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Five-Year Review Report
Third Five-Year Review Report
for
Reilly Tar & Chemical Corporation Superfund Site
City of St. Louis Park
Hennepin County, Minnesota

September 2006

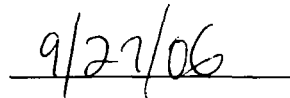
PREPARED BY:

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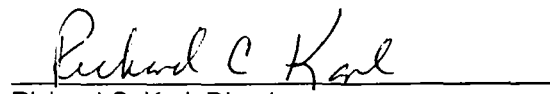
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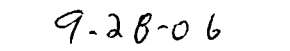
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EXECUTIVE SUMMARY

The remedy for the Reilly Tar & Chemical Corporation Superfund Site located in St. Louis Park, Minnesota included the construction of granular activated carbon treatment plants to treat contaminated groundwater in two municipal wells and also the construction of gradient control groundwater pumping systems to control the spread of contamination in five groundwater aquifers underlying the site. The trigger for this five-year review was the completion date for the previous five-year review.

This is the third 5-year review for the Reilly Tar Site. The ongoing remedial actions are performing consistent with the previous reviews. Drinking water presently distributed to the public meets drinking water criteria. The five-year review found that the remedy was constructed in substantial accordance with the requirements of the site Records of Decision (RODs) and that it remains protective of human health and the environment in the short term. However, groundwater modeling suggests that contaminant migration beyond the gradient control system may occur in the Prairie du Chien Aquifer. Increasing PAH concentration in the City of Edina Well E13 may be an indication of this predicted migration pattern. Based on modeling, pumping from Prairie du Chien wells, Methodist Hospital (W48), Meadowbrook golf course (W119), and St. Louis Park SLP 6 appear to control contaminant migration southeast of the site. It is recommended that pumping from these wells be considered. The potential for vapor intrusion is another issue which will be evaluated. No vapor assessments have been performed for the Site. Further evaluation will be performed of the potential for vapor intrusion into buildings on the site. If necessary, soil gas sampling and/or indoor air monitoring will be performed.

The status of institutional controls for on-site properties should be confirmed. It has been determined that institutional controls for off-site properties have not been filed and therefore, these restrictions need to be completed. Finally, although residents are served by municipal water supplies, it should be determined whether there are institutional controls in place that would prohibit the construction of off-site residential wells.

The remedy at the Reilly Tar and Chemical site is generally functioning as intended and is considered protective of human health and the environment in the short-term. Granular activated treatment of contaminated municipal wells provides water which is safe to drink and the gradient control well systems are generally containing the spread of contamination in the multiple aquifers underlying the site. However, groundwater model simulations indicate the potential for contaminant migration in the Prairie du Chien Aquifer to have future impact to the City of Edina Well E13 and other municipal wells in the area. Potential migration between aquifers, potential vapor intrusion into on-site buildings and the implementation of institutional controls are also

issues. The recommendations and follow-up actions for these issues need to be taken to achieve long-term protectiveness.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Reilly Tar & Chemical Company Superfund Site		
EPA ID (from WasteLAN): MND 980609804		
Region: 5	State: MN	City/ County: City of St. Louis Park/Hennepin County
SITE STATUS		
NPL status: Final		
Remediation status (choose all that apply): Operating		
Multiple OUs?* Yes	Construction completion date: 06/30/97	
Has site been put into reuse? Yes		
REVIEW STATUS		
Lead agency: MPCA		
Author name: Nile Fellows		
Author title: Project Leader	Author affiliation: Minnesota Pollution Control Agency	
Review period: 3/24/06-9/28/06		
Date(s) of site inspection: 8/29/06		
Type of review: Post SARA		
Review number: Third (3)		
Triggering action: Previous Five-Year Review Report		
Triggering action date (from WasteLAN): 9/28/01		
Due date (five years after triggering action date): 9/28/06		

* ["OU" refers to operable unit.]

Five-Year Review Summary Form (con't)

Issues:

- Increased PAH concentrations in Edina Well E13 and the potential migration of contamination beyond the gradient control system in the Prairie du Chien Aquifer.
- Potential migration of contamination in the Platteville Aquifer caused by pumping from SLP 3.
- Potential downward vertical migration of contamination from upper aquifers into underlying aquifers.
- Perforation of well W70 with potential injection of St. Peter Aquifer water into the Prairie du Chien Aquifer.
- Potential vapor infiltration into on-site buildings.
- The status of the filing of institutional controls for both on-site and off-site properties.
- Abandonment of deteriorated monitoring wells.

Recommendations and Follow-up Actions:

- Further evaluation will be performed of the need for additional pumping of wells in the Prairie du Chien Aquifer to achieve gradient control. The evaluation will also assess the need for additional monitoring wells to provide water level data and act as sentry wells to municipal wells.
- Evaluate the potential for contaminant migration in the Platteville Aquifer caused by pumping of SLP 3. Additional ground water sampling, modeling and pump tests may assist in this evaluation.
- Evaluate the condition of well W70. Indications are that the well casing is perforated. The well may need to be sealed.
- Monitor the extent of vertical migration of contamination between aquifers to determine whether the migration predicted by groundwater modeling, can be verified.
- An evaluation will be performed of the potential for vapor intrusion into on-site buildings and soil gas monitoring/indoor air sampling will also be performed, if necessary.
- An Institutional Control Plan (IC) Plan will be prepared to ensure that ICs have been completed and remain effective.
- Evaluate monitoring well construction and conformance to Minnesota Department of Health well codes.

Protectiveness Statement(s):

The remedy at the Reilly Tar and Chemical site is generally functioning as intended and is

considered protective of human health and the environment in the short-term. Granular activated treatment of contaminated municipal wells provides water which is safe to drink and the gradient control well systems are generally containing the spread of contamination in the multiple aquifers underlying the site. However, groundwater model simulations indicate the potential for contaminant migration in the Prairie du Chien Aquifer to have future impact to the City of Edina Well E13 and other municipal wells in the area. Potential migration between aquifers, potential vapor intrusion into on-site buildings and the implementation of institutional controls are also issues. The recommendations and follow-up actions for these issues need to be taken to achieve long-term protectiveness.

Other Comments:

None.

**Reilly Tar & Chemical Corporation Superfund Site
St. Louis Park, Minnesota
Third Five-Year Review Report**

I. Introduction

The purpose of the Five-Year Review is to determine whether the remedy at the Reilly Tar & Chemical Corporation Site (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 issues during the review, if any, and identify recommendations to address them.

This review is required by statute. The Agency is preparing this Five-Year Review report pursuant to CERCLA Section 121 and the National Contingency Plan (NCP) CERCLA Section 121 which 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 ensure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such actions.

The Agency interpreted this requirement further in the NCP; 40 CFR Section 300.430(f)(4)(ii) states:

If a remedial action is selected that results in 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 initiation of the selected remedial action.

The Minnesota Pollution Control Agency (MPCA) conducted the two previous Five-Year Reviews for the Reilly Tar & Chemical Company Superfund Site, St. Louis Park, Minnesota, on behalf of the United States Environmental Protection Agency (EPA). This Five-Year Review evaluates whether the remedial actions remain protective of public health, welfare, and the environment and was conducted from March through September 2006.

This is the third five year review for this site. The triggering action for this review is the second five-year review which occurred on September 28, 2001. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
Listing on National Priorities List	September 8, 1983
ROD for Operable Unit 1 (OU 1)	June 6, 1984
ROD for OU 2	May 30, 1986
Consent Decree issued with CD RAP	September 5, 1986
ROD for OU 4 (St. Peter Aquifer)	September 28, 1990
ROD for OU 3 (Northern Area of the Drift Aquifer)	September 30, 1992
ROD for OU 5 (Northern Area of the Platteville Aquifer)	June 30, 1995
First Five-Year Review	March 28, 1996
Explanation of Significant Differences for OU 5	March 26, 1997
Amendment to Consent Decree	November 8, 1999
Second Five-Year Review	September 28, 2001

III. BACKGROUND

Physical Characteristics

The Reilly Tar & Chemical Corporation site is located in the City of St. Louis Park, Hennepin County, Minnesota (Figure 1). St. Louis Park is a first ring suburb of the City of Minneapolis. The population of St. Louis Park in the 2000 census was 44,126. Recent estimates of the population for the City are 45,000. St. Louis Park is a community of 10.8 square miles located adjacent to the western boundary of the City of Minneapolis. It is essentially fully developed with a mix of residential, commercial, industrial and parkland use.

Land and Resource Use

Between 1917 and 1972, Reilly Industries (Reilly) operated a coal tar distillation and wood preserving plant, known as the Republic Creosoting Company (Republic). 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.

The regional geology consists of unconsolidated glacial drift over sedimentary bedrock. The glacial drift ranges from sand to sandy clay and is generally 80 to 100 feet thick in the vicinity of the Site.

History of Contamination

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 ($\mu\text{g/l}$). 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.

Groundwater Contamination

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. It was reportedly 955 feet deep to the Mt. Simon-Hinckley sandstone 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 logging information, the shallow wells were probably located in the middle and lower drift aquifers and deeper wells were complete in St. Peter's Sandstone. It does not seem as if these wells were 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, the top of Jordan Sandstone. 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 which 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.

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.

Initial Response

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, Reilly and the City have constructed treatment plants for wells SLP-4, SLP-10, and SLP-15. 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 Consent Decree/Remedial Action Plan (CD RAP).

Basis for Taking Action

Contaminants

Hazardous substances that have been detected at concentrations indicating excess risk of exposure in soil/groundwater include:

Soil

It was estimated that up to 1,000,000 cubic yards on-site were contaminated with PAHs at least 10 times the level of PAHs found in background samples. At an estimated cost of \$100,000,000, it was determined that no substantial benefit to groundwater quality would be derived from excavation and removal of all the contaminated soil. The remaining risk to potential receptors of direct contact with excavated contaminated soils is addressed on an ongoing basis by the use of institutional controls required by the site Consent Decree.

For recent on-site redevelopment construction projects, soils detected with a PAH concentration of 100 parts per million or greater were required to be removed from the Site. In 2002, 3,700 tons of soil containing a PAH concentration of 100 parts per million or greater were removed from the Site. Clean soil was placed over the Site to minimize the exposure risk.

Groundwater

Concentrations of PAH were detected in the groundwater above drinking water standards in both shallow and deeper aquifers beneath the site. The upper Drift/Platteville Aquifers had PAH concentrations up to 1000 ug/l (micrograms per liter). Several municipal wells in the Prairie du Chien Aquifer were contaminated with PAHs of 10 ug/l, which posed an unacceptable risk.

IV. Remedial Actions

Remedy Selection

Response actions for the St. Louis Park water supply wells were identified under five different RODs. Each ROD addressed a separate operable unit which is listed below.

RODs/Operable Units

The Site was separated 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 (OUs 3, 4 and 5.)
- 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.

The remedial action objectives of each operable unit are discussed below:

Operable Unit 1

Restoration of drinking water supply for St. Louis Park to drinking water criteria contained in the CD-RAP. See Table 3 in Section VII of this report for the drinking water criteria.

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

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. This aquifer will be continuously monitored for water level and water quality.

Operable Unit 4

The interception and containment of contaminants by pumping well number W410 in the St. Peter Aquifer. This aquifer will be continuously monitored for water level and water quality.

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. This aquifer will be continuously monitored for water level and water quality.

Remedy Implementation

Operable Unit 1 RA

1. Restoration of the drinking water supply and water quality by construction of a Granular Activated Carbon (GAC) treatment system for Municipal Drinking Water Wells 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 3 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.

Municipal wells, SLP-10 and SLP-15 have operated without incident for the past five years except during February 2005. These wells were offline during a portion of February for replacement of actuators and valves and to backwash the system. The CD-RAP required minimum pumping rate of 200 million gallons per year was superseded for 2005 with a pumping rate of 325 million gallons regardless of the incident.

Operable Unit 2 RA

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

Under the requirements of Section 5 of the CD/RAP 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. Initially, there were four water supply production wells screened in this aquifer: SLP-11, -12, -13 and -17. Well SLP-17 has been out of service since 2000 and has not been sampled since then. Well SLP-11 was turned off in October 2003, however, this well still continues to be monitored. Well SLP-13 was turned off in August 2004, however, this well still continues to be monitored. In addition, the City is required to monitor any new wells developed in this aquifer within one mile of the Site. No new Mt. Simon-Hinckley wells were sampled in the past five years. The location of the St. Louis Park wells in this aquifer are shown on Figure 1.

From the 2005 monitoring data, the sums of the concentrations of benzo(a)pyrene and dibenz(a,h)anthracene, carcinogenic PAHs, and other PAHs in wells SLP-11 and SLP-12 are below the advisory levels. It appears that the Mt. Simon-Hinckley Aquifer has not been significantly affected by the contaminants originating from the Site.

2. Monitoring, pumping and treatment of the Iron-ton-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 Well 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.

Well W105 is required to be sampled once per year on even-numbered years. In 2001, the City requested to abandon well W105. The U.S. EPA and the MPCA denied the City's request because the monitoring data from this well is beneficial to assess the plumes in various aquifers.

Based upon the historical data from 1988 through 2005, concentrations have remained below the 10,000 parts per trillion (ppt) cessation criterion.

The location of the area of contamination in the Iron-ton-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 previously 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. Several key wells located in the Prairie du Chien-Jordan Aquifer which provide source or gradient control are discussed below:

Well W23

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 Iron-ton-Galesville and Mt. 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. The effluent from W23 is treated by a granular activated carbon (GAC) facility prior to discharge to Minnehaha Creek. This well is required to be sampled on even-numbered years.

From July 15 through July 19, 2005, well W23 was out of service for repair. Any pumping variations from the target 50 gpm can be attributed to the failing of the pump.

Well W23 continues to be pumped. However, during the past five years, the pumping rate for this well has varied due to the pump itself or the GAC maintenance. The pump does operate at its maximum capacity year round. The concentration of total PAHs regularly exceeds 10,000 ppt total PAH.

SLP-4

The CD/RAP requires that SLP-4 be pumped for gradient control at 300 gpm from May through September and 900 gpm during the months of October through April (annual average of 650 gpm). Pumping of this well began in August 1992 and must continue until water quality in this well and monitoring wells in the vicinity are each less than the drinking water criteria in the CD-RAP.

During February and March 2002, the control system for the well was replaced. During this time, the well was turned off. The City achieved an average pumping rate of 652 gpm for 2002.

During April 2003, a valve needed to be replaced. The pump was down for two weeks to replace this valve. In July 2003, a broken shaft was replaced in the well. The well was down for a period of two weeks during the replacement. The City achieved an average pumping rate of 876 gpm for 2003.

Well SLP-4 was down during April 15 through April 30, 2005 and from May 1 through May 19, 2005 for media replacement and equipment installation for chemical feed. The City achieved an average pumping rate of 831 gpm for 2005.

Concentrations of Total Other PAH were slightly above the CD/RAP Drinking Water Criteria in 2001 to slightly below starting in 2003. The treatment plant for SLP-4 is operated similarly to the SLP10/SLP15 plant.

W48

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 MPCA evaluated pumping W48 as a gradient control well using a newly created model. Additional discussion of pumping W48 is included in Section VIII, Technical Assessment.

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. Municipal well SLP-3 is pumped occasionally during periods of high water demand for the City. Only one well is used as a gradient control well, W410. The 2005 sampling results indicate that the operation of this well is effective in controlling the flow of groundwater, as evidenced by the 2005 water quality and the water level contours that were generated in the Annual Monitoring Report for 2005. Well W410 discharges to the City sanitary sewer.

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 sampling 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 5.

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.

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 the Platteville Aquifer. In addition, down-gradient migration of contaminants to the southeast

from the Drift and Platteville could result in contamination of the deeper St. Peter Aquifer via an erosional trough (also known as a buried valley) through the Platteville Aquifer and the Glenwood Shale confining layer 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, also in the Drift Aquifer. The Platteville Aquifer also has a source control well, W421. These wells have been monitored quarterly since 1987 when pumping began. However, well W422 was discontinued in October 2000 in accordance with the U.S. EPA's and MPCA's approval. This well continues to be monitored, but is no longer used for pumping. The remaining two wells operated as designed with discharge amounts published in the Annual Progress Report and are monitored on a quarterly basis.

Until 2005, the ground water treatment system for these wells included prefiltering with a continuous backwashing sand filter. Periodically, the sand filter was aerated by hand to enhance iron and manganese removal. A small portion (about 10 to 15 gpm) of the raw water was 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, was treated and discharged to the storm sewer and is required under a National Pollutant Discharge Elimination System (NPDES) permit to meet drinking water criteria. Wastewater from sand filter backwashing was recycled through the system and settled iron sludge was discharged to the sanitary sewer.

In 2005, the sand filter was eliminated from the treatment system. Clogging of the filter and maintenance problems created a need to change. The water is now sent directly to the GACs. The GACs are now back-flushed on a regular basis to remove particulates.

During April 2003, the GAC system was down for repairs. This affected the total outputs for wells W420 and W421. Well W421 was experiencing problems with low water levels during the months of April and June 2003, therefore, the pumping rates were reduced during these months. The pumps for wells W420 and W421 maintained a monthly pumping rate of 32.9 gpm and 22.7 gpm, respectively. The required flow rate for both pumps is 25 gpm.

The City 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 consisted of the installation of a gradient control well, W434, in the Platteville Aquifer. This well discharges to the sanitary sewer. The pumping for this well began on June 10, 1997.

During November and December 2002, the pump in W434 began to slow down and had to be pulled for maintenance in December. The City maintained a monthly average pumping rate of 26.7 gpm which is higher than the required 25 gpm.

In January, February, November, and December 2003, the well discharge lines were frozen. This affected the total output for these months. The City was able to maintain a pumping rate of 26 gpm during 2003.

The City requested cessation of pumping at W434 in a letter dated April 15, 2005. In a letter dated June 20, 2005, the Agencies determined that well W434 should continue to operate. Approval for cessation of pumping was later approved. Pumping of W434 stopped in April 2006. This is further described under the Operable Unit 5 description below.

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

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. In accordance with the Consent Decree, 2-3 feet of clean soils were brought in to fill in the wetland. 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 7.

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 aerial 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. The remedies selected for these areas are described below in Operable Unit 3 for the Northern Area Drift Aquifer and Operable Unit 5 for the Northern Area of the Platteville Aquifer.

Operable Unit 3 RA

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.

RI work plans for the Northern Area of the Drift Aquifer were first submitted in 1986. The RI/F/S was completed in 1992. A ROD was issued in September 1992 which called for one gradient control well, well W439. 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. The City began pumping this well in January 1996.

W439 operated in compliance with the CD-RAP in the 5 year period 2001 to 2005. Groundwater was pumped at a rate of approximately 50 gpm during this period. Water quality has been relatively stable with Total Other PAH concentration in the range of 1,000 to 1,800 µg/L. Beginning in 2004, W439 was sampled on a semi-annual schedule.

Operable Unit 4 RA

This operable unit addresses only the St. Peter Aquifer, and is intended to contain the spread of PAH contaminated ground water in this aquifer.

The results of the St. Peter Aquifer RI indicated that a gradient control well was needed. A ROD was issued in September 1990, selecting the use of monitoring well W 410 as the gradient control well. Monitoring well W410 was reconstructed as a pumping well and placed into service on May 30, 1991. This well is required to pump at a rate of 65 to 100 gpm. For the past five years, this well has had a monthly average flow rate of 45 to 85 gpm. The water from well W410 is discharged to the sanitary sewer. PAH concentrations in W410 are significantly higher than the surface water discharge standard. Discharge to the storm sewer is not anticipated to be feasible in the near future. The location of the area of contamination in the St. Peter Aquifer is shown on Figure 5.

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. This remained the case over this five year period.

Operable Unit 5 RA

The Northern Area of the Platteville Aquifer

The Northern Area of the Platteville Aquifer located 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 operable unit addresses only the Northern Area of the Platteville Aquifer, and is intended to contain the spread of contaminated ground water in this aquifer.

Ground water in the Northern Area of the Platteville Aquifer is contaminated with PAHs. 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 of deeper aquifers.

Section 9 of the CD/RAP specified 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 would 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.

Based upon the ground water contours generated in the Annual Monitoring Report for 2005, pumping well W434 has little effect on the Platteville Aquifer. It appears that the well has a local effect in controlling ground water in the Platteville Aquifer immediate area; however, due to the low transmissivity of the Platteville Aquifer in this area, the capture zone is limited. The capture zone of W434 is likely affected by leakage from the above Drift Aquifer recharging the Platteville Aquifer and this effect decreases the lateral extent of the capture area of W434.

The City requested approval for the cessation of pumping at well W434 in a letter dated April 15, 2005. In a letter dated June 20, 2005 the U.S. EPA and the MPCA determined that well W434 should continue operation to control a source of volatile organic contamination. The source of this volatile contamination is not known. Cessation of pumping was later approved by the Agencies and pumping of well W434 stopped in April 2006.

System Operation/Operation and Maintenance

St. Louis Park is conducting the long-term monitoring and maintenance activities in accordance with the CD-RAP which was approved by the U.S. EPA on September 4, 1986. The primary activities associated with the operation and maintenance includes the following:

- Pumping source and gradient control wells;
- Environmental monitoring;
- Discharge permits and the associated sampling requirements;
- GAC filter change outs;
- Utilities;
- Consulting services (ENSR);
- Personnel and administration.

A summary of the annual operating and maintenance costs are shown below in Table 2.

Table 2 – Annual System Operations/O & M Costs

Dates		Total Cost rounded to nearest \$1,000
From	To	
1/2001	12/2001	\$474,000.00
1/2002	12/2002	\$441,000.00
1/2003	12/2003	\$430,000.00
1/2004	12/2004	\$384,000.00
1/2005	12/2005	\$524,000.00

The operating and maintenance costs decreased from 2001 through 2004. This cost reduction can be attributed to the decrease in consulting services needed for the Site. However, the operating and maintenance cost sum for 2005 are similar to those from 1996 through 2001. This increase in cost can be attributed to the increase in consulting services needed for the Site, higher operation and maintenance to the system, and higher costs from the Metropolitan Council of Environmental Services (MCES).

During 2005, the City began generating a database of the analytical results for analysis, i.e., trends, efficiency of the current system and some groundwater modeling. Approximately \$64,000 in additional costs was spent in 2005 conducting these additional services for this Site. Costs of these additional services are included in the Total Cost for 2005.

V. Progress since the Last Five-Year Review

The recommendations from the previous five-year review and follow-up actions for each operable unit are discussed below:

Operable Unit 1

Recommendation: Continue operation and maintenance of extraction system for SLP 10/15.

Routine visits to the GAC treatment system sites and vicinity and annual reporting indicate that the current remedial action is effective. The City operated the GAC system for pumped wells SLP10/15 without incident from January 2001 through December 2005 with the exception of February 2005, when the system went down for repairs. However, pumpage lost in February was made up during the rest of the year and 325 million gallons were pumped, exceeding the CD-RAP minimum of 200 million gallons (per year).

Operable Unit 2

Recommendation: Continue monitoring the Mt. Simon Hinckley Aquifer.

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.

Recommendation: Continue Monitoring Well 105 which is in the Ironton-Galesville Aquifer.

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.

Recommendation: 1.) Monitor and Pump and Treat Prairie du Chien-Jordan Aquifer wells.

2.) Perform computer modeling to determine effects of golf course well and need for a sentry well or pumping from SLP 6.

3.) Continue pumping and monitoring Well W23.

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. The second five-year review had recommended groundwater modeling to determine whether the gradient control system was fully containing the plume. The modeling was performed and is discussed in further detail in Section VII. Technical Assessment, Question A .

Recommendation: Monitoring of St. Peter Aquifer.

Monitoring of the St. Peter Aquifer wells provided data indicating ground water contamination above drinking water standards in wells W133, W412, and W122 from the 1996 and 2001 5-Year Reviews. These three wells are still reporting groundwater contamination above drinking water standards. However, monitoring data have shown a recent PAH decrease in these wells. 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 down-gradient 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. The second five year review had recommended groundwater modeling of the Drift/Platteville Aquifer to determine

whether the gradient control system was fully containing the plume. The modeling was performed and is discussed in further detail in Section VII. Technical Assessment, Question A .

Recommendation: Monitor future development near the site to assure compliance with institutional controls.

The following projects which are either on or adjacent to the Reilly Tar site have involved excavation or development that resulted in reporting activities, requesting information, or Voluntary Investigation and Cleanup Program (VIC) correspondence from the MPCA, in the last 5 years:

1. 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 was completed in 2001. The Property has a deed restriction put in place.
2. Newport on 7 Apartments, 2000. Owners requested and received a No Association Determination, on June 27, 2001. A Deed restriction is pending.
3. Eller Media billboard site east along the northeast corner of Highway 7 and Louisiana Avenue, June 2001. Eller Media intends to purchase the site and is currently seeking an Off-site Source Determination.
4. A Redevelopment Plan dated February 3, 2002 and amended April 5, 2002 was submitted for improvements to the recreational facilities at the Site. Most of the site work was completed in 2002 with a Construction Report dated December 5, 2005 submitted to the Agencies. Some site work continued into 2003 with installation of benches, additional lighting and a playground.
5. Block 7 property office building. Anderson Builders Construction completed the construction of an office building on the property of Block 7 in 2004. U.S. EPA and MPCA approved the Construction Plan on November 13, 2003. As a result of the Agencies' review, indoor air monitoring was performed and a passive venting system was constructed under the building to minimize the potential for any vapor intrusion. After the construction was complete, Anderson Builders Construction submitted the Construction Report to the U.S. EPA and the MPCA on October 1, 2004 outlining the soil management and construction details that occurred at the Block 7 property during 2004. The Agencies approved the Construction Report in a letter dated May 5, 2005.
6. Louisiana Avenue Traffic Improvements. The Agencies approved the Construction Plan on June 22, 2004. On June 11, 2005, the City submitted to the U.S. EPA and the MPCA the

Construction Report for the Louisiana Avenue Traffic Improvements detailing the construction and the procedures for managing soils encountered during construction that may have contained PAHs. The construction activities included a traffic improvement project completed on the southern edge of the former Reilly property along Louisiana Avenue and Highway 7.

7. Storm water detention basin. On July 21, 2005, the City submitted a Construction Plan to the U.S. EPA and the MPCA for a storm water detention basin adjacent to the eastern edge of the Reilly Site. The plan was provided by the City on behalf of Mendota Homes, Inc. who is conducting this redevelopment project. This plan describes the proposed storm water pond and the procedures for managing soils encountered during the pond's construction that may contain PAHs.

Operable Unit 3

Recommendation: Continue monitoring and also define extent of contamination in the Northern Area of the Drift Aquifer.

Northern Area Drift Aquifer Site Conditions

Data could be interpreted as showing a slight decreasing trend in contaminant levels since pumping began. The second five year review had recommended groundwater modeling to determine whether the gradient control system was fully containing the plume in the Northern Area of the Drift Aquifer. The modeling was performed and is discussed in further detail in Section VII. Technical Assessment, Question A .

Operable Unit 4

Recommendation: Evaluate effectiveness of Well W410 as a gradient control well.

St. Peter Site Conditions

A review of PAH concentrations found in the 1991 through 2005 samples from the St. Peter monitoring indicate that the PAH concentrations in most of the wells are 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. Well W409 reached an all-time high in May 2000 for PAH concentration. However, the total PAH concentrations have steadily decreased in this well. Therefore the gradient control well is helping to control contaminant migration through mass removal and decreasing the vertical gradient locally. The second five year review had recommended groundwater modeling to determine whether the gradient control

system was fully containing the plume. The modeling was performed and is discussed in further detail in Section VII. Technical Assessment, Question A .

Operable Unit 5

Recommendation: Continue monitoring the Northern Area of the Drift Aquifer.

The Northern Area of the Platteville Aquifer Site Conditions

Well, W434, was pumped through the 5-year review period. This Platteville well located south of OU5, was approved as an alternative RA for the Northern Area. Evidence suggests that W434 has very limited influence on the Platteville Aquifer. The City requested cessation of pumping of W434 in 2005. The request was initially denied, but later granted. Pumping of W434 ceased in April, 2006. Gradient control in the Platteville Aquifer is currently being achieved by pumping well W421 which is approximately ½ mile west of W434.

VI. Five Year Review Process

Administrative Components

The Five-Year Review was initiated on April 6, 2006. The City representatives were notified of the initiation of the five-year review on April 11, 2006. The review components include:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Development of Five-Year Review Report.

Community Involvement

The MPCA published an official announcement of the 5-year review in the Sun-Sailor newspaper. The announcement appeared in the April 13, 2006 issue. Comments and questions in regard to the cleanup of the Reilly Tar & Chemical Corporation Superfund Site were accepted until July 1, 2006. No comments were received.

Document Review

This Five-Year Review consisted of a review of relevant documents including the RODs, Annual Monitoring Reports (AMR) with O&M activities and monitoring data, MPCA staff response letters, the previous Five-Year Review reports, and other reports. A list of the documents reviewed is presented in Attachment 1.

Data Review

The data review was performed in regard to each aquifer separately, starting with the Mt. Simon-Hinckley Aquifer, which is the deepest aquifer below the ground surface, and ending with the Drift Aquifer, which is the uppermost aquifer monitored. This section only discusses the contaminant concentrations in the aquifers. A detailed discussion of the effectiveness of gradient control wells in containing the spread of contamination is included in Section VII, Question A below.

Mt. Simon-Hinckley Aquifer

St. Louis Park municipal water supply wells, SLP-11, SLP-12, SLP-13, and SLP-17, are located in the Mt. Simon-Hinckley Aquifer. Well SLP-17 has been out of service since 2000 and has not been sampled since. Based on the data from the previous five years, the Mt. Simon-Hinckley Aquifer has not been significantly affected by contaminants originating from the former Reilly site.

Iron-ton-Galesville Aquifer

Well W105 is the only well located in the Iron-Galesville Aquifer. Based on the historical results from 1988 through 2005, the concentrations have remained below the 10,000 ppt cessation criterion.

Prairie du Chien-Jordan Aquifer

The amount and distribution of PAHs in this aquifer have been historically consistent. The PAH concentrations have continued to show a decreasing trend in most of the wells. Edina Municipal Well E13 has shown increasing levels of PAHs in the past decade. The 2005 sample results for Edina E13 exceeded the advisory level in the CD for other PAHs.

St. Peter Aquifer

There has been varying PAH concentrations in the wells of the St. Peter Aquifer. Total PAH concentrations have remained stable for wells W412 and W122. The total PAH concentrations indicate a downward trend in ground water samples collected from W24, W409, and W411. Samples collected from W33 and W133 have been consistent within the past 5 to 10 years.

Platteville Aquifer

W421 and W434 are gradient control wells for the Platteville Aquifer. The historical data collected from the Platteville Aquifer show a stable or decreasing trend in PAH concentrations. Carcinogenic PAHs are generally not detected in these wells. The overall distribution of PAHs in this aquifer has not changed significantly over the past years.

Drift Aquifer

Wells W420 and W439 are gradient control wells for the Drift Aquifer. The PAH concentrations in the Drift Aquifer have generally remained stable without significant changes in the water quality. Carcinogenic PAHs are generally not detected in these wells.

Wells W420, W421, and W439 typically all have higher PAH concentrations than W434 because these wells are located closer to the former Reilly site.

Site Inspection

MPCA staff, performed a site inspection of the Reilly Tar & Chemical Corporation Superfund site on August 29, 2006 as part of the 5-year review process. Scott Anderson, Superintendent of Utilities, Public Works, from the City of St. Louis Park participated in the inspection.

The carbon treatment facilities are clean and well run. Carbon change-out is scheduled for once a year based on past experience. SLP-4 was having the carbon changed out on the date of the inspection. With experience, the City has identified what works best for operating the gradient control system. The City will continue to refine its efforts to efficiently operate its pump out wells.

The City of St. Louis Park, Parks Department has physically changed the Reilly site. During 2002, an estimated 2 feet of clean fill was distributed evenly over the existing cap (see Figure 8). The park was reconstructed including a soccer field and light towers. This construction was performed in accordance with the Redevelopment Plan dated February 3, 2002. The City did not disturb the mound on the west side of the site. The cover looked to be in good condition.

Development has taken place on and around the Reilly Tar Site. The commercial Anderson Building is now located on the east side of the site. A more recent development, Mendota homes is located just north of the Anderson Building site, but is not on the Reilly Tar site. Both properties have had to deal with potential soil contamination as they excavated portions of their sites for runoff control.

The City has been working with a consultant to develop a groundwater data base for the entire site. The data base is making the data more readily accessible and viewable. The data base will be helpful in making decisions about the site.

A copy of the site inspection is presented in Appendix A.

Interviews

Mr. Scott Anderson, Superintendent of Utilities, Public Works, from the City of St. Louis Park was interviewed on June 6, 2006. Mr. Anderson commented on the following City activities associated with the former Reilly site:

- The small drainage pond that is located at the new Anderson Building east of Louisiana Avenue is part of the Reilly Site. The initial Work Plan did not include this drainage pond. The Work Plan was later amended to include it.
- During 2005, the City began conducting its own groundwater studies for the Site. The City began generating a database of the analytical results for analysis, *i.e.*, trends, efficiency of the current pumping systems.
- The sand filter for SLP-4 was upgraded.
- The sand filter for the GTF that treated water from W23, W220 and W221 is no longer used. The GAC is back-flushed regularly.
- Clean fill was distributed over the site to construct a soccer field and improve the park in 2002.
- Edina Municipal Well E13 has shown increasing levels of PAHs in the past decade. The 2005 sample for E13 exceeded the advisory level for other PAHs.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Operable Unit 1

Restoration of the drinking water supply and water quality by the GAC treatment system for SLP-10 and SLP-15 was completed December 27, 1985. The treatment plant is located near SLP-10 and SLP-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.

Municipal wells, SLP-10 and SLP-15 have operated without incident for the past five years except during February 2005. These wells were offline during a portion of February for replacement of actuators and valves and to backwash the system. The CR-RAP required minimum pumping rate of 200 million gallons per year was superseded for 2005 with a pumping rate of 325 million gallons regardless of the incident.

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 Iron-ton-Galesville Aquifer to protect the deeper Mt. Simon-Hinckley Aquifer.

W105 is located on the Site. This well was 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.

The second five-year review had recommended that groundwater modeling be performed to assess the effectiveness of the gradient control wells in this aquifer. Of particular concern was the possibility that contamination would enter the adjacent City of Edina well field. A Prairie du Chien-Jordan groundwater model had been run in 1995/1996 which predicted that part of the plume could escape if well SLP6 or another gradient control well (W48) were not pumping.

The Agencies approved an FS on April 19, 2000 that included: 1) construction of an additional sentry well to monitor ground water 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 a pump-out well with 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 the action recommended in the FS was postponed. From the fall of 2005 to June 2006 a semi-regional ground water model (Reilly Tar Site / Meadowbrook Ground Water Model – from now on referred to as “the Model”) was developed to assist in evaluating the Reilly Tar Site area of gradient control. The 7-layer model embraces the southeastern 1/4th of the Hennepin County, MN, and simulated ground water flow in Drift, Platteville, St. Peter and Prairie du Chien – Jordan aquifers.

A limited number of the model predictive simulations were carried out and the results are included in the model report (STS, June 30, 2006). Additional simulations were conducted after some adjustments to the model. The model adjustments, simulations and the results are reported in a separate Technical Memorandum dated August 3, 2006. This memorandum is entitled “Hydrogeological Analysis Conducted to support the 3rd Five-Year Review Report – Reilly Tar & Chemical Corporation Superfund Site, City of St. Louis Park, Hennepin County, Minnesota, STS Project No. 200604690”.

The model calculated particle pathlines that show which wells are likely to intercept the Reilly Tar Site related ground water contaminants. According to the model, the bulk of the simulated

particles are intercepted by the source control and gradient control wells (Drift, St. Peter wells and St. Louis Park wells SLP-4 and SLP-10/15). However, several particles migrate to Edina, Hopkins and other St. Louis Park municipal wells outside the area of gradient control. Finally, under some pumping configurations simulated by the model, some particles migrate toward downtown Minneapolis. These model predictions are conservative, since the model does not account for contaminant degradation and retardation.

The Model simulations in the Prairie du Chien Aquifer demonstrate that contaminants detected in City of Edina Well No. 13 (E13) apparently have arrived from the St. Louis Park area. Pumping from SLP6, W119 or W48 would very likely decrease migration of contaminants from the Site. This would decrease potential impacts not only to E13, but also to other wells like: Edina Well No. 2 (E2), St. Louis Park 4 and Hopkins 4. Since the City of Minneapolis has expressed interest in pumping W119 during golfing season (irrigation of the golf course), pumping from this well may be the easiest and cheapest to accomplish. In addition to summer pumping from W119, any amount of pumping from SLP6 and /or W48 would have beneficial effect on the performance of the gradient control system. Additional OPCJ monitoring wells should be placed between SLP6/W119/W48 and Edina Well No. 7 (E7), between W119/W48 and E13 and between W23/Flame Industries Well and Hopkins well field (Hopkins 4, 5 and 6), to verify the model predictions. Water levels should be frequently or continuously measured in these “sentry” wells and PAH and VOC samples should be collected at least once a year. The ability to monitor such wells would be necessary for evaluating effectiveness of any gradient control scenarios and anticipating/preventing any major Reilly Tar Site related impacts of the Edina and Hopkins municipal wells.

Following are the main findings of these model predictive simulations:

- If all the gradient control Drift, Platteville and St. Peter wells were turned off, more particles (and, therefore, contaminants) would travel to the underlying Prairie Du Chien Aquifer. The overall similarity of the pattern of path lines calculated for the “current gradient control scenario” and the scenario when all Drift and Platteville are turned off is the effect of the strong downward vertical gradients in the area of Reilly Tar Site between shallower and deeper aquifers. Pumping at low rates from the shallow gradient control wells does not significantly affect these vertical gradients. However, such pumping weakens the shallow sources of contamination and slows the rate of downward contaminant migration, thus giving the system more time for contaminant degradation, dilution and other attenuating processes.

- In addition to the pumping of the current gradient control wells in the Prairie du Chien Aquifer, any combination of pumping from the three currently inoperative wells, St. Louis Park Municipal Well No. 6 (SLP6), Methodist Hospital Well (W48) and Meadowbrook Golf Course Well (W119), will decrease contaminant transport to several municipal wells in the area and will prevent such transport to other wells altogether.
- Preliminary water level data indicate that during the summer time, significant horizontal hydraulic gradient develops between the St. Louis Park and Edina area. During that time, contaminants migrate from the St. Louis Park area toward the Edina main well field. Since the time Edina Well No. 7 was turned off, such transport is most likely slower, although not eliminated. As discussed above, model simulations demonstrate, contaminant transport toward Edina can be controlled and slowed down by pumping from SLP6, W48 and W119 wells.

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.

Further, it is recommended that the condition of well W70 be reviewed to determine if this well adheres to the MDH well code. It appears that W70 is a leaking multi-aquifer well. This well may be required to be sealed to adhere to the MDH requirements. Modeling W70 indicates the potential for injection of contaminants from the St. Peter into the Prairie du Chien Aquifer. This is not an immediate concern since contaminants have not yet migrated to W70.

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

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. Pumping of the gradient control well W410 appears to capture the majority of the horizontal contaminant plume in the St. Peter Aquifer. The vertical migration of the contaminant plume is not prevented as demonstrated by the Model. However, contaminant mass is removed and the vertical gradient is decreased which assists in reducing the contaminant migration.

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.

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.

The Drift and Platteville aquifer source and gradient control wells are located southeast of the Site. The Drift Aquifer 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 an alternative RA to control 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 and Platteville Aquifers 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. Pumping the Drift/Platteville Aquifer does not control the vertical migration of contamination, as demonstrated by the Model. Pumping does reduce the mass and the vertical gradients which reduces the contaminant migration to the deeper aquifers.

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 Street 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 which required the import of 2-3 feet of clean fill had been met. MPCA inspection of the Site had been completed in 1986.

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.

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.

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 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. Groundwater contamination was also identified beneath properties in this area.

Institutional controls still need to be implemented at the properties affected by this contamination.

Operable Unit 3

Gradient control by Well 434 was the prescribed remedial action for OU3. The City requested cessation of pumping in W434 in 2005. The request was initially denied but later granted. Pumping of W434 ceased in April, 2006.

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. Some monitoring wells were abandoned. Remaining wells should be evaluated for compliance with well codes.

Operable Unit 4

A description of the St. Peter Aquifer is included above under the Operable Unit 1 site conditions. This aquifer is a 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. The remedy for this operable unit was the reconstruction of monitoring well W 410 to perform pumping to achieve gradient control.

Total PAH concentrations have remained stable for monitoring wells W412 and W122. The total PAH concentrations indicate a downward trend in ground water samples collected from W24, W409, and W411. Samples collected from wells W33 and W133 contained unusually high PAH concentrations during the May 2005 sampling event. However, samples collected from W33 and W133 in September 2005 were consistent with historical PAH concentrations exhibited in these wells within the last 5 to 10 years.

As discussed under Operable Unit 2 above, pumping from W410 captures the horizontal contaminant plume in the St. Peter Aquifer, but it likely does not prevent contaminants from migrating downward into Prairie du Chien – Jordan aquifer (OPCJ). The Model's predictive simulations indicate that if that well was turned off, more particles (and, therefore, contaminants) would travel to the OPCJ water supply wells in the area. Pumping from W410 most likely slows the rate of downward contaminant migration, thus giving the system more time for contaminant degradation, dilution and other attenuating processes.

Operable Unit 5

The historical water quality data indicates a stable or decreasing trend in PAH concentrations in most Platteville Aquifer wells. Concentrations of PAH were detected in six of the

11 Platteville Aquifer monitoring wells sampled in 2005. The highest concentration was 5,802 µg/L detected in well W437. Carcinogenic PAH concentrations were not detected in any of the 11 wells sampled.

Although pumping of well W434 was the selected remedy for OU 5, groundwater monitoring data shows that pumping well W434 has had little effect on the Platteville Aquifer. It appears that the well has a local effect in controlling ground water in the Platteville Aquifer in the immediate area, however, due to the low transmissivity of the Platteville aquifer in this area, the capture zone is limited. Cessation of pumping from W434 was approved in 2006. Pumping stopped in April, 2006.

The Model's predictive simulations confirmed that pumping from W434 has a minimum effect on the ground water flow system and transport of the Reilly Tar Site related contaminants.

SLP3 is screened in both the St. Peter and Platteville Aquifers. The Model indicates that pumping of SLP-3 may cause movement of contaminants in the Platteville Aquifer. Further evaluation should be performed to determine the potential movement of contaminants in the Platteville Aquifer due to pumping of SLP3.

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.

Implementation of Institutional Controls

Institutional controls (ICs) are non-engineered instruments, such as administrative and legal controls that help to minimize the potential to exposure from contamination and that protect the integrity of the remedy. ICs are required to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure (UU/UE).

The September 1986 Enforcement Decision Document (EDD) for OU 2 referenced the potential hazard of exposure to contaminated material that might be excavated on-site. The EDD indicated that this hazard can be and is currently mitigated through institutional controls to be implemented through the Consent Decree. It should be noted that institutional controls were not specifically listed as a component of the EDD remedy, with the exception of properties in an area south of the site which is discussed further below.

The September 1986 Consent Decree/Remedial Action Plan (CD-RAP) referred to in the EDD required the City of St. Louis Park and the Housing and Redevelopment Authority of St. Louis Park to each provide a Site Development Plan describing actions each would take to minimize disturbance and/or exposure to contaminated soils, groundwater and hazardous substance remaining on site while developing their respective areas of the site. In addition, prior to any construction, these entities were/are required to submit a Construction Plan describing the proposed project and also detailing such items as safety plans for construction workers and methods for handling and disposing of contaminated soils. The CD-RAP requires that any instrument of conveyance of property from the City or Housing Authority include a covenant running with the land that assures the purchaser would have a similar requirement to submit a Construction Plan. The CD-RAP also required two other site owners, Oak Park Village Associates and Philip's Investment Company to record affidavits complying with Minnesota Statute Section 115B.16, Subd. 2 (1984) for their property. Similar to the City, Oak Park Village Associates and Philip's Investment Company were required to submit a Construction Plan. Further, any instrument of conveyance by Oak Park Village and Philip's Investment Company must include a covenant running with the land assuring that the purchaser would comply with the same requirements as these entities. U.S. EPA is currently having a site title commitment document prepared which will show whether required covenants or affidavits have been recorded.

The CD-RAP (and the EDD) also required the City to install borings on properties in an area south of the site (See Figure 6) to determine whether hazardous substances remained in place. The City completed the borings and on May 15, 1989 sent U.S. EPA a letter identifying the locations and owners of properties at which hazardous substances still remained. Within 180 days of completing the borings the parties owning these impacted properties were to have recorded affidavits, with the Recorder of Deeds of Hennepin County which complied with Minnesota Statute 115B.16, Subd. 2 (1984).

U.S. EPA recently requested the City to research the status of the affidavits for these properties south of the site. The City reviewed the titles for these properties and has concluded that the affidavits have not been filed for any of these properties. Since the City is an owner of the site, as well as, the municipality where these properties are located, U.S. EPA requested that the City assist these property owners in recording the necessary affidavits. To date, the City has not responded to this request.

Although, contaminated groundwater extends off-site in multiple aquifers, all residents in the City of St. Louis Park are supplied with water from the municipal well system which is carbon

filtered and safe to drink. However, it should be determined whether there is a City ordinance or some other means to prevent residents from installing their own private wells which could be using contaminated groundwater.

Although the remedy is functioning as intended by the ROD and the CD/RAP, further evaluation will be undertaken to assure that ICs are effective.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The City of St. Louis Park added some clean soil as part of the park improvement project but this has not affected the protectiveness of this remedy.

Changes in Standards and To Be Considereds

The following standards that apply to the ongoing groundwater pump and treat remedial actions are the Safe Water Drinking Act MCLs, the State of Minnesota HRLs, the Clean Water Act NPDES permit standards for surface water discharge and the Clean Water Act pretreatment standards. These standards were reviewed for changes that could affect protectiveness.

At the time the original ROD was written, drinking water standards had not been developed for PAHs. Therefore, risk-based “drinking water criteria” were developed for the site and were included in the site CD. Since the time of the site CD, drinking water standards (both MCLs and HRLs) have been developed for some of the PAHs. Table 3 lists the original drinking water criteria listed in the CD and compares them to the new State of Minnesota Health Risk Limits (HRLs) for drinking water and Federal MCLs, where available.

Table 3 - Drinking Water Criteria

Chemical	CD/RAP/ROD (ng/L)	HRLs (ng/L)	MCLs (ng/L)
Sum of Benzo(a)pyrene and dibenzo(a,h)anthracene	5.6	None	None
Carcinogenic PAHs	28.0	50	200 ^A
Other PAHs	280.0	300,000	None

^ABenzo(a)pyrene

A comparison of the values in Table 3 indicates that the drinking water criteria developed in the CD for carcinogenic PAHs and other PAHs are more stringent than the Federal MCLs and State HRLs and thus the drinking water criteria remain protective. However, since there is no HRL for dibenzo(a,h)anthracene, it is not possible to compare the CD drinking water criteria of the sum of

the two carcinogenic compounds benzo (a) pyrene and dibenzo (a,h) anthracene with the MCLs/HRLs. The MDH has established a calculation for the additivity effects of chemicals when there is exposure to more than one compound. The MPCA compared the criteria above with the additivity calculation and determined the site cleanup standards are protective. The treated water from OU 1 municipal wells SLP-10 and SLP-15 meet the drinking water criteria established in the CD. The OU 2 municipal well SLP-3 which is used for drinking water on a seasonal basis also meets the drinking water criteria when blended with other municipal wells.

At times when water pumped from municipal wells SLP-10 and SLP-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 NPDES effluent limitations in existence at the time of the CD, as was the case of the drinking water criteria, were incorporated into the CD. In November 2000, the NPDES permit was reissued by the MPCA Division of Water Quality (DWQ). All discharges from the site are now managed under permit number MN 0045489. The current effluent limitations are shown in Table 4 below. Table 5 also lists the discharge standards for general permit MN G640084 which governs discharge of filter backwash water.

Table 4 – Current Effluent Limitations for Surface Water Discharge. Treated Water from Wells W23, W420, W421, Direct Discharge from SLP-6

Parameter	Quarterly Average (µg/L)	Monthly Average (µg/L)
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

Table 5 - Effluent Limitations for Filter Backwash Water

Total Suspended Solids (TSS)	30 mg/L monthly average
PH	Between 6 and 9

The OU 2 source and gradient control wells W-23, W420, W-421 which discharge to surface water also meet the current effluent limitations. It should be noted that the new permit includes SLP-6 as an approved discharge location should it be necessary to use it as a gradient control well.

The water from OU 3 gradient control well W439 and OU 4 gradient control well W410 discharge to the sanitary sewer system and currently meet the pretreatment requirements of the Metropolitan Council of Environmental Services (MCES).

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics

There are no new exposure pathways or changes to existing exposure pathways. There have been no changes in the toxicity factors for the contaminants of concern that were used in assessing risk. The exposure assumptions to develop the human health risk assessment are considered to be conservative and reasonable in evaluating risk and developing risk based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted.

Question C: Has any other information come to light that could question the protectiveness of the remedy?

Vapor intrusion has become an emerging issue to be evaluated at Superfund sites. Vapor from some contaminants in groundwater or soils can volatilize and enter into buildings. The Agencies attempted to do a screening for a possible vapor intrusion risk at the site since contaminants have been left in place in the soils and the groundwater contamination in the uppermost Drift Aquifer is relatively shallow (approximately 10 feet). However, there are no existing groundwater monitoring wells close enough to the on-site apartments and townhouses from which data could be used. Also, there is no known previous soil gas survey data available that would give an indication as to whether there were any vapors in the soil.

It appears that prior to the development of townhomes on the site in the late 1970s, there was some excavation of contaminated soils by the City beneath the proposed townhomes. It is not clear to what depth the excavation occurred. It also appears that a passive venting system was installed under the western half of an apartment building and one of the townhouses. The passive venting system was built to vent methane from peat deposits in this area of the site. Both the soil removal and the passive venting system may help reduce vapors in the soil but would not necessarily eliminate all the vapors, if present.

It is recommended that further evaluation be performed on the potential risk from vapor intrusion into the site buildings and if necessary, perform either soil gas monitoring beneath the buildings and/or indoor air sampling.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is substantially functioning as intended by the RODs. There have been no changes in the physical conditions at the site, standards, contaminant toxicity or exposure pathways that would affect the protectiveness of the remedy. Groundwater modeling suggests that there may be a downgradient migration of contamination into the Prairie du Chien Aquifer from the overlying aquifers. The groundwater modeling also suggests that the gradient control system in the Prairie du Chien Aquifer may not be fully controlling the spread of contamination and that additional pumping wells and “sentry” monitoring wells may be required. There is no other new information that calls into question the protectiveness of the remedy, however, additional study will be performed to determine whether there is a potential risk from the vapor intrusion pathway.

VIII. Issues

Table 6 - Issues

Operable Unit	#	Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
OU-2	1	Potential migration of plume in the Prairie du Chien-Jordan Aquifer	N	Y
	2	W70 may be damaged and perforated, water may flow from St. Peter Aquifer to Prairie du Chien-Jordan Aquifer	N	Y
	3	Institutional Controls- In order for the remedy to be protective, in the long-term, effective ICs must be implemented and maintained.	N	Y
	4	Possible Vapor Intrusion Issues for on-site Residents	N	Y
	5	Evaluate the impact of pumping SLP3 on the Platteville Aquifer through further groundwater monitoring, modeling and/or pump tests	N	Y
	6	Possible downward vertical migration of contamination from the Drift, Platteville, and St. Peter Aquifers	N	Y

Issue not affecting the protectiveness of the remedy

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

IX. Recommendations and Follow-Up Actions

Table 7 - Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)
1	Evaluate the necessity of pumping W119, SLP6 and W48. Recommend installation of monitoring wells upgradient of Edina well field.	MPCA	EPA	01/08	Y
2	Evaluate the condition of W70 against existing well codes. Seal well if groundwater model shows impact from St. Peter Aquifer	MPCA	EPA	9/07	Y
3	Develop an IC Plan, to ensure that 1.) deed restrictions are recorded at both on-site and off-site properties; 2.) effective governmental controls are implemented for controlling use restrictions in areas affected by downgradient groundwater contamination; and 3.) mechanisms are in place to ensure regular inspection of ICs and annual certification to EPA that ICs are in place and are effective. Also IC maps (paper and electronic) should be created which depict the areas subject to use restrictions and areas subject to ICs.	City of St. Louis Park/MPCA/ EPA	MPCA/ EPA	3/07	Y
4	Evaluate potential vapor intrusion into on-site structures	City of St. Louis Park	MPCA/ EPA	3/08	Y
5	Evaluate the impact of pumping SLP3 on the Platteville Aquifer through further groundwater monitoring, modeling and/or pump tests.	MPCA	EPA	9/08	Y
	Monitor affected	City	MPCA	9/08	Y

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)
6	aquifers to assess the extent of vertical migration.				

Recommendation/Follow-up Actions not affecting protectiveness of the remedy

The City of St. Louis Park should evaluate the conformance of several monitoring wells with Minnesota Department of Health Well Codes and make repairs to monitoring wells by September 2007, as needed.

X. Protectiveness Statement

Operable Unit 1

The treatment plant appears to be operating properly and supplying safe water to the City. The remedy at OU-1 is protective of human health and the environment.

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 Iron-ton-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 Iron-ton-Galesville Aquifer in the immediate vicinity of the Site, but remains below the criteria established in the Consent Decree.

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.

The August 2006 groundwater model simulations demonstrate that contaminants detected in Edina Well No. 13 (E13) apparently have arrived from the St. Louis Park area. Pumping from SLP6, W119 or W48 would very likely decrease migration of contaminants from the Site. This would decrease potential impacts not only to E13, but also to other wells like: Edina 2, St. Louis Park 4 and Hopkins 4. Since the City of Minneapolis has evaluated pumping W119

during golfing season (irrigation of the golf course), pumping from this well may be the easiest and cheapest to accomplish. In addition to summer pumping from W119, any amount of pumping from SLP6 and/or W48 would have beneficial effect on the performance of the gradient control system. There may be several monitoring wells screened in this aquifer needing repairs in order to maintain sufficient ground water flow information.

Additional OPCJ monitoring wells should be placed between SLP6/W119/W48 and Edina Well No. 7, between W119/W48 and Edina Well No. 13 and between W23/Flame Industries Well and Hopkins well field (Hopkins 4, 5 and 6). Water levels should be frequently or continuously measured in these "sentry" wells and PAH and VOC samples should be collected at least once a year. Ability to monitor such wells would be critical for evaluating effectiveness of any gradient control scenarios and anticipating/preventing any major Reilly Tar Site related impacts of the Edina and Hopkins municipal wells.

This action is considered protective of human health and the environment in the short term.

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.

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.

The August 2006 groundwater model indicated that Drift and Platteville gradient control wells do not control vertical contaminant migration. Pumping in these shallow aquifers does remove contaminant mass and slightly reduces the vertical gradients on a localized basis. These factors decrease the amounts of contamination reaching municipal wells in the area.

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 of human health and the environment.

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 of human health and the environment.

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 subsurface investigation in the vicinity of the site found some deep soil contamination, as well as, groundwater contamination beneath some properties. Appropriate institutional controls will need to be implemented at the affected properties.

Operable Unit 3

Northern Area Drift Aquifer

Currently, monitoring and gradient control wells provide protection at this operable unit. The remedy at OU-3 is protective of human health and the environment.

Operable Unit 4

St. Peter Aquifer

Pumping from W410 captures the horizontal contaminant plume in the St. Peter Aquifer, although it likely does not prevent contaminants from migrating downward into Prairie du Chien – Jordan aquifer (OPCJ). Pumping from W410 most likely slows the rate of downward contaminant migration, thus giving the system more time for contaminant degradation, dilution and other attenuating processes.

Currently, monitoring and treatment of the municipal water supply obtained from the St. Peter Aquifer is providing safe drinking water. The remedy at OU-4 is protective of human health and the environment.

Operable Unit 5

Northern Area Platteville Aquifer

The remedy at OU-5 currently protects human health and the environment because it has a local effect to controlling groundwater in the immediate area. However, to evaluate protectiveness long-term, it is recommended that the effect of pumping SLP-3 on contaminant migration in the Platteville Aquifer should be evaluated.

Site-Wide Protectiveness Statement

The remedy at the Reilly Tar and Chemical site is generally functioning as intended and is considered protective of human health and the environment in the short-term. Granular activated treatment of contaminated municipal wells provides water which is safe to drink and the gradient control well systems are generally containing the spread of contamination in the multiple aquifers underlying the site. However, groundwater model simulations indicate the potential for contaminant migration in the Prairie du Chien Aquifer to have future impact to the City of Edina Well E13 and other municipal wells in the area. Potential migration between aquifers, potential vapor intrusion into on-site buildings and the implementation of institutional controls are also issues. Therefore, the following actions need to be taken to achieve long-term protectiveness:

- 1.) Further evaluation will be performed of the need for additional pumping of wells in the Prairie du Chien Aquifer to achieve gradient control. The evaluation will also assess the need for additional monitoring wells.
- 2.) Further evaluation of the effect of pumping St. Peter Aquifer municipal well SLP-3 on contaminant migration in the upper Platteville Aquifer will be performed.
- 3.) Further evaluation will be performed of the condition of multi-aquifer Monitoring Well W70 which may be contributing to contamination of the Prairie du Chien Aquifer. The well may be sealed if groundwater modeling shows significant contaminant impact from the overlying St. Peter Aquifer.

- 4.) Monitoring will be performed to determine whether the extent of vertical migration of contamination between aquifers, predicted by groundwater modeling, can be verified.
- 5.) An evaluation will be performed of the potential for vapor intrusion into on-site buildings and soil gas monitoring/indoor air sampling will also be performed, if necessary.
- 6.) Implement and maintain long-term, effective institutional controls.

XI. Next Review

The next five-year review for the Reilly Tar & Chemical Corporation Superfund Site is five years from the date of this review.

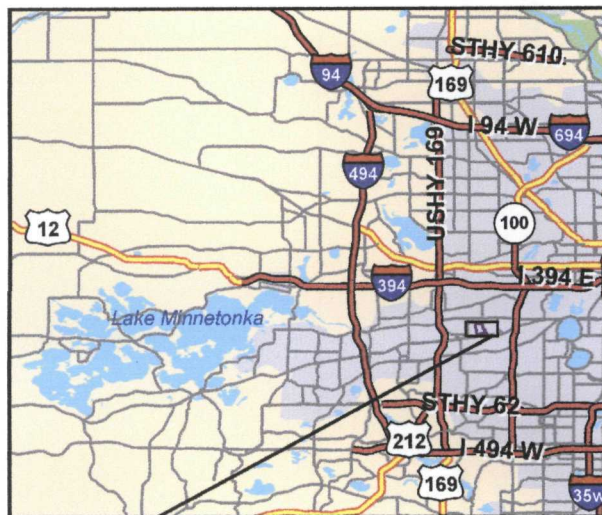
FIGURES

**Reilly Tar and Chemical Corp.
Hennepin County, MN**

MND980609804



State



County



Site

Figure 1

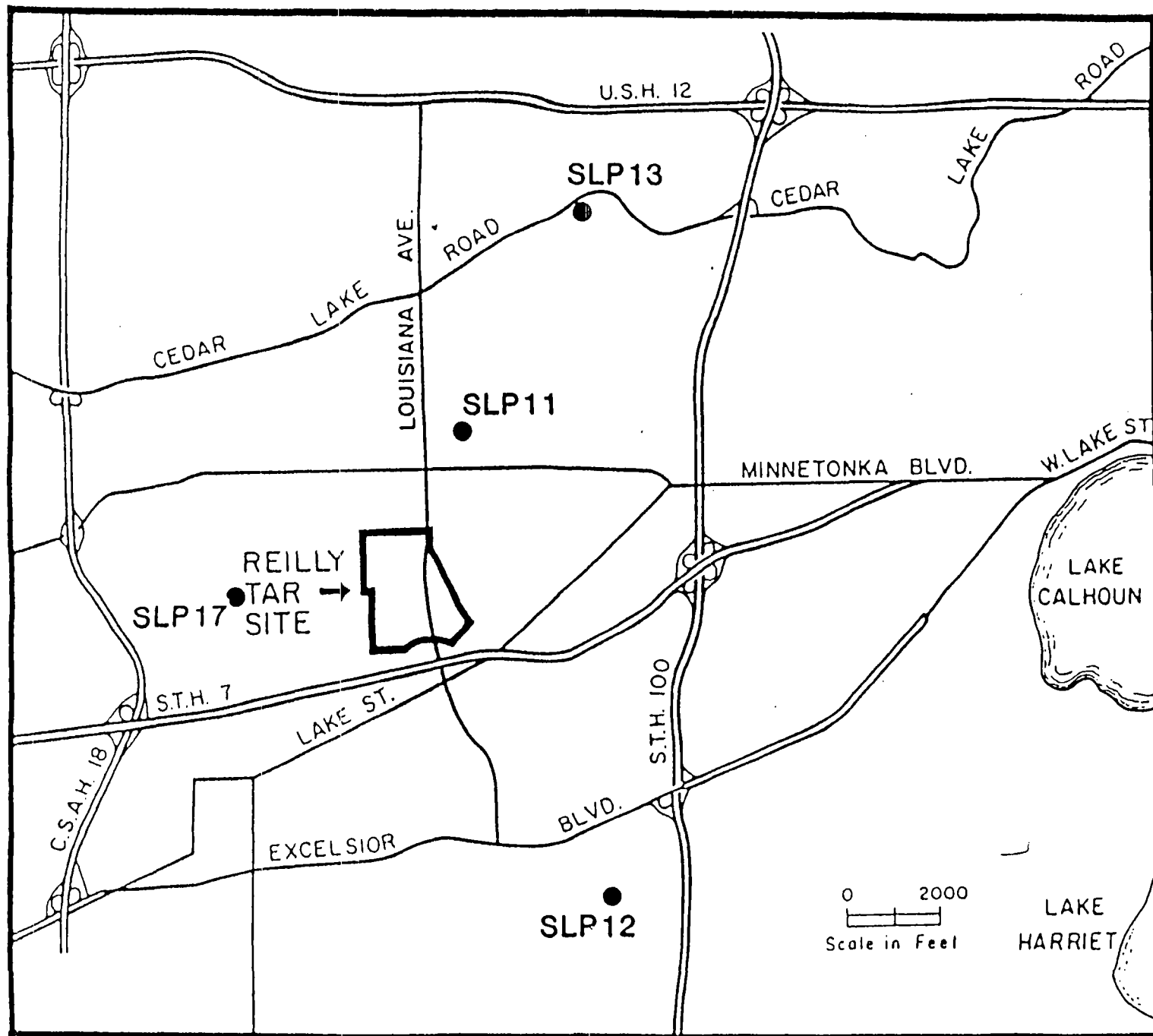
Created by Sarah Backhouse
U.S. EPA Region 5 on 9/22/06
Image Date: 2003

Legend

Reilly Tar and Chemical Corp.



MT. SIMON - HINCKLEY AQUIFER



Depth Below
Land Surface,
in Feet

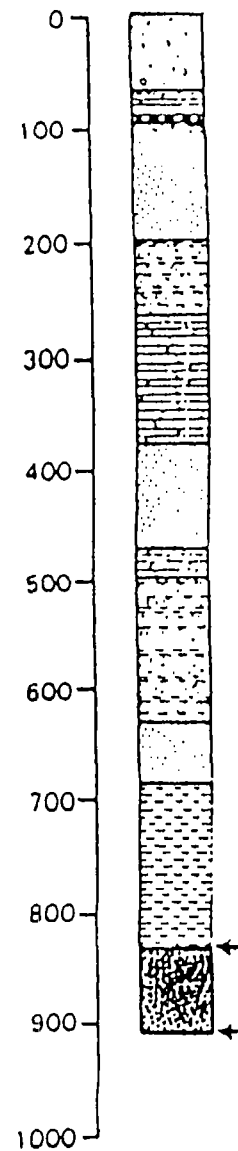
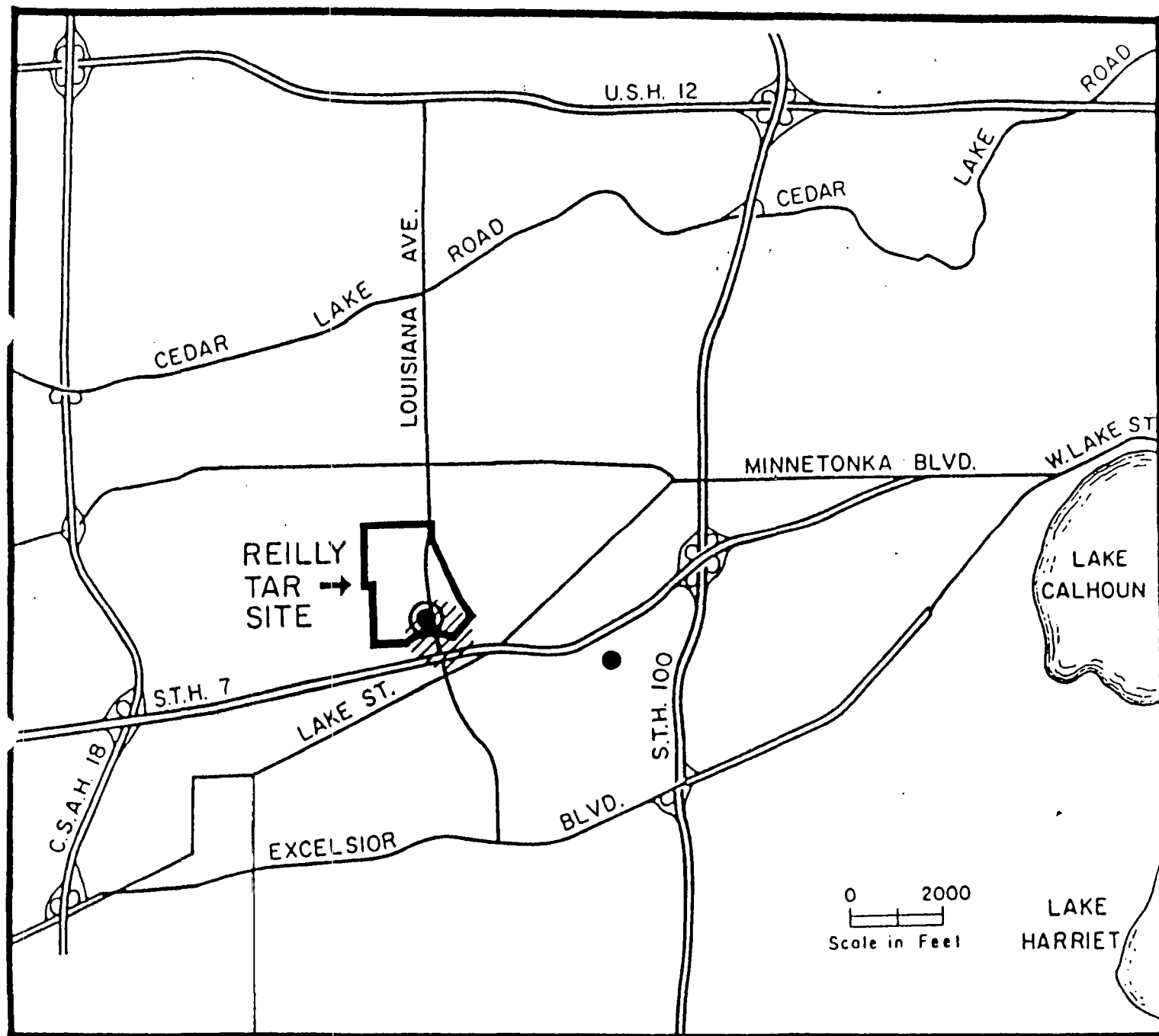


FIGURE 1

● MONITORING AND MUNICIPAL WELL

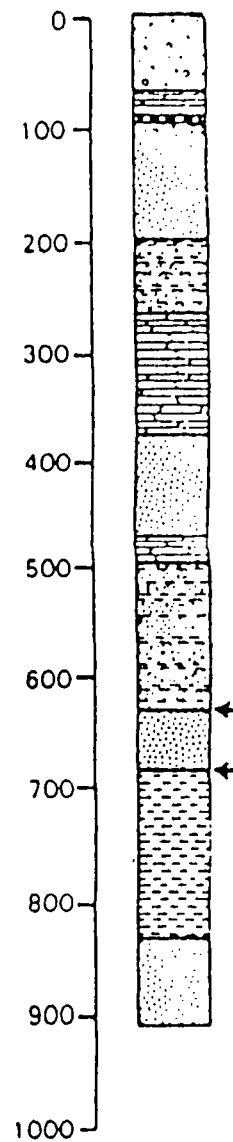
IRONTON - GALESVILLE AQUIFER

FIGURE 2



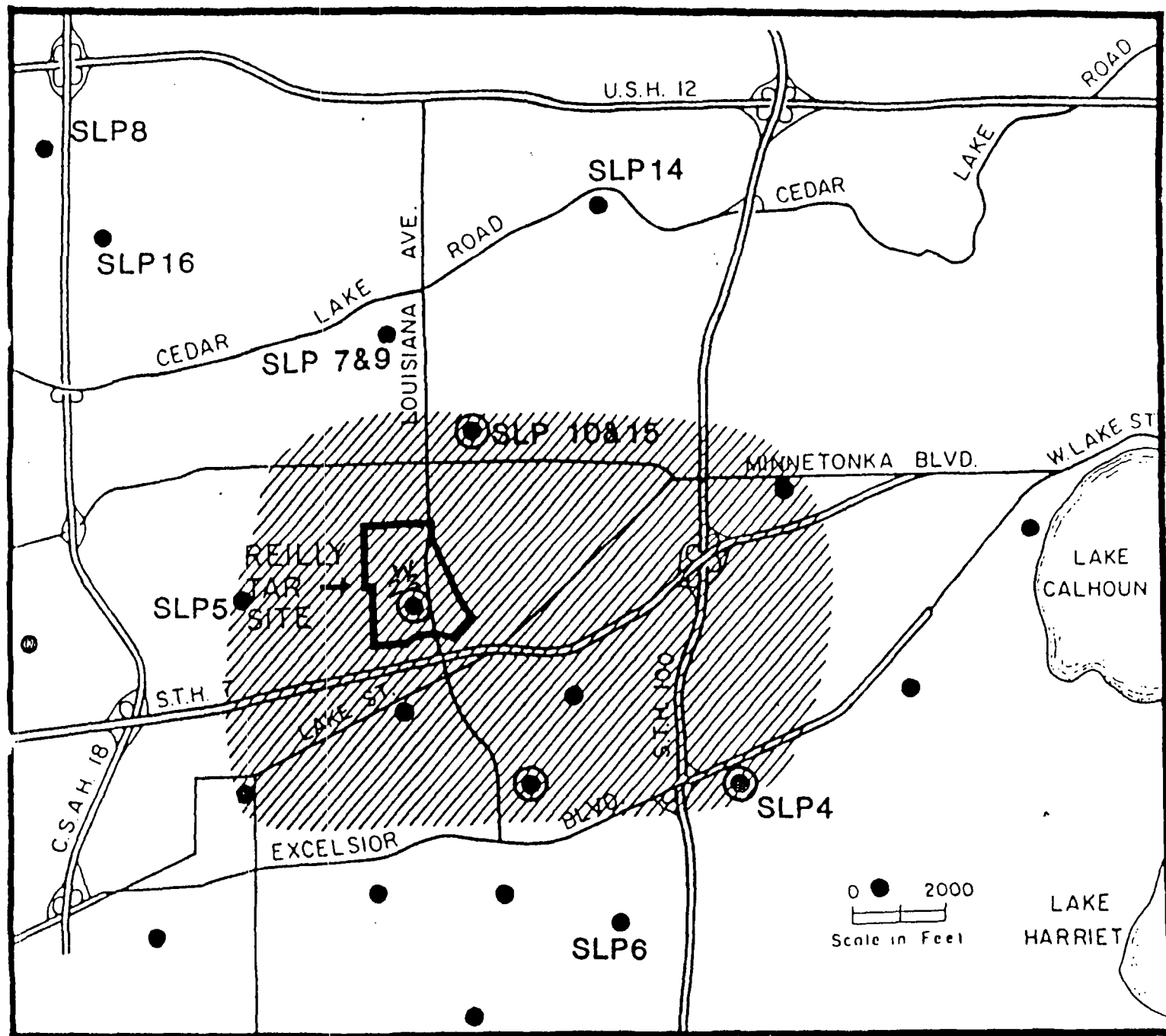
 AREA OF CONTAMINATION
  MONITORING WELL
  SOURCE OR GRADIENT CONTROL WELL

Depth Below
Land Surface,
in Feet

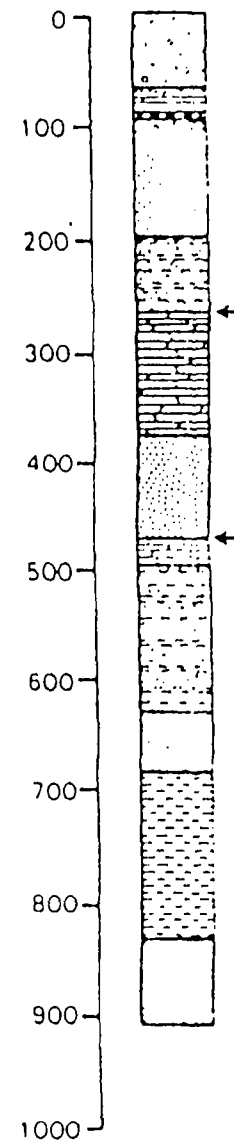


PRAIRIE DU CHIEN - JORDAN AQUIFER

FIGURE 3



Depth Below
Land Surface,
in Feet



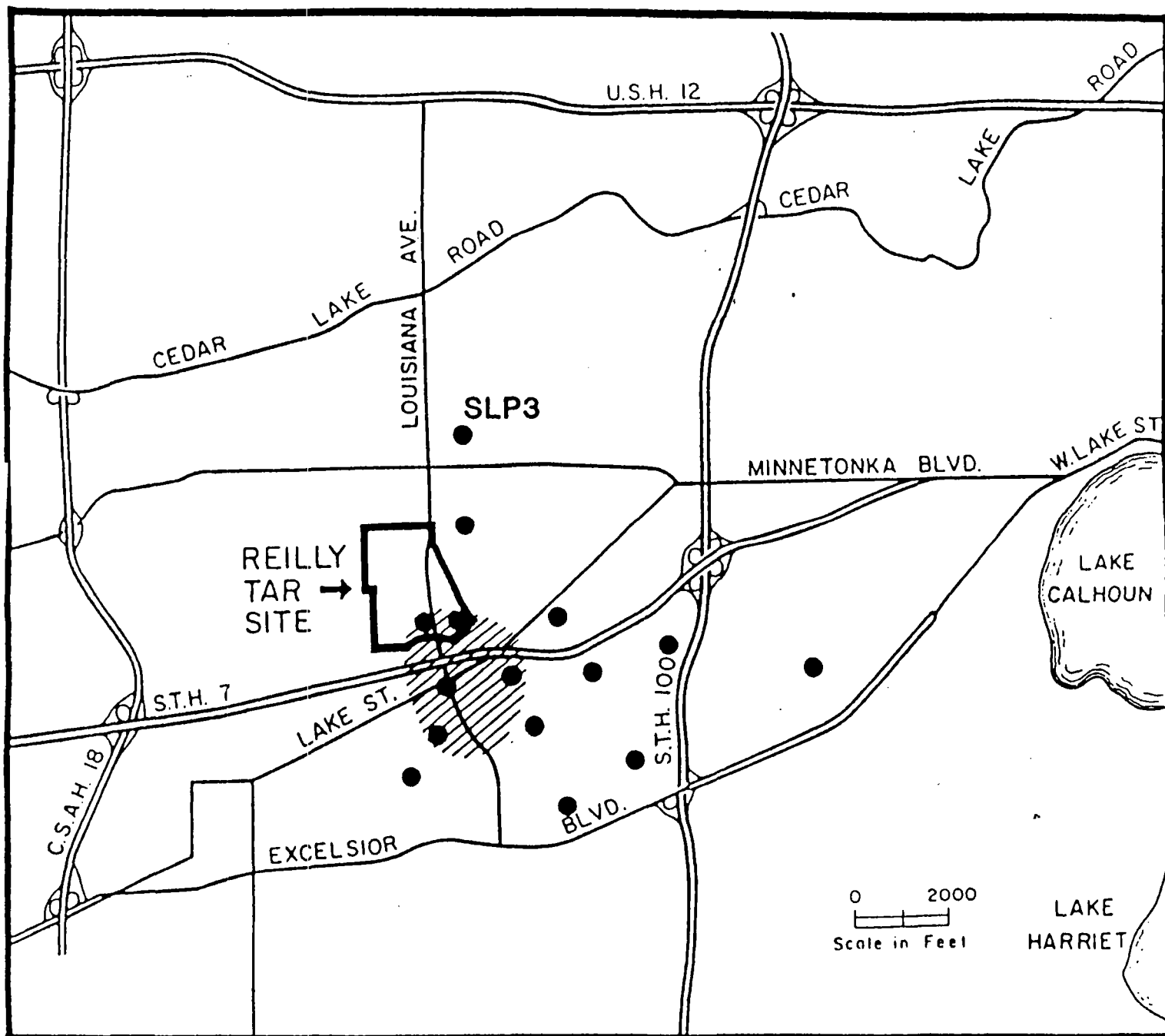
/// AREA OF CONTAMINATION

● MONITORING WELL

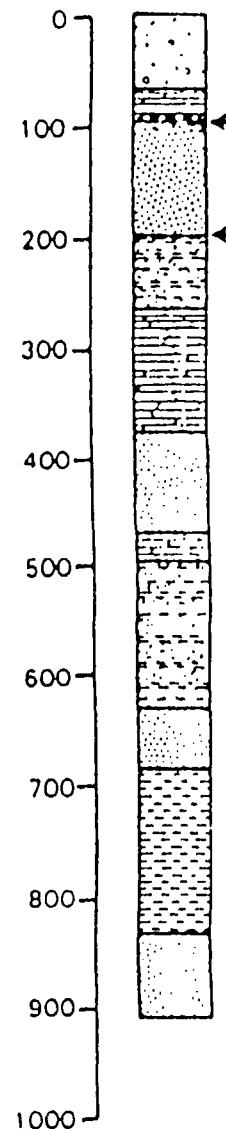
⊙ SOURCE OR GRADIENT
CONTROL WELL

ST. PETER AQUIFER

FIGURE 4



Depth Below
Land Surface,
in Feet



AREA OF CONTAMINATION



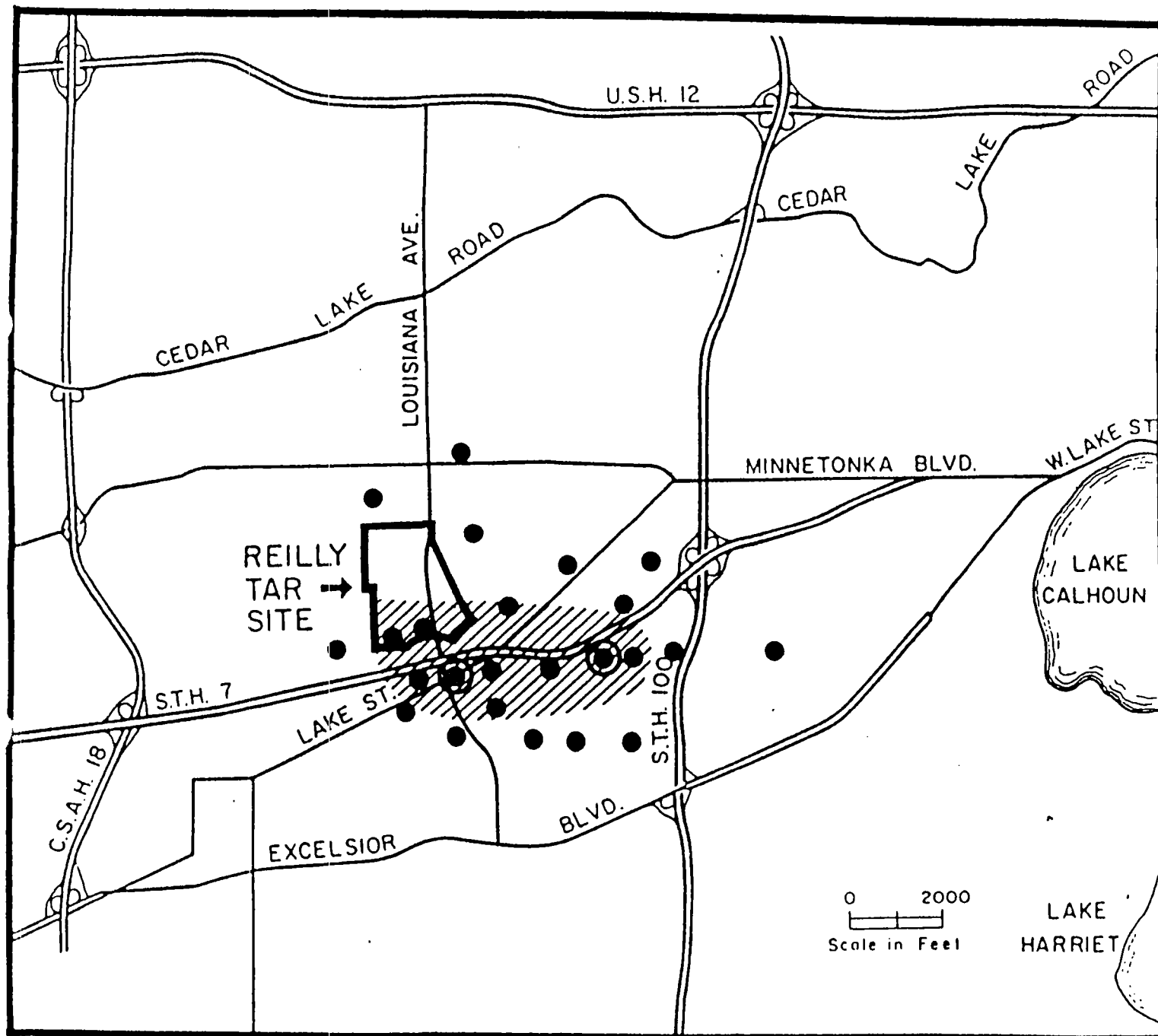
MONITORING WELL



SOURCE OR GRADIENT
CONTROL WELL

DRIFT AND PLATTEVILLE AQUIFERS

FIGURE 5



AREA OF CONTAMINATION

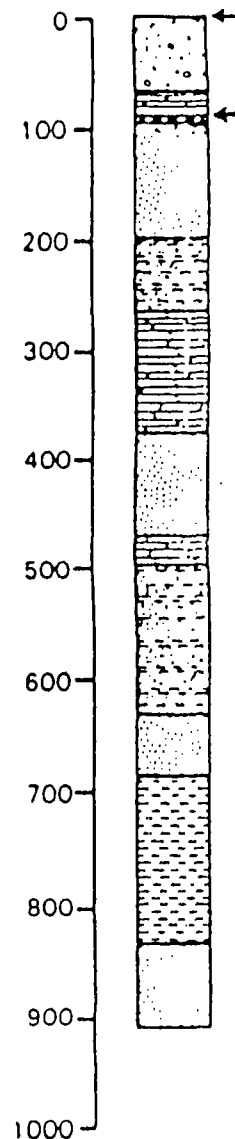


MONITORING WELL



SOURCE OR GRADIENT
CONTROL WELL

Depth Below
Land Surface,
in Feet



NEAR - SURFACE CONTAMINATION INVESTIGATION AREA

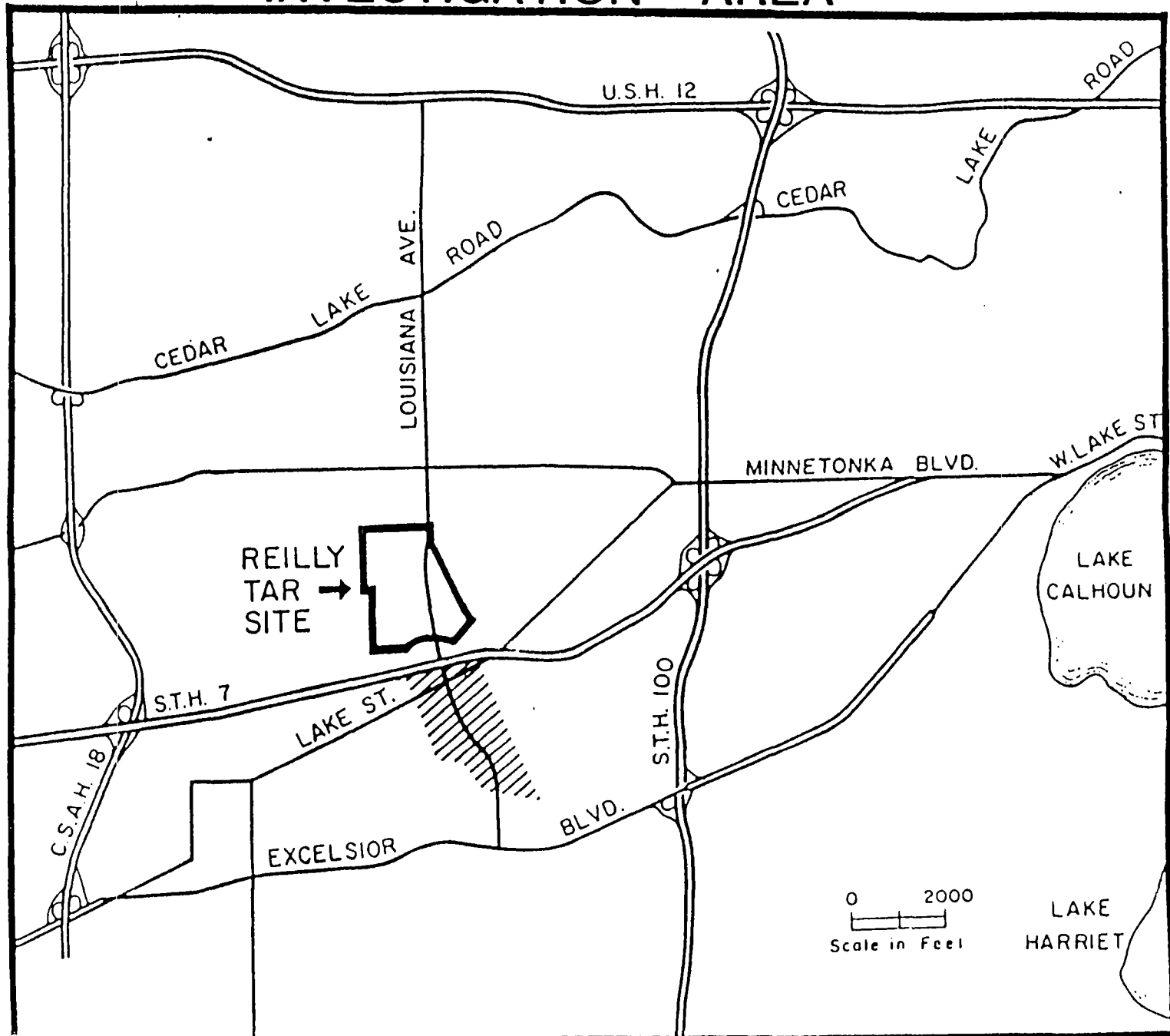
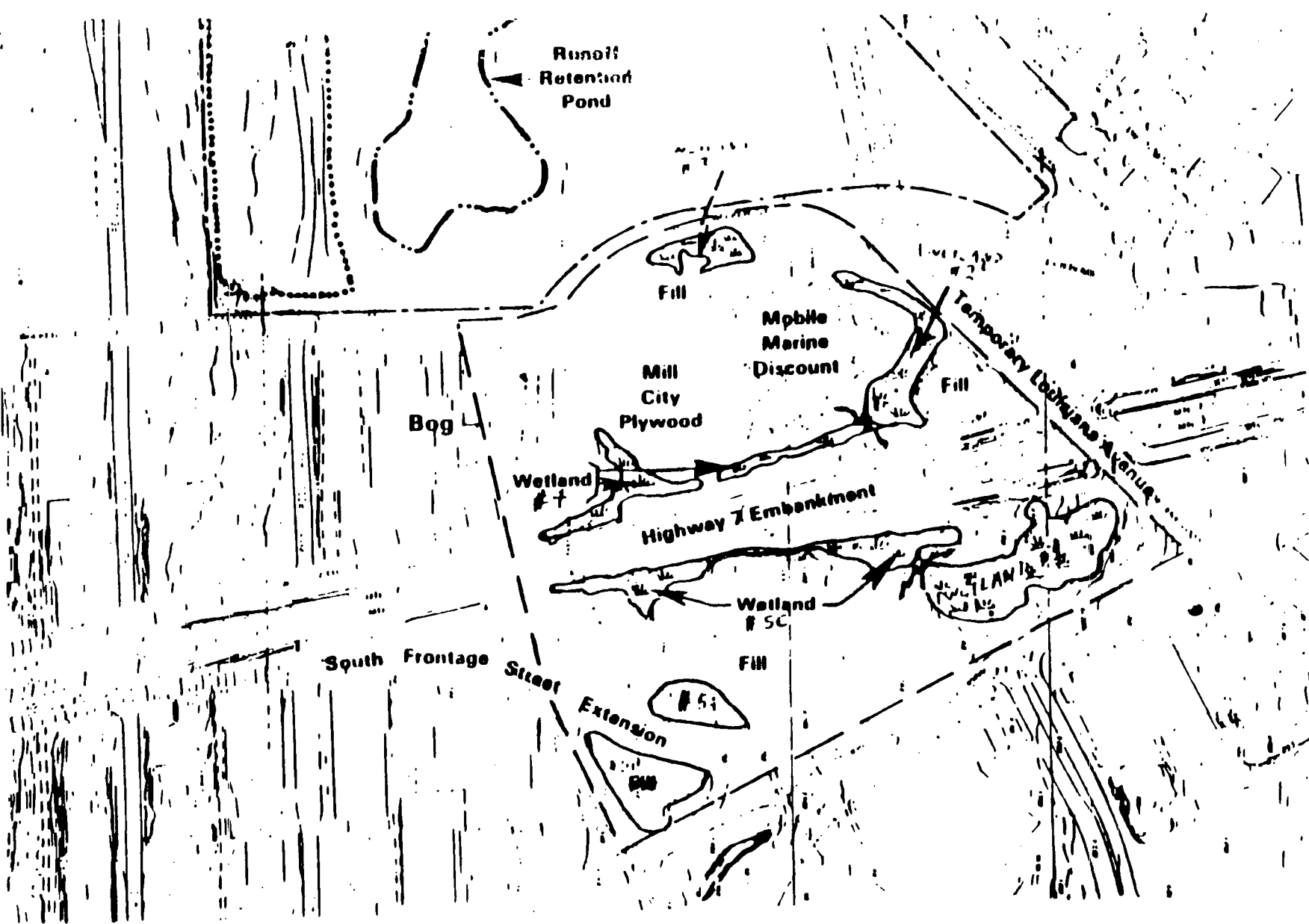


FIGURE 6

Figure 7



APPENDIX B
WETLANDS MAP

ATTACHMENTS

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ATTACHMENT I

List of Documents Reviewed

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

City of St. Louis Park, Annual Progress Reports on the Implementation of the Consent Decree, 2001, 2002, 2003, 2004, and 2005.

Consent Decree and Response Action Plan, 1986.

ENSR, March 15, 2006, Annual Monitoring Report, 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.

MPCA Board Item documents, April, 1986.

MPCA, September 1996, First Five-Year Review for Reilly Tar and Chemical Company.

MPCA, September 2001, Second Five-Year Review for Reilly Tar and Chemical Company.

Office of Emergency and Remedial Response, U.S. EPA, Comprehensive Five-Year Review Guidance.

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

STLN
newspapers
AFFIDAVIT OF PUBLICATION

STATE OF MINNESOTA)

ss.

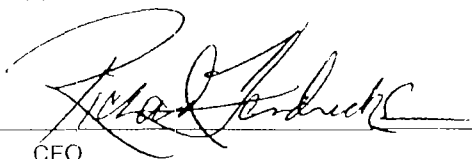
COUNTY OF HENNEPIN)

Richard Hendrickson, being duly sworn on an oath states or affirms, that he is the Chief Financial Officer of the newspaper known as Sun-Sailor, and has full knowledge of the facts stated below:

(A) The newspaper has complied with all of the requirements constituting qualification as a qualified newspaper, as provided by Minn. Stat. §331A.02, §331A.07, and other applicable laws, as amended

(B) The printed public notice that is attached was published in the newspaper once each week for one successive week(s); it was first published on Thursday, the 13 day of April, 2006, and was thereafter printed and published on every Thursday to and including Thursday, the day of , 2006; and printed below is a copy of the lower case alphabet from A to Z, both inclusive, which is hereby acknowledged as being the size and kind of type used in the composition and publication of the notice:

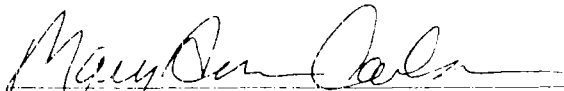
abcdefghijklmnopqrstuvwxyz

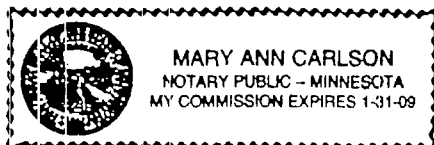
BY: 

CFO

Subscribed and sworn to or affirmed before me

on this 13 day of April, 2006.


Notary Public



RATE INFORMATION

(1) Lowest classified rate paid by commercial users for comparable space	\$ <u>2.85</u> per line
(2) Maximum rate allowed by law	\$ <u>6.20</u> per line
(3) Rate actually charged	\$ <u>1.30</u> per line

LEGAL NOTICES

Minnesota Pollution Control Agency

(Official Publication)

**Reilly Tar
Superfund site
St. Louis Park, Minnesota**

The U.S. Environmental Protection Agency and the Minnesota Pollution Control Agency are reviewing the effectiveness of the cleanup at the Reilly Tar Superfund site in St. Louis Park. Superfund law requires five-year reviews of sites where the cleanup is either done or in progress, but hazardous waste remains on site. These five-year reviews are done to ensure that the cleanup remains effective and protects human health and the environment. This is the second five-year review for this site.

The first five-year review was completed in 1996 and the second review was completed in 2001. Both reviews addressed overall site conditions. The reports concluded that the cleanup actions at the site were protective of human health and the environment.

Redevelopment has occurred at the site. The redevelopment includes an apartment building and several commercial buildings.

Five-year reviews look at:

- site information
- how the cleanup was done
- how well the cleanup is working
- any future actions needed

Site records are at the MPCA, 520 Lafayette Rd., St. Paul, Minnesota. The MPCA is open Monday through Friday from 8:00 a.m. to 4:00 p.m. To review the records, please contact Chris Malec, Records Manager at (651) 297-5177.

Comments and questions will be accepted until July 1, 2006. Please direct your comments or concerns regarding the cleanup to:

Nile Fellows

Project Manager

MPCA

520 Lafayette Rd.

St. Paul, Minn. 55155

(651) 296-7299

nile.fellows@mca.state.mn.us

(Apr. 13, 2006)ja3/St. Louis Reilly Tar31

used to," Wachutka said. "But to do that, we have to be smarter players. We want to really make sure that our players are thinking ahead of time, that they are making the logical responses to the odds in baseball."

Park does have a couple of players who they know will be able to knock in some runs. Pederson and Runyon can both hit, and the coaches like what they've seen from Brian Gilber so far. Brian Thompson is also a proven player, and Zach May and Ryan Cohen have also shown some signs.

After that, it's up in the air.

"That is why we have to play smart," Wachutka said. "By the end of the year, we want to be a much smarter team than we are now."

The Orioles will try to do that by going up against teams they don't know much about. Park will play its inaugural season in the North Suburban Conference. Outside of Cooper, Benilde-St. Margaret's, Totino-Grace and Fridley, Park doesn't have much familiarity with other teams it will face in the conference.

That will make for an interesting first half of the schedule, as the coaching staff makes an attempt at picking up on what they will be facing. "The first time around we'll just go out there and play our game and see what the heck happens," Wachutka said. "Hopefully, by the second time around, we will have learned something."

The non-conference portion of Parks schedule will be more familiar, but it is far from easy. The Orioles will face Wayzata, Edina and Hopkins - all three of which they left behind in the Classic Lake Conference last year. Eden Prairie is also on the schedule. The Eagles spent most of last year as Class AA's top-ranked team before being upset by Minnetonka in sections.

"We want to play the best," Wachutka said. "And if we don't fair very well we know how much work we have to get done and if we are close, we know we are close."

ST. LOUIS PARK 4/13

for her senior year.

Velacoop's sister, Joanna, was penciled in to play first, but a recent trip to the doctor changed those plans.

"She went in to get her knee X-rayed and came out with her arm in a sling,"

LEGAL NOTICES

Minnesota Pollution Control Agency

(Official Publication)
Reilly Tar
Superfund site
St. Louis Park, Minnesota

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Nile Fellows
Project Manager
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520 Lafayette Rd.
St. Paul, Minn. 55155
(651) 296-7299
Nile.fellows@pca.state.mn.us

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APPENDIX A
Site Inspection Form

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION													
Site name: <u>Reilly Tar & Chemical</u>	Date of inspection:												
Location and Region:	EPA ID: <u>MND 9806 09804</u>												
Agency, office, or company leading the five-year review:	Weather/temperature:												
Remedy Includes: (Check all that apply) <table border="0"> <tr> <td>☒ Landfill cover/containment</td> <td>☐ Monitored natural attenuation</td> </tr> <tr> <td>☐ Access controls</td> <td>☐ Groundwater containment</td> </tr> <tr> <td>☐ Institutional controls</td> <td>☐ Vertical barrier walls</td> </tr> <tr> <td>☒ Groundwater pump and treatment</td> <td></td> </tr> <tr> <td>☐ Surface water collection and treatment</td> <td></td> </tr> <tr> <td>☐ Other _____</td> <td></td> </tr> </table>		☒ Landfill cover/containment	☐ Monitored natural attenuation	☐ Access controls	☐ Groundwater containment	☐ Institutional controls	☐ Vertical barrier walls	☒ Groundwater pump and treatment		☐ Surface water collection and treatment		☐ Other _____	
☒ Landfill cover/containment	☐ Monitored natural attenuation												
☐ Access controls	☐ Groundwater containment												
☐ Institutional controls	☐ Vertical barrier walls												
☒ Groundwater pump and treatment													
☐ Surface water collection and treatment													
☐ Other _____													
Attachments: ☐ Inspection team roster attached ☐ Site map attached													
II. INTERVIEWS (Check all that apply)													
1. O&M site manager <u>Scott Anderson</u> <u>Superintendent of M/I</u> <u>8/29/06</u> Name Title Date Interviewed ☒ at site ☐ at office ☐ by phone Phone no. <u>652-424-2557</u> Problems, suggestions; ☐ Report attached _____ _____													
2. O&M staff _____ Name Title Date Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____ Problems, suggestions; ☐ Report attached _____ _____													

Agency _____
 Contact _____

Name	Title	Date	Phone no.
Problems; suggestions; G Report attached _____			

4. **Other interviews (optional)** G Report attached.

[illegible]

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	O&M Documents G O&M manual G As-built drawings G Maintenance logs Remarks _____	G Readily available G Readily available G Readily available	☒ Up to date ☒ Up to date ☒ Up to date	G N/A G N/A G N/A
2.	Site-Specific Health and Safety Plan G Contingency plan/emergency response plan Remarks _____	G Readily available G Readily available	☒ Up to date G Up to date	G N/A G N/A
3.	O&M and OSHA Training Records Remarks _____	G Readily available	☒ Up to date	G N/A
4.	Permits and Service Agreements G Air discharge permit ☒ Effluent discharge G Waste disposal, POTW G Other permits _____ Remarks _____	G Readily available G Readily available G Readily available G Readily available	☒ Up to date ☒ Up to date G Up to date G Up to date	G N/A G N/A G N/A G N/A
5.	Gas Generation Records Remarks _____	G Readily available	G Up to date	☒ N/A
6.	Settlement Monument Records Remarks _____	G Readily available	G Up to date	☒ N/A
7.	Groundwater Monitoring Records Remarks _____	G Readily available	☒ Up to date	G N/A
8.	Leachate Extraction Records Remarks _____	G Readily available	G Up to date	☒ N/A
9.	Discharge Compliance Records G Air ☒ Water (effluent) Remarks _____	G Readily available ☒ Readily available	G Up to date ☒ Up to date	G N/A G N/A
10.	Daily Access/Security Logs Remarks _____	G Readily available	G Up to date	☒ N/A

IV. O&M COSTS																																											
1.	O&M Organization ☐ State in-house ☐ Contractor for State ☒ PRP in-house ☐ Contractor for PRP ☐ Federal Facility in-house ☐ Contractor for Federal Facility ☐ Other _____																																										
2.	O&M Cost Records ☒ Readily available ☒ Up to date ☐ Funding mechanism/agreement in place Original O&M cost estimate _____ ☐ Breakdown attached Total annual cost by year for review period if available <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 10%;">To _____</td> <td style="width: 20%;">_____</td> <td style="width: 50%;">☐ Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td>☐ Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td>☐ Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td>☐ Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td>☐ Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> </table>			From _____	To _____	_____	☐ Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	☐ Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	☐ Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	☐ Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	☐ Breakdown attached	Date	Date	Total cost	
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Date	Date	Total cost																																									
3.	Unanticipated or Unusually High O&M Costs During Review Period Describe costs and reasons: <u>water treatment plant is being</u> <u>rebuilt and computer data base is being</u> <u>implemented by the city.</u>																																										
V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☒ N/A																																											
A. Fencing																																											
1.	Fencing damaged Remarks _____	☐ Location shown on site map	☐ Gates secured ☒ N/A																																								
B. Other Access Restrictions																																											
1.	Signs and other security measures Remarks _____	☐ Location shown on site map	☒ N/A																																								

C. Institutional Controls (ICs) N/A				
1.	Implementation and enforcement			
	Site conditions imply ICs not properly implemented	G Yes	G No	G N/A
	Site conditions imply ICs not being fully enforced	G Yes	G No	G N/A
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		G Yes	G No
	Reports are verified by the lead agency		G Yes	G No
	Specific requirements in deed or decision documents have been met		G Yes	G No
	Violations have been reported		G Yes	G No
	Other problems or suggestions: G Report attached			

2.	Adequacy	G ICs are adequate	G ICs are inadequate	G N/A
	Remarks _____			

D. General				
1.	Vandalism/trespassing	G Location shown on site map		G No vandalism evident
	Remarks _____			

2.	Land use changes on site G N/A			
	Remarks _____			

3.	Land use changes off site G N/A			
	Remarks _____			

VI. GENERAL SITE CONDITIONS				
A. Roads G Applicable G N/A				
1.	Roads damaged	G Location shown on site map		G Roads adequate
	Remarks _____			

B. Other Site ConditionsRemarks _____

_____**VII. LANDFILL COVERS** ☒ Applicable ☐ N/A**A. Landfill Surface**

1. **Settlement (Low spots)** ☐ Location shown on site map ☒ Settlement not evident
 Areal extent _____ Depth _____
 Remarks _____
2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident
 Lengths _____ Widths _____ Depths _____
 Remarks _____
3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
 Areal extent _____ Depth _____
 Remarks _____
4. **Holes** ☐ Location shown on site map ☒ Holes not evident
 Areal extent _____ Depth _____
 Remarks _____
5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
 Remarks _____
6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
 Remarks _____
7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident
 Areal extent _____ Height _____
 Remarks _____

8.	Wet Areas/Water Damage ☐ Wet areas ☐ Ponding ☐ Seeps ☐ Soft subgrade Remarks _____	☒ Wet areas/water damage not evident ☐ Location shown on site map Areal extent _____ ☐ Location shown on site map Areal extent _____ ☐ Location shown on site map Areal extent _____ ☐ Location shown on site map Areal extent _____
9.	Slope Instability Areal extent _____ Remarks _____	☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
B. Benches ☐ Applicable ☒ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	Flows Bypass Bench Remarks _____	☐ Location shown on site map ☒ N/A or okay
2.	Bench Breached Remarks _____	☐ Location shown on site map ☒ N/A or okay
3.	Bench Overtopped Remarks _____	☐ Location shown on site map ☒ N/A or okay
C. Letdown Channels ☐ Applicable ☒ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	Settlement Areal extent _____ Depth _____ Remarks _____	☐ Location shown on site map ☐ No evidence of settlement
2.	Material Degradation Material type _____ Areal extent _____ Remarks _____	☐ Location shown on site map ☐ No evidence of degradation
3.	Erosion Areal extent _____ Depth _____ Remarks _____	☐ Location shown on site map ☐ No evidence of erosion

4.	Undercutting Areal extent _____ Remarks _____	G Location shown on site map Depth _____	G No evidence of undercutting
5.	Obstructions Type _____ G Location shown on site map Size _____ Remarks _____		G No obstructions Areal extent _____
6.	Excessive Vegetative Growth Type _____ G No evidence of excessive growth G Vegetation in channels does not obstruct flow G Location shown on site map Remarks _____		Areal extent _____
D. Cover Penetrations G Applicable ☒ N/A			
1.	Gas Vents G Properly secured/locked G Evidence of leakage at penetration G N/A Remarks _____	G Active G Functioning G Needs Maintenance	G Passive G Routinely sampled G Good condition
2.	Gas Monitoring Probes G Properly secured/locked G Evidence of leakage at penetration Remarks _____	G Functioning G Needs Maintenance	G Routinely sampled G Good condition G N/A
3.	Monitoring Wells (within surface area of landfill) G Properly secured/locked G Evidence of leakage at penetration Remarks _____	G Functioning G Needs Maintenance	G Routinely sampled G Good condition G N/A
4.	Leachate Extraction Wells G Properly secured/locked G Evidence of leakage at penetration Remarks _____	G Functioning G Needs Maintenance	G Routinely sampled G Good condition G N/A
5.	Settlement Monuments Remarks _____	G Located	G Routinely surveyed G N/A

E. Gas Collection and Treatment		G Applicable	<u>G</u> N/A
1.	Gas Treatment Facilities G Flaring G Thermal destruction G Collection for reuse G Good condition G Needs Maintenance Remarks _____		
2.	Gas Collection Wells, Manifolds and Piping G Good condition G Needs Maintenance Remarks _____		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) G Good condition G Needs Maintenance G N/A Remarks _____		
F. Cover Drainage Layer		G Applicable	<u>G</u> N/A
1.	Outlet Pipes Inspected G Functioning G N/A Remarks _____		
2.	Outlet Rock Inspected G Functioning G N/A Remarks _____		
G. Detention/Sedimentation Ponds		G Applicable	<u>G</u> N/A
1.	Siltation Areal extent _____ Depth _____ G N/A G Siltation not evident Remarks _____		
2.	Erosion Areal extent _____ Depth _____ G Erosion not evident Remarks _____		
3.	Outlet Works G Functioning G N/A Remarks _____		
4.	Dam G Functioning G N/A Remarks _____		

H. Retaining Walls		G Applicable	☒ N/A
1.	Deformations	G Location shown on site map	G Deformation not evident
	Horizontal displacement _____	Vertical displacement _____	
	Rotational displacement _____		
	Remarks _____		
2.	Degradation	G Location shown on site map	G Degradation not evident
	Remarks _____		
I. Perimeter Ditches/Off-Site Discharge		G Applicable	☒ N/A
1.	Siltation	G Location shown on site map	G Siltation not evident
	Areal extent _____	Depth _____	
	Remarks _____		
2.	Vegetative Growth	G Location shown on site map	G N/A
	G Vegetation does not impede flow		
	Areal extent _____	Type _____	
	Remarks _____		
3.	Erosion	G Location shown on site map	G Erosion not evident
	Areal extent _____	Depth _____	
	Remarks _____		
4.	Discharge Structure	G Functioning	G N/A
	Remarks _____		
VIII. VERTICAL BARRIER WALLS		G Applicable	☒ N/A
1.	Settlement	G Location shown on site map	G Settlement not evident
	Areal extent _____	Depth _____	
	Remarks _____		
2.	Performance Monitoring	Type of monitoring _____	
	G Performance not monitored		
	Frequency _____	G Evidence of breaching	
	Head differential _____		
	Remarks _____		

IX. GROUNDWATER/SURFACE WATER REMEDIES		☒ Applicable	☐ N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines		☒ Applicable	☐ N/A
1.	Pumps, Wellhead Plumbing, and Electrical ☐ Good condition ☒ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks _____ _____		
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☒ Good condition ☐ Needs Maintenance Remarks _____ _____		
3.	Spare Parts and Equipment ☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks _____ _____		
B. Surface Water Collection Structures, Pumps, and Pipelines		☐ Applicable	☒ N/A
1.	Collection Structures, Pumps, and Electrical ☐ Good condition ☐ Needs Maintenance Remarks _____ _____		
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ Good condition ☐ Needs Maintenance Remarks _____ _____		
3.	Spare Parts and Equipment ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks _____ _____		

C. Treatment System			
☒ Applicable		☐ N/A	
1.	Treatment Train (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ☐ Air stripping ☒ Carbon adsorbers ☐ Filters _____ ☐ Additive (e.g., chelation agent, flocculent) _____ ☐ Others _____ ☐ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually _____ ☐ Quantity of surface water treated annually _____ Remarks _____		
2.	Electrical Enclosures and Panels (properly rated and functional) ☐ N/A ☒ Good condition ☐ Needs Maintenance Remarks _____		
3.	Tanks, Vaults, Storage Vessels ☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks _____		
4.	Discharge Structure and Appurtenances ☐ N/A ☒ Good condition ☐ Needs Maintenance Remarks _____		
5.	Treatment Building(s) ☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair ☐ Chemicals and equipment properly stored Remarks _____		
6.	Monitoring Wells (pump and treatment remedy) ☒ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks _____		
D. Monitoring Data			
1.	Monitoring Data ☒ Is routinely submitted on time ☐ Is of acceptable quality		
2.	Monitoring data suggests: ☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining		

D. Monitored Natural Attenuation**I. Monitoring Wells (natural attenuation remedy)**

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS**A. Implementation of the Remedy**

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Remedy is being implemented

All required pump and wells are working

Recent computer modeling has

indicated a possible need for

changes in the pumpout system.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M is well done

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
