA and is still interested in pursuing use of W119 for irrigation purposes, so modeling efforts continue.

It is also recommended that repairs be made on a few monitoring wells screened in this aquifer in order to maintain sufficient ground water flow information.

4. Monitoring and contingent action for the maintenance of drinking water quality in the St. Peter Aquifer.

Monitoring of the St. Peter Aquifer has been ongoing on a semi-annual basis since 1988 in compliance with the CD/RAP.

An evaluation of the effectiveness of W410 as a gradient control well is being considered under the recommendations pertaining to Operable Unit 4.

SLP3, a water supply well in the St. Peter Aquifer is used occasionally for drinking water. However, this well is also screened in the Platteville Aquifer and may, when pumping, affect the movement of contaminants in the Platteville. It is recommended that an evaluation of the impact of pumping at SLP3 on the Platteville Aquifer be performed.

5. Monitoring, pumping and treatment of the Drift and Platteville Aquifers to protect the downgradient use of the aquifer and the deeper St. Peter Aquifer.

It is recommended to continue the monitoring of ground water data to determine whether or not the Drift Aquifer gradient control system is performing adequately.

It is also recommended that monitoring and possibly modeling data be evaluated to determine whether or not the Platteville Aquifer gradient control system is performing adequately. This will include an evaluation of whether or not pumping at SLP3 is influencing the movement of contamination in the Platteville Aquifer.

Monitoring wells in the Drift and Platteville Aquifers that are no longer needed and that do not meet the standards of the water well code have been or will be abandoned. Well W434 was rehabilitated to pumping status in June 1997.

On September 28, 1999, the City sent a letter requesting that they be allowed to turn off Drift well W422 and Ordovician Platteville (OPVL) well W434. After meetings and discussion with the Agencies, approval was given to shut off W422, but not W434. W434 has a minimum 5-year pumping period required by the CDRAP, and also provides some protection against contamination movement towards the bedrock valley.

While evaluating cessation criteria and the sampling plan, the wells to be sampled in the future were adjusted. HRLs will be used as compliance standards (napthalene will probably be the exceedance). After 2 sampling events in 2001, the well network will be reevaluated in time for submission of the 2002 Sampling Plan (October 2001).

6. Monitoring, pumping and treatment of the source material in the Glacial Drift Aquifer and in well W23 in the Prairie du Chien-Jordan Aquifer.

An evaluation of W23 was completed under Operable Unit 2 item 3. It is recommended that pumping and monitoring of W23 be continued. Recommendations concerning the Glacial Drift Aquifer are included under Operable Unit 2 item 5.

7. Capping and filling of exposed hazardous wastes in the vicinity of the bog, south of the Site, in accordance with the U.S. Fish and Wildlife regulations.

No further action is required for this response action.

8. Discharge of hazardous wastes to a sanitary sewer for any contaminated material excavated and dewatered for the purposes of construction of an intersection in the vicinity of the bog.

No further action is required for this response action.

9. Further subsurface investigation in the vicinity of the Site, to implement deed restrictions for current and future land use in the areas of contamination.

The investigative work has been completed and approved by the Agencies. It is recommended that the Agencies continue to monitor development on the Site and vicinity in order to maintain deed restrictions and to implement additional institutional controls if necessary.

Operable Unit 3

Northern Area Drift Aquifer Recommendations, Operable Unit 3

The RA has only been in operation for approximately five years. It is recommended that ground water quality and water level data continue to be gathered and that this data be reviewed on an annual basis.

Sampling was modified for 2001 to get data from both the Drift and Platteville wells. MDH believes the Northern Area has not been fully defined yet. Data obtained during 2001 should be enough to finish defining the extent of contamination in the Northern area.

There were monitoring wells in the Drift Aquifer that were no longer needed and that did not meet the standards of the water well code. Wells P57, P56, P52, P55, P46, P6, P18, P100, P30, P32, P38, and P101 were abandoned in March and October of 2000.The wells were located up gradient or more than a mile away. Other wells that do not meet the standards will be identified and be repaired or abandoned. Some of the monitoring wells which will be abandoned may be allowing contaminants from the surface to enter the aquifers.

Operable Unit 4

St. Peter Recommendations, Operable Unit 4

It is recommended that an evaluation of the effectiveness ofW410 as a gradient control well be performed in cooperation with the City of St. Louis Park and the MDH to assess the effectiveness of the gradient control system. It is also recommended that water quality and water level data continue to be collected.

Operable Unit 5

Northern Area Platteville Aquifer Recommendations, Operable Unit 5

It is recommended that ground water quality and water level data continue to be gathered from this aquifer and that this data be reviewed on an annual basis. Additional sampling

of wells W1 and W100 and possibly other wells in the vicinity of SLP-3 should be performed to aid in this evaluation.

There are some monitoring wells in the Platteville Aquifer that are no longer needed and that do not meet the standards of the water well code. These wells should be abandoned. Other wells that do not meet the standards should be repaired. Some of the monitoring wells may be allowing contaminants from the surface to enter the aquifers.

Table 5. Recommendations and Follow-up Actions

Operable Unit	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date
Operable Unit 1	Continue operation and maintenance of extraction system for SLP 10/15	City of St. Louis Park	MPCA	Ongoing with Annual Reports
Operable Unit 2	Continue Monitoring the Mt. Simon Hinckley Aquifer	City of St. Louis Park	MPCA	Ongoing with Annual Reports
	Continue Monitoring W105 which is in the Ironton-Galesville Aquifer	City of St. Louis Park	MPCA	Ongoing with Annual Reports
	Monitor and pump & treat Prairie du Chien-Jordan Aquifer wells	City of St. Louis Park	MPCA	Ongoing with Annual Reports
	Perform computer modeling to determine effects of golf course well and need for a sentry well or pumping from SLP6	MPCA	EPA	March 2002
	Monitoring of St. Peter Aquifer	City of St. Louis Park	MPCA	Ongoing with Annual Reports
	Evaluate to impact of pumping SLP3 on the Platteville Aquifer and evaluate the gradient control system of this aquifer	City of St. Louis Park	MPCA	December 2003
	Continue Drift Aquifer Monitoring	City of St. Louis Park	MPCA	Ongoing with Annual Reports
	Continue Pumping and monitoring W23	City of St. Louis Park	MPCA	Ongoing with Annual Reports
	Monitor future development near the site to assure compliance with the institutional controls	MPCA	EPA	Ongoing with Annual Reports
Operable Unit 3	Continue monitoring wells in the Northern Drift Area	City of St. Louis Park	MPCA	Ongoing with Annual Reports
	Define extent of Contamination in Northern Drift Area	City of St. Louis Park	MPCA	December 2002
Operable Unit 4	Evaluate effectiveness of W410 as a gradient control well	City of St. Louis Park	MPCA	December 2002
Operable Unit 5	Continue monitoring the Northern Platteville Aquifer	City of St. Louis Park	MPCA	Ongoing with Annual Reports

VIII. STATEMENT OF PROTECTIVENESS

Operable Unit 1

The treatment plant appears to be operating properly and supplying safe water to the City and is therefore considered sufficiently protective.

Operable Unit 2

1. Monitoring and contingency treatment of the Mt. Simon-Hinckley Aquifer to maintain drinking water quality.

This RA is being implemented as required in the CD and is sufficiently protective.

2. Monitoring, pumping and treatment of the Ironton-Galesville Aquifer to protect the deeper Mt. Simon-Hinckley Aquifer.

This RA is being implemented as required in the CD and is sufficiently protective. Ground water contamination continues to be present in the Ironton-Galesville Aquifer in the immediate vicinity of the Site, but remains below the criteria established in the Consent Decree. The Agencies approved a request to discontinue pumping in this aquifer, with continued monitoring, and the Remedial Action is considered protective.

3. Monitoring, pumping and treatment of the Prairie du Chien-Jordan Aquifer until such time that drinking water quality is uniformly established within the area of gradient control.

Currently, monitoring and treatment of municipal water supplies obtained from the Prairie du Chien-Jordan Aquifer is providing sufficient safe drinking water. However, it is uncertain whether or not gradient control is being maintained due to the abandonment of Methodist Hospital well W48. Contamination may be migrating to the east and southeast from the Site. Groundwater modeling is being performed to assess the impact of pumping the Meadowbrook Golf Course well W119. The modeling is expected to be completed in winter of 2002. This RA is currently considered protective because municipal water supplies from this aquifer are providing safe drinking water. However, modeling needs to confirm the appropriateness of the proposed gradient control system approved in the Agency's April 19, 2000 letter. In addition, there may be several monitoring wells screened in this aquifer needing repairs in order to maintain sufficient ground water flow information.

4. Monitoring and contingent action for the maintenance of drinking water quality in the St. Peter Aquifer.

Currently, monitoring and treatment of the municipal water supply obtained from the

St. Peter Aquifer is providing sufficient safe drinking water. Recommendations for an evaluation of effectiveness of the gradient control system are included in the recommendations for Operable Unit 4.

5. Monitoring, pumping and treatment of the Drift and Platteville Aquifers to protect the down gradient use of the aquifer and the deeper St. Peter Aquifer.

At the present time there is still uncertainty whether or not the Drift and Platteville response actions are performing adequately. Water quality data and possibly ground water flow modeling will be evaluated to determine whether or not the Platteville Aquifer gradient control system is performing adequately. Since these aquifers are not used for drinking water this action is considered sufficiently protective. The modeling would help determine whether further action is needed for gradient control.

6. Monitoring, pumping and treatment of the source material in the Glacial Drift Aquifer and in well W23 in the Prairie du Chien-Jordan Aquifer.

An evaluation of W23 was done under Operable Unit 2 item 3. A discussion of the Glacial Drift aquifer is included in Operable Unit 2 item 5.

7. Capping and filling of exposed hazardous wastes in the vicinity of the bog, south of the Site, in accordance with the U.S. Fish and Wildlife and EPA regulations.

This response action has been completed and is protective.

8. Discharge of hazardous wastes to a sanitary sewer for any contaminated material excavated and dewatered for the purposes of construction of an intersection in the vicinity of the bog.

This response action has been completed and is protective.

9. Further subsurface investigation in the vicinity of the Site, to implement deed restrictions for current and future land use in the areas of contamination.

This response action has been completed and is protective.

Operable Unit 3

Northern Area Drift Aquifer Statement of Protectiveness

Currently, monitoring and gradient control wells provide protection at this operable unit.

Operable Unit 4

St. Peter Aquifer Statement of Protectiveness
Currently, monitoring and treatment of the municipal water supply obtained from the St. Peter Aquifer is providing safe drinking water and thus this action is considered sufficiently protective.

Operable Unit 5

Northern Area Platteville Aquifer Statement of Protectiveness, Operable Unit 5
At current rates of use, monitoring indicates that gradient control from W434 and W439 is providing sufficient protection to the Northern Area of the Platteville.

Sidewide Statement of Protectiveness

The site-wide remedy is currently considered to be protective of human health and the environment because ground water treatment is providing safe drinking water. However, to help determine long-term protectiveness, additional groundwater modeling and monitoring may be necessary to determine the effectiveness of the groundwater gradient control systems in preventing the spread of contamination.

IX. NEXT REVIEW

Hazardous substances, pollutants or contaminants will remain at this Site which will not allow unlimited use or unrestricted exposure. The next Five Year Review will be conducted within five years of the completion of this Five-year review report. The completion date is the date of signature shown on the signature cover attached to the front of this report.

PARTIAL LIST OF DOCUMENTS REVIEWED:

Calgon Corp, Jan. 18, 1985, Granular Activated Carbon System for Reilly Tar & Chemical Corp.,

City of St. Louis Park, 1986, 1987, Soil Investigation Plan for The Reilly Tar & Chemical Corp. N.P.L. Site, St. Louis Park, MN., An Area Bounded by West Lake Street on the North, Monitor Street on the East, Taft Avenue on the West, and Minnehaha Creek on the South.

City of St. Louis Park, Annual Progress Reports on the Implementation of the Consent Decree, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994.

City of St. Louis Park, 1987 (received), W105 Source Control Well Plan

City of St. Louis Park, 1987 (received), Drift-Platteville Aquifer Source Control Well Plan

City of St. Louis Park, July 21, 1989, St. Peter Aquifer Remedial Investigation Report.

City of St. Louis Park, April 26, 1990, St. Peter Aquifer Feasibility Study.

Consent Decree and Response Action Plan, 1986

Correspondence from the City of St. Louis Park regarding Source Control Well W23, 1986 to 1993.

ENSR, March 15, 1994, Annual Monitoring Report, 1993, Reilly Tar & Chemical Corp. N.P.L. Site, St. Louis Park, Minnesota,

ENSR, March 15, 1995, Annual Performance Report of the Granular Activated Carbon Treatment System for 1987, 1988, 1990, 1991, 1993, and 1994, Reilly Tar & Chemical Corp.

Hult, M. F., and M. E. Schoenberg, 1984, Preliminary Evaluation of Ground Water Contamination by Coal Tar Derivative, St. Louis Park, Minnesota, U.S. Geological Survey Water-Supply Paper 2211.

Longest, H. L., May 23, 1991, Structure and Components of Five-Year Reviews, Memorandum, Office of Emergency Response, U.S. EPA.

MPCA Board Item documents, April, 1986

Record of Decision, September 30, 1992, Northern Area of the Drift Aquifer

Record of Decision, June 30, 1995, Northern Area of the Platteville Aquifer

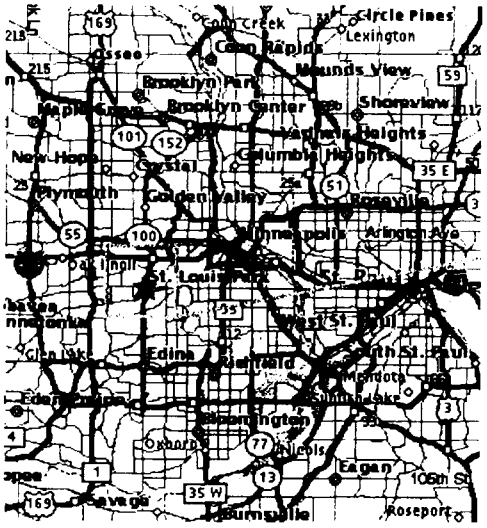
Record of Decision, September 28, 1990, St. Peter Aquifer

U.S. Department of the Interior, Fish and Wildlife Service, January 16, 1987, Letter from John Popowski, acting Regional Director to James Grube, Director of Public Works, City of St. Louis Park, re: inspection of wetlands filling work; and various plans and drawings.

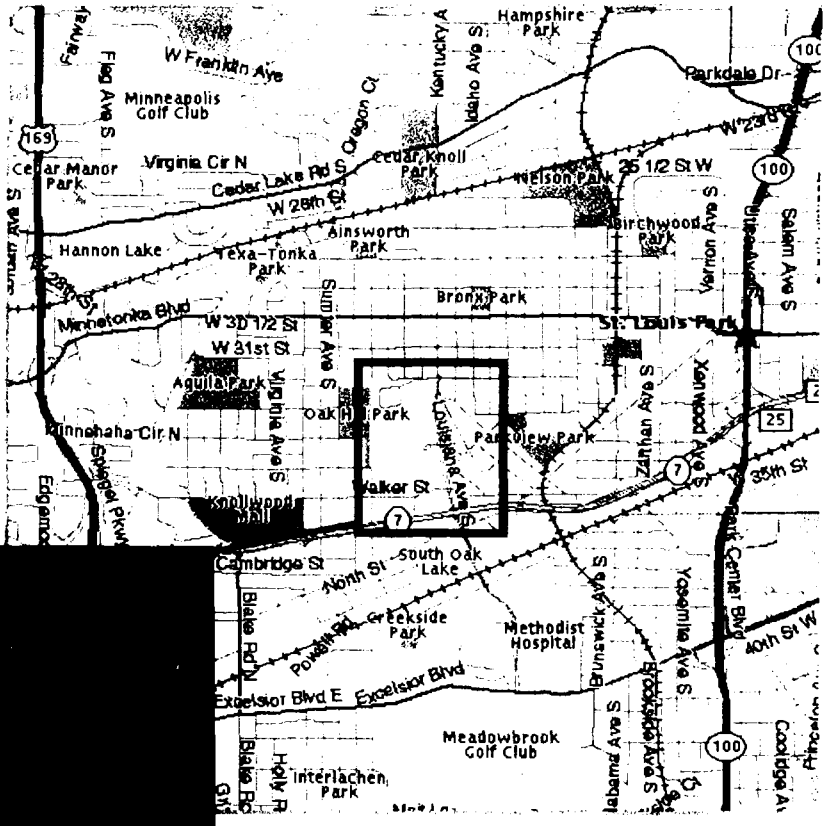
Location Map

Reilly Tar Superfund Site
St. Louis Park, Minnesota

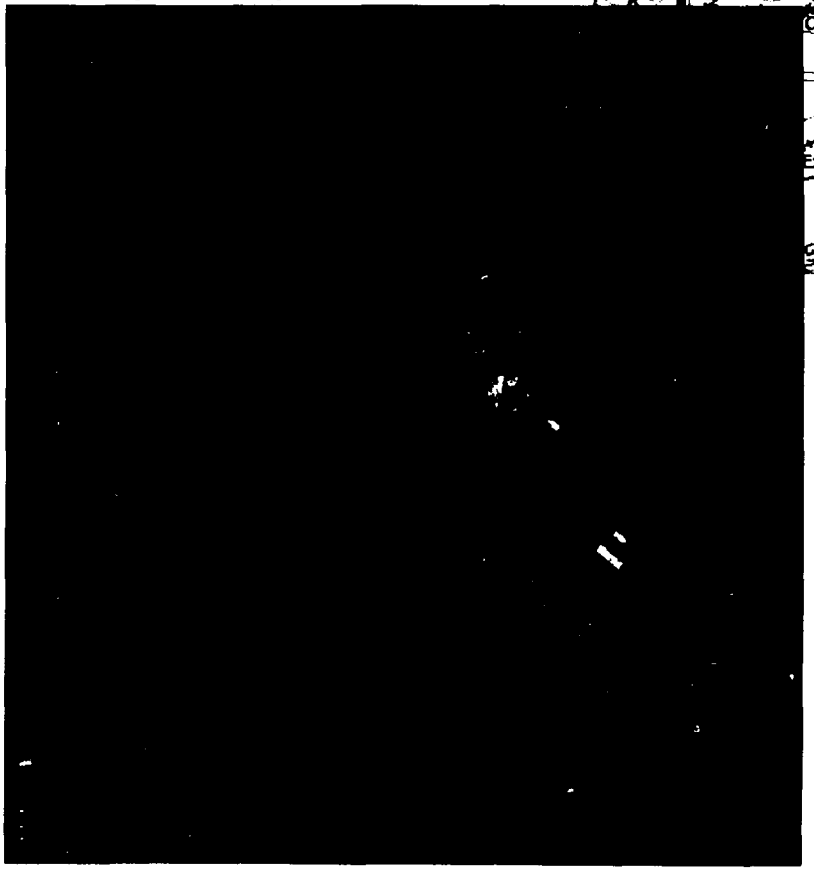
1. State of Minnesota



2. City of St. Louis Park

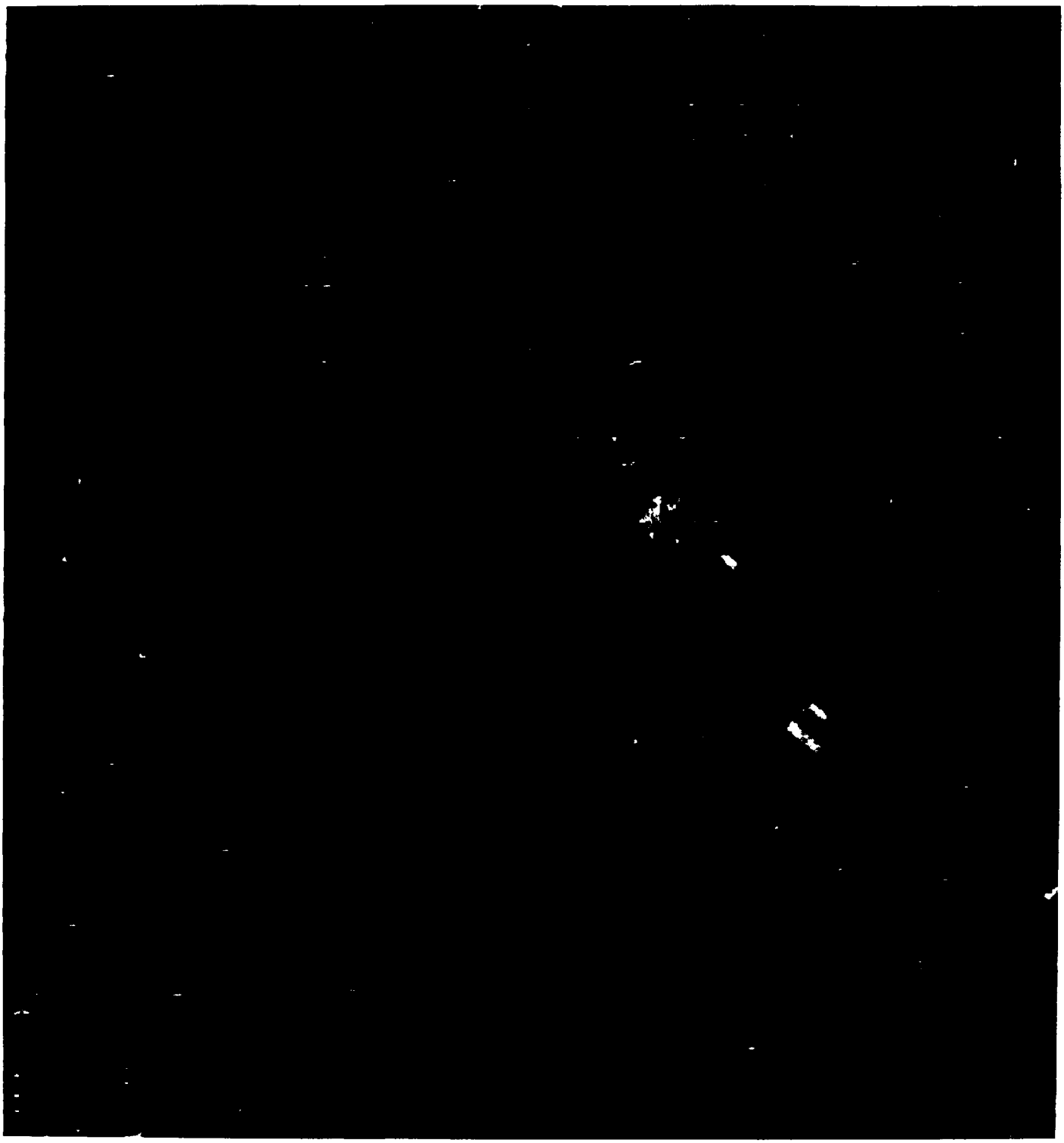


3. Reilly Tar Superfund Site

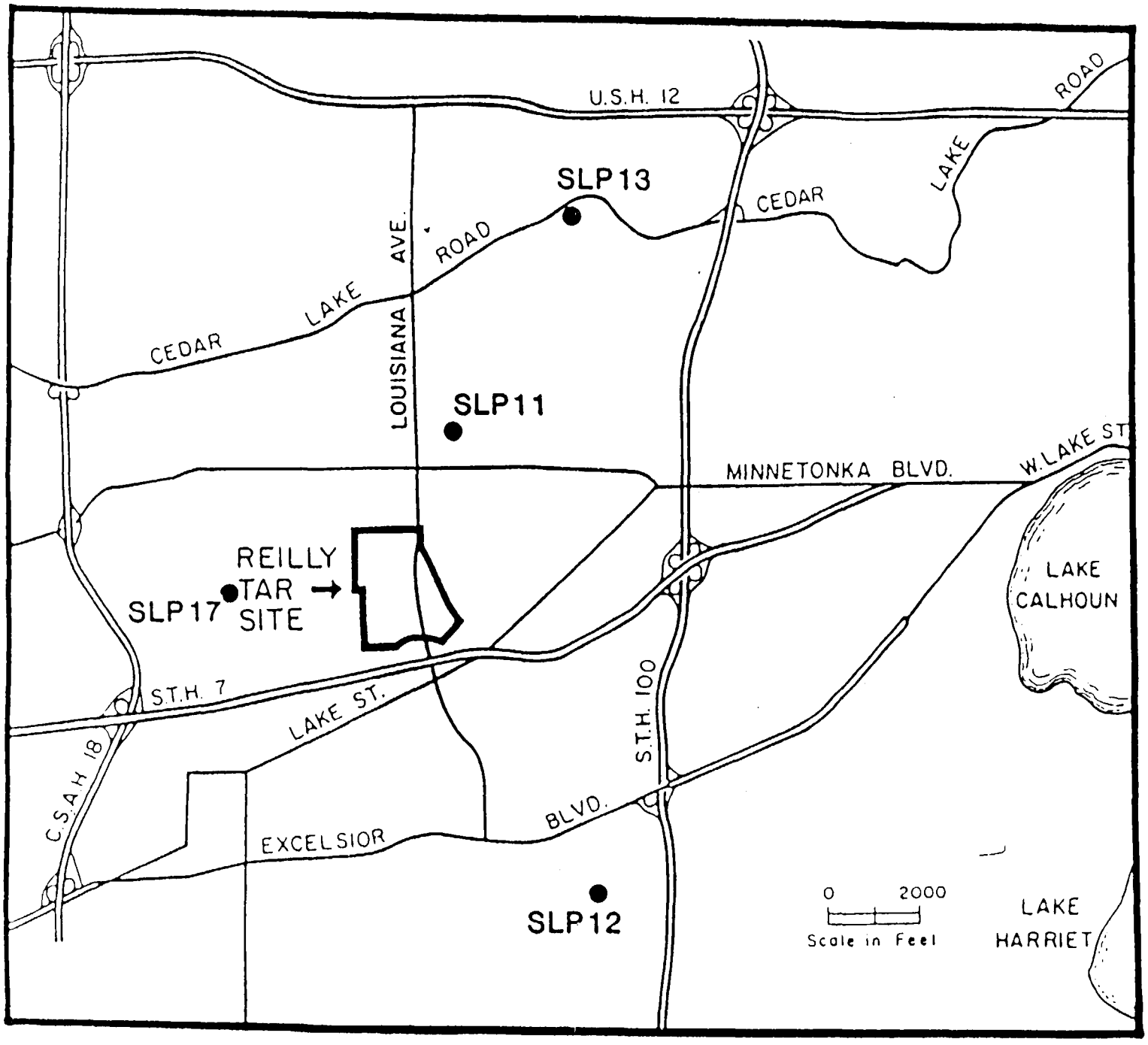


Site Map

Reilly Tar Superfund Site
St. Louis Park, Minnesota



MT. SIMON - HINCKLEY AQUIFER



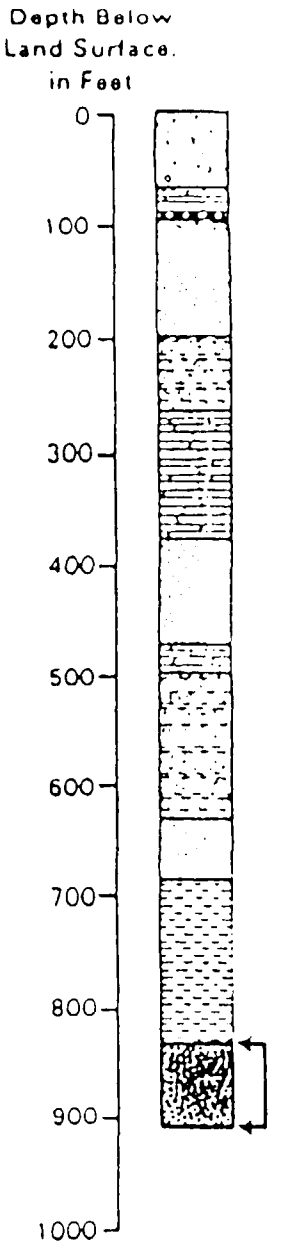
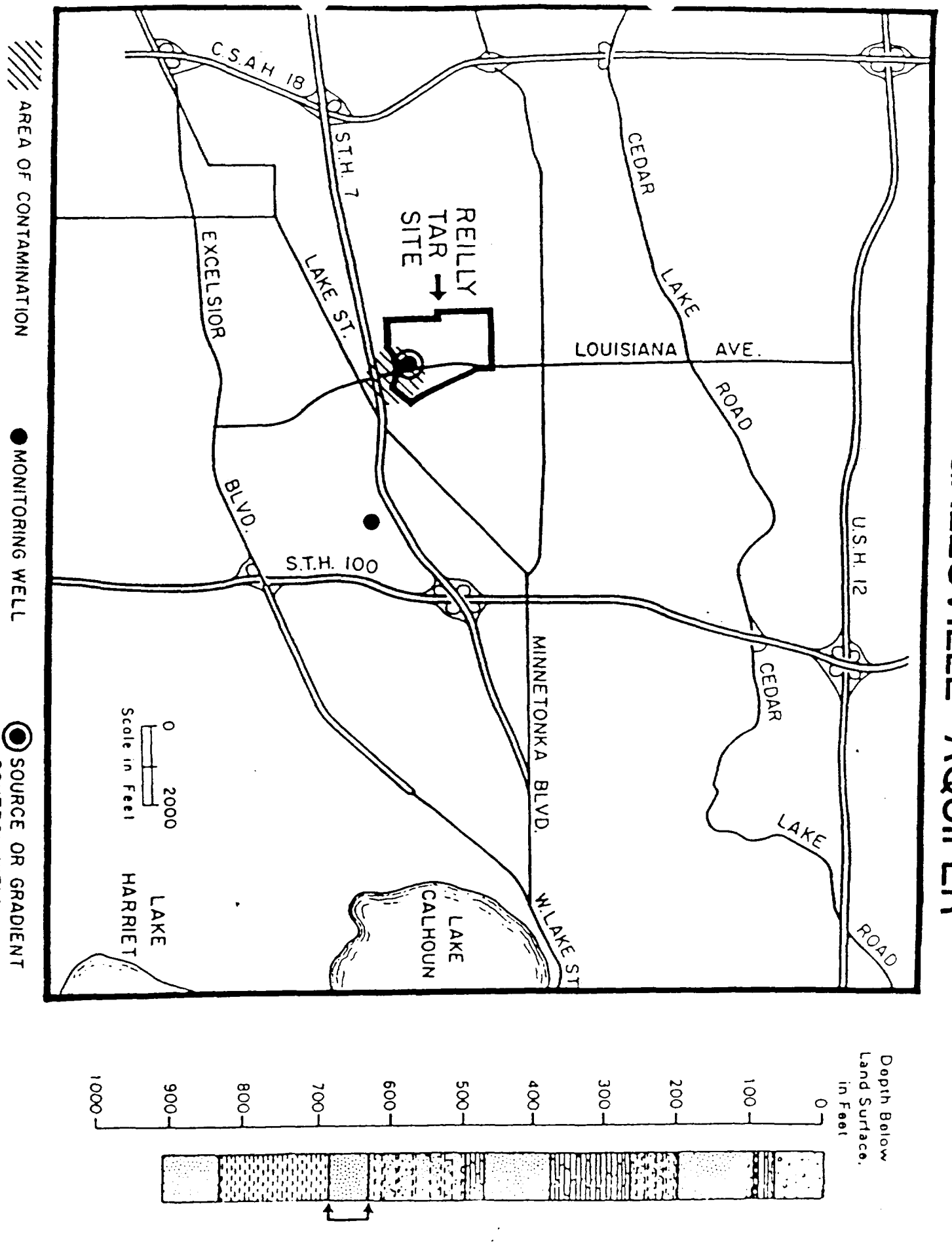


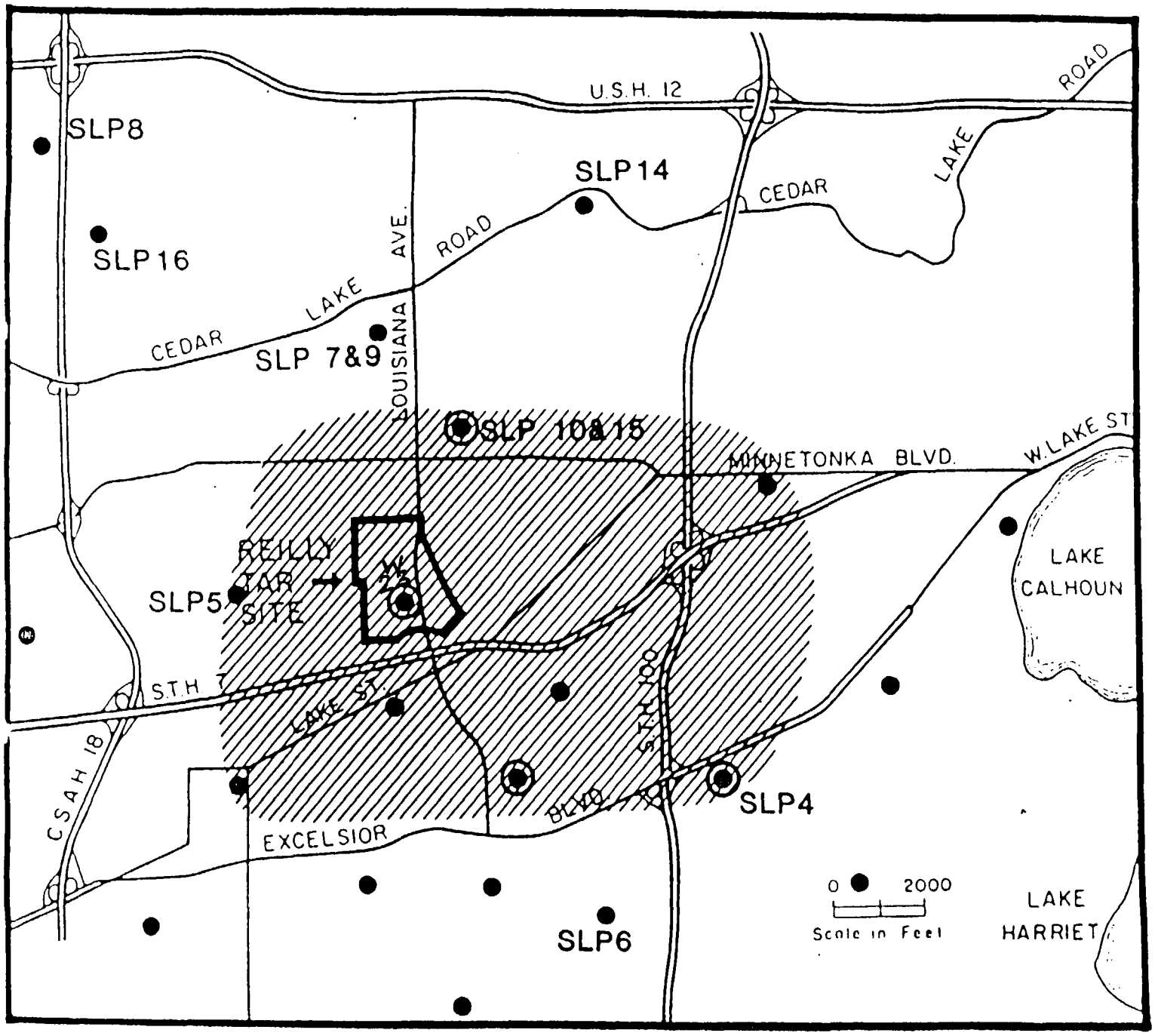
FIGURE 1

● MONITORING AND MUNICIPAL WELL

FIGURE 2


IRONTON – GALESVILLE AQUIFER
AREA OF CONTAMINATION
MONITORING WELL
SOURCE OR GRADIENT CONTROL WELL
C.S.A.H 18
ST.H. 7
REILLY TAR SITE
EXCELSIOR BLVD.
LAKE ST.
CEDAR LAKE ROAD
LOUISIANA AVE.
S.T.H. 100
U.S.H. 12
MINNETONKA BLVD.
W.LAKE ST
CEDAR LAKE ROAD
LAKE CALHOUN
LAKE HARRIET
0
2000
Scale in Feet
Depth Below Land Surface, in Feet
0
100
200
300
400
500
600
700
800
900
1000

PRAIRIE DU CHIEN – JORDAN AQUIFER



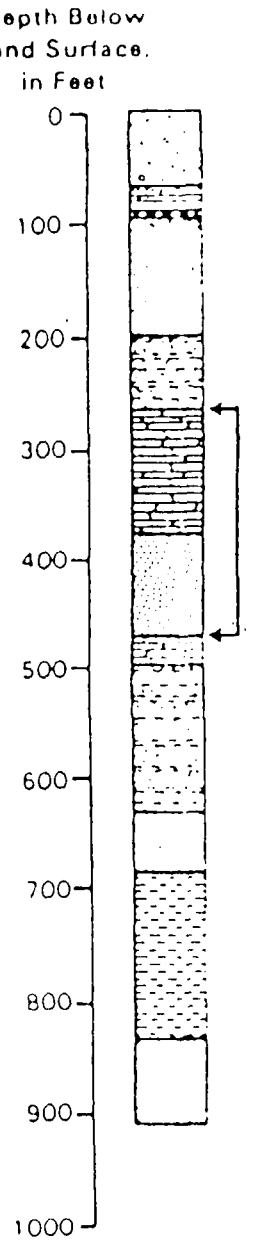
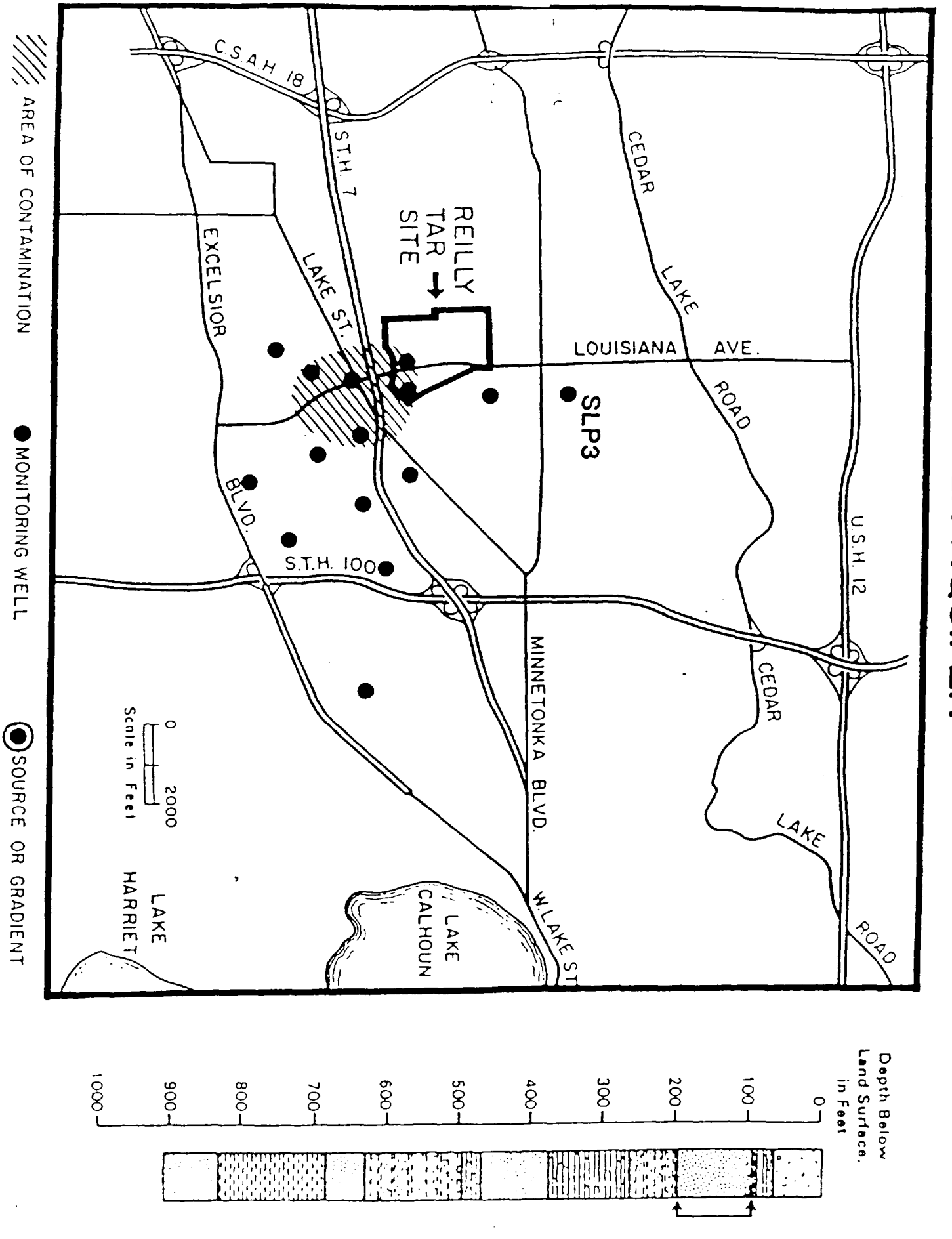


FIGURE 3

FIGURE 4


ST. PETER AQUIFER
AREA OF CONTAMINATION
MONITORING WELL
SOURCE OR GRADIENT
C.S.A.H. 18
S.T.H. 7
EXCELSIOR
LAKE ST.
REILLY TAR SITE
CEDAR LAKE ROAD
LOUISIANA AVE.
SLP3
U.S.H. 12
BLVD.
S.T.H. 100
MINNETONKA BLVD.
W. LAKE ST.
LAKE CALHOUN
LAKE HARRIET
CEDAR LAKE ROAD
0
2000
Scale in Feet
Depth Below Land Surface, in Feet
0
100
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300
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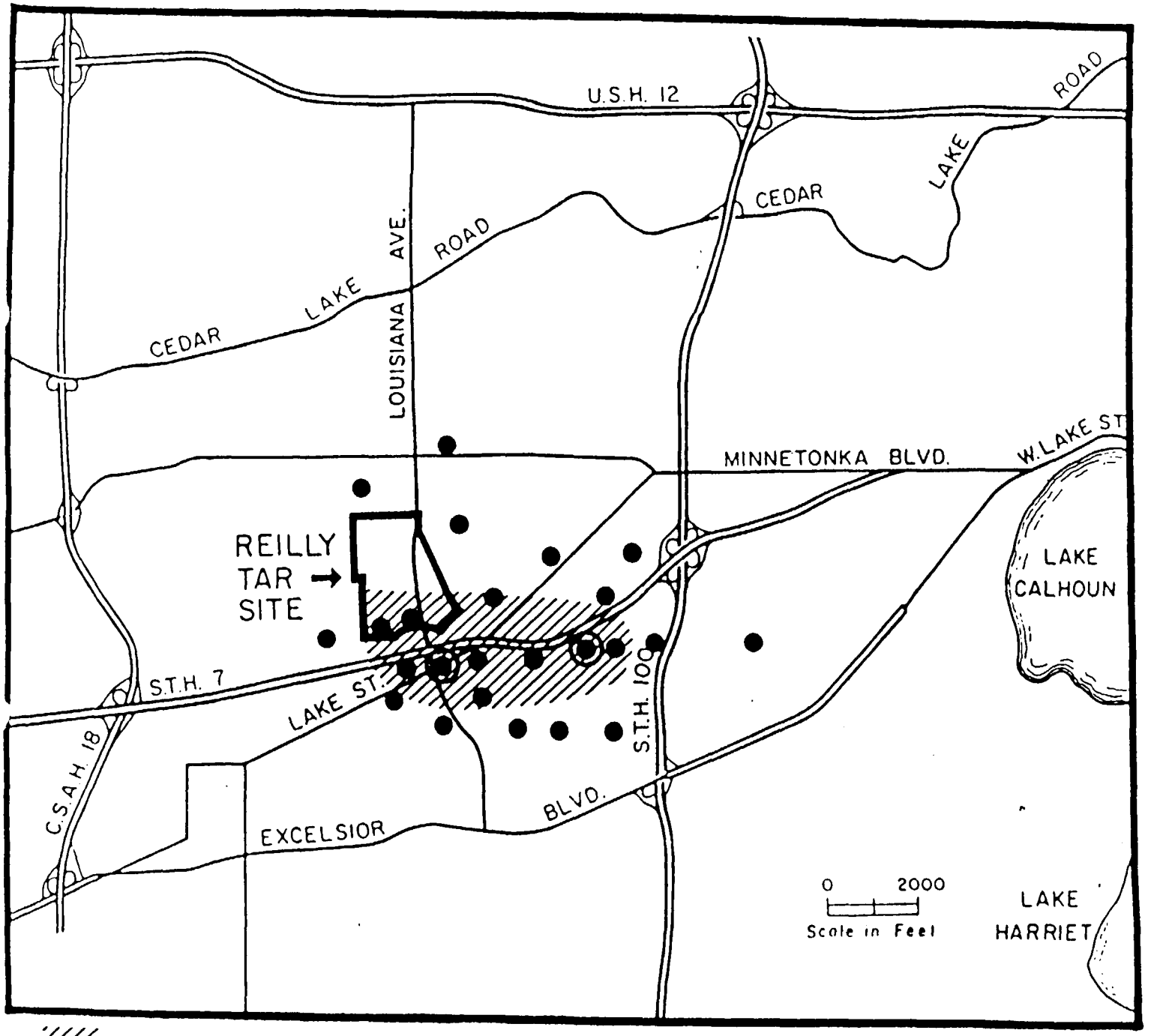
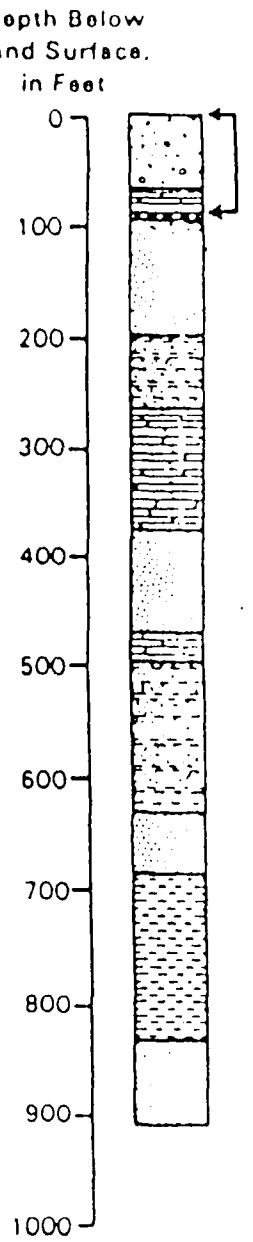
900
1000

DRIFT AND PLATTEVILLE AQUIFERS





NEAR - SURFACE CONTAMINATION INVESTIGATION AREA

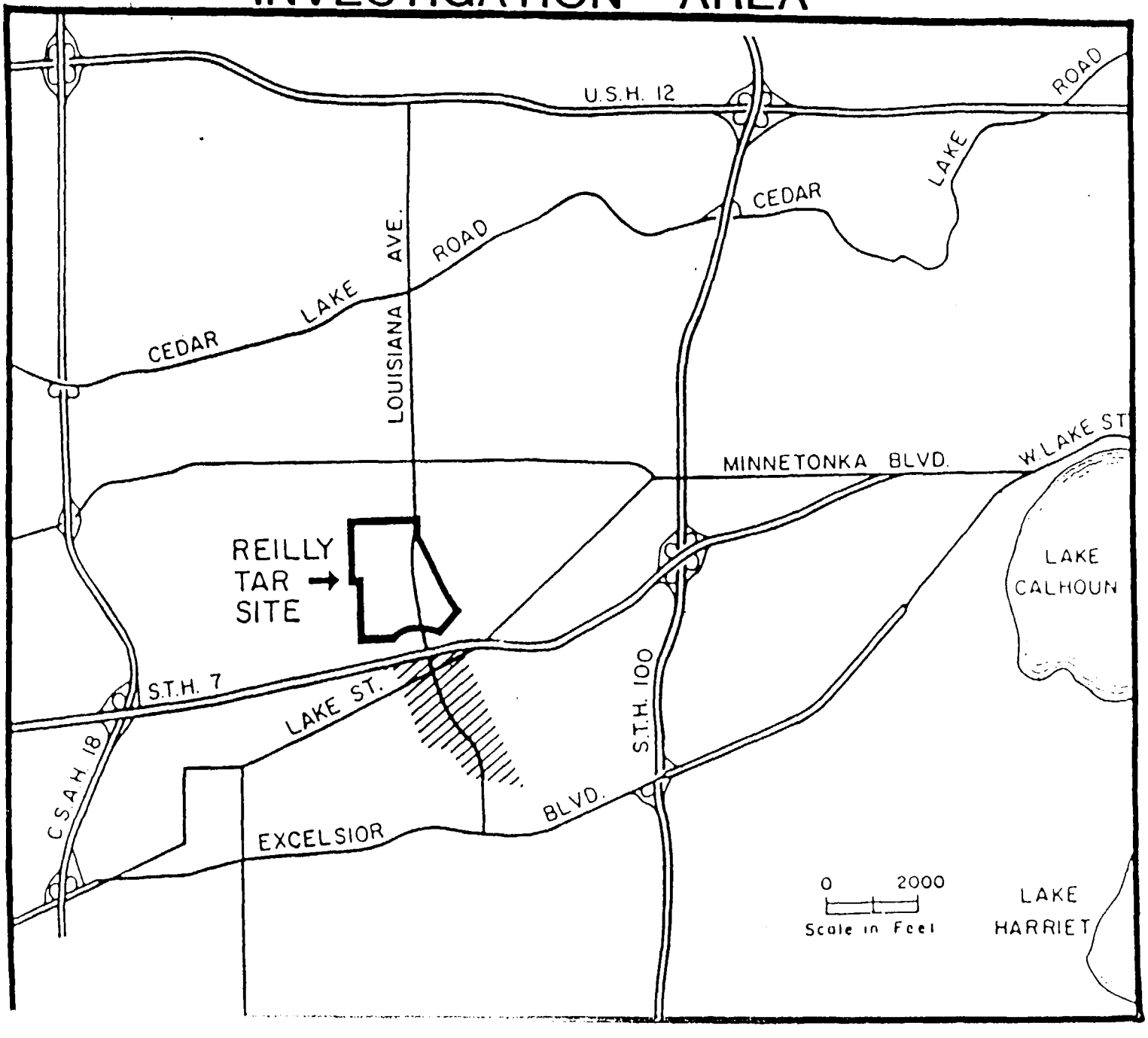
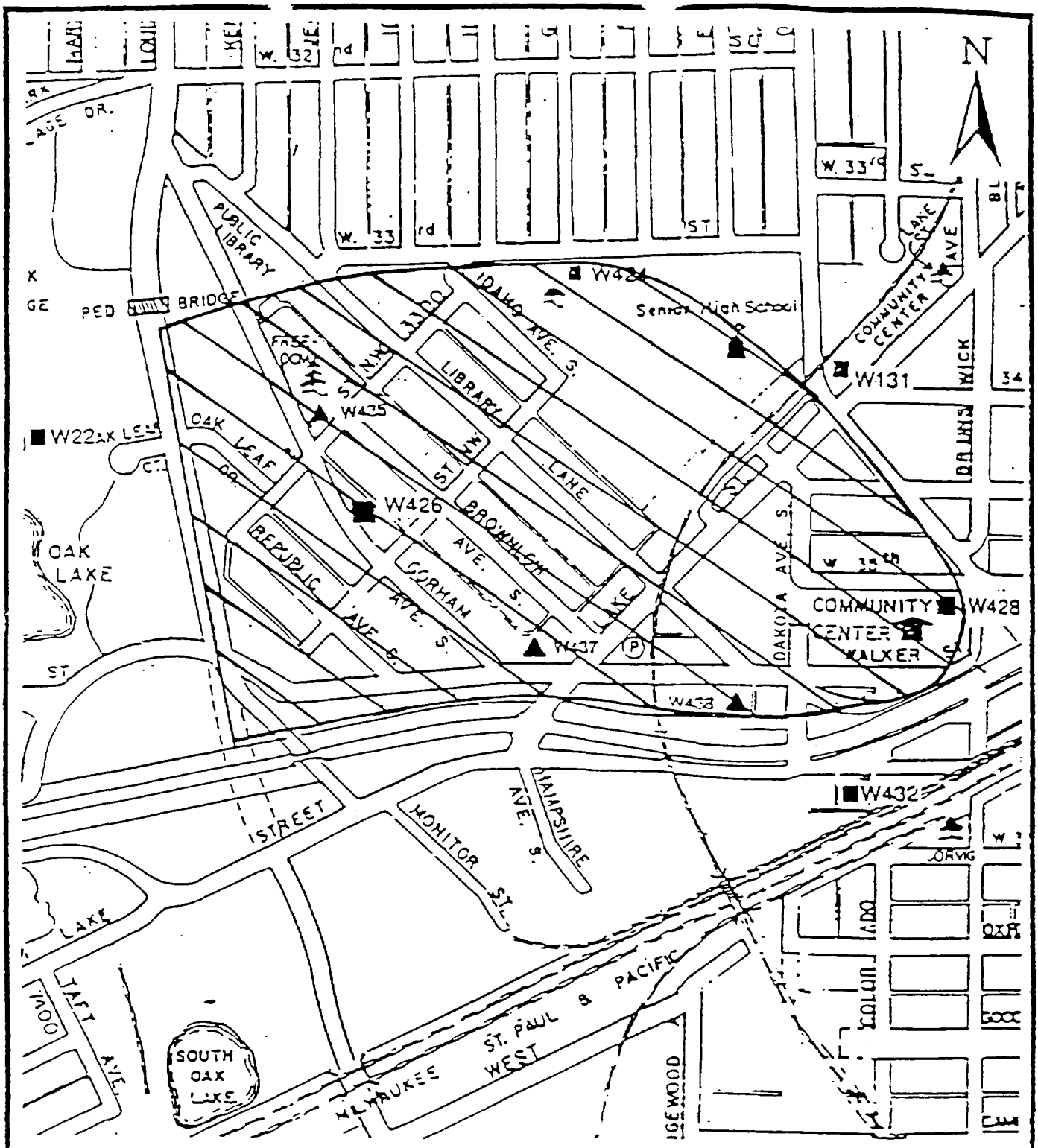


FIGURE 6

Figure 7



▲ New Platteville Wells

■ Existing Platteville

Inferred Extent of Contamination in Northern Area of Platteville

ENSR

Consulting and Engineering

Platteville Aquifer Wells for
Water Quality Monitoring
St Louis Park, MN

DRAWN: LBG | DATE: 5/6/92 | PROJ. NO.: 1620-007