WENCK File #2606-0014
May 2019

Remedial Investigation Work Plan

Water Gremlin Company
White Bear Lake Township

Prepared for:

Water Gremlin

4400 Otter Lake Road,
White Bear Township, MN 55110

WENCK

Responsive partner.
Exceptional outcomes.

Prepared by:

WENCK Associates, Inc.
1800 Pioneer Creek Center
Maple Plain, MN 55359
Phone: 763-479-4200
Fax: 763-479-4242

Table of Contents

IN-TEXT TABLES

FIGURES

APPENDICES

1.0 Purpose and Scope

This is a work plan for the investigation and characterization of the Areas of Concern (AOC) at the Water Gremlin Company Facility in White Bear Lake Township, Minnesota (the Site). This work plan is intended, following Minnesota Pollution Control Agency (MPCA) review and approval, to meet the requirements of Section 10, paragraphs aa. and cc. of the March 1, 2019 Stipulation Agreement between Water Gremlin Company and the MPCA. Water Gremlin will implement a Remedial Investigation (RI) at the site in accordance with the MPCA-approved Work Plan. Following the RI, an RI Report will be submitted documenting the investigation activities, provide a risk assessment for the site to determine the appropriate next step.

2.0 Project Background

2.1 SITE HISTORY AND POTENTIAL CONTAMINANTS

According to reviewed sources of information, the Site was originally purchased by the Ratte family in 1918 for agricultural use. Small scale manufacturing operations of Rubbercor fishing sinkers began in a garage at the Site in approximately 1949. Operations increased over subsequent years and multiple building additions were completed. By approximately 1964 Water Gremlin began coining operations and expanded their facility to 12,000-square feet. By the early 1970s Water Gremlin was a leading manufacturer of fishing sinkers and the facility had expanded to approximately 24,000-square feet. Water Gremlin expanded operations to include custom lead parts in the mid to late 1970s and in approximately 1977 the facility was expanded to approximately 32,000-square feet to include custom parts manufacturing equipment. Between 1997 and 1998, additions totaling roughly 24,000-square foot were completed to the south and eastern portions of the North Campus building. The South Campus building was constructed at 4316 Otter Lake Road in 2013 and is primarily used for packaging, warehousing and shipment of product.

Water Gremlin utilizes various chemicals in the manufacturing process including lead, (both hard (alloy) and soft lead), resin, sulfuric acid, propane, lubricants, petroleum products, solvents, and oils. The chemicals are stored in various areas of the North Campus building in pails, drums, totes, and tanks. The main storage area for hazardous materials is the chemical room located in the eastern portion of the North Campus building. The chemical storage room contains impervious coating and a sub-grade concrete containment that can store up to 1,000 gallons of material.

The hazardous wastes generated as reported for 2017 in the MPCA WIMN online database included:

▲ Bead blast media	5,358 pounds
▲ Cotton Gloves	4,077 pounds
▲ Degreasing Solvent	1,277 gallons
▲ Floor Sweepings	6,450 pounds
▲ Hazardous Waste Solid NOS	1,819 pounds (burned for fuel)
▲ Mop and Oily Water	40 gallons
▲ Resin/TCE	385 gallons
▲ Waste Water Sludge	14,165 pounds

Numerous petroleum products are used in the manufacturing process. Petroleum products currently used at the North Campus building include:

- Die-Slick® mold release compound
- Way Lube oil gear lubricant
- Equipment lubrication oils
- Hydraulic fluids
- Petroleum naphtha parts wasting solvent
- Kerosene
- Diesel fuel (for mobile equipment)
- Paratherm (fluidized bed thermal oil)

Die Slick is the most utilized petroleum-based product in manufacturing operations. The material is stored in 325-gallon plastic totes and smaller 55-gallon drums at die cast machines throughout the North Campus building. Used oil is collected from drip trays under processing equipment. Mobile vacuum carts are used to collect oils which are disposed of in a used oil AST located in the chemical room of the North Campus building.

Parts washers are located in the toolroom, coating room, north die cast, billet and shop//extrusion room.

2.2 SUMMARY OF EXISTING SITE DATA

Water Gremlin provided Wenck with the following previous environmental reports prepared for the Site:

- *Environmental Soils Evaluation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; November 28, 1994 (1994 Soil Investigation Report)
- *Phase I Environmental Site Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.* Prepared for Water Gremlin Company. Braun Intertec Corporation; April 10, 1995. (1995 Braun Phase I Report)
- *Soil Excavation Observations and Documentation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.* Prepared for Water Gremlin Company. Braun Intertec Corporation; September 26, 1995. (1995 Soil Excavation Report)
- *Phase II Environmental Site Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.* Prepared for Water Gremlin Company. Braun Intertec Corporation; March 26, 1996. (1996 Braun Phase II Report)
- *Response Action Plan, Water Gremlin Company, 1610 Whitaker, White Bear Lake, Minnesota*. Prepared For Minnesota Pollution Control Agency. Braun Intertec Corporation; September 12, 1996. (1996 Response Action Plan)
- *APPRAISAL OF 4326 OTTERTAIL ROAD, WHITE BEAR TOWNSHIP, MN 55110.* Prepared for David Zinschlag, Water Gremlin Company. The Search Co. Appraisal Division. (1997 Appraisal)
- *Response Action Plan Implementation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; April 8, 1997. (1997 RAP Implementation)
- *Environmental Soil and Groundwater Evaluation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; August 4, 1997. (1997 Soil and Groundwater Evaluation 1)
- *Environmental Soil and Groundwater Evaluation Report 2, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; January 6, 1998. (1998 Soil and Groundwater Evaluation 2)
- *Environmental Soil and Groundwater Evaluation Report 3, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; January 15, 1999. (1999 Soil and Groundwater Evaluation 3)
- *Environmental Groundwater Evaluation Report 4, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; November 5, 1999. (1999 Soil and Groundwater Evaluation 4)

- *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; February 25, 2000. (1999 Annual Monitoring Report)
- *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; January 3, 2001. (2000 Annual Monitoring Report)
- *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; April 30, 2002. (2001 Annual Monitoring Report)
- *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; January 13, 2003. (2002 Annual Monitoring Report)
- *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*. Prepared for Water Gremlin Company. Braun Intertec Corporation; February 19, 2004. (2003 Annual Monitoring Report)
- Letter Report to Mr. David Zinschlag, Water Gremlin Company*, RE: Additional Groundwater Monitoring Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.* Prepared for Water Gremlin Company. May 6, 2004. (2004 Groundwater Monitoring Report)
- Letter Report to Mr. David Zinschlag, Water Gremlin Company*, RE: Water Gremlin Site, 1610 Whitaker Avenue, White Bear Lake, Minnesota, MPCA Project Number VP5540, No Further Action Determination.* Prepared for Water Gremlin Company. May 14, 2004. (2004 NFA)
- Facsimile message from Dave Zinschlag, Water Gremlin Co. to JoAnn Henry, MPCA Tanks Division regarding Water Gremlin Tank Inventory, October 5, 1999 & May 13, 2004 (1999-2004 Tank Inventory)
- Mi*nnesota Pollution Control Agency AST Notification of Installation or Change in Status Form*. October 10, 2012. (2012 MPCA Tanks – Change In Status)
- Minnesota Department of Health Well and Boring Sealing Record, Minnesota Well and Boring Sealing No. H355975. American Engineering Testing.4-25-2018. (MWD Well Sealing)
- Report of Geotechnical Exploration, Die Cast Machine Foundation, Water Gremlin Company, 4400 Otter Lake Road, White Bear Township, Minnesota. Prepared for Water Gremlin Company. American Engineering and Testing; May 16, 2018.
- *Phase I Environmental Site Assessment, Water Gremlin Company, 4400 Otter Lake Road, White Bear Lake Township, Minnesota.* Prepared for Water Gremlin Company. Braun Intertec Corporation; April 2019. (2019 Wenck Phase I Report)

2.2.1 1994 Soil Investigation Report

The 1994 Environmental Soils Evaluation was completed by Braun Intertec (Braun) on behalf of Water Gremlin to investigate a drum storage and landfill area near the southeast corner of the Site. Ramsey County requested the following actions be completed at the Site after four 55-gallon drums containing foundry sand with lead detected at concentrations of 30,650 milligrams per kilogram (mg/kg) to 58,410 mg/kg were identified at the southeast corner of the property:

- "*Determine the levels of lead in the soil in the immediate area of the drum storage;*
- *Determine the levels of lead in the soil on the perimeter of the drum storage areas;*
- *Establish a background soil lead level for the property south of the loading docks and consisting of the wooded areas bounded by the wooden fences and traffic areas; and*
- *Include the landfilled areas.*"

Ramsey County Department of Health staff was on-site to oversee the investigation which consisted of the completion of fourteen shallow hand auger borings, soil classification and laboratory analysis for total lead concentrations in the collected soil samples. Soil samples were collected from 0-6′′ at each hand auger locations and from 2′ and 4.5′ at select sample locations. The borings HAB-1 through HAB-3 were completed within the former drum storage area, HAB-4 through HAB-7 were completed around the perimeter of the drum storage area, HAB-8 was completed approximately 100-feet west of the drum storage area, HAB-9 through HAB-11 were completed in the filled area south of the drum storage area, and HAB-12 through HAB-14 were completed in the filled area east of the drum storage area.

Elevated concentrations of lead was identified in HAB-1 at 900 mg/kg (0-6′′), 3,800 mg/kg (2′), 940 mg/kg (4.5′); in HAB-3 at 1,800 mg/kg (0-6′′), 2,000 mg/kg (2′); in HAB-4 at 1,100 mg/kg (0-6′′), 1,200 mg/kg (2′); HAB-5 at 2,400 mg/kg (0-6′′); HAB-6 110 mg/kg (0-6′′), 450 mg/kg (2′); HAB-7 at 4,200 mg/kg (0-6′′), 670 mg/kg (2′); and HAB-12 (1,700 mg/kg (0-6′′). The remaining detections of lead identified in the upper 0-6′′ ranged from 32 mg/kg to 95 mg/kg.

The report concluded that based on widespread lead concentrations identified in the shallow soil, the drum storage area most likely not the sole source of lead impacts and additional assessment was recommended. The report indicated additional sources of lead impacts could be related to lead dust from equipment stored in the area and/or vehicular traffic. The report indicated Water Gremlin was planning on expanding the facility to the southeast (in the vicinity of the shipping & receiving area at the time) in the spring of 1995 and Braun was preparing a work plan to assess soils in the area of the proposed expansion.

The 1994 Soil Investigation Report included an attached document titled "Evaluation of Environmental and Biological Conditions, Water Gremlin Company," prepared by Lee Norman, Industrial Consultant and dated November 11, 1984. The document provided a brief history of the Water Gremlin Company up to 1984 and indicated a 8,104-square foot building addition was proposed. The report indicated approximately 146-soil samples were collected along the northern and western property boundaries and analyzed for total lead concentrations. The majority of the lead concentrations were between approximately 10 mg/kg and 30 mg/kg in the soil samples collected during the 1984 assessment.

2.2.2 1995 Braun Phase I Report

Braun completed a Phase I ESA for the Site addressed as 1610 Whitaker Avenue on behalf of Water Gremlin. At the time of the Phase I, the Site consisted of approximately 10-acres occupied by a 45,000 square foot concrete and steel, slab on grade manufacturing and office building; a 1,500-square foot concrete and steel building for cooling non-contact manufacturing process water; and a 6,500-square foot pole building for storage. The remainder of the Site consisted of two single family residences, a shed, paved and un-paved parking/drive areas, an unpaved loading dock/storage area and undeveloped pasture and wooded areas. Surrounding sites consisted of residential development along Whitaker Avenue and Otter Lake Road and undeveloped pastures, wetlands and/or wooded areas.

According to the 1995 Braun Phase I a previous subsurface investigation was completed in November 1994 on the southern portion of the Site to investigate previous complaints regarding disposal of lead sludge allegedly being dumped near the "back" of the property, an abandoned drum containing lead-impacted sand and lead contaminated soil and various violations identified during a facility inspection completed by the Ramsey County Department of Health. Lead-impacted soil was identified during the 1994 subsurface investigation; however, the extent of lead-impacted soil had not been fully defined. The 1995 Phase I report also indicated an area of demolition debris comprised of concrete from former building walls at the Site, wood, tires and miscellaneous waste associated with a former farm dump was identified on the southern portion of the Site.

The 1995 Braun Phase I indicated operations at the Site included manufacturing of fishing lures and battery casings since the 1940s and major expansions of the manufacturing facility were completed between the 1960s and 1980s. Prior to municipal sanitary sewer connections in 1985, a septic tank was utilized at the Site. The Site was connected to the municipal water system in 1993 and the two domestic wells formerly utilized were abandoned. The 1995 Phase I report indicated in 1966 a 175-foot well was completed to provide water for the cooling tower.

According to the 1995 Phase I report, manufacturing processes at the Site utilized hard and soft lead that is processed by either melt molding, melt extrusion, cold pressed and/or coining to produce a variety of battery terminals and fishing lures. The manufacturing process also included coating operations which utilized solvents including TCE. Petroleum products utilized during operations included used oil, Die-Stick mold release compounds, hydraulic oil, lubricants, diesel and fuel oil. Various ASTs were observed throughout the facility and a 20,000-gallon fuel oil AST was located south of the facility. The 1995 Phase I report did not identify any USTs at the facility.

The 1995 Braun Phase I ESA identified the following Recognized Environmental Conditions (RECs) in connection with the Site:

- "*Areas of Spilled, used oil, potentially contaminated with lead, were identified on the concrete floor and cinder block walls of the manufacturing building and on the gravel paved exterior areas beneath the lead-melting pot exhaust vents. It is not known whether the used oil may have seeped through cracks and seems in the concrete flooring and contaminated the underlaying soils. The extent of oil-stained gravel is also not known.*
- *Small areas of stained flooring were observed in the manufacturing building near the coating operations and in the vicinity of drums of unused TCE. It is not known whether the underlaying soils in these areas have been contaminated from TCE seeping through cracks and seams in the floor in these areas.*
- *The active fuel oil AST at the Site is connected to the boiler by a buried supply line, which is approximately 200-feet in length. The AST and associated piping reportedly were inactive from the date of installation in 1978 to October 1993. According to Water Gremlin Company personnel, during that time, the fuel oil supply valve at the AST was locked closed and no fuel oil was present in the buried supply line. In addition, no loss of product from the AST was visually observed or apparent based on measurements of the product levels in the AST. However, the buried piping does to appear to have been tightness tested on a regular basis. It is possible that leaks may have occurred in the buried piping or the base of the AST, which could have impacted soil and groundwater at the Site.*
- *An area of lead-contaminated soil has been identified in the southern portion of the Site. The full extent of the soil contamination has not yet been determined. The exact source of contamination also has not been identified.*"

2.2.3 1995 Soil Excavation Report

During a routine Ramsey County inspection conducted on September 20, 1994, oil was observed on the ground beneath several electrostatic precipitators located on the north end of the existing facility. Ramsey County requested that soil samples be collected from the oil-stained areas, composited and chemically tested for lead to determine if the soil had been impacted with lead at hazardous levels. The initial testing revealed detectable levels of lead above the US EPA's characteristic hazardous limit of 5 milligrams per liter (mg/l). As a result, Ramsey County requested that a work plan be prepared and implemented to remove and dispose of the lead-impacted soils. The work plan was reviewed and approved by the MPCA and the Ramsey County Department of Public Health. The excavation activities consisted of removing impacted soils from 10 separate locations. Depths of excavation varied from approximately two-feet below grade (bg) to approximately five feet bg. At the completion of the remedial excavation activities approximately 101 cubic yards of non-hazardous lead-impacted soil and approximately 12 cubic yards of hazardous lead-impacted soils were hauled off-site to approved landfills and properly disposed.

2.2.4 1996 Braun Phase II Report

Braun Intertec conducted an environmental assessment within a proposed building expansion area south of the then existing building to evaluate potential lead impacts. Braun advanced 48 shallow soil borings in August and September 1995. The soil borings ranged in depth from approximately 4.5-feet bg and 7.5-feet bg. Soil samples were collected from each boring at several depths and submitted to a fix-based laboratory for total and TCLP lead analysis. The data collected during the assessment activities revealed seven distinct areas of lead-impacted soils. Two of the eight areas were found to contain hazardous (i.e., >5 mg/l) levels of lead. Based on the findings of the assessment, Braun estimated volumes of approximately 160 cubic yards of non-hazardous and approximately 75 cubic yards of hazardous soil required removal from the site prior to construction of the proposed building addition.

2.2.5 1996 Response Action Plan

On behalf of Water Gremlin, Braun prepared a Response Action Plan (RAP) to remediate the identified lead-impacted soil. The RAP was submitted to the MPCA on September 12, 1996 and approved on October 24, 1996.

2.2.6 1997 Appraisal

The appraisal was prepared for one of two former residential properties that make up a portion of the Water Gremlin Facility southern facility. It was noted in the appraisal that "No environmental studies were requested or done."

The following standard language is included in the appraisal: "*…the existence of potentially hazardous material used in the construction or maintenance of buildings, such as the presence of ureaformaldehyde foam insulation, asbestos, and/or the existence of substances above or below ground level such as toxic waste, radon gas, etc., and/or the existence of any other environmental influence that may adversely affect the value of the property or the health of the inhabitants of the property, was not observed by me; nor do we have an knowledge of the existence of such materials/substances/influences on or in the property." Additionally: "The value estimated in this appraisal is based on the assumption that: 1) the sanitary waste is disposed of by a municipal sewer or a proper alternate* *treatments (sic) system in good functional condition...5) there is no hazardous waste on the property and there are no hazardous waste sites near the subject property that negatively affect the value of safety of the property and 6) any functioning underground storage tanks are not leaking and are properly registered; 7) any abandoned U.S.T.'s are free from contamination and were properly drained, filled and sealed…12) there is no apparent leaking florescent light ballasts, capacitors or transformers anywhere on or nearby unless noted…14) there is no known infectious medical wastes, pesticides or agricultural pollution on the site and 15) there is no known storage of chemical products, storage drums, radiation or electromagnetic radiation* …

It was noted in the appraisal report that there was electrical service and city water and sewer service to the property but no indication of natural gas service. Wenck reviewed the photographs of the property included with the appraisal and saw no indication of an oil-burning furnace.

2.2.7 1997 RAP Implementation

During the periods of September 28th and 30th, October 1st - 2nd and November 7th, 1996, the eight lead-impacted areas as identified during Braun's 1995 soil assessment activities were remediated through excavation. At the completion of the MPCA-approved remedial excavation activities approximately 1,026 cubic yards of lead-impacted soil were removed from the eight individual areas. The entire volume of excavated soil treated with a stabilization additive to ensure the waste was not hazardous. Upon successfully treating the soil, it was hauled to BFI-owned Subtitle D landfill located in Inver Grove Heights, Minnesota.

On June 20, 1997 a NFA Letter for the lead impacted soil release response actions was issued by the MPCA. A copy of this letter was not available for review.

2.2.8 1997 NFA

On June 20, 1997 The MPCA issued a NFA Letter for the lead impacted soil release response actions. The letter indicated a soil investigation had been completed at the site in the vicinity of a proposed building expansion. Elevated concentrations of lead were identified in the upper 2-feet of soil and 1,026 cubic yards of lead-impacted soil was excavated from the site. According to the 1997 NFA Letter approximately 8-cubic yards of lead impacted soil remains at the site which could not be removed due to the presence of underground utilities. The letter indicates this area was covered by the proposed building expansion. The 1997 NFA Letter indicated the MPCA would not request additional investigation of the identified release of lead impacted soil at the Site; however, the determination does not apply to groundwater conditions at the Site.

2.2.9 1997 Soil and Groundwater Evaluation 1

As a result of the *Recognized Environmental Condition* identified in the April 10, 1995 Phase I ESA, Braun Intertec performed an environmental soil and groundwater (Phase II ESA) at the Water Gremlin facility in March and April 1997. The Phase II ESA consisted the of completion of 25 soil borings, the installation of three permanent groundwater monitoring wells and the collection of three surface water samples. Soil samples for chemical testing were collected from 14 of the soil borings. The soil samples were analyzed for VOCs. Sample results revealed low concentrations of 1,1,2- TCE in five of the 14 soil samples collected. TCE was detected at concentrations ranging from 0.06 mg/kg to 0.68 mg/kg. Groundwater samples were collected from 20 soil boring locations and the three groundwater monitoring wells and analyzed for VOCs. The groundwater test results revealed the presence of 1,1-DCA, 1,2-DCA, 1,1-DCE, cis-1,2-DCE, PCE, 1,1,1-TCA, 1,1,2-TCA and VC within the area investigated. The surface water samples did not reveal the presence of VOCs above the laboratory reporting limits. Based on the of Phase II ESA, Braun recommended quarterly groundwater monitoring be conducted in the three permanent groundwater monitoring wells.

2.2.10 1998 Soil and Groundwater Evaluation 2

In October 1998, Braun conducted addition soil and groundwater evaluation driven by the findings of the March and April 1997 investigation activities. The October 1998 investigation activities consisted of the advancement of two deep soil borings (ST-1 = 110.5′ and ST-2 65.5′), the collection of groundwater samples from the borings for chemical testing, the collection of a "raw" water sample from Municipal Well No. 5 for chemical testing and the completion of a groundwater receptor survey. Groundwater samples collected from ST-1 within the water table aquifer revealed the presence of 1,1-DCA 1,2-DCA, 1,1-DCE, cis-1,2-DCE, PCE, 1,1,1-TCA, 1,1,2-TCA and VC above state drinking water standards. The sample collected from the deeper buried glacial aquifer did not reveal any VOCs above the laboratory reporting limits. Toluene was detected at very low concentrations in the shallow samples collected form soil boring ST-2. No chlorinated compounds were detected above their respective laboratory reporting limits in any of the samples collected from ST-2. Chemical testing the sample collected from Municipal Well No. 5 did not reveal the presence of VOCs above the laboratory reporting limits. The well receptor survey identified 49 water wells within a one-mile radius of the facility. It was determined that all of the water supply wells obtain water from either the buried glacial aquifer or a bedrock aquifer. According to revealed information a confining to semi-confining layer of glacial till separates the surficial aquifer from the buried aquifer in the vicinity of the facility. Based on the findings of the Phase II ESA Braun recommended the installing of two additional permanent groundwater monitoring wells.

2.2.11 1999 Soil and Groundwater Evaluation 3

In May 1999 Braun installed permanent groundwater monitoring wells MW-3D and MW-4/RW-1 on the property. As part of this phase of investigation Braun performed two rounds of groundwater quality testing from existing monitoring wells MW-1 through MW-3 and the newly installed wells MW-3D and MW-4/RW-1. The additional investigation activities revealed consistent chlorinated groundwater impacts within the shallow water table aquifer. Sampling of the deeper, buried glacial aquifer did not reveal the presence of chlorinated compounds. Braun opined that the chlorinated solvent release was isolated to the shallow aquifer and not a risk to the deeper buried glacial or bedrock aquifers. Braun recommended that a groundwater monitoring program be implemented and that the MCPA issue a "No Further Action" contingent on future groundwater quality results.

2.2.12 1999 Soil and Groundwater Evaluation 4

Based on the outcomes of a June 1999 meeting with the MPCA, Braun conducted additional assessment activities including the collection of groundwater quality samples from the existing monitoring well network and the newly installed wells, performed additional assessment of the confining layer at the base of the upper-most glacial aquifer and installed two additional permanent groundwater monitoring wells in the shallow water table aquifer. The additional drilling activities were performed in June 1999. The drilling activities consisted of the advancement of soil borings ST-3 and ST-4 and the installation of groundwater monitoring wells MW-5 and MW-6. Groundwater quality samples were collected from temporary wells installed in boring ST-3 and ST-4 and wells MW-5 and MW-6. None of the water samples collected during this phase of investigation revealed chlorinated compounds above any applicable drinking water standards.

2.2.13 1999 Annual Monitoring Report

The 1999 Annual Groundwater Monitoring investigation consisted of collection of groundwater samples from seven monitoring wells to further investigate the extent of a chlorinated solvent impacted groundwater plume previously identified at the Site. Based on the results of ongoing groundwater investigations, the highest concentrations of chlorinated solvents and associated breakdown products had been identified near the southeast corner of the main manufacturing facility and beneath a building addition completed in 1998.

The monitoring wells were completed throughout the Site in the following locations respective to the identified release: MW-1 was located in an upgradient position, MW-2 was located in a downgradient position, MW-3 was located in a downgradient position, MW-3D was located in a deeper buried glacial aquifer, MW-4/RW-1 was installed as a potential recovery well located within the suspected source area, MW-5 was located in a downgradient position and MW-6 was located downgradient of the contaminate plume.

Groundwater data indicates shallow groundwater at the Site is located between seven and 12-feet bg and approximately 25-feet bg within the deeper buried glacial aquifer. Groundwater flow direction was identified to the south.

Four rounds of groundwater samples were collected from the monitoring wells MW-1, MW-2, MW-3, MW-3D, MW-4/RW-1 and two rounds of sampling from the monitoring wells MW-5 and MW-6 for laboratory analysis of VOCs and natural attenuation parameters (total dissolved iron, total nitrate, total sulfide, organic reduction potential, dissolved oxygen, conductivity and temperature).

The 1999 Annual Monitoring report indicated VOCs were not detected above laboratory reporting limits at the monitoring wells MW-1, MW-3D or MW-6 during the 1999 sampling events.

One or more of the following VOCs were identified during the 1999 sampling events: chloroform, 1,1-DCA, 1,1-DCE, 1,2-DCE, cis-1,2-DCE, dichlorodifluoromethane were identified in the well MW-2; and 1,1-DCA, tetrahydrofuran and 1,1,1-TCA were identified at MW-5; however, the detected concentrations were below their respective MDH HRLS. In the monitoring well MW-3, the VOCs 1,1-DCA, 1,2-DCA, 1,1-DCE, tran-1,2-DCE and vinyl chloride were detected at concentrations exceeding their respective MDH HRLs. In the monitoring well MW-4/RW-1, TCE was detected at a concentration of 33 ug/L, above the MDH HRL of 30 ug/L. The 1999 Annual Groundwater Monitoring Report concluded the following:

- "*The concentrations of solvents in the groundwater have remained stable or decreased over time.*
- *The solvent-impacted groundwater is limited to the surficial aquifer.*
- *The solvent-impacted groundwater does not extend beyond the wetland area or Ramsey County Ditch 14 located south of the Water Gremlin building, and does not extend beyond the Site boundaries.*

- *Chemical and field analysis of groundwater samples for groundwater nutrient parameters and the presence of the chemical breakdown products of the released material indicate that natural attenuation of the impacted groundwater is occurring.*"

The 1999 Annual Monitoring Report recommended continued annual sampling and natural attenuation monitoring be completed at the Site in pursuit of a NFA Letter.

2.2.14 2000 Annual Monitoring Report

On April 4, 2000, the MPCA approved a reduced monitoring frequency to once per year at the Site based on the Contingency Plan prepared by Braun dated January 3, 2001. The Contingency Plan outlined possible changes in the monitoring frequency based on the following circumstances:

- "*Chlorinated solvent compounds or their degradation products are detected in the deep well, MW-3D, during routine sampling event and also during a follow up sampling event of this well conducted within one month of receiving the original sampling results.*
- *Contaminates are detected in MW-6 for two annual events in a row.*
- *The concentrations of individual solvent compounds added together exceeds by more than 20 percent the highest total concentration observed for a single sampling event in MW-3 or MW-4 prior to 2001. Or, the total of the concentrations for individual chlorinated solvent compounds in MW-2 or MW-5 exceeds 10 ug/L. The compounds to be included in the totals include: 1,1-dichloroethane, 1,2-dichlorethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,1,1-tirchloroethane, trichloroethene, vinyl chloride and/or chloroethane.*"

According to the 2000 Annual Groundwater Monitoring Report, the seven monitoring wells at the Site were sampled for VOCs during the 2000 annual sampling event and no VOCs were detected above laboratory reporting limits in the samples collected from MW-1, MW-3D, MW-5 or MW-6. Detections of the VOCs 1,1-DCA and dichlorodifluoromethane in MW-2 did not exceed the MDH HRLs. Detections of 1,1-DCA, 1,2-DCA, 1,1-DCE and vinyl chloride in MW-3 exceeded the MDH HRLS and the detection of vinyl chloride in MW-4 exceeded the MDH HRL.

The 2000 Annual Monitoring Report concluded that VOC concentrations were decreasing with the exception of vinyl chloride in MW-4 and cis-1,2-DCE in MW-3. The decreasing trend of VOCs indicates natural attenuation is occurring at the Site and Braun recommended discontinuation of natural attenuation parameters.

2.2.15 2001 Annual Monitoring Report

On November 15, 2001, the seven groundwater monitoring wells at the Site were sampled for laboratory analysis of VOCs. No VOCs were detected in the monitoring wells MW-1, MW-1 duplicate, MW-3D, MW-5 or MW-6. The VOCs 1,1-DCA, 1,2-DCA, 1,1-DCE and vinyl chloride were identified above their respective MDH HRLs in MW-3 as well as the VOC chloroethane for the first time. Vinyl chloride was detected at a concentration of 390 ug/L in MW-3 during the November 15, 2001 sampling event, significantly higher than the previous detection of 3.7 ug/L identified during the previous sampling event completed on November 7, 2000. Vinyl chloride was also identified above the MDH HRL at MW-4.

Braun concluded the detection of vinyl chloride identified in MW-3 was anomalously high; however, was not a threat to human health or the environment and did not warrant a change in the monitoring plan. The 2001 Annual Monitoring Report concluded the overall VOC concentrations were decreasing and recommended to continue annual groundwater sampling at the Site.

2.2.16 2002 Annual Monitoring Report

The seven monitoring wells at the Site were sampled on November 19, 2002. VOCs were not detected above laboratory reporting limits in the samples collected from MW-1/MW-1 duplicate, MW-3D, MW-5 or MW-6.

In MW-3 the detected concentration of 1,1-DCA exceeded the MDH HRL and vinyl chloride was not detected above laboratory reporting limits during the 2002 sampling event. Detected concentrations of chloroethane identified in MW-3 increased during subsequent sampling events; however, Braun concluded chloroethane is a product of vinyl chloride and the increase supports previous conclusions that natural attenuation is occurring at the Site. The 2002 Annual Monitoring Report concluded the overall VOC concentrations were decreasing and to continue annual groundwater sampling at the Site.

2.2.17 2003 Annual Monitoring Report

The seven monitoring wells at the Site were sampled on November 24, 2003 and on January 13, 2004 the monitoring well MW-3D was re-sampled. VOCs were not detected above laboratory reporting limits in the samples collected from MW-1/MW-1 duplicate, MW-5 or MW-6 during the 2003 sampling event.

None of the detected concentrations of VOCs identified in MW-3, MW-3D or MW-4, exceeded their respective MDH HRLs and vinyl chloride was not identified above laboratory reporting limits. The detected concentration of chloroethane in MW-3 decreased during the 2003 sampling event.

The VOC 1,1-DCA was detected for the first time in MW-3D at a concentration of 2.2 ug/L, well below the MDH HRL of 70 ug/L. The well was re-sampled on January 13, 2004 and no VOCs were detected above laboratory reporting limits.

Based on the results of the 2004 sampling event Braun recommended the wells MW-3, MW-3D, MW-5 and MW-6 be resampled in June 2004 to determine if downward or lateral migration of contaminates had occurred. The report based on the results of the June 2004 sampling, either an NFA would be requested or additional sampling may be warranted.

2.2.18 2004 Phase I ESA

Wenck Associates prepared a Draft Phase I ESA for the northern portion of the Site in 2004. The 2004 Phase I noted that the Site was addressed as 1610 Whitaker Avenue and consisted of a manufacturing plant that produced lead terminals, lead fishing weights and lead-free fishing weight products. The 2004 Wenck Phase I ESA identified the following Recognized Environmental Conditions in connection with the Site:

- *"Groundwater impacts due to past TCE and TCA releases – the facility has been working with the regulatory agency since 1995 to clean up groundwater* *contaminated by solvents releases from the process. MPCA has not determined yet that the health risks at the site are below acceptable levels.*

- *Soil impacts due to past lead releases to soil – the facility has had to remediate lead-impacted soils in the past and in some areas the impacted soils remain in place.*
- *Current and past small releases of petroleum within the building – small spills and leaks of petroleum products were observed and groundwater monitoring data at the site has detected petroleum-related chemicals.*
- *Current releases of Die Slick from electrostatic precipitators – these air emission control units were observed to leak small amounts of Die-Slick compound.*
- *Current oily releases to exterior of building associated with down spouts and condensation vent – oily material was observed to be mixed with water discharges*
- *Current leaking electrical unit – stained foundation and soils were observed around this electric unit.*
- *Area of dead trees – a group of pine trees planted in 1997 were yellow and appeared dead; although many factors can stress newly planted trees, this observation was included as a Recognized Environmental Condition due to known past lead-impacted soil reported on the Subject Property."*

2.2.19 2004 Groundwater Monitoring Report

On April 23, 2004 the seven monitoring wells at the Site were resampled. VOCs were not detected above laboratory reporting limits in the samples collected from MW-1, MW-3D or MW-5 during the 2004 sampling event. Dichlorodifluoromethane was detected at a concentration of 3.2 ug/L, 1,1-DCA was detected at a concentration of 1.5 ug/L, TCE was detected at a concentration of 1.8 ug/L in the monitoring well MW-3. At MW-3 dichlorodifluoromethane was detected at a concentration of 2.3 ug/L, chloroethane was detected at a concentration of 200 ug/L, 1,1-DCA was detected at a concentration of 60 ug/L, tetrahydrofuran was detected at a concentration of 16 ug/L and toluene was detected at a concentration of 5.9 ug/L. In the monitoring well MW-4 dichlorodifluoromethane was detected at a concentration of 4.4 ug/L and 1,1-DCA was detected at a concentration of 5.8 ug/L. Ethylbenzene was detected in MW-6 at a concentration of 1.9 ug/L. The detected concentrations of VOCs at the monitoring wells MW-1, MW-3, MW-4 and MW-6 were below their respective MDH HRLs. Based on the results of the April 2004 sampling event Braun recommended a NFA Letter be issued for the Site.

2.2.20 2004 NFA

The MPCA VIC staff issued a NFA Letter for the identified release of the following VOCs to groundwater at the Site: acetone, benzene, chloroethane, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, trans-1,1-dichloroethylene, dichlorodifluoromethane, ethylbenzene, methyl ethyl ketone, methyl isobutyl ketone, tetrahydrofuran, toluene, 1,1,-trichloroethane, trichloroethene, trichlorofluoromethane, vinyl chloride and xylenes.

The letter indicated past industrial operations at the Site resulted in a release from a coating machine area within the facility. Chlorinated solvents and their degradation products were identified during subsurface investigations completed in the late 1990s and response actions consisting of groundwater sampling and natural attenuation monitoring were completed between 2000 and 2004. Concentrations of VOCs in groundwater have generally decreased and are below their respective MDH HRLS. The 2004 NFA Letter was subject to the following condition:

1. "*Water Gremlin shall record, at its own expense, in the office of the Ramsey County Recorder or Registrar of Titles, whichever is appropriate, in and for Ramsey County, an Affidavit describing the contamination remaining at the Site in the from attached as Attachment C. The description of the remaining contamination should include both groundwater concentrations in excess of the MDH HRLs and soil concentrations in excess of the Industrial Soil Reference Values. The Affidavit should include language that describes that cleanup goals established for this Site were based on an industrial property use and that if the Site is redeveloped as other than industrial, the need for other response actions more appropriate to the new property use will need to be evaluated. A copy of the proposed appropriate language shall be submitted to the MPCA staff for review and approval within sixty days after receipt of this letter and Water Gremlin shall record the affidavit within 30 calendar days after receipt of MPCA approval. Water Gremlin shall submit a copy of the affidavit as recorded to the MPCA within 30 days after the affidavit is officially recorded.*"

The NFA was revised on June 9, 2004. The revised letter was subject to the following condition:

1. "*Cleanup goals established for this Site were based on an industrial property use and if the Site is redeveloped as other than industrial, the need for other response actions more appropriate to the new property use will need to be evaluated.*"

2.2.21 2004 Phase II ESA

The Phase II consisted of collection of groundwater samples from the seven monitoring wells at the Site. During the groundwater sampling event Wenck staff accompanied Braun staff and collected split groundwater samples for laboratory analysis for VOCs. The detected concentrations of VOCs from the seven monitoring wells were below their respective MDH HRLs. The following VOCs were detected in the monitoring wells at the Site during the 2004 Phase II ESA: MW-2 dichlorodifluoromethane at 3.2 ug/L, 1,1-dichloroethane at 1.5 ug/L, trichloroethene at 1.8 ug/L; MW-3 dichlorodifluoromethane at 2.3 ug/L, chloroethane at 200 ug/L, 1,1-dichloroethane at 60 ug/L, tetrahydrofuran at 16 ug/L, toluene at 5.9 ug/L; MW-4 dichlorodifluoromethane at 4.4 ug/L, 1,1-dichloroethane at 5.8 ug/L; MW-5 ethylbenzene at 1.9 ug/L.

Four soil samples were also collected from an area of distressed vegetation identified at the Site during completion of the 2004 Wenck Phase I for lead analysis. Concentrations of lead were identified at 17.6 mg/kg, 5.68 mg.kg, 13.7 mg/kg and 6.63 mg/kg, well below the MPCA Residential Soil Reference Value of 300 mg/kg for lead.

2.2.22 1999-2004 Water Gremlin Tanks Inventory

The facsimile message includes a table of storage tanks with tank number, status, substance stored, capacity, installation date and removal date. The facsimile is reproduced below:

tss101 TABS SITE, OWNER TANK INFO vquinon 09/02/99 13:21						
Site id: 53354 Above or Under: A Facility Type: INDUSTRY/MANUFACTURI Site Name: WATER GREMLIN CO Old AST ID: 3354 Address 1: 1610 WHITAKER AVE City: WHITE BEAR LAKE State: MN Zip: 55110 County: 62 RAMSEY Region Code: M UST AST Site Phone: 6514297761 Registration Date: 07/16/1992						
--OWNER INFORMATION--						
Owner ID: 63354 WATER GREMLIN CO Address: 1610 WHITAKER AVE Phone: 6514297761 City: WHITE BEAR LAKE State: MN Zip: 55110						
--TANK INFORMATION---						
Nbr	A/U	Status	Substance Stored	Capacity	Install	Removed
1001	A	ACTIVE	HYDRAULIC FLUID	500	07/07/92	4/95
1002	A	ACTIVE	DIE SLICK	500	07/07/92	4/95
1003	A	ACTIVE	LUBE OIL	300	07/07/92	4/95
1006	A	ACTIVE	WASTE WATER	225	07/07/92	
1007	A	INACTIVE	CALCIUM CHLORIDE/WATE	265	07/07/92	3/94
1008	A	ACTIVE	WASTE OIL	225	07/07/92	
1009	A	REMOVED	FUEL OIL 1-2	265		07/07/92
1010	A	REMOVED	WASTE OIL	2,500		07/07/92
1011	A	ACTIVE	TRICHLOROETHYLENE	150	07/07/92	7/95
1012	A	ACTIVE	TRICHLOROETHYLENE	150	07/07/92	7/95
1013	A	ACTIVE	TRICHLOROETHYLENE	150	07/07/92	7/95
1014	A	ACTIVE	TRICHLOROETHYLENE	250	07/07/92	7/95
1015	A	REMOVED	FUEL OIL 1-2	20,000		07/07/92
1016	A	REMOVED	FUEL OIL 1-2	20,000		07/07/92
		ACTIVE	WASTE OIL	600		7/95

Note: Shading indicates hand-written entries on table.

Also included in the Water Gremlin Company file was a print out from the MPCA website dated May 13, 2004. The table is reproduced below:

Tank Number	Last Action Date	Registration Date	Tank Capacity	Tank Status	Stored Product	Above or Underground
1001	Apr 01, 95	Jul 16, 92	500	Removed	Hydraulic Fluid	Above Ground
1002	Apr 01, 95	Jul 16, 92	500	Removed	Petroleum Other	Above Ground
1003	Apr 01, 95	Jul 16, 92	300	Removed	Lube Oil	Above Ground
1006	Jul 07, 92	Jul 16, 92	225	Active	Sewage, Manure Or Wastewater	Above Ground
1007	Mar 01, 94	Jul 16, 92	265	Removed	Other Substance	Above Ground
1008	Jul 07, 92	Jul 16, 92	225	Active	Used Or Waste Oil	Above Ground
1009	Jul 07, 92	Jul 16, 92	265	Removed	Fuel Oil	Above Ground
1010	Jul 07, 92	Jul 16, 92	2500	Removed	Used Or Waste Oil	Above Ground
1011	Jul 01, 95	Jul 16, 92	150	Removed	Chemical Other Or Unspecified	Above Ground
1012	Jul 01, 95	Jul 16, 92	150	Removed	Chemical Other Or Unspecified	Above Ground

Tank Number	Last Action Date	Registration Date	Tank Capacity	Tank Status	Stored Product	Above or Underground
1013	Jul 01, 95	Jul 16, 92	150	Removed	Chemical Other Or Unspecified	Above Ground
1014	Jul 01, 95	Jul 16, 92	250	Removed	Chemical Other Or Unspecified	Above Ground
1015	07/07/92	Jul 16, 92	20000	Removed	Fuel Oil	Above Ground
1016	07/07/92	Jul 16, 92	20000	Removed	Fuel Oil	Above Ground
1017	Jul 01, 95	May 15, 00	600	Active	Used Or Waste Oil	Above Ground
1018	Jun 01, 00	May 15, 00	4000	Active	Chemical Caustic	Above Ground

2.2.23 2012 MPCA Tanks Change In Status

The form provides notification of two storage tanks (1006 and 1018) being removed. Tank 1006 is listed as a 225-gallon wastewater tank having been removed on March 1, 1997. Tank 1018 is listed as a 4,000-gallon chemical/caustic tank having been removed on April 1, 2002. No other information is provided on the form.

2.2.24 2019 Geotechnical Report

The City of White Bear Lake building permits contained the Geotechnical Exploration Report prepared by American Engineering and Testing (AET) dated May 16, 2018. The report indicated Water Gremlin intended to move large equipment and construct a machine pad foundation within the North Campus building. A new die cast machine was placed adjacent to the existing die cast #19 machine and the existing floor required removal and replacement. The report indicated one geotechnical boring (B-1) was completed within the building to approximately 20-feet bg. According to the report soils were screened with a photoionization detector (PID) during drilling and select samples were collected for environmental analytical testing (specific parameters were not listed). The soil boring encountered approximately 4-feet of fill soils comprised of clayey and silty sand overlaying native fine-grained sand. Groundwater was encountered at approximately 7.7-feet bgs. The report recommended excavation of the upper 2 to 4-feet of existing fill. PID readings and analytical results were not included with the report.

2.2.25 2019 Wenck Phase I ESA Report

Wenck completed a Phase I ESA for the Site in April 2019. This ESA has identified no RECs, CRECs or HRECs relative to the Subject Property except for the following:

- In 1982 the MPCA had investigated a complaint of alleged discharge of contaminated cooling water with oil from the Water Gremlin plant to a county ditch. Lead impacted soil was identified in the soil sample collected at the discharge point. The identified impacts associated with the discharge of contaminated cooling water is considered to represent a REC for the Subject Property.

- The potential for subsurface soil, groundwater and soil vapor impacts at the Subject Property associated with the former septic system is considered to represent a REC for the Subject Property.

- Previous lead contaminated soil and solvent impacted groundwater investigated as VP5540 is considered a CREC for the Subject Property.

- Petroleum impacts to soil and groundwater have been identified at the North Campus building of the Subject Property during previous subsurface investigations completed between 1995 and 2004. The identified petroleum impacts have not been investigated and therefore are considered to represent a REC.

- Oil staining in the vicinity of the die cast machines and along the wall of the tool room in the North Die Cast building is considered and REC.

- The air pollution control equipment at the North Campus building was found to be not functioning properly causing TCE to be emitted into the air at levels exceeding Water Gremlin's air permit. Corrective actions are currently on-going. The identified TCE release is considered a REC for the Subject Property.

Select information was used in the preparation of this work plan and has been included in **Appendix A**.

3.0 Site Description and History

3.1 SITE LOCATION AND GENERAL DESCRIPTION

The Site is located in a commercial and residential area at 4400 Otter Lake Road White Bear Lake Township, Ramsey County, Minnesota. Additional addresses of the Site include: 1596 and 1610 Whitaker Avenue; 4316, 4336, 4350 and 4370 Otter Lake Road. The Site is located in the East ½ of the Southwest ¼ of the Northeast ¼ of Section 22, Township 30 North, Range 22 West.

The Site consists of seven parcels occupied by two manufacturing buildings (the North Campus building and the South Campus building) with paved parking lots and drive areas, support structures, storage areas and landscaped areas along the western portion of the property. The eastern half of the Site primarily consists of undeveloped wetlands. County Ditch 14 (Lambert Creek) bisects the center of the Site in an approximate east-west configuration. A pedestrian bridge is located along Otter Lake Road providing access to the two buildings. The site is approximately 61.44-acres in size and is associated with the following parcel numbers:

- 1596 Whitaker Street: 22-30-22-13-0024 (2.77-acres)
- 1596 Whitaker Street: 22-30-22-14-0009 (0.69-acres)
- 4400 Otter Lake Road: 22-30-22-13-0022 (10.77-acres)
- 4316 Otter Lake Road: 22-30-22-22-42-0013 (6.9-acres)
- 4336 Otter Lake Road: 22-30-22-13-0007 (0.64-acres)
- 4370 Otter Lake Road: 22-30-22-13-0023 (4.62-acres)
- 0 Whitaker Street: 22-30-22-14-0008 (35.05-acres)

The Site location is shown in **Figure 1**. A parcel map showing the site boundaries on an aerial photograph is included as **Figure 2**.

3.2 CURRENT SITE CONDITIONS AND USE

The Site currently consists of a North Campus and a South Campus. The North Campus is the primary manufacturing operation. The existing North Campus building is approximately 90,000 square feet in size with the original building constructed in 1949. Building additions were made in approximately 1952, 1954, 1959, 1962, 1964, 1965, 1968, 1969, 1971, 1973, 1974, 1976, 1978, 1987, 1994, 1995, 1997, 1998 with interior renovations in 2013 and 2018.

Manufacturing operations in the North Campus building include die casting, hot melt molding, hot melt extrusion, cold forming, coining, gravity casting and coating. Lead bars are melted into liquid via hot melt pots located on die cast machines. The molten lead is injected into a die (mold) forming custom lead parts. Scrap material is dropped into a conveyor that brings the scrap back to the lead melting pot. Lead die cast machines are equipped with electro static precipitators (brand name "Smog Hog") to remove particulates before emitting outside the building.

The coating operations consist of mixing a solvent with solid coating materials (Oppanol and wood resin) to produce a liquid material for application on lead parts. Coating operations are conducted within plexiglass enclosures, which are vented to a common duct and directly vented to the atmosphere Prior to January 2016, trichloroethylene (TCE) was used as the primary carrier in the coating process. Water Gremlin has recently resumed coating operations using FluoSolv, a solvent primarily comprised of trans-1,2-dichloroethylene (TDCE).

The South Campus currently improved with one approximately 84,000 square foot building. The building was constructed in 2014. Operations in the South Campus building primarily consist of warehousing, light assembly, research and development and shipping and receiving. The majority of the building consists of warehouse space. Light assembling and product packaging activities are conducted in the southeastern portion of the building and research and development laboratories are located along the southwestern portion of the building. Loading docks and shipping/receiving are located on the east side of the building.

Current Site conditions are shown in **Figure 3**.

3.3 PAST SITE USE

According to reviewed sources of information, the Site was originally purchased by the Ratte family in 1918 for agricultural use. Small scale manufacturing operations of Rubbercor fishing sinkers began in a garage at the Site in approximately 1949. Operations increased over subsequent years and multiple building additions were completed. By approximately 1964 Water Gremlin began coining operations and expanded their facility to 12,000-square feet. By the early 1970s Water Gremlin was a leading manufacturer of fishing sinkers and the facility had expanded to approximately 24,000-square feet. Water Gremlin expanded operations to include custom lead parts in the mid to late 1970s and in approximately 1977 the facility was expanded to approximately 32,000-square feet to include custom parts manufacturing equipment. Between 1997 and 1998, additions totaling roughly 24,000-square foot were completed to the south and eastern portions of the North Campus building. Interior and exterior renovations were completed at the North Campus building in 2013, and in 2016 the west parking lot and stormwater ponds were completed. In 2018 an interior portion of the North Campus building floor was replaced.

Former dwellings on the northern portion of the Site were addressed as 1596 Whitaker Street, 4350 Otter Lake Road & 4370 Otter Lake Road. The residential structures were located adjacent to the west and northwest of the North Campus building from at least 1940 until 2015 when the structures were razed.

Residential structures were located on the southern portion of the Site in the vicinity of the current south building from at least 1940 until the early 1990s. The South Campus building was constructed at 4316 Otter Lake Road in 2013. A residential structure was located at 4336 Otter Lake Road, adjacent to the north of the South Building, from 1924 until 2017 when the residence was razed.

The central and eastern portions of the Site have remained vacant wetlands, bisected by County Ditch 14 (Lambert Creek) from at least 1940 to the present. A pedestrian bridge was constructed over the county ditch and wetlands, along Otter Lake Road in 2017.

4.0 Conceptual Site Model

4.1 GENERAL

A Conceptual Site Model (CSM) was developed for this Work Plan's scope of work that provides the basis for identifying and evaluating potential contaminant sources and transport mechanisms for contaminant migration through the environment as well as evaluation of risk to receptors. The CSM includes all potential sources, release and transport pathways, and potential exposure media. The components of the CSM include:

- Physical Setting
- Contaminants of Concern
- Contamination Mechanisms
- Source Media
- Transport Mechanisms
- Exposure Media
- Exposure Pathways

Environmental site conditions described by the CSM included the review of existing contaminant sources, site conditions, surrounding geology and hydrogeology, and hydrologic information. This information was used to identify potential contaminant migration pathways.

4.2 PHYSICAL SETTING

4.2.1 Topography

The Site has a general slope to the east toward Goose Lake and White Bear Lake with approximate elevation ranging from 920 to 910 feet above mean sea level. Site surface drainage is sheet flow into the municipal stormwater sewer system associated with adjacent public streets and via infiltration in the wetland areas on the eastern portion of the Site. Historic development may have included grading or filling of the Site to improve the location for construction and drainage.

County Ditch 14 (Lambert Creek) is in an east-west configuration and bisects through the approximate center of the Site. County Ditch 14 receives drainage from the adjacent wetlands, residential developments and Goose Lake and flows southwest and eventually drains into East Vadnais Lake, located approximately 3.5-miles southwest of the Site.

A stormwater retention pond is located directly east of the main manufacturing building and receives stormwater runoff from the parking lot areas located on the east, north and southeast sides of the building as well as roof drain runoff. The eastern stormwater pond overflows to the surrounding wetlands and then to County Ditch 14 (Lambert Creek), which runs along the south side of the Facility.

A stormwater pond is located southwest of the loading docks of the North Campus building and receives runoff from the southwest portion of the facility, which includes the shipping and receiving docks, covered dumpsters, and diesel generator. The retention pond has an outlet on the south side and water flows under the drive via a culvert and then flows overland to County Ditch 14 (Lambert Creek).

4.2.2 Geology

Published references describe the surficial geology at the Site as organic sediment comprised of peat, shallow lakes and/or marshes. The Ramsey County Atlas indicates some areas have been excavated and/or artificially filled (Minnesota Geological Survey, 1992).

Previous subsurface investigations completed at the Site have identified shallow fill soils underlain by fine-grained, poorly graded sandy soils ranging in thickness from five (south end of the Site) to approximately 30 feet (north end of the Site). This sandy unit overlies a silty clay semi-confining layer with silt and sand lenses. The semi-confining layer is estimated to be approximately 45 to 65 feet thick. Beneath this semi-confining layer is a clayey to silty sand unit. Based on geologic references the thickness of the unconsolidated sediments in the area of the Site are approximately 200 feet thick.

Bedrock in the vicinity of the Site consists of the Ordovician-aged St. Peter Sandstone. The St. Peter Sandstone units ranges in thickness from approximately 155 to 165 feet in Ramsey County. The upper portion of the St. Peter Sandstone consists of fine- to medium-grained sandstone. The lower portion of this unit is composed of fine-grained units of mudstone, siltstone and shale interbedded with coarse-grained sandstone. Lying beneath the St. Peter Sandstone is the Prairie du Chein Group consists of thinly to thickly-bedded dolostone. (Minnesota Geological Survey, 1992). Depth to bedrock is anticipated to be approximately 200 feet bg (Minnesota Geological Survey, 1992).

4.2.3 Hydrogeology

According to available hydrogeologic references, the general direction of shallow groundwater flow in the area of the Site is to the west (Minnesota Geological Survey, 1992). Previous monitoring wells completed at the Site identified shallow groundwater at approximately seven and 12-feet bg with a southerly flow direction, towards the wetland and County Ditch 14 (Lambert Creek). The previous subsurface investigations completed at the Site indicate two distinct aquifers are present in the vicinity of the Site. Groundwater has historically been identified within the upper 10-feet bg of the shallow unconsolidated aquifer and at approximately 25-feet bg within a deeper buried glacial aquifer.

4.2.4 Surface Water

Based on a review of the digital United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps (http://www.fws.gov/wetlands/data/Mapper.html), the Site does have designated wetland areas onsite. Discharge from both on-Site retention ponds flows through designated wetlands before discharging to County Ditch 14 (Lambert Creek).

4.3 CONTAMINANTS OF CONCERN

A list of potential contaminants of concern (COCs) based on past site assessment activities is as follows:

- Volatile organic compounds (VOCs): Chloroethane, 1,1-Dichloroethane (1,1-DCA), 1,2-Dichloroethane (1,2-DCA), 1,1-Dichloroethene (1,1-DCE), cis-1,2-Dichloroethene (cis-1,2-DCE), trans-1,2-Dichloroethene (trans-1,2-DCE), Tetrachloroethene (PCE, 1,1,1-Trichloroethane (1,1,1-TCA), 1,1,2-Trichloroethene (TCE), Vinyl Chloride (VC)
- Lead

Laboratory methodologies that will be used during this investigation are as follows:

Parameter	Laboratory Methodology
Lead	EPA Method 6020
VOCs	EPA Method 8260

4.4 CONTAMINATION MECHANISM

Historical lead and VOC releases, with the potential to provide a mechanism for contamination, were documented as part of the previous site investigations. The primary site activities identified were lead deposition through equipment exhaust, release of petroleum-related contamination through surface discharges and historical releases of chlorinated solvents to the subsurface.

4.5 SOURCE MEDIA

Historical investigation has identified releases of VOCs to the shallow groundwater system and lead to the Site soils. The facility, until 2018, used TCE in its battery terminal manufacturing process. The facility has manufactured lead sinkers and battery terminals since the 1940s.

4.6 TRANSPORT MECHANISMS

The following transport mechanisms were evaluated in preparation for this Work Plan:

- Volatilization
- Air Emissions
- Leaching
- Erosion

Volatilization: Contaminants in the subsurface may migrate via volatilization if solid materials convert into a gas and become mobile. The ability for chemicals to volatilize from soil is a function of the chemical's volatility. This parameter is represented by Henry's law coefficient. Volatilization may be a significant transport pathway for highly volatile chemicals.

Air Emissions/Fugitive Dust: Contaminants may become airborne via emission control equipment associated with the manufacturing activities. The formation of fugitive dust is highly dependent on the ground cover at the site. Currently, ground cover consisting of impervious drive and parking surfaces, natural and landscaped vegetation, surface water features, brush and trees cover the entire Site.

Leaching: Contaminants may migrate to the groundwater system via leaching from impacted soil. Leaching is caused by precipitation infiltrating through contaminated media and transporting the leached chemical into the groundwater. The factors that affect the leaching rate include a contaminant's solubility, partition coefficient and concentration. Insoluble compounds will precipitate out of solution in the subsurface or remain in their insoluble forms with little leaching. Another factor that affects whether a contaminant will reach groundwater via leaching is the contaminant's rate of decay. Inorganic chemicals do not decay; however, most organic chemicals decay at characteristic rates that are described by the chemical's half-life. Chemicals with long half-lives have a greater potential for contaminating groundwater than those with shorter half-lives. Based on historical groundwater data, leaching appears to be a primary transport mechanism at the site. Groundwater may also transport contaminants to other locations, including surface water bodies.

Erosion/Stormwater Transport: Contaminants in surface soil/sediments/fugitive dust in paved areas may migrate to surface water via erosion (i.e., stormwater surface flow). The ability for chemicals to migrate via erosion is dependent on the amount of exposed soils/sediments/fugitive dust.

4.7 POTENTIAL EXPOSURE MEDIA

Potential exposure media describe the individual medium where contaminants are available to human receptors. Potential exposure media include the following:

- Exterior Air– Potential contamination from volatilization from the soil or from fugitive dust is considered very low. There is limited exposure potential due to the inability of contaminants to concentrate in the breathing zone if not contaminants (lead and VOCs) are disturbed in the soil.
- Indoor Air – Potential contamination associated from vapor intrusion from soils beneath the North Campus building into the breathing zone within the building.
- Soil– Potential contamination associated with dermal contact and inhalation exposure of materials when disturbed or in contact with a receptor.
- Surface Water – Potential contamination from erosion of impacted soil. Contaminants have the ability to concentrate in the on-Site stormwater detention ponds and the county ditch that borders the North Campus building to the south.
- Groundwater – Known groundwater contamination exists at the Site. Past investigation has shown the unconfined water table at the Site has been impacted with chlorinated solvents. Past investigation has also revealed a semi-confining layer beneath the unconfined groundwater table aquifer protecting the deeper potable groundwater aquifer. Limited exposure potential because there are no drinking water wells located at the site. In addition, past investigation demonstrated natural attenuation of the chlorinated solvent pollution within the shallow groundwater system.

4.8 POTENTIAL EXPOSURE PATHWAY ANALYSIS

The CSM for fate and transport provided the basis for identifying and evaluating the contamination mechanism, source media, transport mechanisms, and potential exposure media. The contaminated media (soil and groundwater), if present, acts as potential sources of contamination for transport to other potential exposure media. Contaminants in soil may migrate to air via fugitive dust, to surface water via erosion, and groundwater via leaching. The exposure pathways to a human receptor from the potential source media are discussed below:

- Vapor intrusion pathway: Indoor air exposure through vapor intrusion could occur if groundwater impacts from leached soil originated or migrated beneath a building, volatilized then migrated through the vadose zone into the interior spaces of a building. Based on current data, this exposure pathway is possible and warrants additional evaluation.

- Direct contact exposure pathway: Potential exposure would likely occur from soil disturbance during any future excavation activities (i.e. building construction, utility installation, etc.) that will occur at the site. Based on current data, this exposure pathway is possible and warrants additional evaluation.
- Drinking water exposure pathway: Potential impacted groundwater exposure would occur from the leaching of contaminated soil into the groundwater system, the migration of the contaminated groundwater to a potable water well, and the consumption or dermal contact of the withdrawn contaminated water. Based on current data, this exposure pathway has not been documented or is not expected at the site and is, therefore, considered an incomplete pathway. However, additional investigation of potential sources is warranted given the fact past investigation focused on the upper portion of the shallow non-potable water table aquifer. Efforts will be made to evaluate the lower portion of the unconfined water table aquifer as the chlorinated solvents are heavier than water and have the potential to reside at the base of the aquifer, or on the top of the confining unit.
- Groundwater to surface water risk pathway: Based on current data it is presumed shallow groundwater at the Site may discharge to the ditch located south of the North Campus building. This groundwater to surface water discharge scenario has the potential to adversely impact surface water and sediment in the receiving water. This potential risk pathway warrants additional evaluation.

The CSM presented herein is based on the previous investigation data available for the site and will be modified if necessary, during future project activities and will be considered during the risk assessment performed during the preparation of the Remedial Investigation Report.

5.0 Project Organization and Responsibility

5.1 RESPONSIBILITIES AND AUTHORITIES OF QUALITY CONTROL PERSONNEL

Table 5-1 identifies the responsibilities and authorities of key project personnel identified in the Project Organization Chart. **Table 5-2** provides a contact list for key project personnel.

Table 5-1: Personnel Responsibilities and Qualifications

Name	Title	Organizational Affiliation	Responsibilities
Chris Bratsch	Wenck Project Manager	Wenck Associates, Inc.	▲ Review and approve technical reports, including subsequent revisions. ▲ Provide document control on technical reports to ensure project team has the most current version. ▲ Coordinate with the QA Manager on all QA/QC matters. ▲ Ensure compliance with appropriate technical reports for all project work. ▲ Assign trained staff and resources to complete work in accordance with technical plans.
Shane Waterman	Technical Lead, QA Manager	Wenck Associates, Inc.	▲ Evaluates analytical results generated during sampling activities. ▲ Provides technical direction of field sampling team. ▲ Technical report preparation. ▲ Prepare or oversee preparation of field data validation reports. ▲ Initiate corrective action. ▲ Internal QC review of field documentation and laboratory samples ▲ Completes final quality control and technical review of all deliverables prior to release. Coordination with the third-party data validator.
Katie Swor	Risk Assessor	Wenck Associates, Inc.	▲ Performs risk assessment ▲ Technical report preparation ▲ Provides regulatory support.

Table 5-2: Contact List for Key Project Personnel

Individual	Affiliation	Project Role(s)	Phone Number	Email Address
Chris Bratsch	Wenck Associates, Inc.	Wenck Project Manager	763.252.6825	cbratsch@wenck.com
Shane Waterman	Wenck Associates, Inc.	Technical Lead, QA Manager	651.294.4588	swaterman@wenck.com
Katie Swor	Wenck Associates, Inc.	Risk Assessor	651.395.5227	kswor@wenck.com
Denise L'Allier-Pray	Water Gremlin Co.	EHS Manager	651.209.9441	Denise.L'Allier-Pray@watergrem.com
Michael Ginsbach	MPCA	Hydrogeologist	651.757.2329	michael.ginsbach@state.mn.us

5.2 PROJECT COORDINATION

The Wenck PM will serve as the POC for communications with Water Gremlin. The Wenck PM will collaboratively oversee the scheduling and reporting and conduct project meetings and briefings (including conference calls). Formal and informal periodic reviews will also be scheduled within Wenck and with Water Gremlin, to evaluate status progress against plans, adjust schedules, and to coordinate resolution of outstanding issues.

5.3 SUBCONTRACTORS

Subcontractor support will be needed to complete the project. Wenck will subcontract services for environmental drilling support, laboratory chemical analysis, and waste management. The Wenck Technical Lead/QA Manager will be the laboratory contact and will verify all data associated with the project. The Wenck PM will maintain ultimate control and accountability for the project by means of formal subcontract agreements with subcontractors and through directives and communication with the subcontractor's program and project management staff. The Wenck PM will have administrative authority for the subcontractors. The Wenck Technical Lead/QA Manager will manage subcontractor field operations.

5.4 TRAINING

All field personnel scheduled for work at the Site have been appropriately trained in accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER). Field personnel are experienced in hazardous waste site work, use of personal protective equipment (PPE), and emergency response procedures. All Wenck field personnel assigned to the project will receive the project planning documents and the Site Safety and Health Plan (SSHP) prior to beginning work on the site. The Wenck-Trained Field Technician (FT) will perform work status and safety/health briefings daily throughout the project. Relevant health and safety issues will be discussed during project safety meetings.

6.0 Site Investigation Work Plan

6.1 AREAS OF CONCERN

Based on the review of past investigation documentation and the completion of the April 2019 Phase I ESA and multiple Site visits, Wenck has identified several AOCs that warrant additional evaluation and form the basis of this work plan. The following is a list of AOCs that will be evaluated as part of the proposed work plan:

- AOC #1 Coating Rooms #1 and #3
- AOC #2 Coating Room #2
- AOC #3 Chemical Storage Room
- AOC #4 Tool Room Crawl Space
- AOC #5 Location of the 1982 oil discharge area
- AOC #6 Former septic system
- AOC #7 Smog Hog unit located on the east side of the North Campus Building revealing oil discharge to the exterior surfaces of the building
- AOC #8 Smog Hog units located on the northwest corner of the North Campus Building revealing oil discharge to the exterior surfaces of the building
- AOC #9 Utility trenches in the Main Die Cast Area
- AOC #10 North Campus Building rooftop oil and particulate discharges near several rooftop heat extraction blower bed units

6.2 RATIONALE AND OBJECTIVE

The objective of the RI at the Site is to evaluate and ensure adequate protection of public health, welfare, and the environment. The scope of services associated with the RI consists of the following tasks:

- Preparation of the RI Work Plan (this document).
- Preparation of the Site Safety and Health Plan (SSHP). The SSHP will be prepared to cover all field work under this Work Plan. The SSHP includes emergency phone numbers and directions to the local hospital. The SSHP will also address safety and health requirements based on site-specific conditions encountered during the field activities.
- Advancement of push-probe soil cores for the purpose of field-screening Site soils and for the collection of grab soil samples for chemical testing.
- Advancement of push-probe soil cores for the purpose of collecting grab groundwater samples.
- Installation of sub-slab vapor points within the North Campus building and collecting sub slab samples for chemical testing.
- Sampling of surface water samples from the County 14 Ditch.
- Collection of sediment samples from the County 14 Ditch.
- Preparation of a RI report documenting RI activities.

Procedures for soil, soil vapor, sediment, surface water and groundwater sampling activities are detailed herein. This investigation work plan was prepared using appropriate guidance included in the MPCA's publicly available documents entitled *Risk Based Site Characterization and Sampling Guidance* (Working Draft, September 16, 1998) and the

MPCA's current *Vapor Intrusion Best Management Practices for Vapor Intrusion and Building Mitigation Decisions* (October 2017, c-rem3-06e).

Based on the findings of this investigation Wenck will begin to evaluate the nature and extent of contamination, evaluate the AOCs as identified in Section 6.1, evaluate the risk associated with identified contaminant source(s) and determine whether or not those impacts will require additional investigation or response actions.

6.3 SUBSURFACE INVESTIGATION WORK PLAN

6.3.1 Drinking Water Well Survey

A water well receptor survey will be conducted to identify the existence and location of any drinking water wells within a one-mile radius of the Site. Based upon the results of groundwater investigation completed as part of this investigation, a secondary well receptor survey may be completed to identify down-gradient high capacity wells within a three-mile radius.

6.3.2 Surface Water Survey

A surface water receptor survey will be conducted to identify all potential surface waters within a one-mile radius of the Site.

6.3.3 Soil Investigation Activities

Wenck proposes to complete approximately 28 push-probe soil borings at the Site to assess soil and groundwater conditions at the locations shown on **Figure 4**. In addition, Wenck proposes to collect up to four shallow soil samples from within the utility trenches located behind the Main Die Cast machines (AOC #9). Soil sample locations within the Main Die Cast Area will be determined in the field based on accessibility. The soil boring/sampling locations were determined based on the findings of Wenck's April 2019 Phase I ESA and the developed AOCs. Field oversight of the soil borings by a geoscientist, including sample collection and field-screening of soil, will be conducted. Soil samples will be visually assessed and screened for the presence of volatile organics with a photoionization detector (PID) equipped with a 10.6 eV lamp. Based on soil screening, collection of soil samples for laboratory analysis will be completed. Soil classification will be performed in the field in accordance with ASTM Method D2488, *Standard Practice for Description and Identification of Soils*. A boring log will be created for each soil boring showing stratigraphic sequence and associated field screening notes and observations. Visual evidence of contamination will be noted on the field log.

If elevated soil PID readings are encountered, soil samples will be collected from each soil boring location for analysis of VOCs. Soil samples will be collected at the interval(s) revealing the highest PID response or at intervals revealing visual evidence of contamination. If there is evidence of contamination in a soil boring, Wenck will attempt to collect a second sample at a deeper interval from the soil boring if contamination terminates before water is encountered. In the absence of obvious soil impacts, soil samples will be collected just above the unconfined water table.

A minimum of one soil sample will be collected from each boring location for total lead analysis. Total lead samples will be collected from the zero to one-foot zone at each boring location. Deep samples for total lead analysis will be collected if field-evidence of contamination are observed. Soil boring locations will be surveyed per the procedures documented in Section 6.3.11 below.

Appropriate Quality Control (QC) samples will be collected during the RI activities. Matrix spike (MS) and matrix spike duplicate (MSD) samples will be collected for each sampling method at a rate of 1:20 samples collected for lab analysis. Rinsate Blank samples will also be collected at a rate of 1:20. Lab provided Trip Blanks will accompany each sample cooler.

A summary of the soil sampling and analytical requirements are presented in **Table 6-1**.

Table 6-1: Soil Sampling and Analytical Requirements

Matrix	No. Field Samples	Analysis	Holding Time	Preservation Requirements	Sample Containers
Soil	Samples = Min. 32 MS/MSD = 2 Rinsate Blanks = 2 Trip Blanks = 1/cooler (lab-provided) **Total No. of samples = Min. 36**	VOCs by EPA Method 8260B (modified list detailed in Section 4.3)	14 days	Methanol 1:1 ratio, temperature <4 degrees Celsius	40 ml amber vial
Soil	Samples = Min. 32 MS/MSD = 2 Rinsate Blanks = 2 **Total No. of samples = Min. 36**	Lead by EPA Method 6020	180 days	None	40 ml amber vial

6.3.4 Groundwater Investigation Activities

Wenck proposes to advance approximately 25 push-probes for the purpose of collecting grab groundwater samples at the locations shown on **Figure 4**. The soil boring locations were determined based on the findings of Wenck's April 2019 Phase I ESA and the developed AOCs. Vertical groundwater sampling will be conducted at each location with multiple samples collected from each boring. Vertical groundwater sampling will be conducted immediately adjacent to the soil borings. The first grab groundwater sample will be collected at the top (within the upper 3 feet) of the unconfined groundwater table and every five feet thereafter. Groundwater sampling will discontinue once the semi-confining layer is encountered. The elevation of the semi-confining layer will be determined based on the soil characterization activities as discussed in Section 6.3.3 above. A minimum of two water samples will be collected at each location. Grab groundwater samples will be collected in lab-provided 40 ml glass vials with hydrochloric acid preservative and placed in a cooler with ice.

Groundwater samples will be collected directly from the push-probe equipment using low-flow methods. Laboratory samples will be collected for VOC analysis (EPA Method 8260). Quality control samples, including equipment rinsate blanks, blind field duplicates, matrix spike, matrix spike duplicate, and trip blanks will be collected. Samples will be labeled, recorded on chain-of-custody (COC) forms, packed on ice, and sent to Pace Analytical Services for analysis within the required holding times. Groundwater sample locations will be surveyed per the procedures documented in Section 6.3.11 below.

Blind field duplicate samples will be collected at a rate of 1:10 samples collected for lab analysis. MS and MSD samples will be collected at a rate of 1:20 samples collected for analysis. Field blanks and Rinsate Blanks will also be collected at a rate of 1:20. Lab provided Trip Blanks will accompany each sample cooler.

A summary of the groundwater sampling and analytical requirements are presented in **Table 6-2** below.

Table 6-2: Groundwater Sampling and Analytical Requirements

Matrix	No. Field Samples	Analysis	Holding Time	Preservation Requirements	Sample Containers
Groundwater	Samples = Min of 50 Blind Dups = 5 MS/MSD = 3 Field Blanks = 4 Rinsate Blanks = 5 Trip Blanks = 1/cooler (lab-provided) **Total No. of samples = Approx. 67**	VOCs by EPA Method 8260B (modified list detailed in Section 4.3)	14 days	pH <2, temperature <4 degrees Celsius	40 ml amber vial

6.3.5 Sub-Slab Soil Vapor, Crawl Space and Background Vapor Assessment Activities

Installation of 25 permanent sub-slab vapor sampling ports will occur inside the building. Sub-slab sample locations are shown on **Figure 5**. The locations of the sub-slab sampling ports will be dependent on building use and access. The sub-slab vapor samples will be analyzed for VOCs by EPA method TO-15. The permanent sampling ports will allow for follow-up sampling of the sub-slab if additional monitoring is warranted.

Interior sub-slab soil vapor samples will be collected using the Vapor-Pin™ kit methodology for permanent sub-slab soil vapor sampling ports. The concrete slab will be cored with a 5/8" drill bit and the vapor pin is installed in the hole along with the silicone sealing sleeve. In addition, a larger diameter hole will be drilled to countersink the permanent port equipment. Dedicated polyethylene tubing is then placed on the fitting. Approximately 300 mL of air will be purged out of the sample line with a syringe prior to collecting the sample. The samples will be collected in 1L Summa canisters equipped with 5-minute fill regulator (200 mL per minute flow rate) and dedicated in-line moisture filter. The soil vapor samples will be submitted under chain-of-custody control to the selected accredited laboratory. A PID equipped with a 10.6 eV source lamp is then connected to the tubing for field screening purposes upon the completion of the Summa can sample collection.

Crawl space samples will be collected from six locations as shown on **Figure 5**. The samples will be collected in 6L Summa canisters equipped with 24-hr fill regulators and dedicated in-line moisture filter. The crawl space air samples will be submitted under chain-of-custody control to the selected accredited laboratory.

Background samples will be taken to represent ambient air conditions. Two background air samples will be collected as part of this investigative effort. One sample will be collected from northeast of the North Campus building and one sample will be collected from southwest of the North Campus building. The samples will be collected at the same time as the crawl space samples. Background TO-15 samples will be collected using the same procedures used to collect crawl space vapor samples. 24-hour samples will be taken using a 6L summa canister. Background air sampling will begin approximately one hour before any indoor air sampling is to commence. Background air sample locations will be surveyed per the procedures documented in Section 6.3.11 below.

Blind field duplicate samples will be collected at a rate of 1:10 samples collected for lab analysis. A summary of the vapor sampling and analytical requirements are presented in **Table 6-3**.

Table 6-3: Vapor Sampling and Analytical Requirements

Matrix	No. Field Samples	Analysis	Holding Time	Preservation Requirements	Sample Containers
Sub-Slab Soil Vapor Samples	Samples = 25 Blind Dups = 3 **Total No. of samples = Approx. 28**	EPA Method TO-15 (modified list detailed in Section 4.3)	30 days	None	1L Summa Canister
Crawl Space Air Samples	Samples = 6 Background ambient samples = 2 **Total No. of samples = Approx. 8**	EPA Method TO-15 (modified list detailed in Section 4.3)	30 days	None	6L Summa Canister

6.3.6 Surface Water Sampling Activities

Wenck proposes to collect six surface water samples from the County 14 Ditch (Lambert Creek) south of the North Campus building at the locations shown on **Figure 4**. The water samples will be collected from the north bank of the ditch using a dedicated disposable poly-bailer. One surface water sample will be collected from each location for chemical testing. The subcontracted laboratory will be directed to analyze the surface water samples for total lead by EPA Method 6020 and VOCs by EPA Method 8260.

Blind field duplicate samples will be collected at a rate of 1:10 samples collected for lab analysis. MS and MSD samples will be collected at a rate of 1:20 samples collected for analysis. Field blanks and Rinsate Blanks will also be collected at a rate of 1:20. Lab provided Trip Blanks will accompany each sample cooler with VOC samples.

A summary of the surface water sampling and analytical requirements are presented in **Table 6-4**.

Table 6-4: Surface Water Sampling and Analytical Requirements

Matrix	No. Field Samples	Analysis	Holding Time	Preservation Requirements	Sample Containers
Surface Water	Samples = 8 Blind Dups = 1 MS/MSD = 1 Field Blanks = 1 Trip Blanks = 1/cooler (lab-provided) **Total No. of samples = Approx. 11**	VOCs by EPA Method 8260B (modified list detailed in Section 4.3)	14 days	HCL, temperature <4 degrees Celsius	40 ml amber vial
Surface Water	Samples = 8 Blind Dups = 1 MS/MSD = 1 Field Blanks = 1 **Total No. of samples = Approx. 11**	Total Lead by EPA Method 6020	180 days	HNO_3	250 ml HDPE bottle

6.3.7 Sediment Sampling Activities

Wenck proposes to collect five sediment samples from the County 14 Ditch (Lambert Creek) south of the North Campus building at the locations shown on **Figure 4**. The sediment samples will be collected from the ditch bottom near the north bank of the ditch using a hand push-probe sampling device. One sediment sample will be collected from each location for chemical testing. Wenck proposes to collect three sediment samples; two at the pond inlets and one at the pond outlet for chemical testing. The subcontracted laboratory will be directed to analyze the sediment samples for total lead by EPA Method 6020 and VOCs by EPA Method 8260.

MS and MSD samples will be collected at a rate of 1:20 samples collected for analysis. Rinsate Blank samples will also be collected at a rate of 1:20. Lab provided Trip Blanks will accompany each sample cooler with VOC samples. A summary of the sediment sampling and analytical requirements are presented in **Table 6-4** below.

Table 6-5: Sediment Sampling and Analytical Requirements

Matrix	No. Field Samples	Analysis	Holding Time	Preservation Requirements	Sample Containers
Sediment	Samples = 5 MS/MSD = 1 Rinsate Blanks = 1 Trip Blanks = 1/cooler (lab-provided) **Total No. of samples = Approx. 7**	VOCs by EPA Method 8260B (modified list detailed in Section 4.3)	Extraction within 14 days of sample collection. Analysis within 40 days of extraction.	pH < 2, temperature <6 degrees Celsius	40 ml amber vial
Sediment	Samples = 5 MS/MSD = 1 Rinsate Blanks = 1 **Total No. of samples = Approx. 7**	Lead by EPA Method 6020	180 days	None	40 ml amber vial

6.3.8 Investigation-Derived Waste Management

Investigation Derived Waste in the form of drill soil cuttings and purge water will be collected and temporarily staged on-Site until characterized through analytical testing. Containers will be labeled and staged in a secure location until removal from the site. Once the waste streams have been characterized, they will be properly disposed of. Characterization of the Investigation-Derived Waste will be based in part on the analytical testing results from the investigation.

6.3.9 Utility Clearance

Minnesota State Statute 216D requires anyone who engages in excavation/subsurface activities to provide advance notice of at least 48 hours to underground utility operations affected by the subsurface work. Prior to performing the subsurface investigation, Gopher One (811) will be notified to identify any underground lines or structures in the vicinity of the Site. Any utility lines buried at the Site will be located by the appropriate utility company and indicated on the ground surface. Private underground utilities buried by the property owner will also need to be identified. Private utilities will be located by contracted service provider.

6.3.10 Quality Control

Quality control (QC) procedures are of prime importance to this investigation to ensure quality of the data collected, and thus the interpretations made from this data. The Wenck corporate QC program will be followed throughout the investigation, which mandates the use of industry-wide accepted procedures and practices during investigations. Laboratory results will be reviewed with respect to the laboratory's reported quality control (QC) results, including assessment of whether any observed deviations from QC criteria will affect the usability of the data for the intended purpose. Results for any field QC samples (e.g., field duplicates, field blanks, etc.) will also be assessed, if collected.

6.3.11 Surveying

Upon completion of remedial investigation activities, exterior investigation locations will be surveyed to a common Site datum as a reference. Vertical control (0.1-inch accuracy) and horizontal control (0.01-inch accuracy) will be established for reference with existing structures. Vertical measurements will be referenced to the National Geodetic Vertical Datum (NGVD) and longitude and latitude coordinates recorded. Interior sample locations will be surveyed using traditional staff and level technology. Horizontal locations will be established taking measurements from a minimum of two permanent structural features with a tape measure.

7.0 Field Documentation

The following sections describe the general field procedures to be used during the excavation activities performed at the site.

7.1 FIELD LOGBOOKS

Field logbooks will be hardbound with supplemental, water-resistant log sheets. Entries in the logbooks and supplemental log sheets will be written using indelible ink. The top of each page will include the project name and number, date, and page number. The bottom of each page in the book will include the time, initials of the person recording the entries, and sufficient detail so that the logic used in decision making during the project can be tracked through later review. During each day of project activity, information will be recorded in each field logbook including, but not limited to:

- Project Name
- Date/time
- Name and title of any personnel representatives onsite
- Purpose of the field activity
- Location of project activities
- Planned chronology of events during the day
- Information concerning any property access arrangements
- Information about any conversations with facility staff
- Weather conditions and air temperature
- General field observations
- Date and time of sample collection
- Notes related to QC samples (i.e., blind duplicate)
- Sample Identification (I.D.) number(s) and location information
- Sample transportation information, including the name of the laboratory and courier (if applicable)
- Information on any deviations from the approved work plans, including methodology and sample collection
- Summary of daily tasks and documentation on any scope of work changes required by field conditions
- Printed name, signature and date on the bottom of each logbook page

7.2 PHOTOGRAPHIC RECORDS

Digital photography will be conducted during the field activities. Digital photography will be numbered and cataloged in the field notebook to include a description of the scene, site area, date, and time. Selected digital photographs will be incorporated in the Remedial Investigation Report. A photographic log will be maintained in the field notebook to identify the location and subject of each photograph. The photographer will review the photographs and compare them to the photographic log to confirm the log and photographs match on a daily basis.

7.3 SAMPLE DOCUMENTATION

7.3.1 Sample Numbering System

The field sample numbering system will follow the MPCA's Location Unique Identifiers (LUIs) protocol. Sample numbers will be generated prior to implementing field sampling activities using the MPCA's Remediation LUI Generator.

Trip blanks, equipment rinsate blanks, and field duplicates use consecutive sample numbers (NN) just like any other environmental sample. The location of the blind duplicate will be noted in the log book.

Samples that are collected as blind field duplicates will be collected, numbered, packaged, and sealed in the same manner as other samples and submitted "blind" to the laboratory.

7.3.2 Sample Labels and/or Tags

Labels will be affixed to all sample containers during sampling activities. Information will be recorded on each sample container label at the time of sample collection. The information to be recorded on the sample container labels will be as follows:

- A unique sample number with consistent format (see below)
- Sample matrix
- Date
- Time
- Parameters to be analyzed
- Preservative (if any)
- Site ID
- Sampler's initials

Labels will be secured to the bottle and will be completed in indelible ink.

7.3.3 Chain-of-Custody Records

Field personnel are responsible for sample custody from the time of collection until the time of sample shipment. Samples must be kept in the secure possession of the sampler, meaning that they are either within sight of the sampler, in the sampler's secure vehicle, or within the secure office of the sampling firm. The chain-of-custody (CoC) procedures implemented for the project will provide documentation of the handling of each sample from the time of collection until completion of laboratory analysis. The CoC form serves as a legal record of possession of the sample. A sample is considered to be "in custody" if one or more of the following criteria is met:

- The sample is in the sampler's possession.
- The sample is in the sampler's view after being in possession.
- The sample was in the sampler's possession and then was placed into a locked area to prevent tampering.
- The sample is in a designated secure area.

Custody will be documented throughout the project field sampling activities by the CoC form initiated for each day during which samples are collected. This record will accompany the samples from the site to the laboratory and will be returned to the Wenck PM with the final analytical report. All personnel with sample custody responsibilities will be required to sign, date, and note the time on the CoC form when relinquishing samples from their immediate custody (except in the case where samples are placed into designated secure areas for temporary storage prior to shipment). Bills of lading or air-bills will be used as custody documentation during times when the samples are being shipped from the site to the laboratory, and they will be retained as part of the permanent sample custody documentation.

CoC forms will be used to document the integrity of all samples collected. To maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory, CoC forms will be filled out for sample sets as determined appropriate during the course of fieldwork. An example of the CoC form to be used for the project is included in **Appendix F**.

The following procedures for chain-of-custody forms will be followed:

- Chain of custody forms will be Test America standard forms (see attached example).
- Chain of custody forms will include the project name or number, signature of sampler, receiving laboratory, sample ID numbers, date and time of collection, sample location, number of containers, analyses requested, sample matrix, and custody transfer signatures, including the name of the shipping company. Signature of personnel from the shipping company is not required. The shipping bill number will be recorded on the chain of custody form.
- One chain of custody form will be supplied in each cooler.
- Chain of custody forms will be completed in ink.
- Mistakes will be lined out with a single line and initialed and dated.
- Entries will be sequentially numbered.
- Repetitive entries made in the same column may be simplified with a continuous vertical arrow between the first entry and the next different entry. A "ditto" or quotation marks indicating repetitive information will not be used.
- Multiple chain of custody forms for a single shipment will be consecutively numbered using the "Page ___ of ___" designation.
- At least one copy of the chain of custody form will be filed with the sampling firm for tracking and laboratory communication purposes.

The individual responsible for shipping the samples from the field to the laboratory will be responsible for completing the CoC form and noting the date and time of shipment. This individual will also inspect the form for completeness and accuracy. After the form has been inspected and determined to be complete, the responsible individual will sign, date, and note the time of transfer on the form. For commercial couriers, the CoC form will be placed in a sealable plastic bag and placed inside the cooler used for sample transport after the field copy of the form has been detached. In this case the laboratory will retain a copy of the shipping bill as proof of custody during transit. For laboratory couriers, the CoC form will be placed in a sealable plastic bag on the top of the cooler for the courier to accept custody. The field copy of the form will be appropriately filed and kept at the site for the duration of the site activities.

In addition to the CoC form, CoC seals will also be placed on each cooler used for sample transport. These seals will consist of a tamper proof adhesive material placed across the lid and body of the coolers in such a manner that if the cooler is opened, the seals will be broken. The CoC seals will be used to ensure that no sample tampering occurs between the time the samples are placed into the coolers and the time the coolers are opened for analysis at the laboratory. Cooler custody seals will be signed and dated by the individual responsible for completing the CoC form contained within the cooler.

7.4 DOCUMENTATION PROCEDURES/DATA MANAGEMENT AND RETENTION

Field documentation from logbooks, data collection sheets, digital photography, email correspondence, and CoC forms will comprise the bulk of the field documentation associated with the sampling and remediation at the site. Hard copy field data will be reproduced for backup and scanned for inclusion in the project.

The analytical laboratory will provide data as final analytical reports using a pdf format. The report will include all the report requirements of Minn. Rules Part 4740 and the details appear in Section C.2.3 of the MPCA's 2014 Site Assessment QAPP. All final lab reports will be reviewed and approved by the laboratory's technical QA/QC and project management staff. All data will be provided to Wenck electronically in the MPCA-developed EQuIS format. This format can be found at the following EarthSoft web page - http://www.earthsoft.com/?s=Lab_MN.

The Wenck QA Manager and Risk Assessor are charged with tracking the reporting of analytical data and sample coordinates and tracks the external analytical data validation. The Wenck QA Manager and Risk Assessor will also track and manage the updating and storage of all analytical data tables generated during the preparation of the RI Report.

Digital data files are stored on a network drive at Wenck's Maple Plain, Minnesota office. The network servers are backed up daily, then replicated to the Cloud for indefinite storage. Data stored electronically by Wenck will be retrievable from the Cloud indefinitely.

8.0 Sample Packaging and Shipping Requirements

The subcontracted laboratories will provide all sample containers. Preparation certification and lot numbers will accompany all sample containers delivered to the site from the vendors. The following procedures will be followed for samples that will be analyzed by subcontracted laboratories:

- Each lab-provided sample cooler will be wiped clean of all debris and water.
- Sample collection points, depth increments, and sampling devices documented in the field logbooks will be verified with the information written on the sample label and CoC form.
- Glass sample containers will be wrapped with plastic insulating material (bubble wrap) to prevent contact with other sample containers or the inner walls of the cooler. Samples will be placed into re-sealable plastic bags.
- Samples will be packaged in thermally insulated, rigid coolers, according to DOT specifications 173 Subparts A and B and 172 Subparts B, C, and D. Environmental samples and field QC blanks to be submitted to the analytical laboratory will be placed in a sample cooler along with ice and temperature blanks, and the final cooler temperature will be recorded. After a cooler is filled, the appropriate CoC form will be placed inside a re-sealable plastic bag and taped to the inside lid of the cooler, and the outer surface of the cooler will be cleaned.
- Coolers will be secured with at least two cooler custody seals and covered with clear plastic packing tape.
- Each cooler will be taped and sealed shut with clear plastic packing tape around each end of the cooler.
- Each cooler will either be hand delivered to the laboratory or be picked up by a laboratory courier the day of collection.

Sample preparation and packaging will be completed at the end of each day that samples are collected. If samples are collected during the weekend, the samples will undergo normal preparation and will be kept within a cooler, on ice, until all samples have been collected during the weekend. On the following Monday, the iced samples will be delivered to the laboratory. Samples held over the weekend will be checked once in the morning and once in the evening to ensure that they kept at proper temperature and have sufficient ice.

9.0 Contractor Quality Control

9.1 GENERAL

The Wenck Corporate QA/QC program is in place to ensure that sampling and analytical activities and the resulting chemical parameter measurement data comply with the data quality objectives (DQOs) and the requirements of the project work plan. The Wenck PM and Wenck QA Manager are responsible for the preparatory, initial, and follow-up phases of the project. Tasks subject to inspection consist of the review of planning documents, oversight of field and laboratory activities, oversight of data analysis and assessment, and oversight of report preparation. The PM or Technical Lead may, at any time, conduct a field or laboratory audit to ensure that proper protocols are being applied.

9.2 PRE-PROJECT MEETING

The Wenck PM and Technical Lead will conduct a pre-project meeting prior to initiating any field work associated with the project. The meeting will include a review of all work requirements, a physical examination of all required materials and equipment, an examination of work areas to ascertain completion of all preliminary work, and a demonstration of all field activities. The Wenck PM or the Technical Lead/QA Manager must conduct additional meetings with sampling or technical personnel arriving onsite during the work effort prior to their beginning work. Prior to the pre-project meeting, field personnel will have reviewed in detail the project work plan prior to the inspection and will participate in a discussion of all pertinent sections of these plans and/or specifications during the meeting. Project plans (Work Plan and SSHP) will be present onsite. Materials to be accumulated during the preparatory phase will consist of the items listed below:

- Site maps
- Sample summary tables, correlating field samples to field control samples
- Field instrument calibration tables
- Laboratory information, including name, address, telephone number, POC, and turnaround time for the analyses, instructions for laboratory on requirements for sample procedures
- Field logbooks
- Field file box or equivalent to store field documentation
- Indelible ink pens
- Field instrumentation pertinent to the project
- Instrument operating manuals
- Established procedures or contracts for instrument repair
- PPE (e.g., nitrile gloves)
- Supplies for soil sampling (i.e., stainless steel spade, Alconox, decontamination wash bucket, decontamination rinse bucket)
- Drum for storage of IDW
- Plastic bags
- Stainless steel bowls and spoons
- Sample CoC forms
- Sample shipping documents
- Sample containers of the types to be used for each test or chemical analysis planned for all environmental samples and any QC samples
- Labels for sample containers

- Sample cooler custody seals
- Sample shipping coolers
- Clear tape

The Wenck PM or QA Manager will review pertinent sections of the plans and specifications during the meeting in order to ensure that all field personnel understand the overall project DQOs as well as any specific sampling and analysis requirements. Field instruments should be calibrated during the meeting using certified calibration standards. Frequency and contents of data reporting requirements will be discussed. The sampling team will demonstrate in detail how each type of sample will be collected, using the intended sample containers, sampling equipment, decontamination, and sample handling procedures. Equipment decontamination procedures will be reviewed in detail using the proper decontamination solutions in accordance with the project work plan. The area designated for decontamination will be identified.

The sample numbering system, sample labeling, and sample shipment documentation requirements will be discussed during the meeting. Laboratory address and contact information will be also be discussed. Analytical test methods, sample hold times per method, sample turnaround times and sample preservation requirements will be fully discussed. The items detailed in this section will be documented in the meeting minutes.

9.3 PROJECT INSPECTION

A project inspection will be conducted for each definable field task. The Wenck PM will provide direction and oversight for all project subtasks and will review the work for compliance with contract requirements. Oversight will ensure that initial and ongoing instrument calibrations are observed, verified, and documented. Field notes will be reviewed to ensure that all pertinent data are recorded in accordance with the requirements discussed in Section 7.0.

The packaging, shipping and overall handling of the samples will be inspected daily by the Field Technician (FT). Individual sample labels and CoC forms will be inspected for accuracy, completeness, and consistency. The FT will document each day of sampling in the project field book.

9.4 FOLLOW-UP INSPECTIONS

Follow-up inspections will be conducted as needed to ensure continued compliance with contract requirements until completion of each project task. Procedures and documentation will be checked periodically to ensure they are complete, accurate, and consistently applied throughout the duration of the project. Inspections will include a review of any field data and the daily calibration log of all instruments being used. The Wenck PM, and QA Manager may, at any time, conduct a field audit to ensure that proper protocols are being applied.

The subcontractor laboratory for the project is Eurofins TestAmerica. Laboratory audits (internal) will be conducted by the Eurofins TestAmerica Quality Manager (or designee) on an annual basis (minimum). Throughout the project, Wenck will submit blind performance samples along with project samples to a designated laboratory for analysis. The analytical results of these single-blind performance samples are evaluated to ensure that the laboratory maintains acceptable performance.

10.0 Nonconformance/Corrective Actions

10.1 GENERAL

Discovery and resolution of a nonconformance with project procedures or other problem discovered during the implementation of project activities will be noted in the FT's logbook. Possible discrepancies or problems could include, but are not limited to: improper sampling procedures, improper instrument calibration procedures, incomplete or improper sample preservation, and problems with samples upon receipt at the laboratory.

10.2 FIELD SAMPLING

The Wenck PM will be responsible for implementation and monitoring of the project work plan procedures. In the event of improper sampling procedures, the Wenck PM will:

1. Communicate to the sampling crew to immediately comply with the project work plan;
2. Document the discrepancy from proper sampling procedures and the reasons for the discrepancy; and
3. Re-collect samples, if necessary, using the proper sampling procedures.

Improper sampling procedures and any corrective action will be documented in the field book.

Field instruments will be calibrated using manufacturer's criteria as documented in the instrument manual. Instrument calibrations will be recorded daily by the project staff conducting the calibrations. Any instrument problems will be reported immediately to the Wenck PM for resolution. The FT will arrange to either attempt recalibration of the instrument or replace defective instruments with instruments in proper working condition. Improper instrument calibration and any corrective action will be documented in the field book.

Sample preservation procedures in the field will be supervised by the FT. Sampling containers that have been prepared by the laboratories will be inspected by the FT. The laboratory will relay problems with the samples to the FT in the field. In the event of discrepancies between the CoC form and the sample labels, the FT will resolve the problem. Broken sample containers or samples that are listed on the CoC forms and are not in the cooler will be replaced, if necessary, by the sampling crew. The FTL will documents in the project's field notebook. Any other deviations from the project work plan will be reported initially to the Wenck PM.

10.3 LABORATORY

Corrective actions may be required for analytical/equipment problems and noncompliance with criteria. Analytical and equipment problems may occur during sampling, sample handling, sample preparation, laboratory instrumental analysis, and data review.

Laboratory QA plans will provide systematic procedures to identify out-of-control situations and document corrective actions. Corrective actions will be implemented to resolve problems and restore malfunctioning analytical systems. In general, corrective action procedures often are handled at the bench level by the analyst who reviews the preparation or extraction procedure for possible errors and checks such factors as instrument calibration, spike and calibration mixes, and instrument sensitivity. If the problem persists or cannot be identified, the matter is referred to the Laboratory Supervisor, Manager, and/or QA Department for further investigation. When resolved, full documentation of the corrective action procedure is filed with project records and the laboratory QA Department, and the information is summarized within case narratives.

11.0 Standard of Care

The standard of care for all professional services performed by Wenck and presented within this report is the care, skill, and diligence used by members of the consulting services profession practicing under similar circumstances at the same time and in the same locality. Wenck makes no warranties, express or implied, with respect to this report or otherwise, in connection with Wenck's services.

Report prepared by:

Shane Waterman, PG (MN)
Principal

Report reviewed by:

Chris Bratsch
Senior Environmental Engineer

12.0 References

Patterson, Carrie J. Surficial Geology. University of Minnesota, Minnesota Geological Survey, County Atlas Series, Ramsey County, Atlas C-7, Plate 3, 1992.

Mossler, John. H. and Bloomgren, Bruce A. Bedrock Geology. University of Minnesota, Minnesota Geological Survey, County Atlas Series, Ramsey County, Atlas C-7, Plate 2, 1992.

Mossler, John. H. and Cleland, Jane M. Depth to Bedrock. University of Minnesota, University of Minnesota, Minnesota Geological Survey, County Atlas Series, Ramsey County, Atlas C-7, Plate 5, 1992.

Kanivetsky, Roman and Cleland, Jane M. Surficial Hydrogeology. Minnesota Geological Survey, County Atlas Series, Ramsey County, Atlas C-7, Plate 6, 1992.

Braun Intertec Corporation. November 28, 1994. *Environmental Soils Evaluation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. April 10, 1995. *Phase I Environmental Site Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.*

Braun Intertec Corporation. September 26, 1995. *Soil Excavation Observations and Documentation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.*

Braun Intertec Corporation. March 26, 1996. *Phase II Environmental Site Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.*

Braun Intertec Corporation. September 12, 1996. *Response Action Plan, Water Gremlin Company, 1610 Whitaker, White Bear Lake, Minnesota*.

The Search Co. Appraisal Division. *APPRAISAL OF 4326 OTTERTAIL ROAD, WHITE BEAR TOWNSHIP, MN 55110.* Prepared for David Zinschlag, Water Gremlin Company.

Braun Intertec Corporation. April 8, 1997. *Response Action Plan Implementation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. August 4, 1997. *Environmental Soil and Groundwater Evaluation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. January 6, 1998. *Environmental Soil and Groundwater Evaluation Report 2, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Minnesota Pollution Control Agency. September 16, 1998. *Risk-Based Site Characterization and Sampling Guidance.* Working Draft

Braun Intertec Corporation. January 15, 1999.*Environmental Soil and Groundwater Evaluation Report 3, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. November 5, 1999. *Environmental Groundwater Evaluation Report 4, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. February 25, 2000. *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. January 3, 2001. *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. April 30, 2002. *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. January 13, 2003. *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Braun Intertec Corporation. February 19, 2004. *Annual Groundwater Monitoring Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota*.

Letter Report to Mr. David Zinschlag, Water Gremlin Company*, RE: Additional Groundwater Monitoring Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.* May 6, 2004.

Letter Report to Mr. David Zinschlag, Water Gremlin Company*, RE: Water Gremlin Site, 1610 Whitaker Avenue, White Bear Lake, Minnesota, MPCA Project Number VP5540, No Further Action Determination.* Prepared for Water Gremlin Company. May 14, 2004.

Facsimile message from Dave Zinschlag, Water Gremlin Co. to JoAnn Henry, MPCA Tanks Division regarding Water Gremlin Tank Inventory, October 5, 1999 & May 13, 2004

Minnesota Pollution Control Agency. October 10, 2012. *AST Notification of Installation or Change in Status Form*.

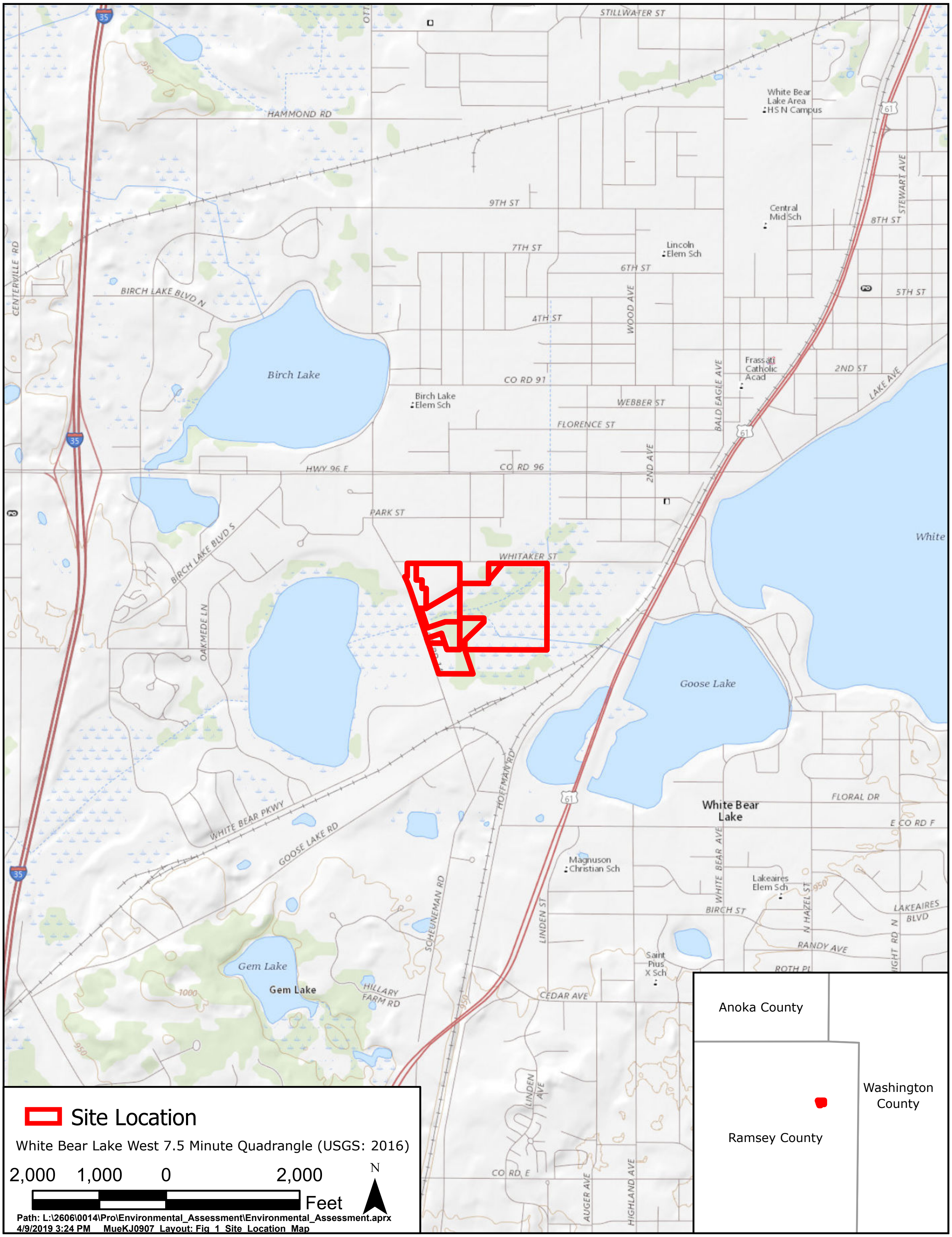
Minnesota Pollution Control Agency. October 2017. *Best Management Practices for Vapor Investigation and Building Mitigation Decisions. C-rem3-06e*

American Engineering Testing. April 25, 2018. Minnesota Department of Health Well and Boring Sealing Record, Minnesota Well and Boring Sealing No. H355975.

American Engineering and Testing. May 16, 2018. *Report of Geotechnical Exploration, Die Cast Machine Foundation, Water Gremlin Company, 4400 Otter Lake Road, White Bear Township, Minnesota*.

Wenck Associates, Inc. April 2019. *Phase I Environmental Site Assessment, Water Gremlin Company, 4400 Otter Lake Road, White Bear Lake Township, MN 55110.*

Figures



WATER GREMLIN COMPANY

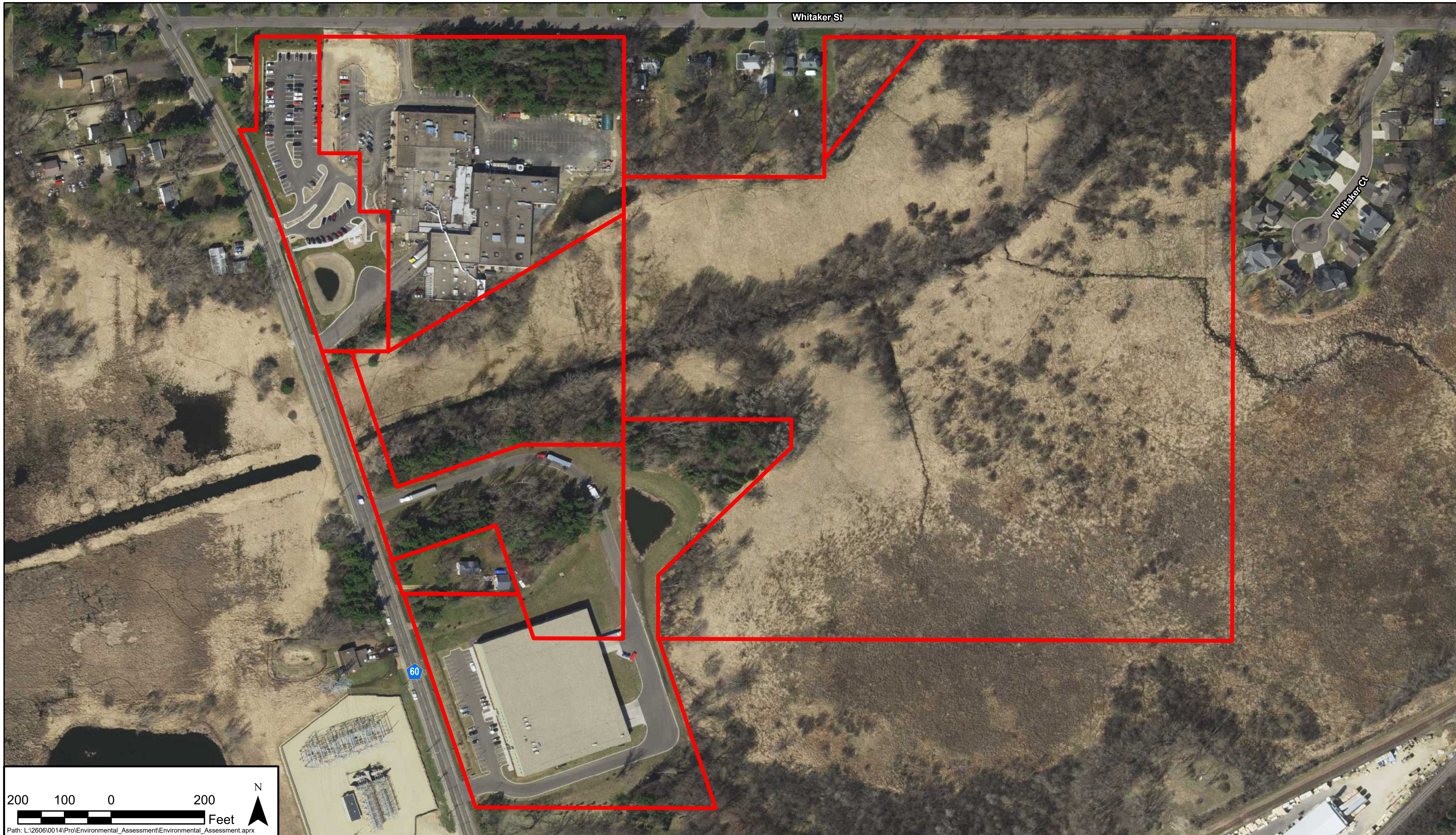
Site Location Map

WENCK
Responsive partner. Exceptional outcomes.

APR 2019

Figure 1

WATER GREMLIN COMPANY	WENCK Responsive partner. Exceptional outcomes.	APR 2019
Parcel Map		Figure 2



WATER GREMLIN COMPANY

Current Site Conditions Map

WENCK

Responsive partner. Exceptional outcomes.

APR 2019

Figure 3

WATER GREMLIN COMPANY	WENCK	MAY 2019
Proposed Remedial Investigation Map	Responsive partner. Exceptional outcomes.	Figure 4

WATER GREMLIN COMPANY

Sub-Slab & Crawl Space Vapor Samples

WENCK
Responsive partner. Exceptional outcomes.

APR 2019

Figure 5

Appendix A

Excerpts from Previous Environmental Reports

BRAUN℠
INTERTEC

Braun Intertec Corporation
1345 Northland Drive
Mendota Heights, Minnesota 55120-1141
612-683-8700 Fax: 683-8888

Engineers and Scientists Serving the Built and Natural Environments®

November 28, 1994

Project No. CMXX-94-0708

Mr. Tony Pauletti
Water Gremlin Company
1610 Whitaker Ave.
White Bear Lake, Minnesota 55110

Dear Mr. Pauletti:

Re: Environmental Soils Evaluation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.

In accordance with your authorization, Braun Intertec Corporation (Braun Intertec) conducted an environmental soils evaluation at the referenced location. The objective of this evaluation was to evaluate the concentration of lead in the soils in the drum storage area and landfilled areas in accordance with the general work scope requested by Ramsey County.

For a complete discussion of our evaluation, please refer to the attached Environmental Soils Evaluation Report.

We appreciate the opportunity to provide professional services to you for this project. If you have any questions or comments regarding this letter or the attached report, please call Tony LaBarre at (612) 683-8729 or Jon Carlson at (612) 683-8760.

Sincerely,

Anthony R. LaBarre
Geologist/Project Manager

Jon A. Carlson, CHMM
Supervisor, Environmental Site Assessments

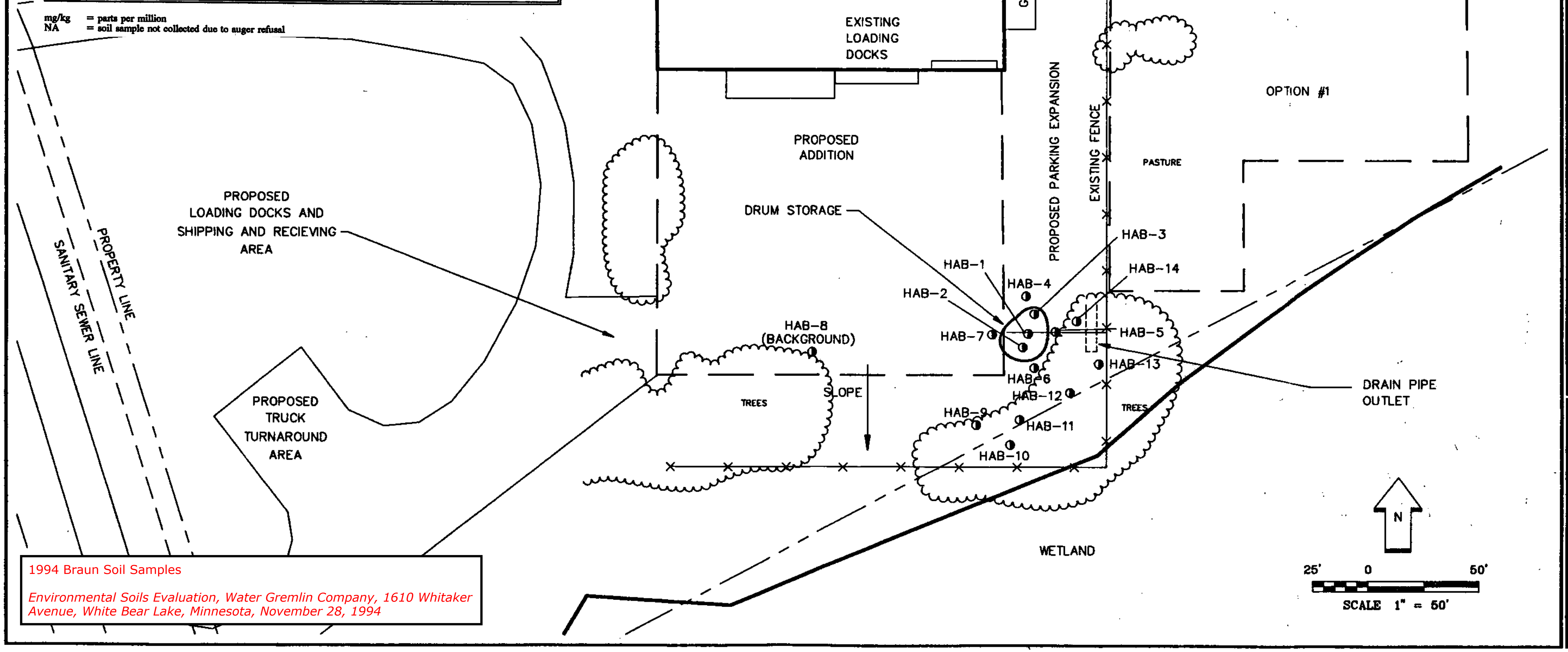
Attachment: Environmental Soils Evaluation Report

f:\wpfiles\cmxx\94\0708\0708.r01

Table 2
Soil Chemistry Results – Total Lead –
(all values listed in mg/Kg)

Boring Number	0-6 Inches	2 Feet	4.5 Feet
HAB-1	900	3800	940
HAB-2	95	40	NA
HAB-3	1800	2900	NA
HAB-4	1100	1200	38
HAB-5	2400	NA	NA
HAB-6	110	450	NA
HAB-7	4200	670	10
HAB-8	310	17	<2.5
HAB-9	78	NA	NA
HAB-10	150	NA	NA
HAB-11	180	NA	NA
HAB-12	1700	NA	NA
HAB-13	440	NA	NA
HAB-14	32	NA	NA

mg/kg = parts per million
NA = soil sample not collected due to auger refusal



BRAUN INTERTEC

EXISTING SOIL BORING LOCATION MAP
ENVIRONMENTAL SOILS ASSESSMENT
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

	INT	DATE
DRAWN BY:	LOL	11-15-94
APP'D BY:	ARL	11-15-94
JOB No.	CMXX-94-0708	
DWG. No. MX40708C	SHEET 2	OF 2
SCALE	1" = 50'	

FIGURE NO. 2

1994 Braun Soil Samples

Environmental Soils Evaluation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, November 28, 1994

BRAUN[SM]
INTERTEC

Soil Excavation Observations and Documentation Report

Water Gremlin Company
1610 Whitaker Avenue
White Bear Lake, Minnesota

Prepared For

Water Gremlin Company

Project Number CMXX-95-0401
September 26, 1995

Braun Intertec Corporation

Engineers and Scientists
Serving the Built and
Natural Environments

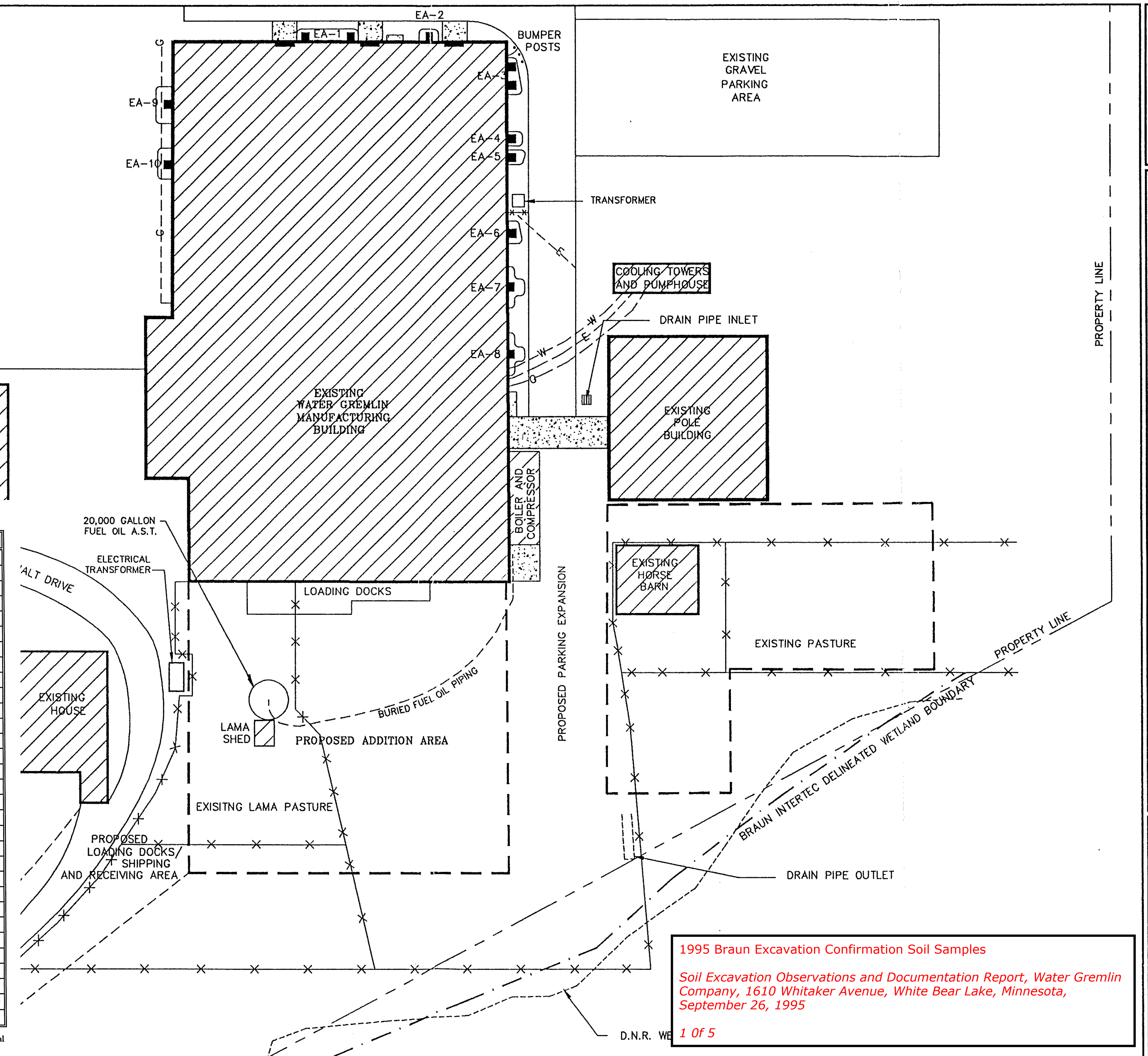


Table 1
Laboratory Chemical Analysis Results

Excavation Area	Sample Number and Depth		Concentration
EA-1	SS-1 @ 2'	R	470
	SS-2 @ 2'		27
	SS-25 @ 4'		59
	SS-3 @ 2'		12
	SS-4 @ 2'		57
EA-2	SS-5 @ 2'		380
	SS-6 @ 2'		230
EA-3	SS-7 @ 2'		77
	SS-8 @ 2'		110
	SS-9 @ 2'		84
	SS-10 @ 2'		42
EA-4	SS-11 @ 2'		<2.5
	SS-12 @ 2'		47
EA-5	SS-13 @ 2'		5.9
	SS-14 @ 2'		110
EA-6	SS-15 @ 2'	R	1000
	SS-16 @ 2'	R	510
	SS-26 @ 4'		240
	SS-27 @ 4'		360
EA-7	SS-17 @ 2'	R	800
	SS-18 @ 2'		340
	SS-28 @ 4'		3.3
EA-8	SS-19 @ 2'	R	1100
	SS-20 @ 2'	R	930
	SS-29 @ 4'		4.5
	SS-30 @ 4'	R	3600
	SS-31 @ 5'		570
EA-9	SS-21 @ 2'		6.0
	SS-22 @ 2'		81
EA-10	SS-23 @ 2'		170
	SS-24 @ 2'		100

R = Removed. The soils located where this sample was collected were excavated and an additional sample was collected after the additional soil excavation.

1995 Braun Excavation Confirmation Soil Samples

Soil Excavation Observations and Documentation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, September 26, 1995

1 Of 5

BRAUN INTERTEC

ELECTROSTATIC PRECIPITATOR LOCATION MAP
ENVIRONMENTAL SOILS ASSESSMENT
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

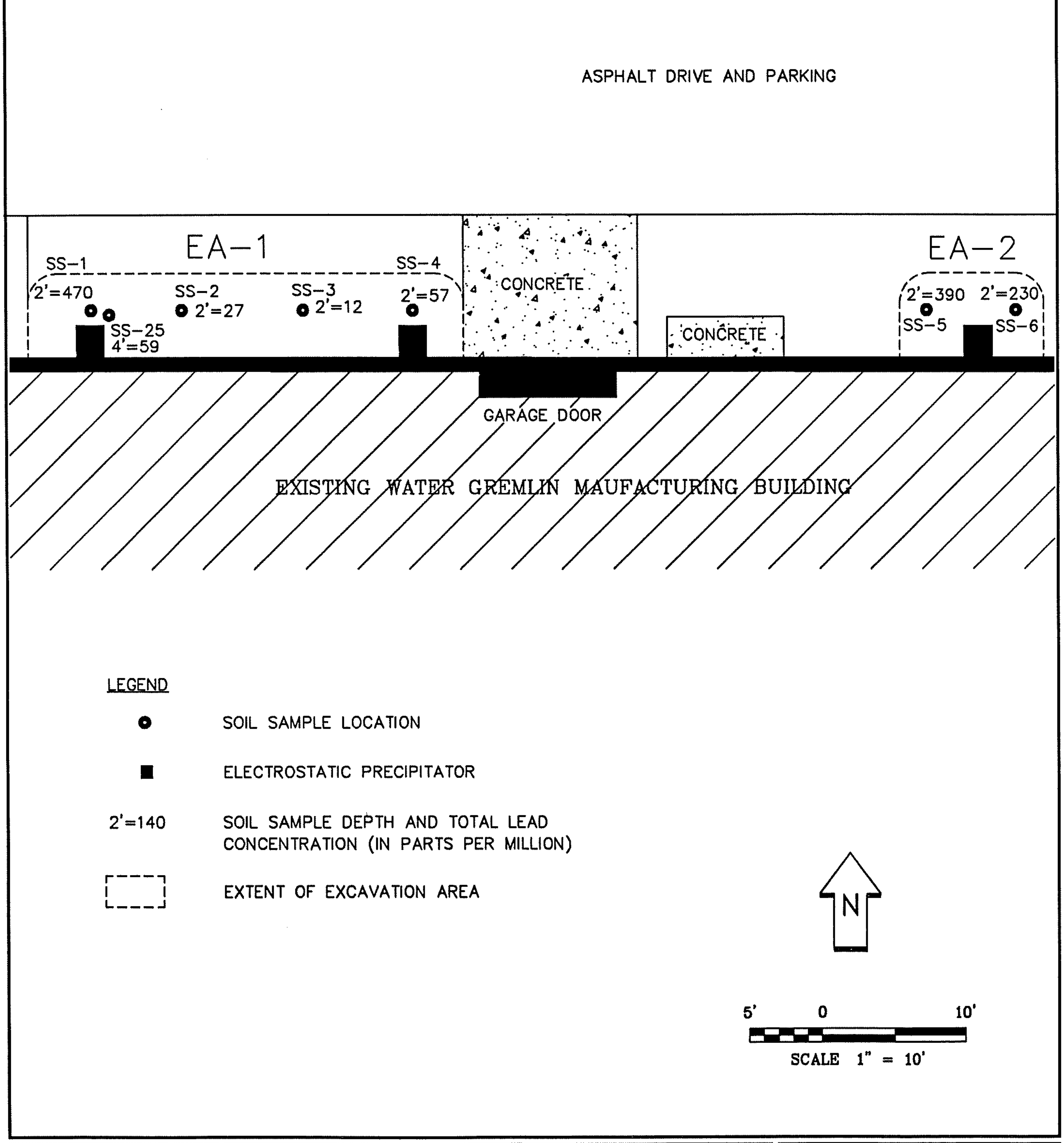
	INT	DATE
DRAWN BY:	LOL	09-18-95
APP'D BY:	ARL	09-19-95
JOB No.	CMXX-95-0591	
DWG. No.	MX40708	SHEET 1 OF 1
SCALE	NONE	

FIGURE NO.

1995 Braun Excavation Confirmation Soil Samples

Soil Excavation Observations and Documentation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, September 26, 1995

2 Of 5



BRAUN INTERTEC

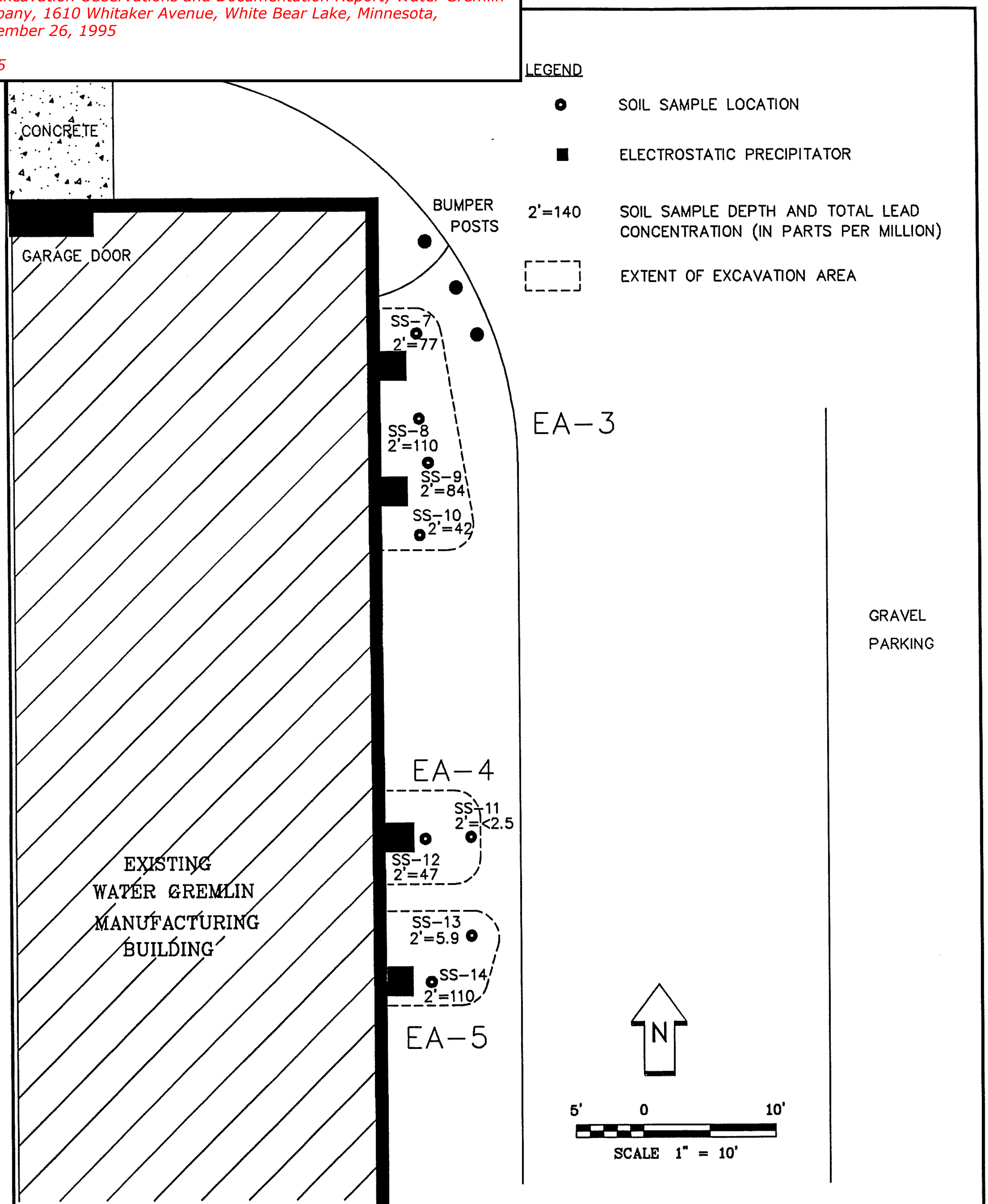
SOIL SAMPLING LOCATIONS MAP
ELECTROSTATIC PRECIPITATOR SOIL REMOVAL
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

INT	REVISION	SHEET
DRAWN BY: LOL	09-15-95	1
APP'D BY: ARL	09-28-95	OF
JOB NO. CMXX-95-0401		1
DWG. NO. MX40708A		FIGURE NO.
SCALE 1" = 10'		3

1995 Braun Excavation Confirmation Soil Samples

Soil Excavation Observations and Documentation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, September 26, 1995

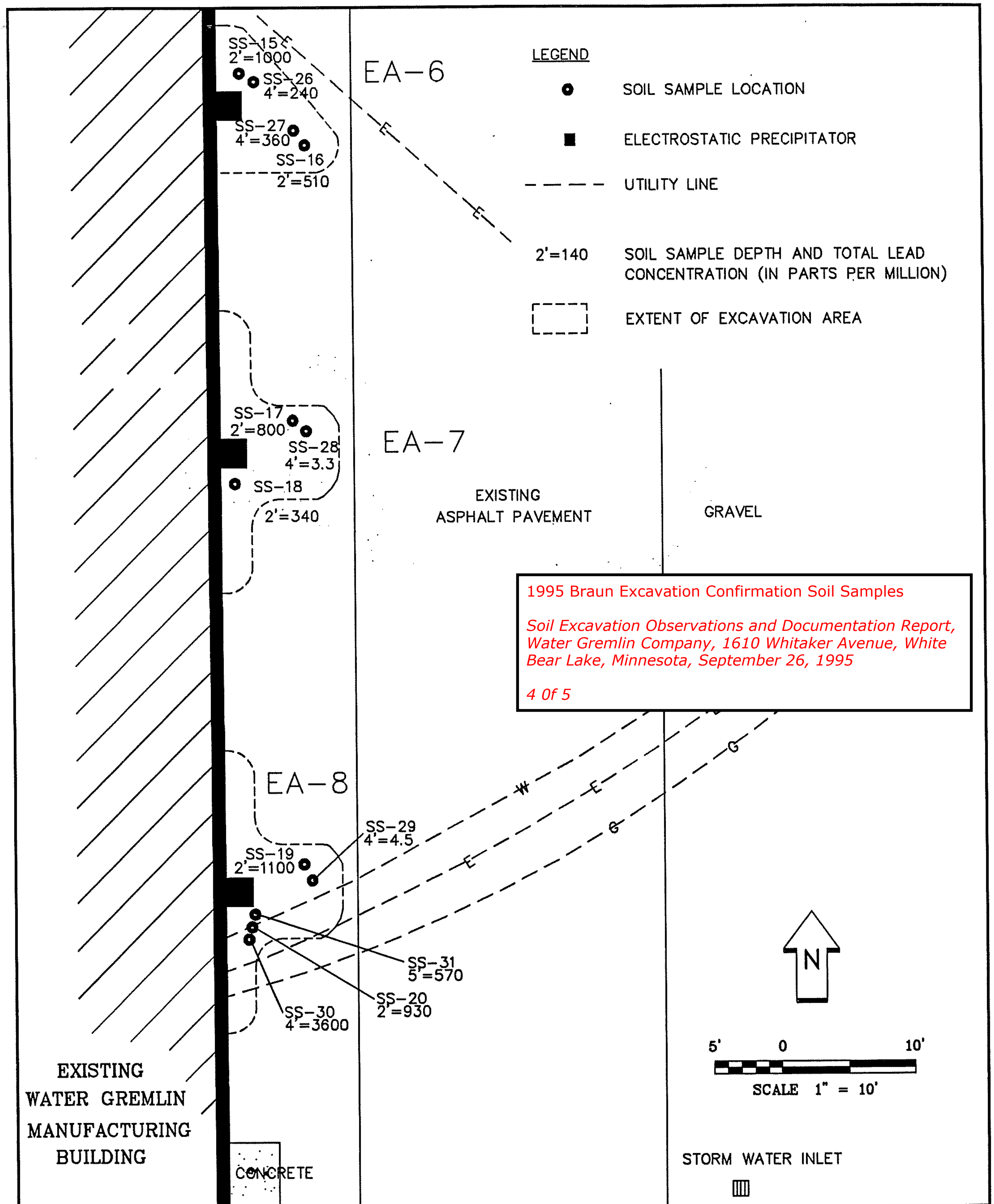
3 Of 5



BRAUN INTERTEC

SOIL SAMPLING LOCATIONS MAP
ELECTROSTATIC PRECIPITATOR SOIL REMOVAL
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

INT		REVISION	SHEET
DRAWN BY:	LOL	09-15-95	1
APP'D BY:	ARL	09-28-95	OF
JOB NO.	CMXX-95-0401		1
DWG. NO.	MX40708A	FIGURE NO.	
SCALE	1" = 10'		4



1995 Braun Excavation Confirmation Soil Samples

Soil Excavation Observations and Documentation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, September 26, 1995

4 Of 5

BRAUN™
INTERTEC

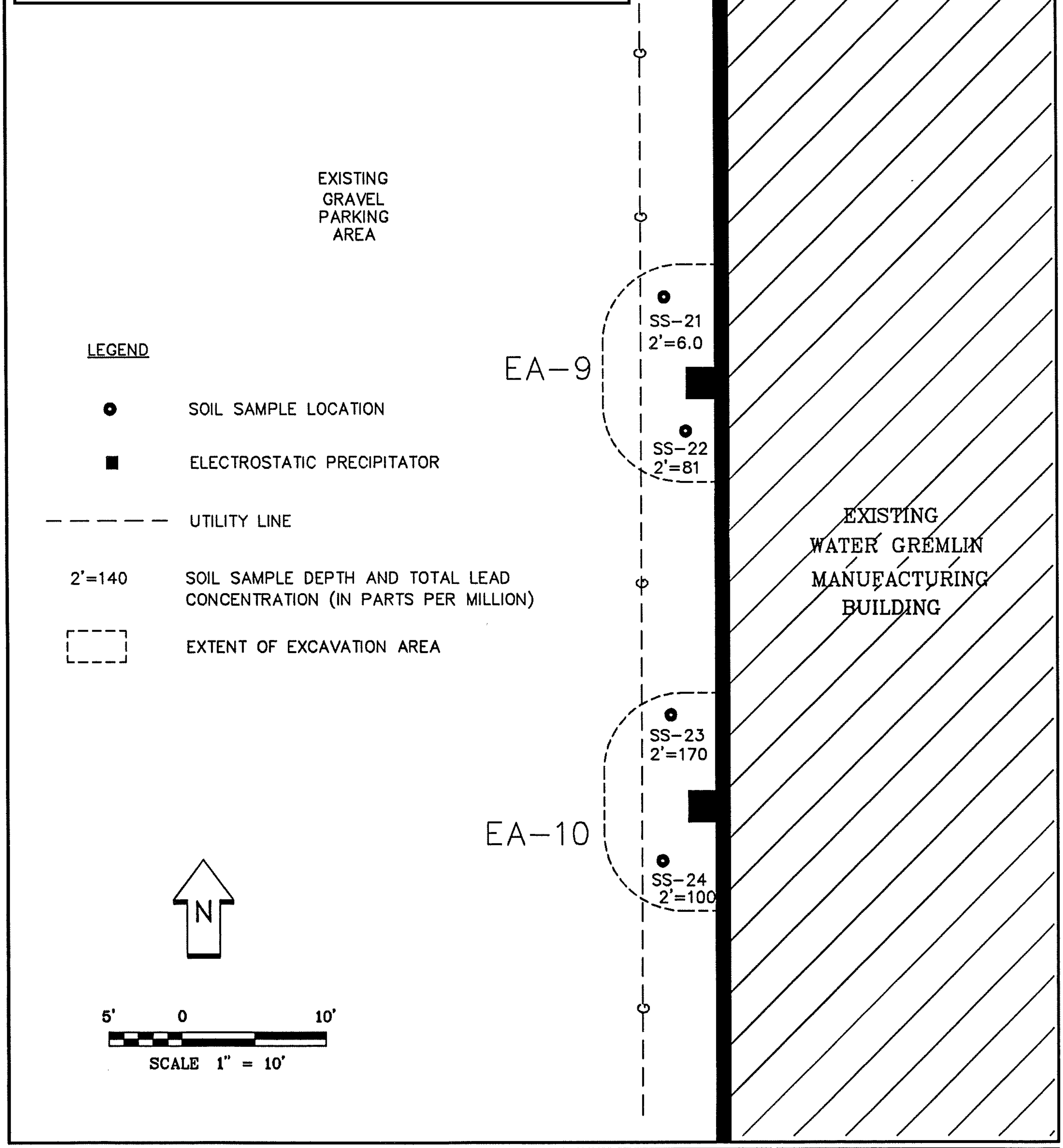
SOIL SAMPLING LOCATIONS MAP
ELECTROSTATIC PRECIPITATOR SOIL REMOVAL
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

INT		REVISION	SHEET
DRAWN BY:	LOL	09-15-95	1
APP'D BY:	ARL	09-28-95	OF
JOB NO.	CMXX-95-0401		1
DWG. NO.	MX40708A	FIGURE NO.	
SCALE	1" = 10'		5

1995 Braun Excavation Confirmation Soil Samples

Soil Excavation Observations and Documentation Report, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, September 26, 1995

5 Of 5



BRAUN INTERTEC

SOIL SAMPLING LOCATIONS MAP
ELECTROSTATIC PRECIPITATOR SOIL REMOVAL
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

INT	REVISION	SHEET
DRAWN BY: LOL	09-15-95	1
APP'D BY: ARL	09-28-95	OF
JOB NO. CMXX-95-0401		1
DWG. NO. MX40708A		FIGURE NO.
SCALE 1" = 10'		6

BRAUN[SM]
INTERTEC

Phase II Environmental Site Assessment

Water Gremlin Company
1610 Whitaker Avenue
White Bear Lake, Minnesota

Prepared For

Water Gremlin Company

Project No. Number CMXX-95-0591
March 26, 1996

Braun Intertec Corporation

Engineers and Scientists Serving the Built and Natural Environments

1996 Braun Phase II Environmental Site Assessment

Phase II Environmental Site Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, March 26, 1996

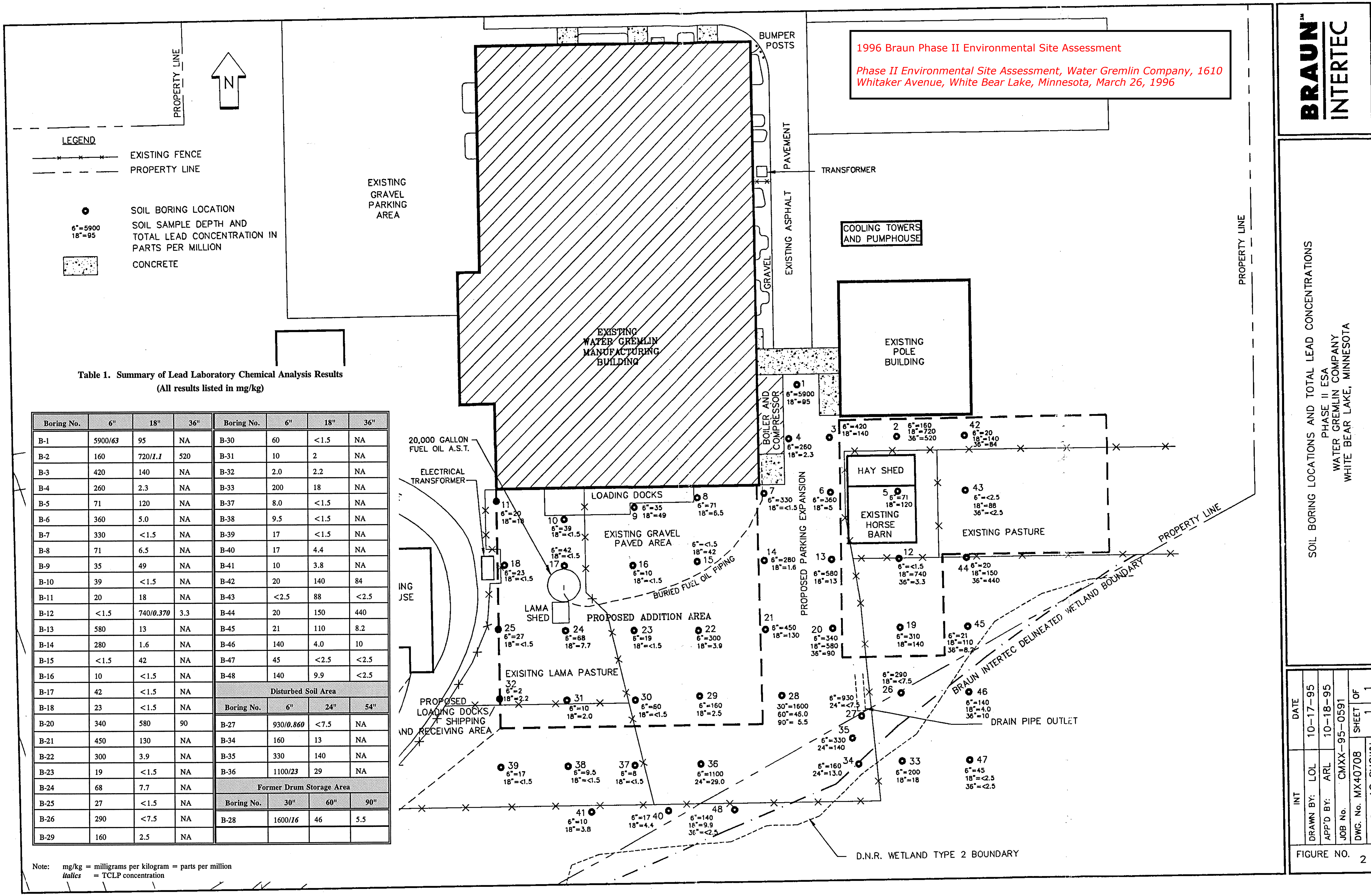


Table 1. Summary of Lead Laboratory Chemical Analysis Results
(All results listed in mg/kg)

Boring No.	6"	18"	36"	Boring No.	6"	18"	36"
B-1	5900/*63*	95	NA	B-30	60	<1.5	NA
B-2	160	720/*1.1*	520	B-31	10	2	NA
B-3	420	140	NA	B-32	2.0	2.2	NA
B-4	260	2.3	NA	B-33	200	18	NA
B-5	71	120	NA	B-37	8.0	<1.5	NA
B-6	360	5.0	NA	B-38	9.5	<1.5	NA
B-7	330	<1.5	NA	B-39	17	<1.5	NA
B-8	71	6.5	NA	B-40	17	4.4	NA
B-9	35	49	NA	B-41	10	3.8	NA
B-10	39	<1.5	NA	B-42	20	140	84
B-11	20	18	NA	B-43	<2.5	88	<2.5
B-12	<1.5	740/*0.370*	3.3	B-44	20	150	440
B-13	580	13	NA	B-45	21	110	8.2
B-14	280	1.6	NA	B-46	140	4.0	10
B-15	<1.5	42	NA	B-47	45	<2.5	<2.5
B-16	10	<1.5	NA	B-48	140	9.9	<2.5
B-17	42	<1.5	NA	**Disturbed Soil Area**			
B-18	23	<1.5	NA	**Boring No.**	**6"**	**24"**	**54"**
B-20	340	580	90	B-27	930/*0.860*	<7.5	NA
B-21	450	130	NA	B-34	160	13	NA
B-22	300	3.9	NA	B-35	330	140	NA
B-23	19	<1.5	NA	B-36	1100/*23*	29	NA
B-24	68	7.7	NA	**Former Drum Storage Area**			
B-25	27	<1.5	NA	**Boring No.**	**30"**	**60"**	**90"**
B-26	290	<7.5	NA	B-28	1600/*16*	46	5.5
B-29	160	2.5	NA				

Note: mg/kg = milligrams per kilogram = parts per million
italics = TCLP concentration

BRAUN[SM]
INTERTEC

Response Action Plan Implementation

Water Gremlin Company
1610 Whitaker Avenue
White Bear lake, Minnesota

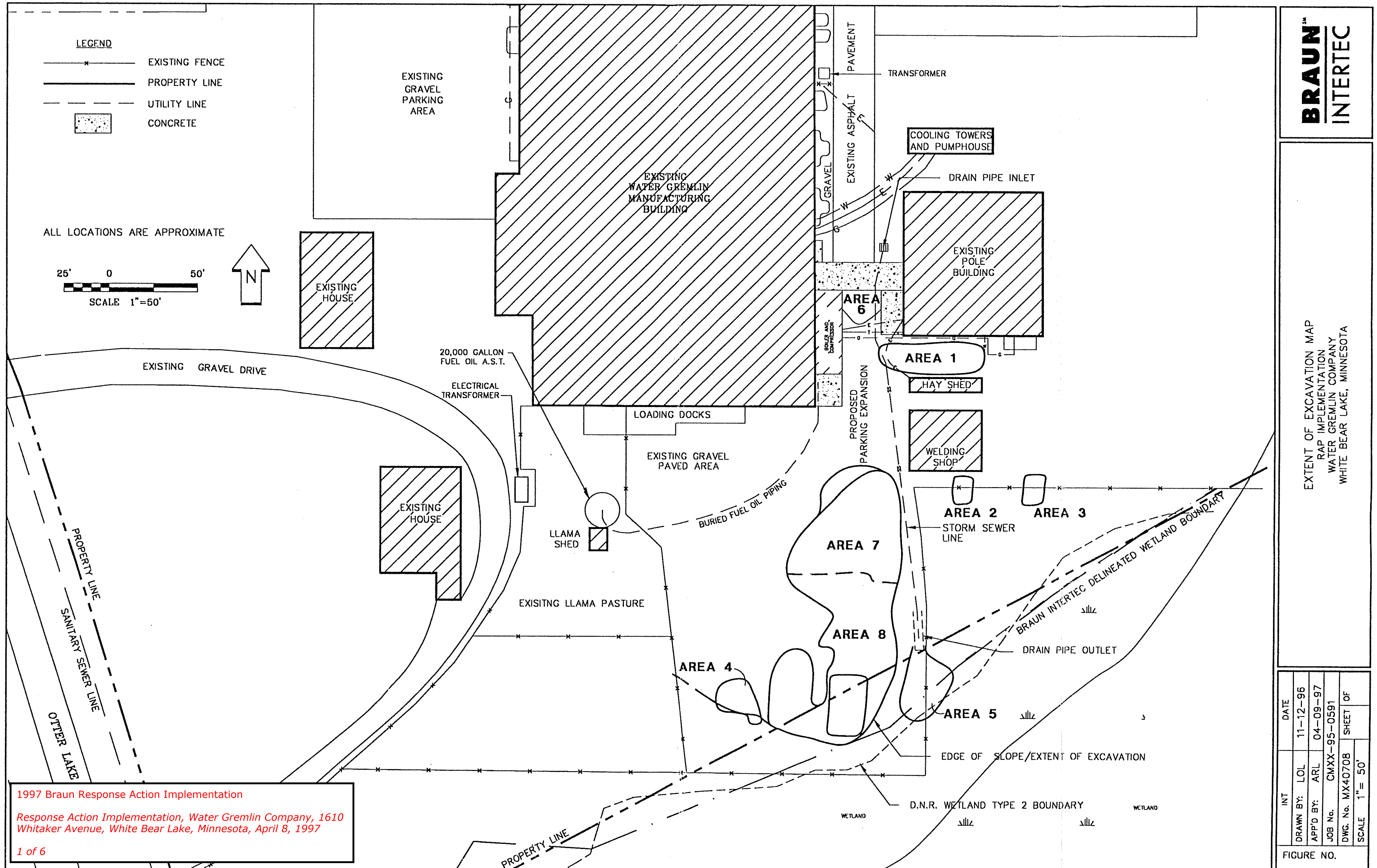
Prepared For

Water Gremlin Company

Project No. Number CMXX-95-0591
April 8, 1997

Braun Intertec Corporation

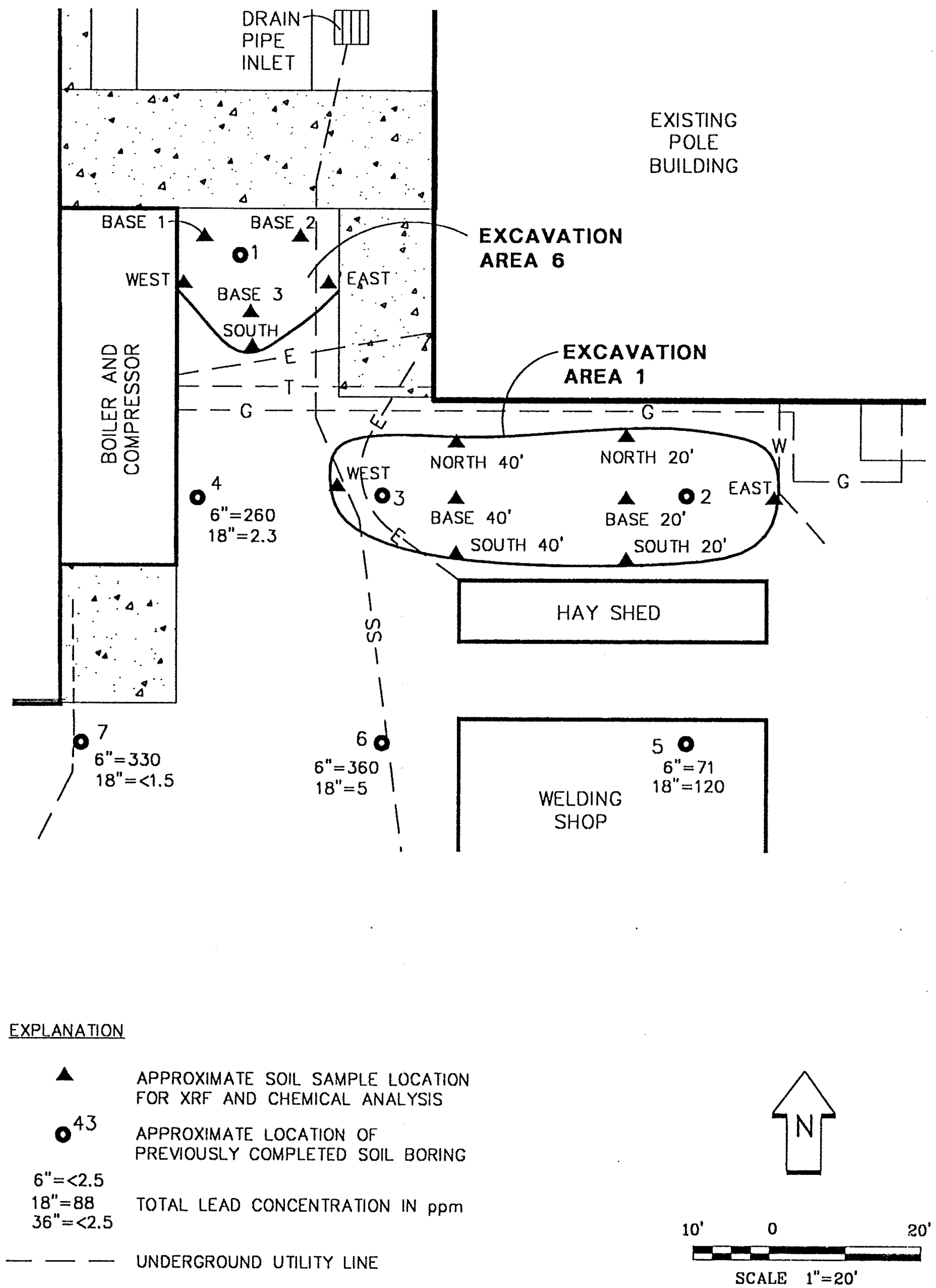
Engineers and Scientists
Serving the Built and
Natural Environments



1997 Braun Response Action Implementation

Response Action Implementation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, April 8, 1997

1 of 6



EXCAVATION AREA 1		
Sample Location	XRF Concentration	Laboratory Concentration
East Sidewall	25	36
West Sidewall	51	86
North Sidewall @ 20'	54	<6.5
North Sidewall @ 40'	30	13
South Sidewall @ 20'	11	<6.5
South Sidewall @ 40'	38	<6.5
Base @ 20'	16	10
Base @ 40'	29	6.5
R-1 @ 18"	428	460

EXCAVATION AREA 6			
Sample Location	XRF Concentration	Laboratory Concentration	Average Concentration
North	No Sample	No Sample (concrete)	--
South	404	580/1100 (utility lines)	694
East	340	1100/520 (storm drain)	653
West	21	13	--
Base-1	56	<6.5	--
Base-2	79	<6.5	--
Base-3	18	16	--

1997 Braun Response Action Implementation

Response Action Implementation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, April 8, 1997

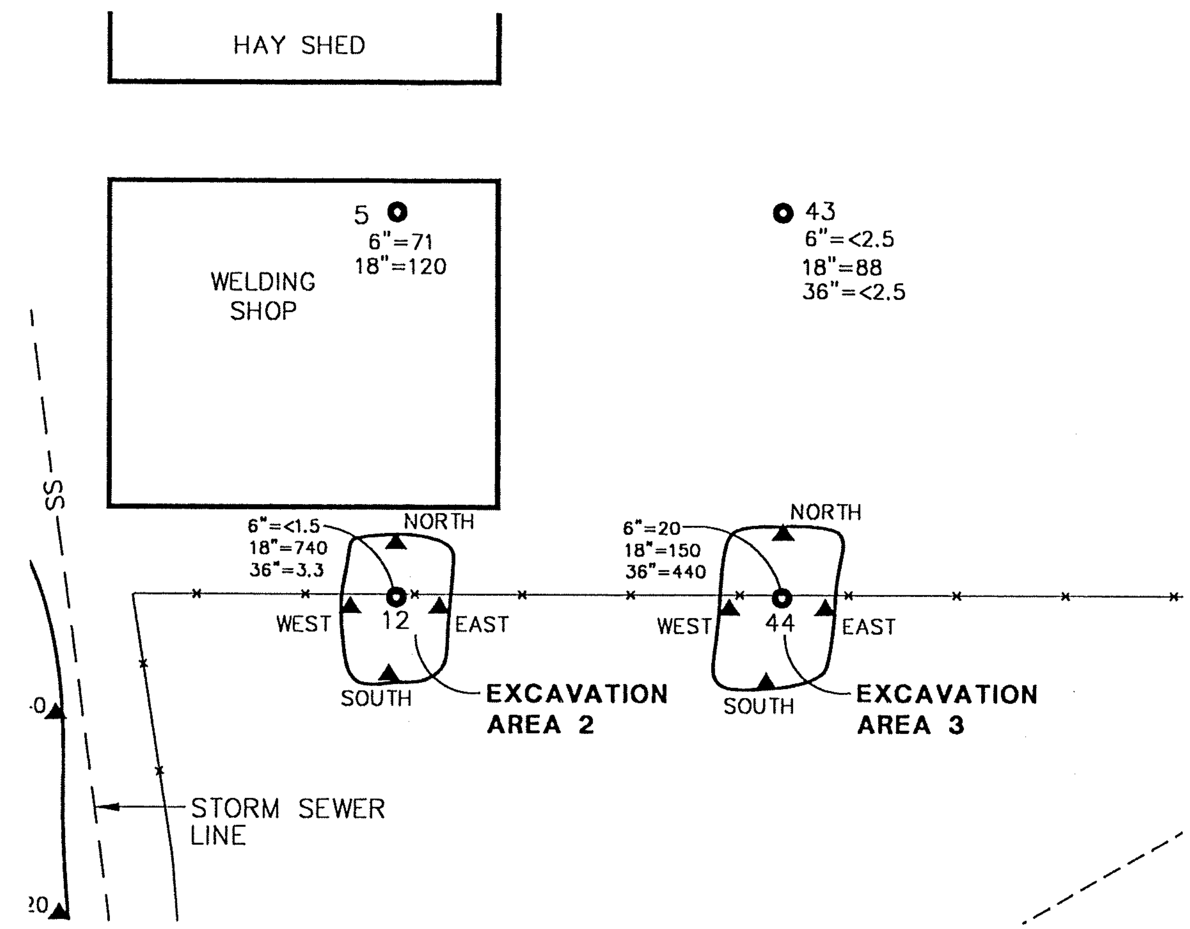
2 of 6

BRAUN INTERTEC

EXTENT OF EXCAVATION AREA 1 AND EXCAVATION AREA 6
RAP IMPLEMENTATION
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

	INT	DATE
DRAWN BY:	GMG	11-13-96
APP'D BY:	ARL	04-08-97
JOB No.	CMXX-95-0591	
DWG. No.	MX40708	SHEET OF
SCALE	1"=20'	

FIGURE NO.



EXCAVATION AREA 2		
Sample Location	XRF Concentration	Laboratory Concentration
NORTH	60	<6.5
SOUTH	49	91
EAST	46	<6.5
WEST	95	440
BASE	6	<6.5

EXCAVATION AREA 3		
Sample Location	XRF Concentration	Laboratory Concentration
NORTH	6	<6.5
SOUTH	205	200
EAST	229	170
WEST	143	170
BASE	81	14

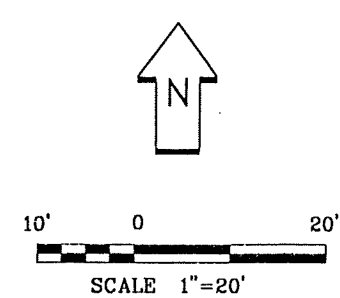
EXPLANATION

▲ APPROXIMATE SOIL SAMPLE LOCATION FOR XRF AND CHEMICAL ANALYSIS

43 APPROXIMATE LOCATION OF PREVIOUSLY COMPLETED SOIL BORING

6"=<2.5
18"=88
36"=<2.5
TOTAL LEAD CONCENTRATION IN ppm

— — — UNDERGROUND UTILITY LINE



1997 Braun Response Action Implementation

Response Action Implementation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, April 8, 1997

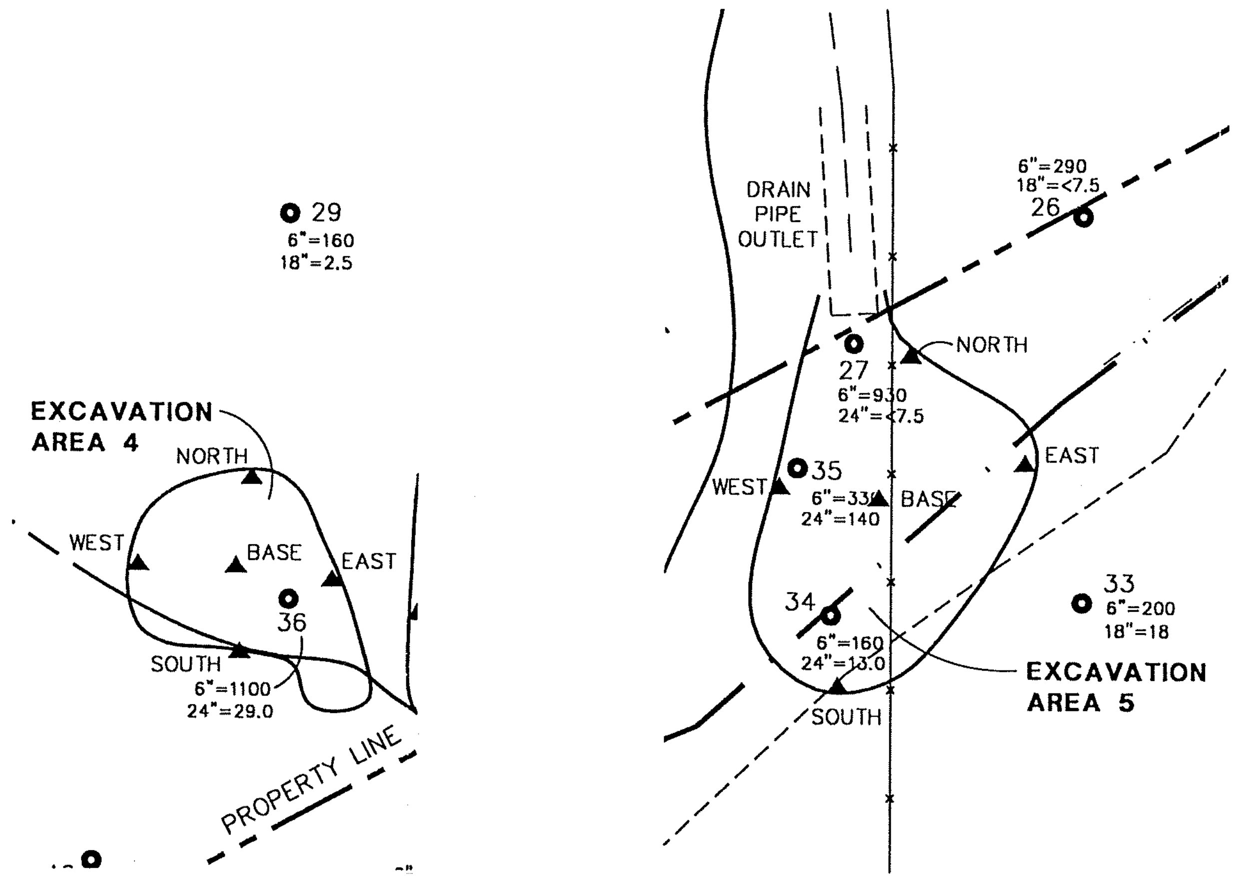
3 of 6

BRAUN INTERTEC

EXTENT OF EXCAVATION AREA 2 AND EXCAVATION AREA 3
RAP IMPLEMENTATION
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

	INT	DATE
DRAWN BY:	GMG	11-13-96
APP'D BY:	ARL	04-08-97
JOB No.	CMXX-95-0591	
DWG. No.	MX40708	SHEET OF
SCALE	1"=20'	

FIGURE NO.



EXCAVATION AREA 4		
Sample Location	XRF Concentration	Laboratory Concentration
NORTH	204	200
SOUTH	168	480
EAST	180	240
WEST	98	120
BASE	131	23

EXCAVATION AREA 5		
Sample Location	XRF Concentration	Laboratory Concentration
NORTH	59	<6.5
SOUTH	320	420
EAST	41	<6.5
WEST	347	290
BASE	25	8.3

EXPLANATION

▲ APPROXIMATE SOIL SAMPLE LOCATION FOR XRF AND CHEMICAL ANALYSIS

43 APPROXIMATE LOCATION OF PREVIOUSLY COMPLETED SOIL BORING

6"=<2.5
18"=88
36"=<2.5 TOTAL LEAD CONCENTRATION IN ppm

UNDERGROUND UTILITY LINE

N

10' 0 20'

SCALE 1"=20'

1997 Braun Response Action Implementation

Response Action Implementation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, April 8, 1997

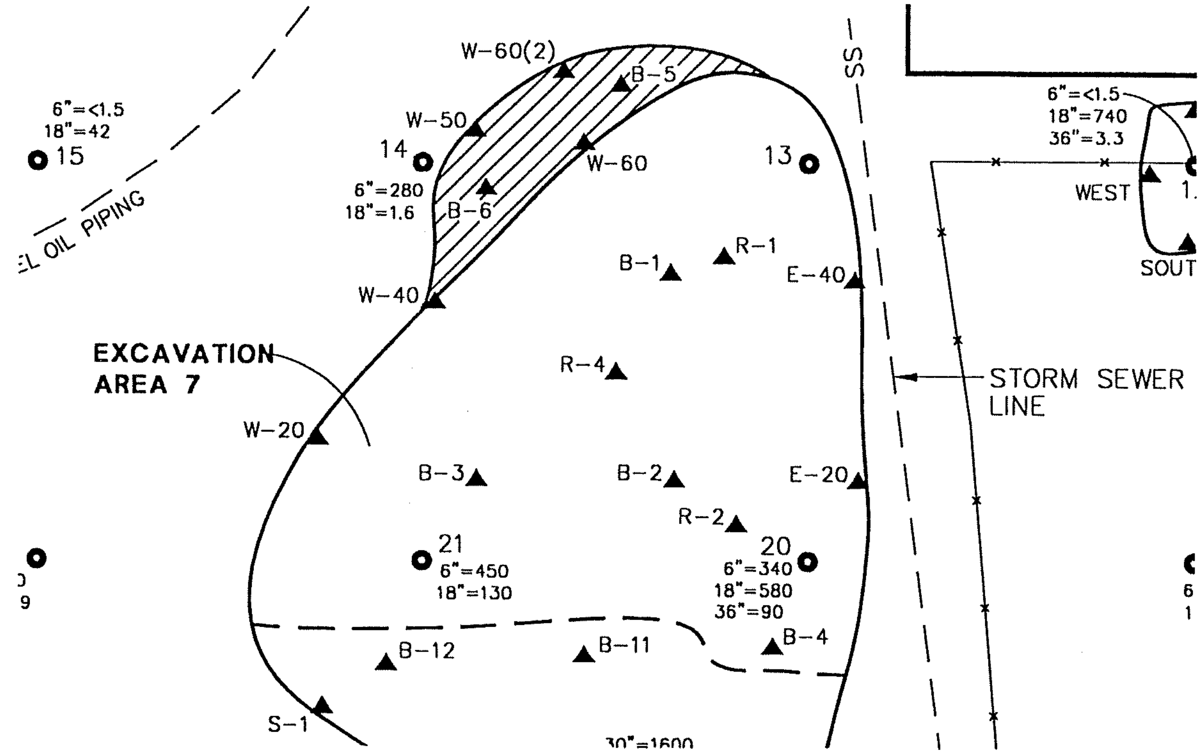
4 of 6

BRAUN™ INTERTEC

EXTENT OF EXCAVATION AREA 4 AND EXCAVATION AREA 5
RAP IMPLEMENTATION
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

INT		DATE
DRAWN BY:	GMG	11-13-96
APP'D BY:	ARL	04-08-97
JOB No.	CMXX-95-0591	
DWG. No.	MX40708	SHEET OF
SCALE	1"=20'	

FIGURE NO.



EXCAVATION AREA 7		
Sample Location	XRF Concentration	Laboratory Concentration
EAST-20	199	70
EAST-40	350	590/340
WEST-20	270	280
WEST-40	9	77
WEST-50 (2)	ND	<6.5
WEST-60	234	950/700
WEST-60 (2)	125	89
BASE-1	136	21
BASE-2	174	<6.5
BASE-3	106	110
BASE-4	357	400
BASE-5 (2)	25	6.6
BASE-6 (2)	10	9.3
R-1	1250	1500
R-2	963	1300
R-4	897	1000

B-4 (2) XRF AND CHEMICAL ANALYSIS RESULTS OF SOIL SAMPLES COLLECTED AFTER ADDITIONAL EXCAVATION ON NOVEMBER 7, 1996

EXPLANATION

▲ APPROXIMATE SOIL SAMPLE LOCATION FOR XRF AND CHEMICAL ANALYSIS

o 43 APPROXIMATE LOCATION OF PREVIOUSLY COMPLETED SOIL BORING

6"=<2.5
18"=88
36"=<2.5 TOTAL LEAD CONCENTRATION IN ppm

— — — UNDERGROUND UTILITY LINE

AREA OF ADDITIONAL SOIL REMOVAL COMPLETED ON NOVEMBER 7, 1996

N

10' 0 20'

SCALE 1"=20'

1997 Braun Response Action Implementation

Response Action Implementation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, April 8, 1997

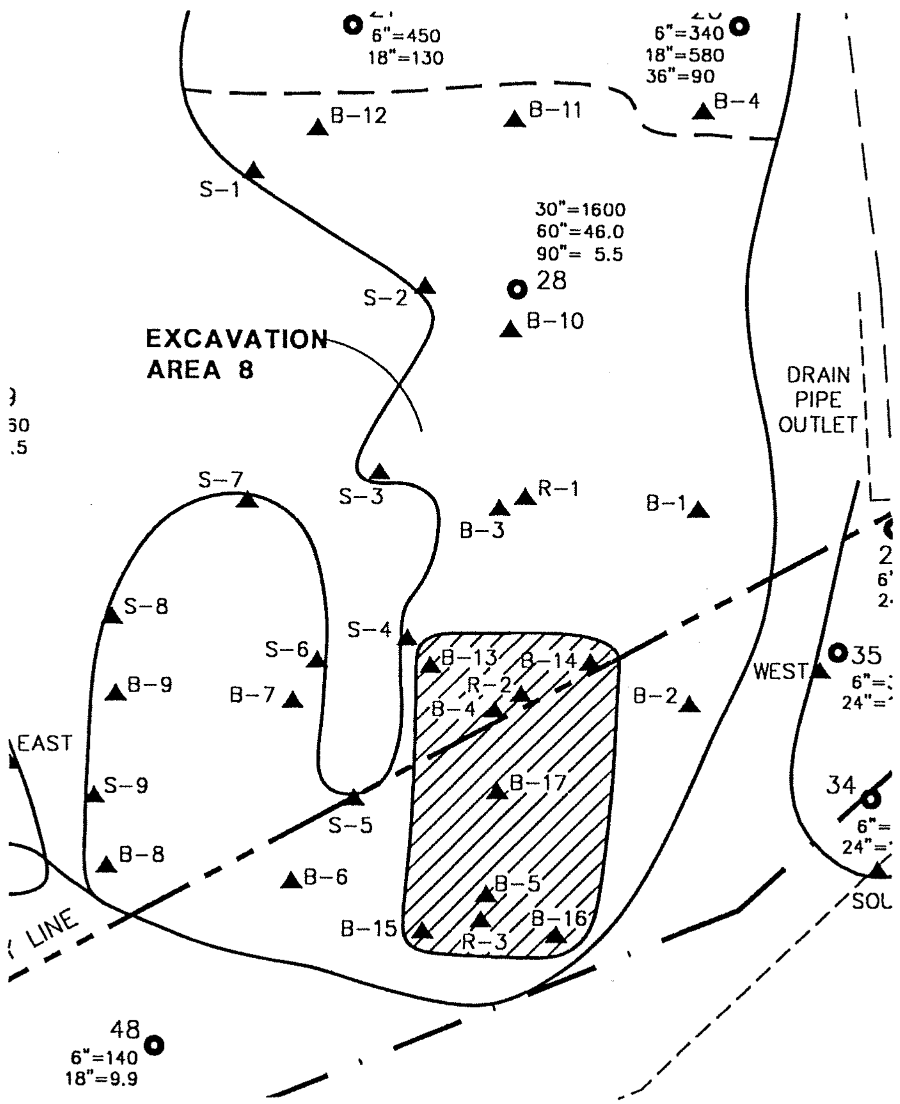
5 of 6

BRAUN INTERTEC

EXTENT OF EXCAVATION AREA 7
RAP IMPLEMENTATION
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

INT		DATE
DRAWN BY:	GMG	11-13-96
APP'D BY:	ARL	04-09-97
JOB No.	CMXX-95-0591	
DWG. No.	MX40708	SHEET OF
SCALE	1"=20'	

FIGURE NO.



EXCAVATION AREA 8		
Sample Location	XRF Concentration	Laboratory Concentration
S-1	141	160
S-2	36	21
S-3	151	240
S-4	327	280
S-5	343	320
S-6	39	73
S-7	303	480
S-8	42	59
S-9	182	560/340
B-1	85	260
B-2	85	190
B-3	232	300
B-4	311	1200/1100
B-4 (2)	ND	<6.5
B-5	326	630/560
B-5 (2)	5	<6.5

EXCAVATION AREA 8		
Sample Location	XRF Concentration	Laboratory Concentration
B-6	226	250
B-7	238	250
B-8	180	140
B-9	108	96
B-10	89	22
B-11	64	28
B-12	30	30
B-13 (2)	ND	--
B-14 (2)	ND	--
B-15 (2)	ND	--
B-16 (2)	11	--
B-17 (2)	25	--
R-1	1012	1400
R-2	920	2200
R-3	643	2900

EXPLANATION

▲ APPROXIMATE SOIL SAMPLE LOCATION FOR XRF AND CHEMICAL ANALYSIS

43 APPROXIMATE LOCATION OF PREVIOUSLY COMPLETED SOIL BORING

6"=<2.5
18"=88
36"=<2.5 TOTAL LEAD CONCENTRATION IN ppm

— — — UNDERGROUND UTILITY LINE

AREA OF ADDITIONAL SOIL REMOVAL COMPLETED ON NOVEMBER 7, 1996

1997 Braun Response Action Implementation

Response Action Implementation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, April 8, 1997

6 of 6

N

10' 0 20'

SCALE 1"=20'

BRAUN INTERTEC

EXTENT OF EXCAVATION AREA 8
RAP IMPLEMENTATION
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

	INT	DATE
DRAWN BY:	GMG	11-13-96
APP'D BY:	ARL	04-09-97
JOB No.	CMXX-95-0591	
DWG. No.	MX40708	SHEET OF
SCALE	1"=20'	

FIGURE NO.

BRAUN[SM]

INTERTEC

Environmental Soil and Groundwater Evaluation

Water Gremlin Company
1610 Whitaker Avenue
White Bear Lake, Minnesota

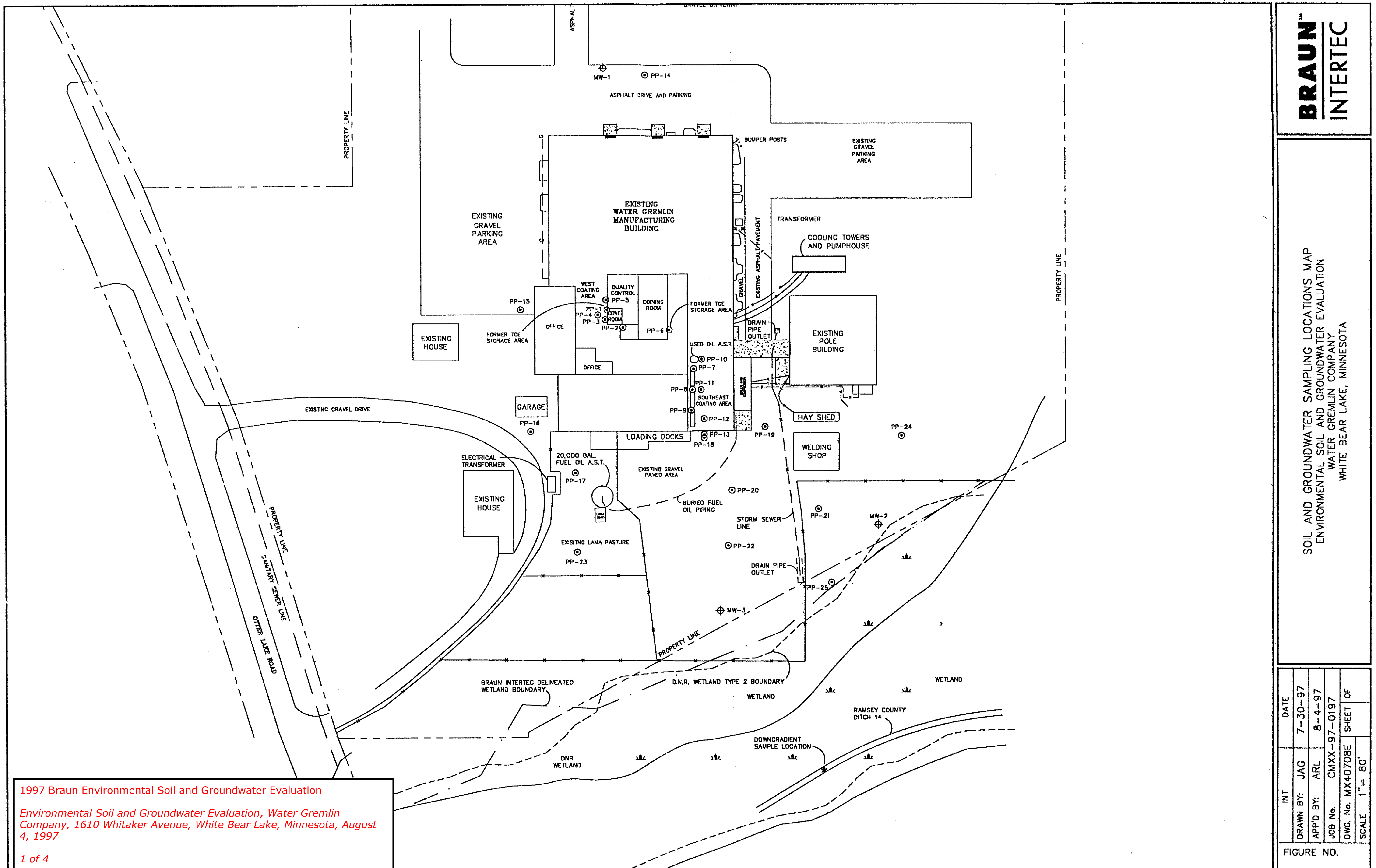
Prepared For

Water Gremlin Company

Project No. Number CMXX-97-0197
August 4, 1997

Braun Intertec Corporation

Engineers and Scientists Serving the Built and Natural Environments



1997 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, August 4, 1997

1 of 4

Table 1: Summary of Soil Chemical Analysis
(Concentrations in mg/kg)

Compound	GP-2@2'	GP-5@2'	GP-6@2'	GP-9@6"	GP-10@2'
1,1,2-Trichloroethylene	0.68	0.06	0.12	0.27	0.20

mg/kg = parts per million

Table 2: Summary of Groundwater Chemical Analysis, PP-1 through PP-12 (Interior)
(Concentrations in μg/l)

Compound	PP-1	PP-3	PP-5	PP-6	PP-7	PP-9	PP-10	HRL
Acetone	<20	<20	<20	<20	27	<20	<20	700
Chloroethane	<2.0	<2.0	<2.0	<2.0	<2.0	3.9	<2.0	-
1,1-Dichloroethane	<1.0	<1.0	<1.0	5.0	6.8	31	7.0	70
1,2-Dichloroethane	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	<0.3	4
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	2.4	<1.0	6
cis1,2-Dichloroethylene	0.9	1.2	3.7	0.6	19	760	17	70
trans 1,2-Dichloroethylene	<0.2	<0.2	<0.2	<0.2	<0.2	4.9	1.1	100
Methylene Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	50
1,1,1-Trichloroethane	1.1	0.8	1.2	1.5	1.2	4.6	0.7	600
1,1,2-Trichloroethylene	220	280	350	14	64	560	23	30
Vinyl Chloride	<1.0	<1.0	<1.0	2.6	<1.0	<1.0	<1.0	0.2

μg/l = parts per billion
Shaded cells = detected above the Minnesota Department of Health Risk Limits (HRL) for Private Drinking Water Supplies

1997 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, August 4, 1997

Table 3. Summary of Groundwater Chemical Analysis, PP-13 through PP-23 (Exterior) (Concentrations in μg/l)

Compound	PP-13	PP-14S	PP-14D	PP-15	PP-16	PP-17	PP-18D	PP-19	PP-20	PP-21	PP-22	PP-22D	PP-23	HRL
Acetone	300	<20	<20	<20	<20	<20	<20	<40	520	80	29	<20	<20	700
Benzene	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	10
Chloroethane	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	230	4.0	<1.0	<1.0	-
Chloroform	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	<2.0	<2.0	<1.0	<1.0	<1.0	60
Chloromethane (Methyl chloride)	<5.0	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<5.0	<5.0	<5.0	<2.5	<2.5	<2.5	—
1,4-Dichlorobenzene	0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	2.9	1.3	0.4	<0.2	<0.2	10
1,1-Dichloroethane	970	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	6.5	980	69	230	<1.0	<1.0	70
1,2-Dichloroethane	24	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	2.7	12	4.5	8.0	<0.3	<0.3	4
1,1-Dichloroethylene	2000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	13	390	14	76	<1.0	<1.0	6
cis-1,2-Dichloroethylene	3800	<0.2	<0.2	<0.2	<0.2	<0.2	9.0	46	370	960	270	<0.2	<0.2	70
Trans 1,2-Dichloroethylene	5.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	1.4	5.3	1.2	<0.2	<0.2	100
Dichlorodifluoro methane	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	99	97	18	13	<2.5	<2.5	1000
Dichlorofluoro-methane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	18	<0.5	<0.5	<0.5	<0.5	-
Ethyl Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0	<1.0	<1.0	<1.0	700
Methyl Ethyl Ketone	130	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	100	20	6.1	<5.0	<5.0	4000
Methyl Isobutyl Ketone	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	29	21	<5.0	<5.0	<5.0	300
MTBE	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	2.9	<1.0	<1.0	<1.0	<1.0	-
Methylene Chloride	21	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<4.0	7.9	<2.0	<2.0	<2.0	<2.0	50
Tetrachloro-ethylene	11	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	11	23	<1.0	<1.0	<1.0	<1.0	7
Tetrahydrofuran	58	<5.0	<5.0	<5.0	<5.0	<5.0	5.9	79	51	180	29	<5.0	<5.0	100
Toluene	95	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	120	<1.0	2.9	<1.0	<1.0	1,000
1,1,1-Trichloroethane	32,000	<0.5	<0.5	0.6	<0.5	<0.5	0.6	140	4300	<0.5	100	<0.5	<0.5	600
1,1,2-Trichloroethane	7.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.4	4.3	<1.0	<1.0	<1.0	<1.0	3
1,1,2-Trichloroethylene	97	<0.5	0.7	8.2	<0.5	<0.5	<0.6	4300	18	160	21	<0.5	<0.5	30
1,2,4-Trimethylbenzene	<1.0	2.7	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	-
Vinyl Chloride	2.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	9.4	3.1	<1.0	<1.0	<1.0	0.2
Total Xylenes	<1.0	2.9	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	12.0	<2.0	<1.0	<1.0	<1.0	10,000
n-Butylbenzene	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	-
Napthalene	<1.0	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	300

ug/l = parts per billion
Shaded cells = detected above MDH HRLs for private drinking water supplies

1997 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, August 4, 1997

Table 4. Groundwater Chemical Analysis Results for PP-24, PP-25 and MW-1 through MW-3 (Concentrations in μg/l)

Compound	PP-24	PP-25	MW-1		MW-2		MW-3		MDH/HRL
Date Collected	4/22/97	4/22/97	5/5/97	5/19/97	5/5/97	5/19/97	5/5/97	5/19/97	
Bromodichloromethane	<0.3	<0.3	1.3	<0.3	<0.3	<0.3	<0.3	<0.3	6
Chloroethane (Methylene Chloride)	28	<1.0	<1.0	<1.0	<1.0	<1.0	24	<1.0	50
Chloroform	<1.0	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	60
1,1-Dichloroethane	32	1.5	<1.0	<1.0	3.4	3.3	600	640	70
1,2-Dichloroethane	2.7	<0.3	<0.3	<0.3	<0.3	<0.3	12	10	4
1,1-Dichloroethylene	2.6	<1.0	<1.0	<1.0	<1.0	<1.0	54	42	6
cis-1,2-Dichloroethylene	30	<0.2	<0.2	<0.2	0.4	<0.2	17	16	70
trans-1,2-Dichloroethylene	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.4	100
Dichlorodifluoromethane	43	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	1000
Methyl Isobutyl Ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	7.2	7.1	300
Tetrahydrofuran	110	<5.0	<5.0	<5.0	<5.0	<1.0	46	<1.0	100 RAL
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.3	2.2	1000
1,1,1-Trichloroethane	<0.5	2.0	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	600
1,1,2-Trichloroethylene	1.6	<0.5	<0.5	<0.5	1.3	1.3	2.1	1.9	30
Vinyl Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.6	2.5	0.2

μg/l = parts per billion (MDH)
Shaded cells = detected above the Minnesota Department of Health Risk Limits for Private Drinking Water Supplies
RAL = MDH Recommended Allowable Limit

BRAUN[SM]

INTERTEC

Environmental Soil and Groundwater Evaluation Report 2

Water Gremlin Company
1610 Whitaker Avenue
White Bear Lake, Minnesota

Prepared For

Water Gremlin Company

Project No. Number CMXX-97-0197
January 6, 1998

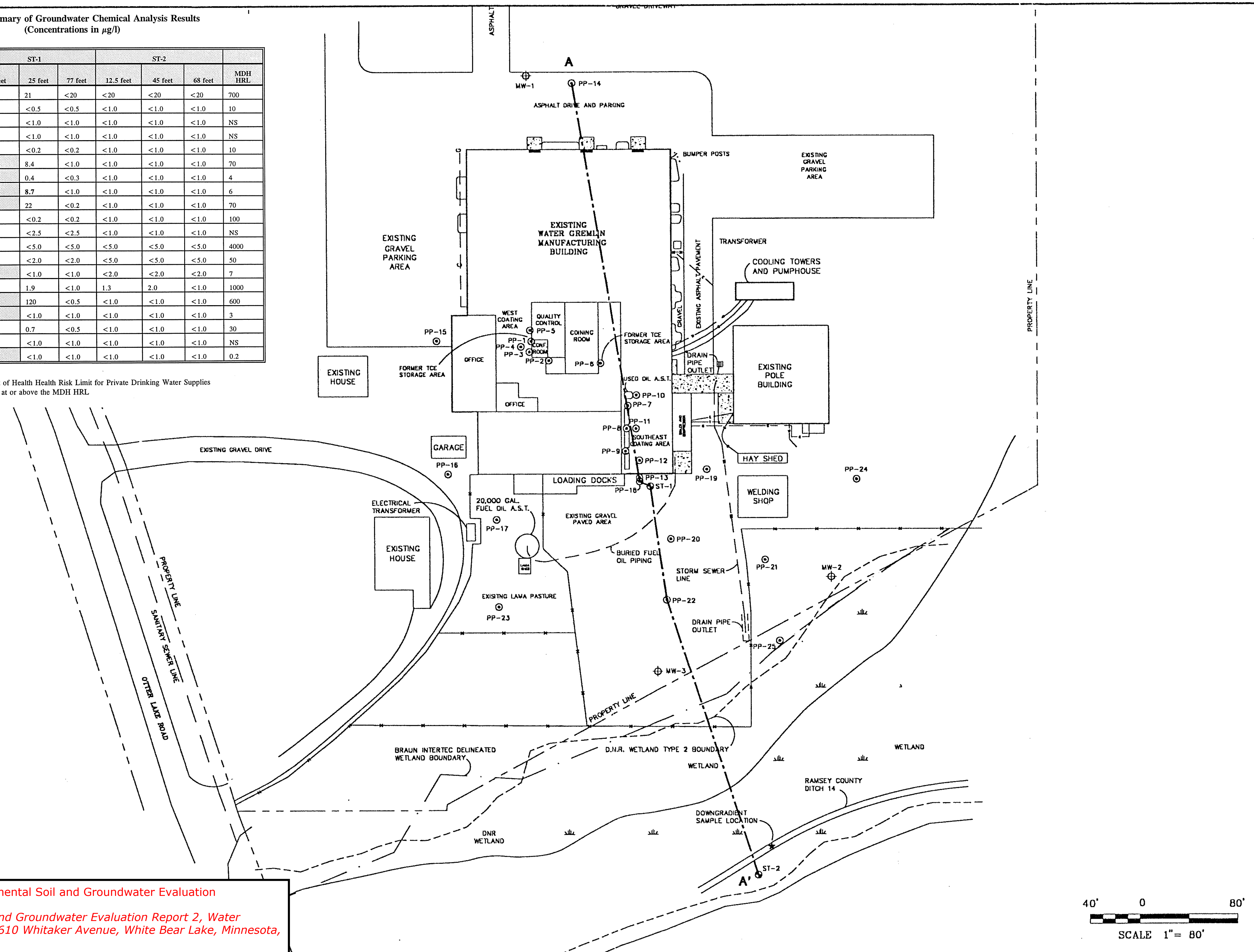
Braun Intertec Corporation

Engineers and Scientists Serving the Built and Natural Environments

Table 1. Summary of Groundwater Chemical Analysis Results
(Concentrations in μg/l)

Compound	ST-1			ST-2			
Depth	10 feet	25 feet	77 feet	12.5 feet	45 feet	68 feet	MDH HRL
Acetone	<20	21	<20	<20	<20	<20	700
Benzene	0.7	<0.5	<0.5	<1.0	<1.0	<1.0	10
n-Butylbenzene	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	NS
tert-Butylbenzene	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	NS
1,4-Dichlorobenzene	5.2	<0.2	<0.2	<1.0	<1.0	<1.0	10
1,1-Dichloroethane	1400	8.4	<1.0	<1.0	<1.0	<1.0	70
1,2-Dichloroethane	44	0.4	<0.3	<1.0	<1.0	<1.0	4
1,1-Dichloroethylene	1400	**8.7**	<1.0	<1.0	<1.0	<1.0	6
cis-1,2-Dichloroethylene	11000	22	<0.2	<1.0	<1.0	<1.0	70
trans-1,2-Dichloroethylene	12	<0.2	<0.2	<1.0	<1.0	<1.0	100
Dichlorodifluoromethane	6.3	<2.5	<2.5	<1.0	<1.0	<1.0	NS
Methyl Ethyl Ketone	410	<5.0	<5.0	<5.0	<5.0	<5.0	4000
Methylene Chloride	7.1	<2.0	<2.0	<5.0	<5.0	<5.0	50
Tetrachloroethylene	19	<1.0	<1.0	<2.0	<2.0	<2.0	7
Toluene	240	1.9	<1.0	1.3	2.0	<1.0	1000
1,1,1-Trichloroethane	8200	120	<0.5	<1.0	<1.0	<1.0	600
1,1,2-Trichloroethane	10	<1.0	<1.0	<1.0	<1.0	<1.0	3
1,1,2-Trichloroethylene	21	0.7	<0.5	<1.0	<1.0	<1.0	30
1,2,4-Trimethylbenzene	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	NS
Vinyl Chloride	11	<1.0	<1.0	<1.0	<1.0	<1.0	0.2

μg/l= parts per billion
MDH HRL= Minnesota Department of Health Health Risk Limit for Private Drinking Water Supplies
Shaded areas = Compound detected at or above the MDH HRL
NS= No Standard



BRAUN™ INTERTEC

GEOLOGIC CROSS SECTION
ENVIRONMENTAL SOIL AND GROUNDWATER EVALUATION
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

	INT	DATE
DRAWN BY:	JAG	7-30-97
APP'D BY:	ARL	12-19-97
JOB No.	CMXX-97-0197	
DWG. No.	MX40708E	SHEET OF
SCALE	1"= 80'	

FIGURE NO. 3

1997 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation Report 2, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, January 6, 1998

Environmental Soil and Groundwater Evaluation Report 3

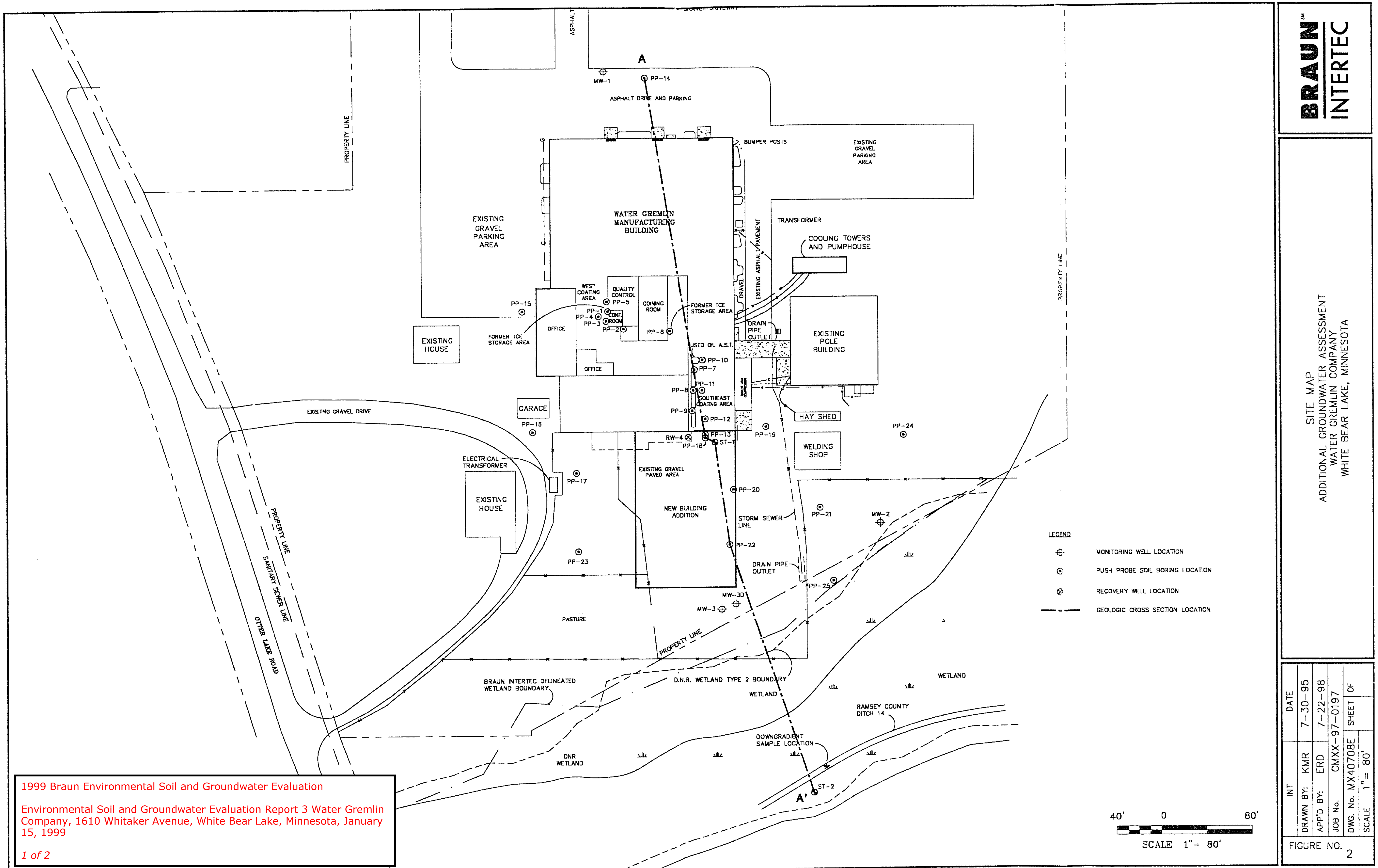
Water Gremlin Company
1610 Whitaker Avenue
White Bear Lake, Minnesota

Prepared For

Water Gremlin Company

Project No. Number CMXX-97-0197
January 15, 1999

Braun Intertec Corporation



1999 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation Report 3 Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, January 15, 1999

1 of 2

Table 1. Summary of Groundwater Chemical Analysis Results
(Concentrations in $\mu g/l$)

Compound	MW-1				MW-2				MW-3				MW-3D		MW-4/RW-1		
Date	05/05/97	05/19/97	06/24/98	09/02/98	05/05/97	05/19/97	06/24/98	09/02/98	05/05/97	05/19/97	06/24/98	09/02/98	06/24/98	09/02/98	06/24/98	09/02/98	MDH HRL
Acetone	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	22	700
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.2	<0.5	<0.5	<0.5	<0.5	<0.5	10
Bromodichloromethane	1.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	6
Chloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	24.0	<1.0	34	45	<1.0	<1.0	4.7	3.7	50
Chloroform	1.5	<1.0	<1.0	<1.0	3.4	3.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	60
1,1-Dichloroethane (1,1-DCA)	<1.0	<1.0	<1.0	<1.0	<0.3	<0.3	3.2	4.8	600	640	620	630	<1.0	<1.0	40	36	70
1,2-Dichloroethane (1,2-DCA)	<0.3	<1.0	<0.3	<0.3	<1.0	<1.0	<0.3	<0.3	12	10	13	14	<0.3	<0.3	<0.3	<0.3	4
1,1-Dichloroethylene (1,1-DCE)	<1.0	<0.2	<1.0	<1.0	<1.0	<0.2	<1.0	1.5	54	42	52	120	<1.0	<1.0	38	38	6
cis-1,2-Dichloroethylene (cis-1,2-DCE)	<0.2	<0.2	<0.3	<0.3	0.4	<0.2	<0.3	0.5	17	16	19	29	<0.3	<0.3	110	190	70
trans-1,2-Dichloroethylene (trans-1,2-DCE)	<0.2	<2.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.4	1.2	2.5	<0.2	<0.2	<02	0.9	100
Dichlorodifluoromethane	<2.5	<1.0	<2.5	<2.5	<2.5	<2.5	9.3	3.6	<2.5	<2.5	<2.5	4.6	<2.5	<2.5	32	16	1000
Ethylene Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1	<1.0	<1.0	700
Methyl Ethyl Ketone			<5.0	<5.0	<5.0	<5.0	<5.0	<5.0			<5.0	<5.0	<5.0	<5	<5	12	4000
Methyl Isobutyl Ketone (MIK)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	7.2	7.1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	300
Tetrahydrofuran	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	46	<1.0	55	49	<5.0	<5.0	<5.0	<5.0	100 RAL
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.3	2.2	5.3	5.9	<1.0	<1.0	3.6	2.4	1000
1,1,1-Trichloroethane (1,1,1-TCA)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	180	140	600
1,1,2-Trichloroethane (1,1,2-TCE)	<0.5	<0.5	<0.5	<0.5	1.3	1.3	<0.5	0.6	2.1	1.9	<1.0	2.3	<1.0	<0.5	96	58	30
Trichlorofluoromethane (Freon 11)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	2000
Vinyl Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.6	2.5	8.2	3.6	<1.0	<1.0	<1.0	<1.0	0.2
m,p-Xylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.0	<1.0	<1.0	<1.0	<1.0	<1.0	10000*

$\mu g/l$= parts per billion
MDH HRL= Minnesota Department of Health Health Risk Limit for Private Drinking Water Supplies
Shaded areas = Compound detected at or above the MDH HRL
NS= No Standard

kf\r:\cmxx\97\0197\0197-r04.wpd

1999 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation Report 3, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, January 15, 1999

Environmental Groundwater Evaluation Report 4

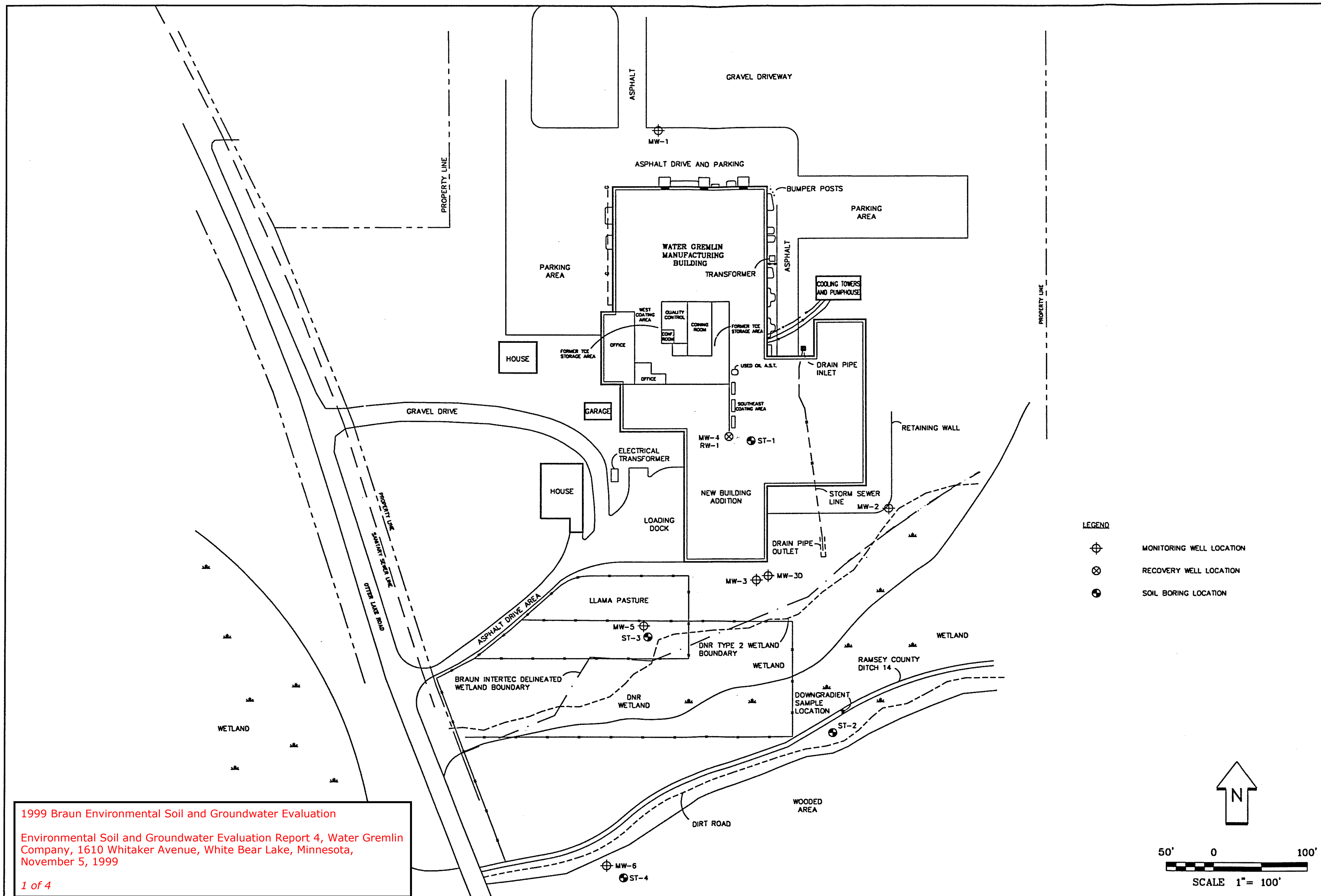
Water Gremlin Company
1610 Whitaker Avenue
White Bear Lake, Minnesota

Prepared For

Water Gremlin Company

Project No. Number CMXX-97-0197
November 5, 1999

Braun Intertec Corporation



BRAUN INTERTEC

SITE MAP
ADDITIONAL GROUNDWATER ASSESSMENT
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

	INT	DATE
DRAWN BY:	KMR	7-30-95
APP'D BY:	ARL	11-12-99
JOB No.	CMXX-97-0197	
DWG. No.	MX40708E	SHEET OF
SCALE	1"= 100'	

FIGURE NO. 2

1999 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation Report 4, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, November 5, 1999

1 of 4

Table 1. Summary of Groundwater Chemical Analysis Results
(Concentrations in µg/l)

Compound	MW-1							MW-2							MW-3							MDH
Date	05/05/97	05/19/97	06/24/98	09/02/98	01/20/99	04/07/99	07/13/99	05/05/97	05/19/97	06/24/98	09/02/98	01/22/99	04/07/99	07/09/99	05/05/97	05/19/97	06/24/98	09/02/98	01/20/99	04/07/99	07/13/99	HRL
Acetone	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	700
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	4.2	<0.5	<0.5	<1.0	<1.0	10
Bromodichloro-methane	1.3	<0.3	<0.3	<0.3	<0.3	<1.0	<1.0	<0.3	<0.3	<0.3	<0.3	<0.3	<1.0	<1.0	<0.3	<0.3	<0.3	<0.3	<0.3	<1.0	<1.0	6
Chloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	24	<1.0	34	45	27	21	7.2	50
Chloroform	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.4	3.3	<1.0	<1.0	<1.0	<1.0	2.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	60
1,1-Dichloroethane (1,1-DCA)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.3	<0.3	3.2	4.8	2.4	2.4	<1.0	600	640	620	630	570	450	580	70
1,2-Dichloroethane (1,2-DCA)	<0.3	<1.0	<0.3	<0.3	<0.3	<1.0	<1.0	<1.0	<1.0	<0.3	<0.3	<0.3	<1.0	<1.0	12	10	13	14	12	11	13	4
1,1-Dichloroethylene (1,1-DCE)	<1.0	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.2	<1.0	1.5	<1	<1.0	<1.0	54	42	52	120	65	51	89	6
cis-1,2-Dichloroethylene (cis-1,2-DCE)	<0.2	<0.2	<0.3	<0.3	<0.3	<1.0	<1.0	0.4	<0.2	<0.3	0.5	<0.5	<1.0	2.9	17	16	19	29	36	34	54	70
trans-1,2-Dichloroethylene (trans-1,2-DCE)	<0.2	<2.5	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<0.2	1.4	1.2	2.5	1.4	1.1	1.8	100
Dichlorodifluoro-methane	<2.5	<1.0	<2.5	<2.5	<2.5	<1.0	<1.0	<2.5	<2.5	9.3	3.6	5.6	13	<1.0	<2.5	<2.5	<2.5	4.6	5.6	5.8	3.7	1000
Ethylene Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	700
Methyl Ethyl Ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<10	<5.0	<5.0	<5.0	<5.0	<5.0	<1.0	<5.0			<5.0	<5.0	<5.0	<1.0	<10	4000
Methyl Isobutyl Ketone (MIK)	<5.0	<5.0	<5.0	<5.0	<5.0	<50	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<1.0	7.2	7.1	<5.0	<5.0	<5.0	<5.0	<5.0	300
Tetrahydrofuran	<5.0	<5.0	<5.0	<5.0	<5.0	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1.0	46	<1.0	55	49	54	48	45	100 RAL
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.3	2.2	5.3	5.9	4.3	2.9	4.3	1000
1,1,1-Trichloroethane (1,1,1-TCA)	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	0.6	<0.5	<0.5	<0.5	<1.0	<1.0	600
Trichloroethene	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	1.3	1.3	<0.5	0.6	<0.5	<1.0	<1.0	2.1	1.9	<1.0	2.3	1.5	<1.0	1.6	30
Trichlorofluoro-methane (Freon 11)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2	<1.0	<1.0	<1.0	<1.0	2000
Vinyl Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.6	2.5	8.2	3.6	20	<1.0	1.2	0.2
m,p-Xylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4	<1.0	<1.0	<1.0	<1.0	10000*

µg/l= parts per billion
MDH HRL= Minnesota Department of Health Health Risk Limit for Private Drinking Water Supplies
Shaded areas = Compound detected at or above the MDH HRL
NS= No Standard

1999 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation Report 4, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, November 5, 1999

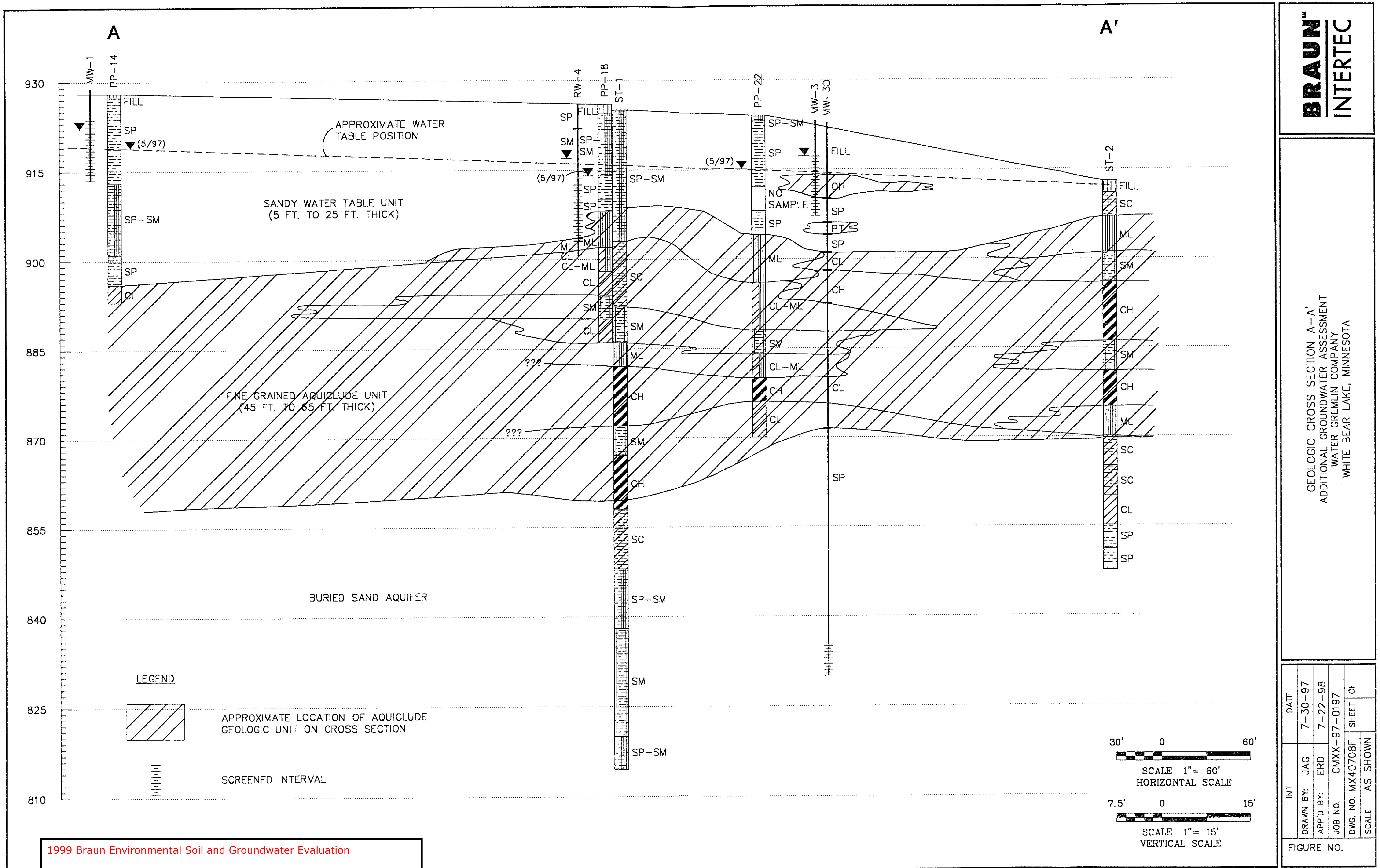
Table 1. Summary of Groundwater Chemical Analysis Results
(Concentrations in µg/l)
(Continued)

Compound	MW-3D					MW-4/RW-1					MW-5	MW-6	MDH
Date	06/24/98	09/02/98	01/20/99	04/07/99	07/09/99	06/24/98	09/02/98	01/20/99	04/07/99	07/09/99	07/09/99	07/09/99	HRL
Acetone	<20	<20	<20	<20	<20	<20	22	<20	<20	<20	<20	<20	700
Benzene	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	10
Bromodichloro-methane	<0.3	<0.3	<0.3	<1.0	<1.0	<0.3	<0.3	<0.3	<1.0	<1.0	<1.0	<1.0	6
Chloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	4.7	3.7	2.4	<1.0	<1.0	<1.0	<1.0	50
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	60
1,1-Dichloroethane (1,1-DCA)	<1.0	<1.0	<1.0	<1.0	<1.0	40	36	33	12	7.8	1	<1.0	70
1,2-Dichloroethane (1,2-DCA)	<0.3	<0.3	<0.3	<1.0	<1.0	<0.3	<0.3	<0.3	<1.0	<1.0	<1.0	<1.0	4
1,1-Dichloroethylene (1,1-DCE)	<1.0	<1.0	<1.0	<1.0	<1.0	38	38	14	2.8	2.7	<1.0	<1.0	6
cis-1,2-Dichloroethylene (cis-1,2-DCE)	<0.3	<0.3	<0.3	<1.0	<1.0	110	190	340	150	44	<1.0	<1.0	70
trans-1,2-Dichloroethylene (trans-1,2-DCE)	<0.2	<0.2	<0.2	<1.0	<1.0	<02	0.9	2.2	1.2	<1.0	<1.0	<1.0	100
Dichlorodifluoromethane	<2.5	<2.5	<2.5	<1.0	<1.0	32	16	3.5	8.5	10	<1.0	<1.0	1000
Ethylene Benzene	<1.0	<1	2.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	700
Methyl Ethyl Ketone	<5.0	<5	<5	<1.0	<1.0	<5	12	<5	<10	<10	<10	<1.0	4000
Methyl Isobutyl Ketone (MIK)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5.0	<5.0	<5.0	<5.0	300
Tetrahydrofuran	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5.0	<5.0	7.8	<5.0	100 RAL
Toluene	<1.0	<1.0	3.5	<1.0	<1.0	3.6	2.4	2	<1.0	<1.0	<1.0	<1.0	1000
1,1,1-Trichloroethane (1,1,1-TCA)	<0.5	<0.5	<0.5	<1.0	<1.0	180	140	48	7	7.7	1.2	<1.0	600
Trichloroethene	<1.0	<0.5	<0.5	<1.0	<1.0	96	58	310	230	77	<1.0	<1.0	30
Trichlorofluoromethane (Freon 11)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2000
Vinyl Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.1	<1.0	<1.0	<1.0	<1.0	0.2
m,p-Xylene	<1.0	<1.0	5.9	<1.0	<1.0	<1.0	<1.0	<1	<1.0	<1.0	<1.0	<1.0	10000*

1999 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation Report 4, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, November 5, 1999

3 of 4



1999 Braun Environmental Soil and Groundwater Evaluation

Environmental Soil and Groundwater Evaluation Report 4, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, November 5, 1999

4 of 4

BRAUN
INTERTEC

May 6, 2004

Project CMXX-97-0197

Mr. David Zinschlag
Water Gremlin Company
1610 Whitaker Avenue
White Bear Lake, MN 55110

Dear Mr. Zinschlag:

Re: Additional Groundwater Monitoring Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota.

In accordance with your verbal authorization, Braun Intertec Corporation (Braun Intertec) conducted an additional groundwater monitoring event at the referenced site on April 23, 2004. Our results are provided in the following letter report. The results are consistent with previous sampling events in that the contaminant concentrations are generally decreasing.

A. Introduction

As you requested, Braun Intertec collected groundwater samples from the groundwater monitoring wells at the Water Gremlin Company facility located at 1610 Whitaker Avenue in White Bear Lake, Minnesota (site). A site location map is attached as Figure 1.

This sampling event was the fifth monitoring event since the site was approved by the Minnesota Pollution Control Agency (MPCA) for a reduced monitoring frequency of once per year (MPCA letter dated April 4, 2000). The sampling event was conducted in general accordance with the MPCA-approved Groundwater Monitoring and Contingency Plan (Monitoring Plan) dated January 3, 2001, and the Annual Ground Water Monitoring Report Approval Letter from the MPCA VIC Program dated April 2, 2004.

B. Scope of Services

The following tasks were conducted following the methods described in the Monitoring Plan.

- Collection of one round of groundwater samples on April 23, 2004, from the seven on-site groundwater monitoring wells (MW-1 through MW-3, MW-3D, MW-4, MW-5 and MW-6) shown in Figure 2.

- Laboratory analysis of the samples for MDH Method 465E list volatile organic compounds (VOCs) by GC/MS.

- Measurement of water levels to evaluate the groundwater flow direction at the site.

C. Results

C.1. Groundwater Quality

Results of the VOC analysis for monitoring wells MW-2, MW-3, MW-4 and MW-5 are summarized in Table 1 along with historical data. No VOCs were detected during the current sampling event in wells

MW-1, MW-5, MW-5 duplicate or MW-6. Of these wells, only MW-5 has contained chlorinated VOCs historically, and those VOCs were detected only during the 1999 monitoring event. Each of the VOCs detected during the most recent sampling event were detected at concentrations below or similar to the most recent sampling events, and in most cases, the recently detected concentrations were the lowest ever measured. No VOCs were detected in the field blank or trip blank.

None of the wells sampled at the site had any VOC concentrations in excess of the Minnesota Department of Health (MDH) Health Risk Limits (HRLs). Vinyl chloride, which was detected in MW-3 during the 2001 sampling event at an atypically high concentration, was not detected in MW-3 during the 2002 or 2003 sampling event, nor was it detected during this sampling event in any of the wells. Chloroethane is a product of vinyl chloride degradation under reducing conditions, and the higher concentrations detected in 2001, 2002 and 2003 were likely related to the higher vinyl chloride concentration observed in MW-3 during the 2001 sampling event. The 2004 sampling event shows that the concentration of chloroethane has again decreased and vinyl chloride was not detected for the third consecutive sampling event. The relationship between chloroethane concentrations and vinyl chloride concentrations in MW-3 is depicted in the attached graph. An HRL has not been established for chloroethane.

Graphs of selected contaminant concentrations over time for MW-3 and MW-4 are attached. All of the graphed contaminant concentrations for the two wells have decreased significantly over the monitoring period beginning in 1997. The laboratory report for the current sampling event is also attached.

During the 2003 full monitoring event, 1,1-dichloroethane was detected in monitoring well MW-3D at a concentration of 2.2 ppb, which is less than the HRL of 70 ppb. On January 13, 2004, monitoring well MW-3D was re-sampled according to the contingency criteria established by the MPCA. No VOCs were detected in the January 2004 sample at concentrations above the method detection limits. During the most recent sampling event performed on April 23, 2004, no VOCs were detected in MW-3D at concentrations above the method detection limits.

C.2. Groundwater Flow

Groundwater elevations calculated from the water levels measured during groundwater sampling are provided along with historical water level data in Table 2. Figure 3 shows a water table contour map for the April 23, 2004 water level data. At that time, groundwater was flowing southward, which is consistent with previous data. As illustrated by the attached hydrograph, the water levels have slightly increased since the last sampling event in November 24, 2003, with the exception of MW-3D, which has slightly decreased.

D. Conclusions and Recommendations

Based on the results of the groundwater sampling conducted to date, the contaminant concentrations show an overall decreasing trend. The only unexpected result obtained during the 2003 sampling event was the detection of the chlorinated solvent compound 1,1-dichloroethane in MW-3D at a concentration of 2.2 ppb, which is less than the HRL of 70 ppb. Groundwater samples collected from MW-3D on January 13 and April 23, 2004, did not detect any VOCs above the method detection limits. Therefore, since the most recent sampling events are consistent with the overall trend of decreasing contaminant concentrations in all of the wells and no VOCs have been detected in any of the wells at concentrations greater than the HRLs during the two most recent sampling events, Braun Intertec will request, on behalf of Water Gremlin, that the MPCA issue a No Further Action Determination.

E. Assessment Limitations

The analyses and conclusions submitted in this report are based on our field observations and the results of laboratory chemical analyses of groundwater samples collected from the monitoring wells completed for this project. In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession practicing in the same location. No other warranty is made or intended.

We appreciate the opportunity to provide our professional services to you for this project. If you have any questions or comments, please call Mary Rivard at (952) 995-2484 or Jon Carlson at (952) 995-2440.

Sincerely,

BRAUN INTERTEC CORPORATION

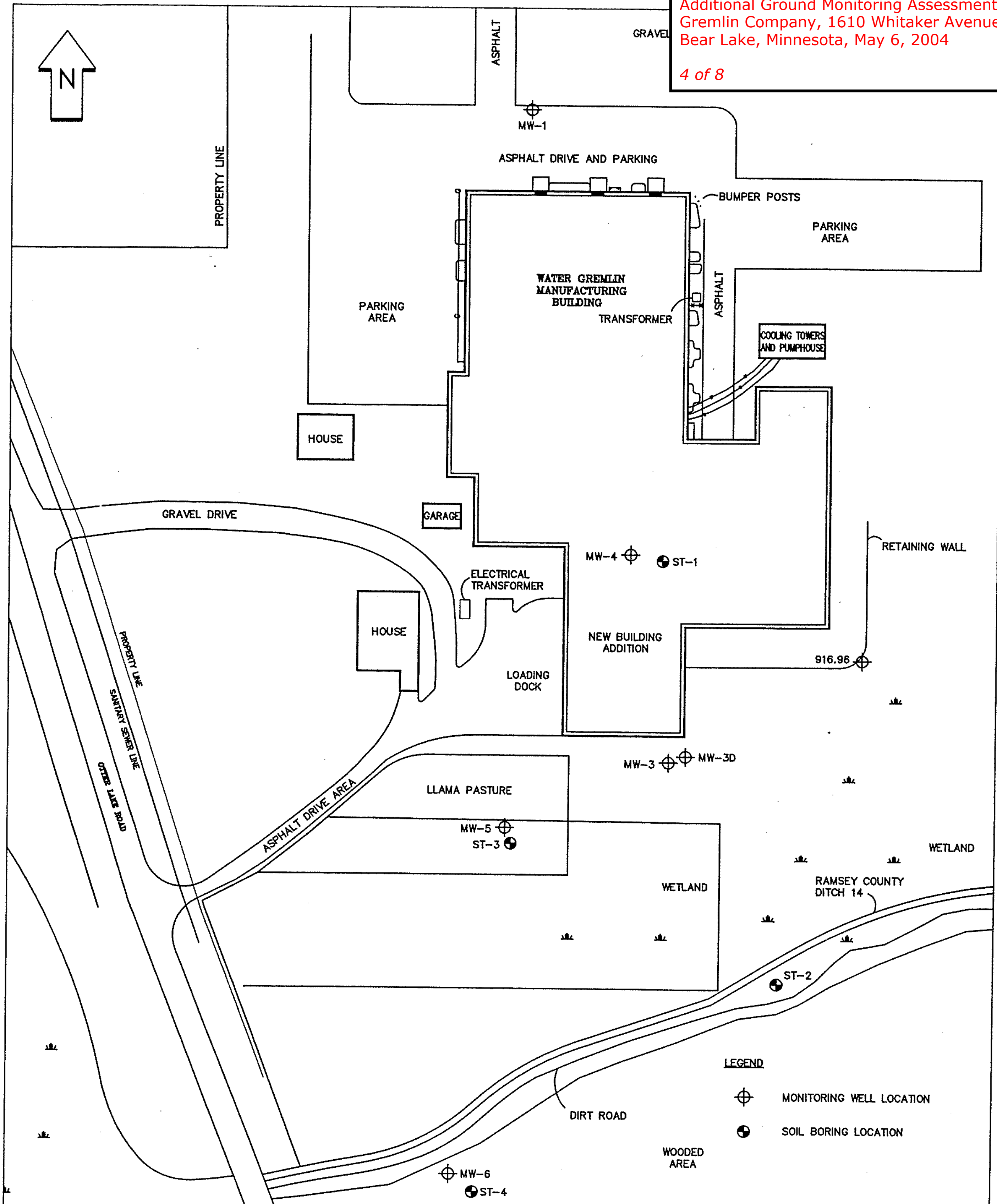
Mary P. Rivard, PG
Project Engineer

FOR

Jon A. Carlson, CHMM, PG
Vice President

Attachments:
Figure 1 - Site Location Map
Figure 2 - Site Map
Figure 3 - Water Table Contour Map (4/23/04)
Table 1 - Summary of Groundwater Chemical Analytical Results
Table 2 - Water Level Data
Groundwater Elevations Hydrograph
Graphs of Specific Analytical Parameters
Laboratory Analytical Report

c: Mr. Richard Jolley, VIC Program, MPCA



BRAUN℠
INTERTEC

SITE MAP
WATER GREMLIN COMPANY
WHITE BEAR LAKE, MINNESOTA

INT		REVISION	SHEET
DRAWN BY:	JAG	7-30-97	
APP'D BY:	MR	4-26-04	OF
JOB NO.	CMXX-97-0197		
DWG. NO.	MX40708E	FIGURE NO.	
SCALE	1"= 50'	2	

Table 1. Summary of Groundwater Chemical Analysis Results
Concentrations in µg/l
Page 1 of 3

Compound	MW-2												MDH HRL
	05/05/97	05/19/97	06/24/98	09/02/98	01/22/99	04/07/99	07/09/99	11/07/00	11/15/01	11/19/02	11/24/03	04/23/04	
Acetone	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	< 20	< 20	700
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	10
Chloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	NE
Chloroform	**3.4**	**3.3**	<1.0	<1.0	<1.0	<1.0	**2.3**	<1.0	<1.0	<1.0	< 1.0	< 1.0	60
1,1-Dichloroethane (1,1-DCA)	<0.3	<0.3	**3.2**	**4.8**	**2.4**	**2.4**	<1.0	**1.8**	**1.7**	**1.4**	**1.1**	**1.4**	70
1,2-Dichloroethane (1,2-DCA)	<1.0	<1.0	<0.3	<0.3	<0.3	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	4
1,1-Dichloroethylene (1,1-DCE)	<1.0	<0.2	<1.0	**1.5**	<1	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	6
cis-1,2-Dichloroethylene (cis-1,2-DCE)	**0.4**	<0.2	<0.3	**0.5**	<0.5	<1.0	**2.9**	<1.0	<1.0	<1.0	< 1.0	< 1.0	70
trans-1,2-Dichloroethylene (trans-1,2-DCE)	<0.2	<0.2	<0.2	<0.2	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	100
Dichlorodifluoromethane	<2.5	<2.5	**9.3**	**3.6**	**5.6**	**13**	<1.0	**8.6**	**6.6**	**4.5**	**3.6**	**5.7**	1,000
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	700
Methyl Ethyl Ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<5.0	< 10	< 10	4,000
Methyl Isobutyl Ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<1.0	<1.0	<1.0	<1.0	< 5.0	< 5.0	300
Tetrahydrofuran	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	< 5.0	< 5.0	NE
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	1,000
1,1,1-Trichloroethane (1,1,1-TCA)	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	600
Trichloroethene	**1.3**	**1.3**	<0.5	0.6	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	30
Trichlorofluoromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	2,000
Vinyl Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	0.2
m,p-Xylenes	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	10,000

MDH HRL = Minnesota Department of Health Health Risk Limit
Shaded areas = Compound detected at or above the MDH HRL
NE = Not Established
*Duplicate results above reporting limits in parentheses.

Table 1. Summary of Groundwater Chemical Analysis Results
Concentrations in µg/l
Page 2 of 3

Compound	MW-3												MDH HRL
	05/05/97	05/19/97	06/24/98	09/02/98	01/20/99	04/07/99	07/13/99	11/07/00	11/15/01	11/19/02	11/24/03	04/23/04	
Acetone	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	< 20	< 20	700
Benzene	<0.5	<0.5	4.2	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	10
Chloroethane	24	<1.0	34	45	27	21	7.2	27	130	240	210	190	NE
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	60
1,1-Dichloroethane (1,1-DCA)	600	640	620	630	570	450	580	250	220	83	48	43	70
1,2-Dichloroethane (1,2-DCA)	12	10	13	14	12	11	13	7.2	4.3	<1.0	< 1.0	< 1.0	4
1,1-Dichloroethylene (1,1-DCE)	54	42	52	120	65	51	89	39	<1.0	<1.0	< 1.0	< 1.0	6
cis-1,2-Dichloroethylene (cis-1,2-DCE)	17	16	19	29	36	34	54	67	6.3	<1.0	< 1.0	< 1.0	70
trans-1,2-Dichloroethylene (trans-1,2-DCE)	<0.2	1.4	1.2	2.5	1.4	1.1	1.8	1.3	<1.0	<1.0	< 1.0	< 1.0	100
Dichlorodifluoromethane	<2.5	<2.5	<2.5	4.6	5.6	5.8	3.7	7.1	6.1	4.2	3.2	2.9	1000
Ethylbenzene	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	700
Methyl Ethyl Ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<1.0	<10	<10	<10	< 10	< 10	< 10	4000
Methyl Isobutyl Ketone	7.2	7.1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	< 5.0	< 5.0	300
Tetrahydrofuran	46	<1.0	55	49	54	48	45	35	22	24	11	9.8	NE
Toluene	3.3	2.2	5.3	5.9	4.3	2.9	4.3	1.8	4.6	5.5	4.8	3.6	1000
1,1,1-Trichloroethane (1,1,1-TCA)	<0.5	0.6	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	600
Trichloroethene	2.1	1.9	<1.0	2.3	1.5	<1.0	1.6	<1.0	<1.0	<1.0	< 1.0	< 1.0	30
Trichlorofluoromethane	<1.0	<1.0	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	2000
Vinyl Chloride	2.6	2.5	8.2	3.6	20	<1.0	1.2	3.7	390	<1.0	< 1.0	< 1.0	0.2
m,p-Xylenes	<1.0	<1.0	4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	10000

MDH HRL = Minnesota Department of Health Health Risk Limit
Shaded areas = Compound detected at or above the MDH HRL
NE = Not Established
*Duplicate results above reporting limits in parentheses.

2004 Braun Groundwater Monitoring Assessment

Additional Ground Monitoring Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, May 6, 2004

Table 1. Summary of Groundwater Chemical Analysis Results
Concentrations in µg/l
Page 3 of 3

Compound	MW-4/RW-1										MW-5						MDH HRL
	06/24/98	09/02/98	01/20/99	04/07/99	07/09/99	11/7/00*	11/15/01	11/19/02	11/24/03	04/23/04	07/09/99	11/07/00	11/15/01	11/19/02	11/24/03	04/23/04	
Acetone	<20	22	<20	<20	<20	<20	<20	<20	< 20	< 20	<20	<20	<20	<20	<20	<20 (<20)	700
Benzene	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	10
Chloroethane	4.7	3.7	2.4	<1.0	<1.0	<1.0	1.4	1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	NE
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	60
1,1-Dichloroethane (1,1-DCA)	40	36	33	12	7.8	16 (16)	34	28	8.2	5.5	1	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	70
1,2-Dichloroethane (1,2-DCA)	<0.3	<0.3	<0.3	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	4
1,1-Dichloroethylene (1,1-DCE)	38	38	14	2.8	2.7	3.6 (4.0)	2.4	2.2	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	6
cis-1,2-Dichloroethylene (cis-1,2-DCE)	110	190	340	150	44	10 (11)	3.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	70
trans-1,2-Dichloroethylene (trans-1,2-DCE)	<02	0.9	2.2	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	100
Dichlorodifluoromethane	32	16	3.5	8.5	10	9.1 (9.2)	2.2	<1.0	<1.0	7.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	1000
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	700
Methyl Ethyl Ketone	<5	12	<5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10 (<10)	4000
Methyl Isobutyl Ketone	<5.0	<5.0	<5	<5.0	<5.0	<5.0	<5.0	<5.0	< 5.0	< 5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0 (<5.0)	300
Tetrahydrofuran	<5.0	<5.0	<5	<5.0	<5.0	<5.0	<5.0	<5.0	< 5.0	< 5.0	7.8	<5.0	<5.0	<5.0	<5.0	<5.0 (<5.0)	NE
Toluene	3.6	2.4	2	<1.0	<1.0	1.2 (1.2)	4.1	<1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	1000
1,1,1-Trichloroethane (1,1,1-TCA)	180	140	48	7	7.7	22 (24)	57	2.7	< 1.0	< 1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	600
Trichloroethene	96	58	310	230	77	2.8 (2.7)	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	30
Trichlorofluoromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	2000
Vinyl Chloride	<1.0	<1.0	4.1	<1.0	<1.0	7.6 (7.9)	5.1	<1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	0.2
m,p-Xylenes	<1.0	<1.0	<1	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0 (<1.0)	10000

MDH HRL = Minnesota Department of Health Health Risk Limit
Shaded areas = Compound detected at or above the MDH HRL
NE = Not Established
*Duplicate results above reporting limit in parentheses.

2004 Braun Groundwater Monitoring Assessment

Additional Ground Monitoring Assessment, Water Gremlin Company, 1610 Whitaker Avenue, White Bear Lake, Minnesota, May 6, 2004

Table 2
Groundwater Elevation Data
Water Gremlin Site
CMXX-97-0197

Well	MW-1	MW-2	MW-3	MW-3D	MW-4	MW-5	MW-6
TOR Elevation	**932.61**	**926.90**	**923.21**	**925.96**	**931.92**	**919.69**	**916.84**
05/05/97	922.91	916.96	915.70				
05/19/97	922.69	917.08	915.51				
06/23/98	922.65	917.50	915.58	901.62	921.58		
09/02/98	922.63	917.13	915.86	900.82	921.16		
01/20/99	920.79	916.79	915.27	901.41	919.44		
04/07/99	921.25	916.96	916.20	902.27	919.68		
07/09/99	922.63	917.13	915.86	900.82	921.16	915.53	911.63
11/18/99	920.92	916.78	915.31	902.64	919.44	914.93	909.76
01/11/00	920.37	916.58	914.98	902.21	918.99	914.42	909.92
11/07/00	920.06	916.89	915.17	899.96	918.67	914.71	909.48
11/15/01	920.43	916.68	915.03	898.17	918.89	914.09	908.62
11/19/02	922.70	917.30	916.03	903.39	920.64	915.20	910.71
11/24/03	920.08	916.73	915.05	901.69	918.73	914.16	907.97
04/23/04	920.48	916.96	915.83	900.69	919.03	915.28	910.26

All elevations in feet above mean sea level.

WENCK

Responsive partner.
Exceptional outcomes.

Toll Free: 800-472-2232 Email: wenckmp@wenck.com Web: wenck.com