ENVIRONMENTAL COMPLIANCE CONSULTANTS, INC.

P. O. Box 614, Rhinelander, WI 54501 • 715-365-5200 (Voice) • 715-365-5201 (Fax)

SITE INVESTIGATION WORK PLAN

FOR

EAGLE CLEANERS

(DNR BRRTS #02-64-269753, ECCI PROJECT #01607)

320 E. WALL STREET
EAGLE RIVER, WI 54521

Prepared for

Lawrence and Sharon Favorite, Owner
Eagle River, Wisconsin

June 2002

Sharing Your Concerns. Creating Sound Solutions.

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**Lawrence and Sharon Favorite, Owner
556 Bloom Road
Eagle River, Wisconsin**

June 2002

I, Timothy R. Baker, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03(1), Wis. Adm. Code; that I am a registered professional geologist in the State of Wisconsin, registered in accordance with the requirements of Ch. GHSS 2, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in Ch. GHSS 5, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in Chs. NR 700 to 726, Wis. Adm. Code.

Tim Baker 6/24/02

Prof. Geologist #98 Date

I, Boyd N. Possin, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03(1), Wis. Adm. Code; that I am a registered professional geologist in the State of Wisconsin, registered in accordance with the requirements of Ch. GHSS 2, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in Ch. GHSS 5, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in Chs. NR 700 to 726, Wis. Adm. Code.

6/24/02

Prof. Geologist #929 Date

REPORT DISTRIBUTION

Wisconsin DNR, Antigo
Attention: John Sager

Lawrence and Sharon Favorite, Owner

DNR/DERP: To Be Submitted with Claim

ECCI Files, Rhinelander and Green Bay, WI

Environmental Compliance Consultants, Inc.
22 N. Pelham Street
P.O. Box 614
Rhinelander, WI 54501
(715) 365-5200, Fax: (715) 365-5201

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

Environmental Compliance Consultants, Inc. (ECCI), has prepared this Site Investigation Work Plan (hereinafter referred to as the "Plan") on behalf of the owner of the Eagle Cleaners property. The Plan has been prepared as the initial phase of the owner's obligation to complete a site investigation as required by the State of Wisconsin. This Plan has been developed in accordance with chapters NR 169 and NR 700, Wis. Adm. Code.

Site Classification

Groundwater impacts of trichloroethylene (TCE) and tetrachloroethylene, also known as perchloroethylene (PCE), were discovered during a Site Assessment by Northern Environmental in 2000, and reported to the Wisconsin Department of Natural Resources (DNR) on January 2, 2000. On April 3, 2001, the property owner received a letter from the DNR ordering a site investigation and potential cleanup of the site. BRRTS #02-64-269753 was assigned to the case. This site has been classified as a complex site because the compounds discovered, TCE and PCE, are not listed in Tables 1 and 2 of NR 720.

Site Location, Responsible Party, and Consultant

Site Location:
Eagle Cleaners
320 East Wall Street
P.O. Box 622
Eagle River, WI 54521
Vilas County
NW¼NE¼ Section 33, Township 40 North, Range 10 East
(715) 479-8141

Responsible Party:
Lawrence and Sharon Favorite
556 Bloom Road
Eagle River, WI 54521
(715) 479-7407

Consultant:
Environmental Compliance Consultants, Inc.
Timothy R. Baker, P.G.
22 N. Pelham Street
P.O. Box 614
Rhinelander, WI 54501
(715) 365-5200
(715) 365-5201 (fax)

Figure 1 is the site location map, which is taken from the U.S. Geological Survey 7.5-minute *Eagle River East* topographic map. All figures for this report are included in Appendix A.

SITE INVESTIGATION SCOPING

Site investigation scoping is conducted to ensure that the scope and detail of the investigation are appropriate to the complexity of the site. The scope of the investigation is based upon the conceptual model, as outlined below.

The glacial drift in the vicinity of the city of Eagle River consists of three sedimentary layers overlying an irregular bedrock surface (Attig, 1985). Both the upper and lower layers consist of glacial stream sediment with an overall greater sorting than the supraglacial debris flow separating them. According to Attig (1985), the upper layer (the water table aquifer) ranges from 15 to 25 meters thick, the middle layer (an aquitard) is about 5 meters thick, and the lower layer (a confined aquifer) is from 15 to 40 meters thick. The upper layer unconfined aquifer is estimated to have a saturated thickness of 12 to 23 meters. The depth to the water table is assumed to be 4 to 5 meters. The middle layer is assumed to be an aquitard, separating the unconfined aquifer above from the confined aquifer.

Mainly because of the absence of known free solvent product, which is denser than water and would sink to a layer of fine sediments, and relatively low concentrations of chlorinated volatile organic compounds (CVOCs) in the groundwater, our Plan is designed to investigate only the upper unconfined aquifer. This aquifer will be investigated for distribution of the contaminants of concern, which are fully detectable by a VOC scan, and for its geologic and hydrogeologic nature. Additionally, samples collected will be analyzed for natural attenuation (NA) parameters to evaluate the ability of the aquifer to adsorb or attenuate the contaminants of concern. Our experience indicates that thick glacial outwash plains, like the one in the study area, usually exhibit a vertically downward hydraulic gradient because of the high infiltration rate of sandy flat surfaces. Therefore, selected probes along the assumed flow path will penetrate deeply into the upper aquifer to retrieve groundwater for analyses to investigate the possibility of a diving plume.

ECCI's conceptual model of the source of the release contains three hypotheses. Our Plan will address all three.

1. The first hypothesis is of a small release of dry cleaning solvent from the small tank or washing system within the building at Eagle Cleaners. In this scenario, small amounts of solvent reached the concrete floor, and were flushed down the floor drain and out the sewer. Leaks in the sewer system could have resulted in solvent releases. Probing will be conducted near the sewer lateral to investigate this hypothesis.

2. The second hypothesis is that there is an upgradient source. Probes will be located upgradient (to the southeast) of Eagle Cleaners to investigate this hypothesis.

3. The third hypothesis is that the detections of PCE and TCE at the former Lorch Chevrolet site, which were revealed in our DNR area file search, may be from a source downgradient of Eagle Cleaners. Probes will be located between Eagle Cleaners and the former Lorch Chevrolet to investigate this hypothesis.

The remainder of this Plan details the tasks that will be performed based upon this conceptual model.

History of the Property

This property contained a residential building at the end of the 1890s. The building was razed and the property was vacant until the 1920s, when a building housing a laundry was constructed (Northern Environmental, 2001). According to the current owner, Larry Favorite, this property has been used for dry cleaning since the 1940s. He purchased the business from his father in 1985. His father purchased the business in 1966. Little is known about specific activities at this property prior to 1966.

Stoddard solvents were used in the dry cleaning operation from 1966 to1985. A PCE-based solvent has been used since 1985. From 1985 until 1991, the dry cleaning system had a solvent usage of about 150 gallons per year. A 100-gallon aboveground tank was located within the building for the PCE solvent storage. Filters used with this system were periodically changed and then disposed. The company supplying the solvent and providing filter disposal was Safety Clean.

In 1991, a new PCE-based system was installed, with a 40-gallon-per-year PCE consumption rate. This new system did not require the use of filters. The PCE storage tank was no longer needed and was removed. This system is still in use today. The solvent for this system is supplied by, and the resultant residue is collected and disposed by, Wausau Chemical.

Type and Amount of Known Impacts

In the initial Geoprobe® site investigation, performed by Northern Environmental (2001), soil and groundwater samples were collected from the perimeter of the building and analyzed for VOCs.

The only detection of any VOCs in the soil was for toluene. This single detection was from a sample collected at nine feet. The toluene level detected was 28 µg/Kg. This is barely above the laboratory detection limit of 25 µg/Kg and below regulatory standards.

All of the six water samples collected from the Geoprobe® investigation registered detections of VOCs and contained levels of PCE in excess of the state groundwater Enforcement Standard (ES) of 5 µg/L, ranging from 6 to 130 µg/L. TCE was detected in three of the six groundwater samples collected. The levels detected exceeded the state Preventive Action Limit (PAL) of 0.5 µg/L, ranging from 0.54 to 2.1 µg/L. The sample collection locations were on all sides of the Eagle Cleaners building and about 100 feet southeast of the building. Three other VOCs were detected in the groundwater, each from one boring: 1,2-dibromoethane was detected above its ES of 0.05 µg/L at 1.2 µg/L; cis-1,2-dichloroethene was detected at 1.7 µg/L, which is below regulatory levels; and chloroform was detected at 0.62 µg/L, which is slightly above its PAL of 0.6 µg/L.

A DNR file search of surrounding sites in the city of Eagle River was conducted in the plan scoping process. Dry cleaner compounds were detected east of Eagle Cleaners on three area properties: Eagle River Service (a former gas station), Don's Standard (now a pizza place), and the former Lorch Chevrolet. The locations of these properties are depicted in Figure 2.

History of Previous Discharges and Environmental Pollution on the Property

There are no known discharges of dry cleaning compounds on the Eagle Cleaners property. It is possible that minor amounts of dry cleaning fluids were spilled onto the floor over the years. These

minor spills may have made it to the floor drain, and out to the lateral sewer pipes to the sewer system, where they may have leaked to the soil.

Environmental Media Affected by the Potential Release

Based upon information collected to date, groundwater appears to be the main medium affected on the Eagle Cleaners property. Soil samples collected in the vicinity of the Eagle Cleaners building had only one compound (toluene) detected. There were no detections of the contaminants that were discovered in the soil near the building.

Location of the Site Relative to Other Releases

Numerous petroleum release sites are known to exist within the immediate vicinity of Eagle Cleaners (shown on Figure 2). The sites depicted had releases from underground petroleum tanks, and three of these sites registered dry cleaner compounds in the groundwater. Solvents containing CVOCs are commonly used to clean car parts, and were used in automotive repair shops associated with petroleum underground storage tanks. Our research at the DNR has revealed three properties in the study area where PCE and/or TCE were detected in the groundwater: two former gas stations located one block west, and the former Lorch Chevrolet site three blocks to the northwest.

Need for Permission from Adjacent Property Owners

Permission will be needed and requested of the owners of monitoring wells located near the Eagle Cleaners site to collect water samples from those wells. The well locations are displayed on Figure 2. The initial phase of probing will be conducted solely on the road right-of-way granted by the City of Eagle River. Permission will be requested from the city for right-of-way access to perform the Geoprobe® investigation. If access to other properties is necessary for subsequent phases of drilling, permission will be obtained prior to conducting the drilling.

Potential and/or Known Impacts to Water Supplies and Other Receptors

The city of Eagle River is served by a municipal water supply. Three wells supply water for the city. Well 3 is located 1,500 feet to the northwest, on the opposite side of the Eagle River. Well 3 is unlikely to be affected by this potential release because of its location on the opposite side of the river. Wells 1 and 2 are located about 1,375 feet west of Eagle Cleaners and have a slight potential to be affected by the hypothetical solvent release at Eagle Cleaners. No known water supply impacts are currently recognized. Potential impacts to the water supplies will be investigated. The locations of the City of Eagle River water supply wells are depicted on Figure 3. The municipal well construction detail is included as Appendix B to the Plan. The hypothetical solvent release on the property, as it is currently understood, poses a minimal threat to:

- State- or federal-listed endangered species.
- Species, habitat, or ecosystems sensitive to the environment.
- Wetlands or other wet areas as defined in NR 103.04.

- Outstanding resource waters as defined in NR 102.10 and NR 102.11.
- Sites of historical or archaeological significance.

Need for Immediate or Interim Actions on the Property

No immediate or interim actions are anticipated for this property.

Physiographical and Geological Setting of the Property

The topography in the immediate area is very flat and the soil is sandy. This flat, sandy surface is a glacial outwash plain. The land surface and the water table slope gently to the northwest toward the Eagle River.

Approximately 30 to 90 meters of glacial-derived sediment underlies the property, deposited on Proterozoic volcaniclastic metasediments associated with the Penokean Orogeny (Attig, 1985). The glacial sediments are well sorted, sandy, braided stream sediments of the Nashville Member of the Langlade Lobe of the Copper Falls Formation (Attig, 1985). The surficial soils are classified as low sloping Rubicon sand (RoB), which are gently sloping, excessively drained soils (Natzke and Hvizdak, 1988).

ECCI performed aquifer slug tests at a nearby site, the former Krueger-Oestreich bulk plant (ECCI, 1995), to estimate the hydraulic conductivity at the top of the unconfined aquifer glacial sediments. The Bouwer and Rice (1976) analyses of the slug test data indicated a hydraulic conductivity of 3.97×10^{-3} cm/s. The calculations for this hydraulic conductivity are included as Appendix C to the Plan.

Based upon various area reports on file with the Rhinelander DNR, the water table is anticipated to be encountered at a depth of 12 to15 feet, sloping to the northwest. The hydraulic conductivity of the glacial sediments in the upper portion of the unconfined aquifer may vary significantly due to grain-size variations typical of braided stream deposits.

Potential Release Migration Pathways

No known potential migration pathways (other than the groundwater) or utility corridors are known to exist on the property. Migration pathways will be assessed in accordance with published DNR guidance.

INVESTIGATION TECHNIQUES AND SAMPLING PLAN

This plan consists of two phases and uses the results of our initial scoping. The initial scoping consisted of gathering all information available regarding the area aquifers, the distribution of monitoring wells and CVOCs in the soil and groundwater of the unconfined aquifer in the city of Eagle River, in the area surrounding the Eagle Cleaners property, and downgradient to the Eagle River, which lies north-northwest and west of the property.

Phase I will consist of a Geoprobe® investigation utilizing an on-site laboratory to analyze soil and water samples collected from the probes, and water samples collected from existing monitoring wells, to define the limits and concentrations of the groundwater plume. Selected soil samples will be collected for analysis by the on-site laboratory to evaluate the soil and groundwater impact, and to define the degree and extent of dry cleaner compounds in the groundwater related to the reported release from the Eagle Cleaners site. In the Geoprobe® investigation, all information gathered in the initial part of the first phase will be evaluated to minimize the amount of groundwater collection points needed to properly define the extent of the CVOC plume in the groundwater.

In Phase II of the investigation, ECCI will strategically place groundwater monitoring wells in order to properly corroborate the degree and extent of the CVOC plume in the groundwater defined by Phase I. All information gathered in the Geoprobe® investigation will be evaluated to assist in the placement of the wells to monitor the future aspects of the plume's flux.

In addition to defining the degree and extent of the VOC distribution in the soil on the subject property and in the area groundwater, soil samples will be collected for interpretation by a professional geologist to assist in defining the conceptual geologic model of the immediate area. The geologic interpretation will provide information necessary for the selection of potential remedial techniques.

The types of investigations to be performed, types of samples to be collected, sample handling methods, analytical methods, and decontamination methods are discussed below for each sample type.

Soil Investigation

The Phase I investigation will be conducted using a Geoprobe® drilling rig. The Geoprobe® is a vehicle-mounted, hydraulically driven probing system capable of sampling soil, groundwater, and soil vapor at discrete intervals in the subsurface. Soil samples will be collected in 2- or 4-foot-long, nickel-plated sampling tubes. Soil samples are retrieved by driving the soil sampler to the desired sampling depth using hollow driving rods, releasing the stop-pin in the sampler to allow the driving point to retract into the sampling tube, driving the sampler into the ground to fill it with soil, and pulling the driving rods and sampler to the ground surface. The sample is recovered in an acetate liner. It can be logged and analyzed on site, or prepared for shipping and off-site analysis. Driving rods and soil sampling tubes are decontaminated between sampling points using standard wash-and-rinse decontamination procedures.

Using the Geoprobe®, soil samples will be collected down to the water table, which is estimated to be 14 feet below ground surface. The objective of the soil boring investigation is to find the source of the effected groundwater by locating the soil potentially impacted by cleaning solvents, and to collect information for geologic interpretation to aid in the development of our conceptual model. It is not possible to predict the exact number or the location of soil borings to be constructed; however, we estimate that 12 to 15 borings will be sufficient.

After retrieval of the sampler from the boring, the sampler will be opened and the sample will be split longitudinally. That half of the sample to be set aside for analytical work will be dealt with immediately. Following this, the other half of the sample will be placed in a Mason®-type jar in order to screen it with a photoionization detector (PID) using the "jar headspace method" (DNR, 1990). Appendix D of this report consists of an extract from the DNR's description of this method. All samples from which sufficient soil is recovered will be screened in this manner. All results from this field-testing will be recorded. The results of the headspace-screening for each boring will be used, together with other relevant information, to select the most appropriate samples for analytical work following the collection of all samples from each boring.

The VOC analysis listed in Table 1 will be performed by the on-site lab on selected soil samples taken from the Geoprobe® borings during the Phase I investigation. Two other analyses may be performed on selected soil samples retrieved during monitoring well construction in the Phase II investigation—dry bulk density and organic carbon. The dry bulk density sample(s) will be collected midway between the ground surface and the water table. The purpose of the dry bulk density sample(s) is to help evaluate the potential of any residual contaminants in the vadose zone to reach the groundwater. Therefore, a dry bulk density sample will only be collected if VOCs are detected in the soil. The dry bulk density samples would be collected during the second phase, when the drill rig is available. The fraction of organic carbon samples will be collected from above and beneath the water table. The purpose of the fraction of organic carbon samples will be to aid in the evaluation of the soil's and aquifer's ability to retard the transport of the chlorinated compounds by infiltration water or groundwater.

TABLE 1. SOIL SAMPLE ANALYTICAL PARAMETERS

Soil Analyte	Description	Typical Method Detection Limit
VOC	Volatile Organic Compounds will be analyzed using EPA Method 8021 - Phase I and Phase II	0.5 µg/Kg
Grain-Size Determination	To be collected from various depths by the drill rig – Phase II.	NA
Dry Bulk Density	To potentially be collected from the drill rig – Phase II.	N/A
Fraction of Organic Carbon	This is a soil sample, but will be collected above and beneath the water table to assess the soil's and aquifer's ability to retard chlorinated compound transport. (Phase II).	0.01 %

The grain-size analyses will be completed on representative samples from distinct geologic units and/or from intervals corresponding to the well screen in accordance with NR 141.

Boring logs will be prepared for all borings where soils were described according to standard geologic classification systems. Characteristics, such as soil structure, voids, layering, lenses, odor, staining, and mottling, will be noted on the logs. Boring logs will be presented on DNR Form 4400-122, *Soil Boring Log Information.*

Each Geoprobe® soil boring will be backfilled and properly abandoned. Borehole abandonment forms (DNR Form 3300-5W) will be filled out for each abandoned boring. These forms will be filed with the DNR's local project manager, and copies of the forms will be included as part of the Site Investigation Report.

Decontamination will be performed to minimize cross-contamination. All sampling equipment will be decontaminated between collection of each sample. Decontamination will consist of washing the sampling equipment with a detergent solution and rinsing with clean tap water. Additionally, the hand tools used by the sampler to select and divide sample portions will be given a final rinse with deionized water before use on each new sample. The drilling augers will be decontaminated between each boring by steam-cleaning or by high-pressure, hot water washing. A stiff brush will be used, if required, to remove soil adhering to the augers.

Groundwater Investigation

The Phase 1 Geoprobe® investigation will include a preliminary attempt to determine groundwater impacts. Geoprobe® groundwater samples can be collected using either a vertically mill-slotted screen and a Teflon® tubing/check-valve apparatus, or an expendable point apparatus. Groundwater samples are retrieved by driving the mill-slotted screen or expendable point to the desired depth using hollow driving rods; or, in the case of the expendable point apparatus, releasing the point by pulling the driving rods upward approximately six inches to create a cavity, allowing groundwater to recharge into the cavity or screened sampler; and inserting HDPE- or Teflon® tubing down the hollow rods and applying a vacuum, or using the check-valve apparatus to draw groundwater into the tubing. The groundwater sample is recovered in a glass sampling flask or dedicated vial, and can either be analyzed on site or prepared for off-site analysis. Driving rods and groundwater samplers are decontaminated between sampling points using standard decontamination procedures. The used Teflon® tubing is discarded.

The Phase I probe water samples will be collected from 12 to 15 Geoprobe® locations and analyzed by an on-site lab for VOCs to provide real-time data to effectively define the limits of the VOC plume in groundwater. The anticipated locations for the collection of the Geoprobe® water samples are displayed in Figure 4. The actual locations may vary, based upon the site conditions and the information gathered as the drilling and sampling proceed. Existing monitoring wells are present in the area at Don's Standard, to the west, and the CITGO gas station to the east. Permission will be requested from the owners of these wells to collect samples for analysis by the mobile laboratory to aid in our Phase I groundwater investigation and for the Phase II investigation. Approximately four probe borings will be constructed as temporary monitoring points for repeated groundwater sampling. These 1" wells will be located upgradient and sidegradient of the defined CVOC

groundwater plume in non-impacted groundwater. These wells will be used to define the upgradient and sidegradient portions of the plume. Since these wells are not NR 141 compliant, they will only be used to corroborate the absence of CVOCs and not to quantify levels of CVOCs.

In the Phase II investigation, monitoring wells and piezometers will be located based upon the information obtained in the Phase I investigation. The wells will be constructed using a hollow-stem auger drilling rig. The soil in these borings will be sampled and screened with a PID, as previously described. The wells and piezometers will be constructed and developed according to NR 141, *Groundwater Monitoring Well Requirements*. Because of the anticipated depth to water, ECCI does not anticipate the necessity for a variance from NR 141. Schedule 40 PVC, with threaded joints, will be used for both well casing and screen. The monitoring wells will have 10-foot well screens and will be constructed so the screen bisects the water table. The piezometers will be constructed with a 5-foot screen placed below the water table to monitor groundwater at depth. The well screens will be filter-packed with coarse sand. Fine-grained sand will be placed above the filter pack. Bentonite seals will be placed on top of the fine sand. The remaining annular space will be sealed with granular bentonite. A locking, protective casing will be placed in concrete grout over each monitoring well. Flush-mounted, protective covers may be used to prevent motor vehicle interference.

Wells will be developed by alternately surging and purging for a minimum of 30 minutes. Water will then be pumped from the well until ten well volumes have been removed or clear water is produced. If the permeabilities of the glacial deposits are too low to permit the described development, the wells will be bailed dry and permitted to recover, and surging techniques will not be employed. The wells will be developed after a minimum of 12 hours if grout is used. Well construction and development details will be documented as required by NR 141 on DNR Form 4400-113A, *Monitoring Well Construction*, and Form 4400-113B, *Monitoring Well Development*.

Groundwater sampling and decontamination procedures will follow guidelines suggested in the DNR's *Groundwater Sampling Field Manual* (September, 1996). Groundwater samples will be submitted for analytical parameters as listed in the following Table 2.

The monitoring wells will be surveyed in accordance with current professional practice for conducting groundwater investigations, including standards set forth by the DNR, which require that the tops of well casing elevation be determined to the nearest 0.01 foot, using the national geodetic survey datum.

Quality Assurance and Quality Control

The following procedures will be used during sample collection to provide quality assurance and quality control (QA/QC), to minimize loss of volatile compounds, and to maintain the suitability of samples for analysis. Except for drinking water samples, the sample collection and analytical procedures will be consistent with SW-846: *Test Methods For Evaluating Solid Waste*, November 1986, and updates published by the U.S. Environmental Protection Agency (EPA).

TABLE 2. GROUNDWATER ANALYTICAL PARAMETERS

Groundwater Analyte	Analytical Method	Typical Method Detection Limit
VOC	EPA Method 8021 - Phases I & II	0.5 µg/L
NO3+NO2-N	EPA Method 355.1 - Phase II	0.3 mg/L
Dissolved Iron	EPA Method 6010 - Phase II	0.01 mg/L
Sulfate	EPA Method 300.0 - Phase II	5.0 mg/L
Sulfide	EPA Method 376.1 - Phase II	5.0 mg/L
Methane	ES 535 - Phase II	1.0
pH	EPA Method 150.1 - Phase II	–
Chloride	EPA Method 300.1 - Phase II	1.0 µg/L
Alkalinity	EPA Method 310.1 - Phase II	3.1 mg/L
Ethene	ES 535 - Phase II	1.0 µg/L
Dissolved Oxygen	Field Meter - Phase II	0.1 mg/L

QA/QC methods to be used are described below.

- All sampling containers and preservatives will be supplied by a state-certified laboratory, and analyses will be performed by a state-certified laboratory under NR 149 for the test that they perform.
- All samples will be handled in such a manner as to minimize the loss of organic compounds to volatilization and biodegradation, and sampling equipment will be decontaminated between sampling events.
- All samples collected will be discrete (not composite) samples.
- Soil from a given sample, which is to be submitted for laboratory analytical work, will be handled and prepared before soil from that sample is used for field-screening.
- All samples for analysis will be placed in a cooler on ice (not blue ice) at a temperature of 4°C immediately following collection.
- Samples will be delivered to the laboratory on either the day that they are collected or the morning of the next day, unless the samples are collected on a Friday, in which case they will be delivered no later than Monday morning. Where possible, sample collection on Fridays will be avoided.

ECCI plans to immediately preserve VOC soil samples with methanol unless brass tubes are used. If brass tubes are used for soil sampling, samples will be preserved with methanol within two hours of sample collection (*Release News*, July 1994, Vol. 4, No. 3).

One temperature blank will be submitted and all samples will be maintained on ice. One methanol trip blank will be supplied per sampling event. One duplicate sample of groundwater will be taken for every ten (or fewer) groundwater samples collected. In addition:

- One field blank will be taken with every ten (or fewer) groundwater samples collected.
- One trip blank will be taken per sampling event (only for VOC).
- One temperature blank will be taken per sampling event.

Chain-of-custody procedures will be used throughout the sampling/delivery process. Documentation of the sampling and QA/QC procedures will include notes available for DNR inspection. These notes will include documentation of the procedures for sampling and all other routine activities, logs of all routine and non-routine instrument calibrations performed on field equipment, and field notes describing the sequence of activities that took place in the investigation.

Groundwater monitoring wells will be inspected annually to determine whether the wells are leaking and acting as conduits for surface water to enter groundwater. Leaking wells will be repaired.

SITE MANAGEMENT

The following sections describe a site-specific health and safety plan, a waste management plan, and a description of property access. These are components of the investigation that require planning prior to commencement of fieldwork, and are required by the Occupational Safety and Health Administration (OSHA), as specified in 29 CFR, Part 1910.120.

Health and Safety Plan

ECCI personnel are fully trained in accordance with OSHA requirements of 29 CFR, Part 1910.120, Hazardous Waste Site Operations and Emergency Response standard. Site Health and Safety Plans (HASPs) are prepared for ECCI's field operations personnel for every property where there is potential for environmental impact resulting from hazardous substances. The HASP for this site is currently being developed. It applies only to ECCI personnel and does not govern safety procedures for non-ECCI personnel. At work sites where ECCI personnel and non-ECCI personnel are both present, ECCI assumes that non-ECCI personnel will act under their own HASPs.

Subsurface investigations, such as the one outlined in this Plan, involve the hazard of intersecting and potentially destroying underground utilities, such as pipelines, electrical lines and other subsurface structures. Additionally, the destruction of utilities may be hazardous either to the operator(s) of the equipment or to the environment. ECCI will use due precaution in proceeding with the investigation at this site. ECCI will check to be sure that the drillers and/or excavators at the property have obtained clearance from Diggers' Hotline. However, ECCI cannot and does not guarantee that all underground utilities present at each drilling location have been located. If an underground utility is unintentionally intersected during investigative operations at this property, the reactions of ECCI personnel at the property will be governed by the applicable site-specific HASP.

Waste Management Plan

Waste materials will be generated during the investigation. All waste generated will be managed in accordance with DNR and EPA regulations. The anticipated wastes are both impacted and non-impacted soil and water. These wastes may require special handling. Soil cuttings will be generated during drilling of soil borings and monitoring wells. These soils will require handling and/or disposal. Water requiring special disposal may be generated during decontamination of the drilling augers and during development of the groundwater monitoring wells. To the extent possible, soils will be screened during drilling of soil borings and the construction of monitoring wells.

Impacted solid and liquid waste will be placed directly into DOT-approved, 55-gallon drums on the Eagle Cleaners property until appropriate off-site disposal or treatment can be arranged. Arrangements will be made with the local Publicly Owned Treatment Works or other licensed authority for disposal of this water after an analysis of the water is obtained.

SCHEDULE OF ACTIVITIES

The Geoprobe® investigation and sampling of existing monitoring wells at nearby sites will be scheduled upon receipt of DNR approval of this Work Plan. Fieldwork will commence as quickly as possible, depending upon the availability of the low bidder subcontractors.

SITE INVESTIGATION REPORT

The Site Investigation Report, complying with the requirements of NR 716, will include: documentation of the background and field investigations described by this Plan; discussion of ECCI's interpretation of the geology, hydrogeology, and chlorinated plume degree and extent; an assessment of potential migration pathways and the potential environmental and health risks of the pathway-specific receptors; and ECCI's summary and conclusions of the findings.

If additional investigation is needed beyond the scope defined herein, recommendations for additional investigative work will be made.[1]

If a cleanup is warranted, ECCI will include recommendations to mitigate the release.

[1]The most likely cause for additional work would occur if the scope of work described herein ends up providing indications that dense non-aqueous phase liquid may exist at depth—something no one anticipates, at present.

REFERENCES

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Bouwer, H., and Rice, R. C., 1976, "A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells," *in* Water Resources Research, June 1976: American Geophysical Union, v. 12, no. 3, p. 423.

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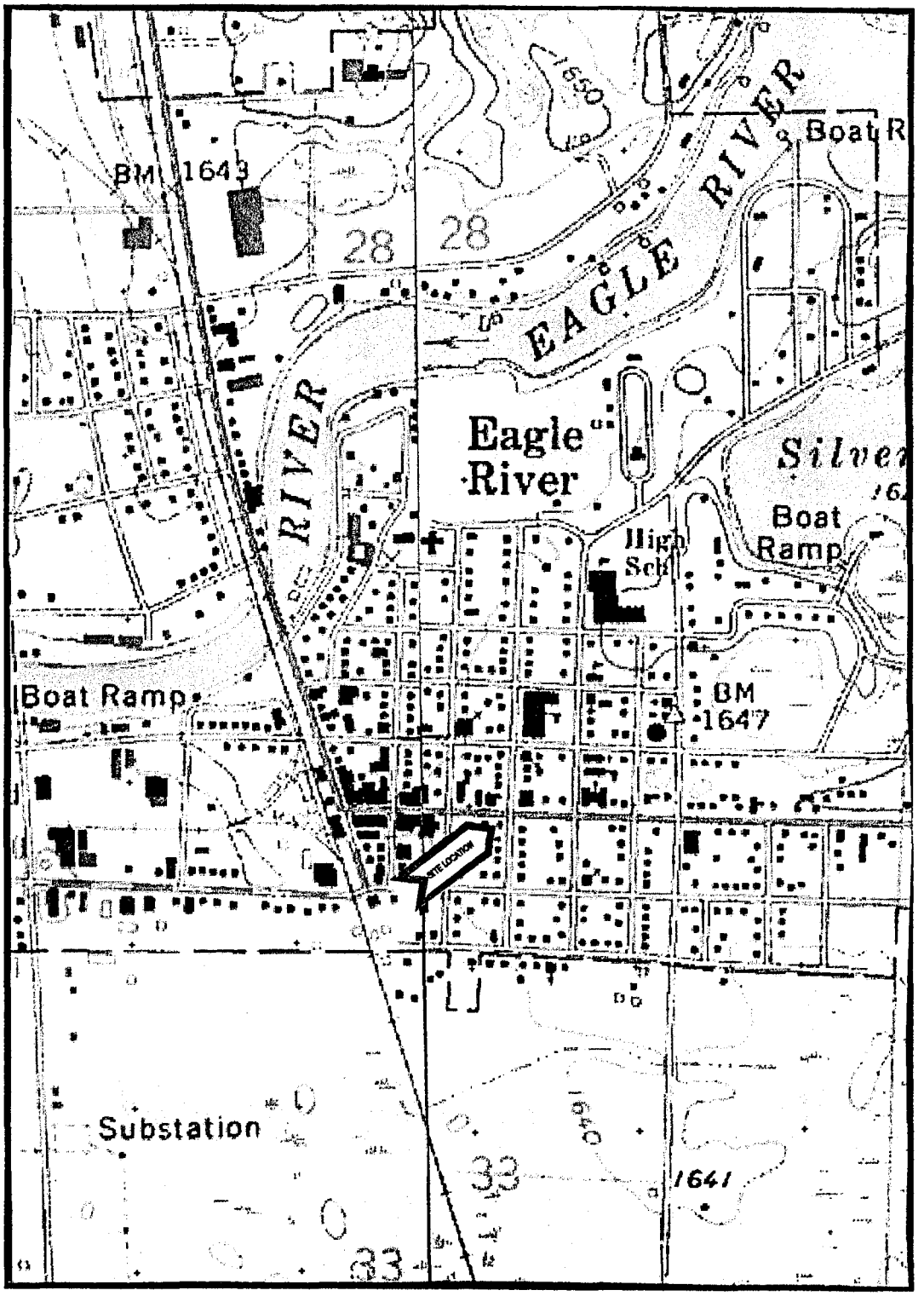
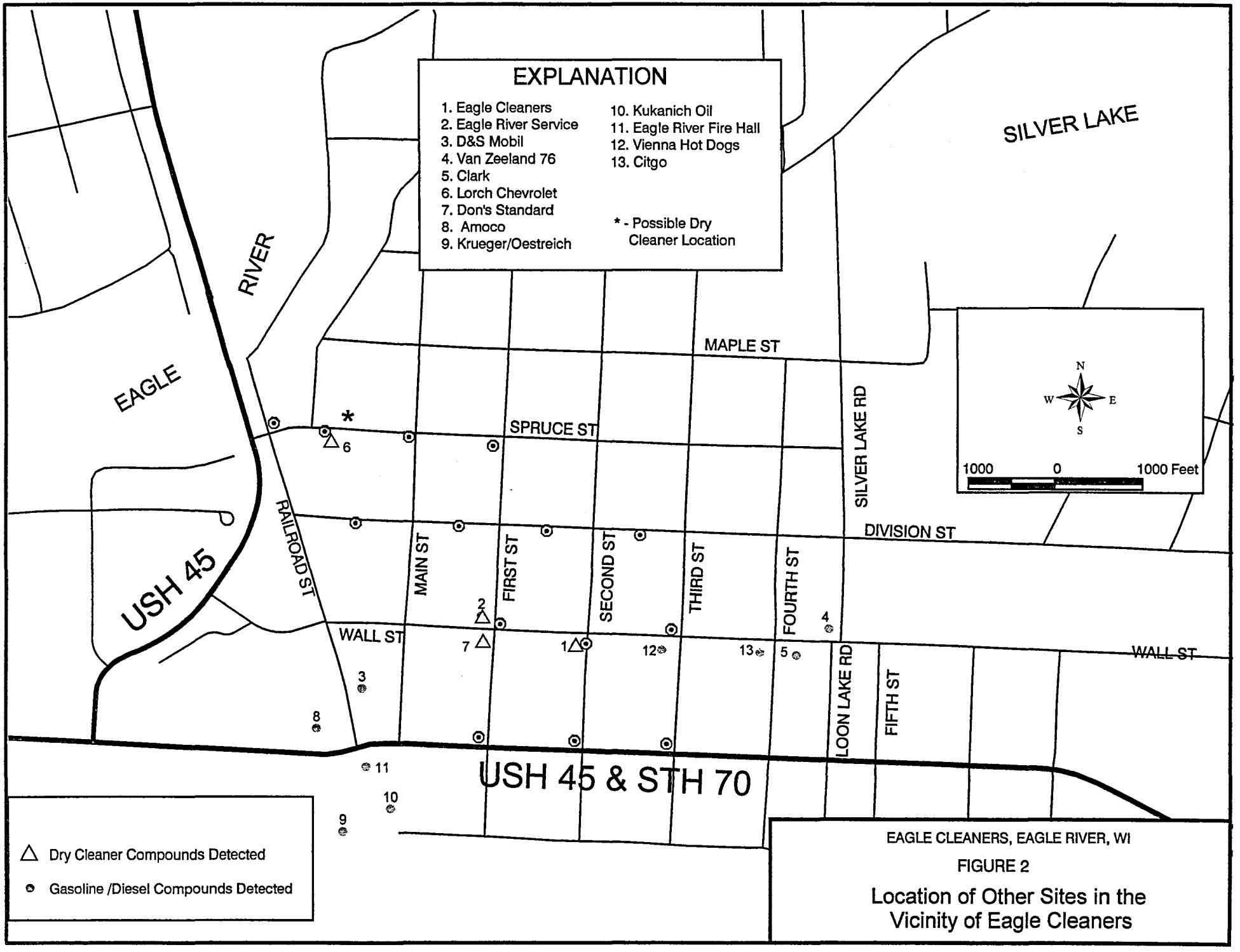
APPENDIX A

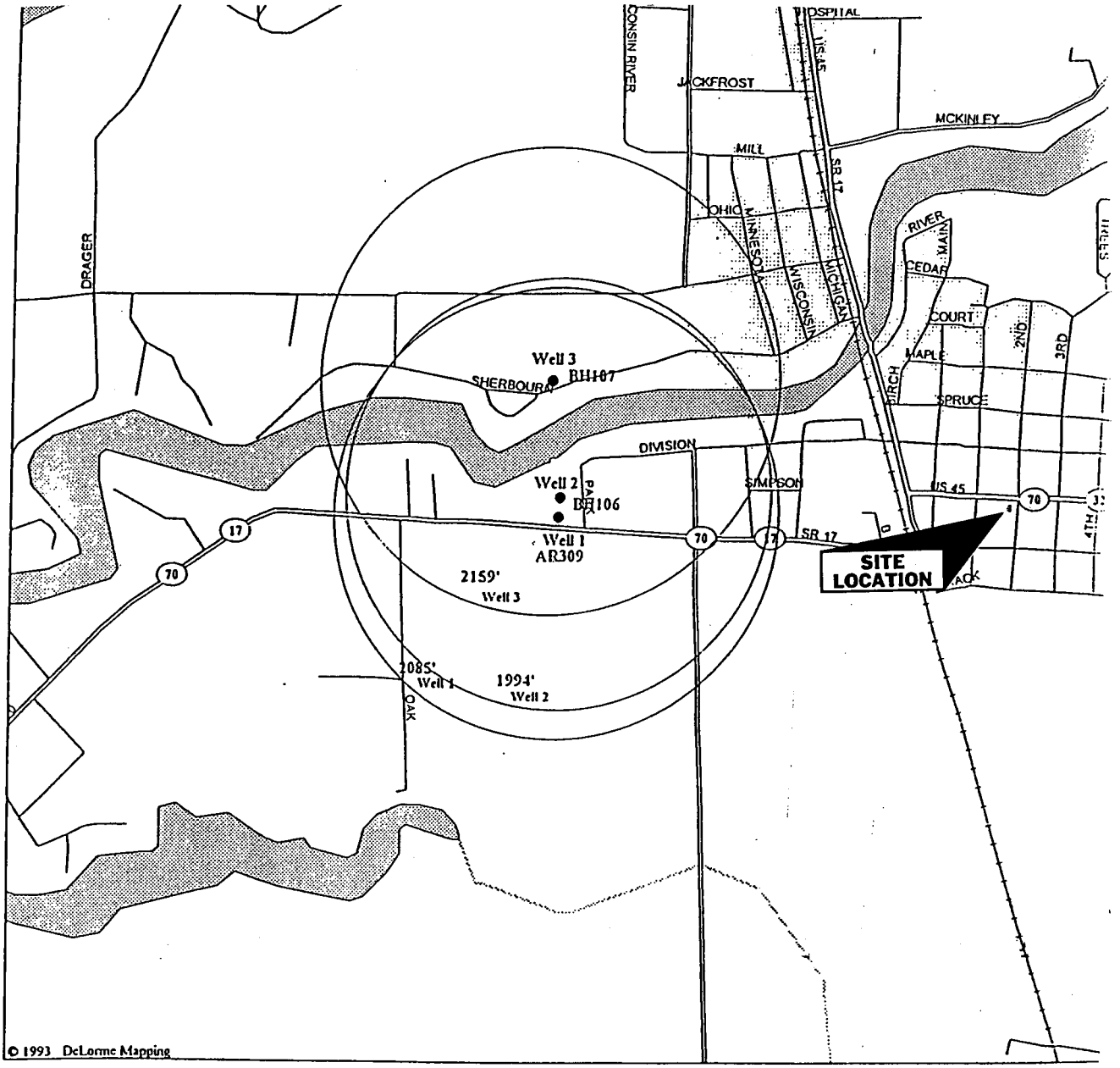
Figures 1 through 4



NOTE: Taken from the Eagle River East 7.5 Minute USGS Topographic Map Copyright (C), 1997 Maptech, Inc.

EAGLE CLEANERS - EAGLE RIVER, VILAS COUNTY, WI	
FIGURE 1 SITE LOCATION MAP	
SCALE: 1" = 1000'	DATE: February 12, 2002
Environmental Compliance Consultants, Inc.	BY: Tim Baker


EXPLANATION
1. Eagle Cleaners
2. Eagle River Service
3. D&S Mobil
4. Van Zeeland 76
5. Clark
6. Lorch Chevrolet
7. Don's Standard
8. Amoco
9. Krueger/Oestreich
10. Kukanich Oil
11. Eagle River Fire Hall
12. Vienna Hot Dogs
13. Citgo
* - Possible Dry Cleaner Location
SILVER LAKE
RIVER
EAGLE
MAPLE ST
SPRUCE ST
DIVISION ST
WALL ST
WALL ST
SILVER LAKE RD
RAILROAD ST
MAIN ST
FIRST ST
SECOND ST
THIRD ST
FOURTH ST
LOON LAKE RD
FIFTH ST
USH 45
USH 45 & STH 70
N
W
E
S
1000
0
1000 Feet
Dry Cleaner Compounds Detected
Gasoline /Diesel Compounds Detected
EAGLE CLEANERS, EAGLE RIVER, WI
FIGURE 2
Location of Other Sites in the Vicinity of Eagle Cleaners



LEGEND

- Population Center
- State Route
- Town, Small City
- Street, Road
- Major Street/Road
- State Route
- US Highway
- Railroad
- River
- Open Water

Scale 1:15,625 (at center)

1000 Feet

500 Meters

Eagle River Waterworks
Mag 15.00
Mon May 22 14:56:45 1995

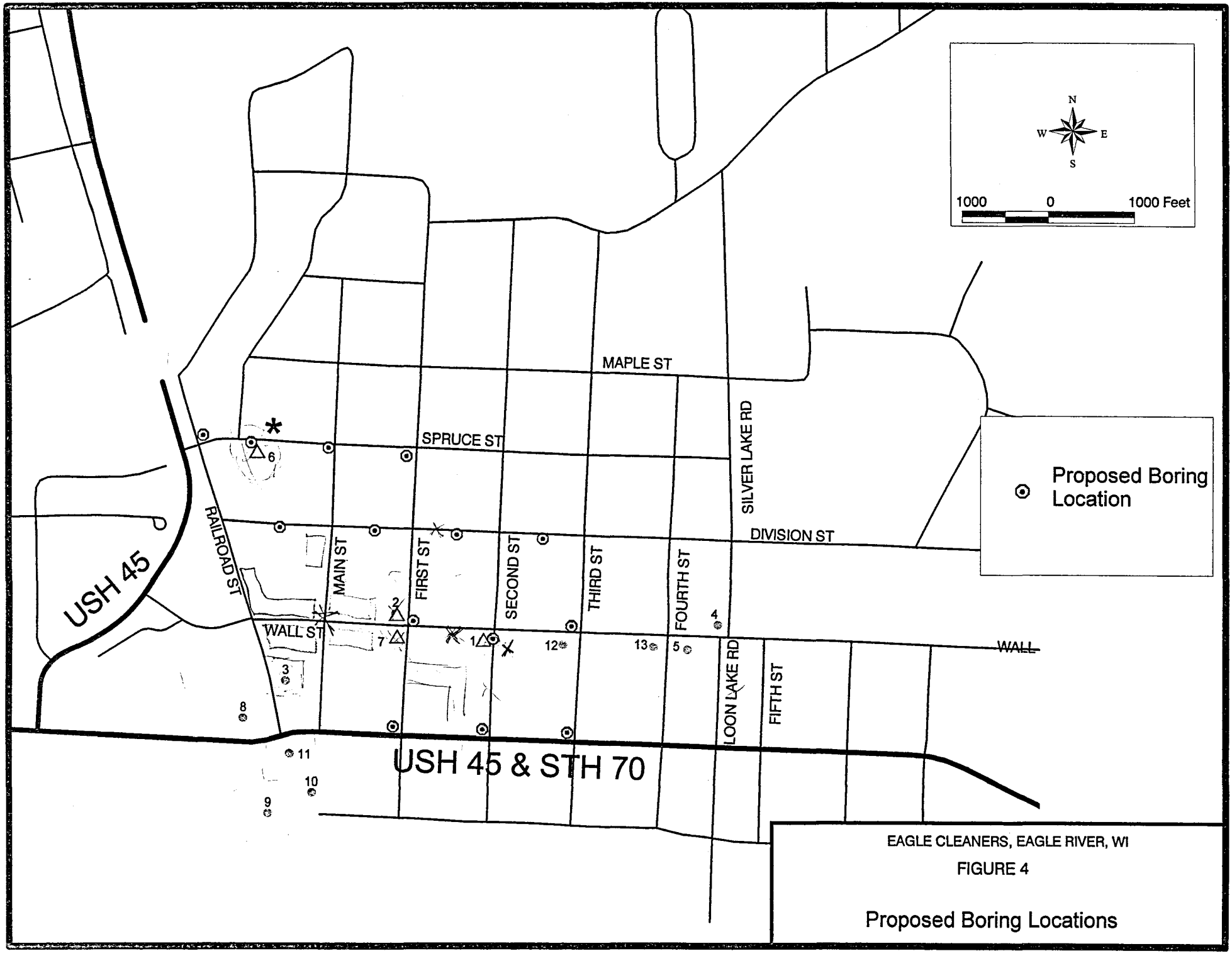
N

Large circles denote DNR's calculated groundwater 5-year travel times toward municipal wells

EAGLE CLEANERS - EAGLE RIVER, VILAS COUNTY, WI

FIGURE 3
WELL LOCATION MAP

SCALE: 1" = 1000'	DATE: February 12, 2002
Environmental Compliance Consultants, Inc.	BY: Tim Baker



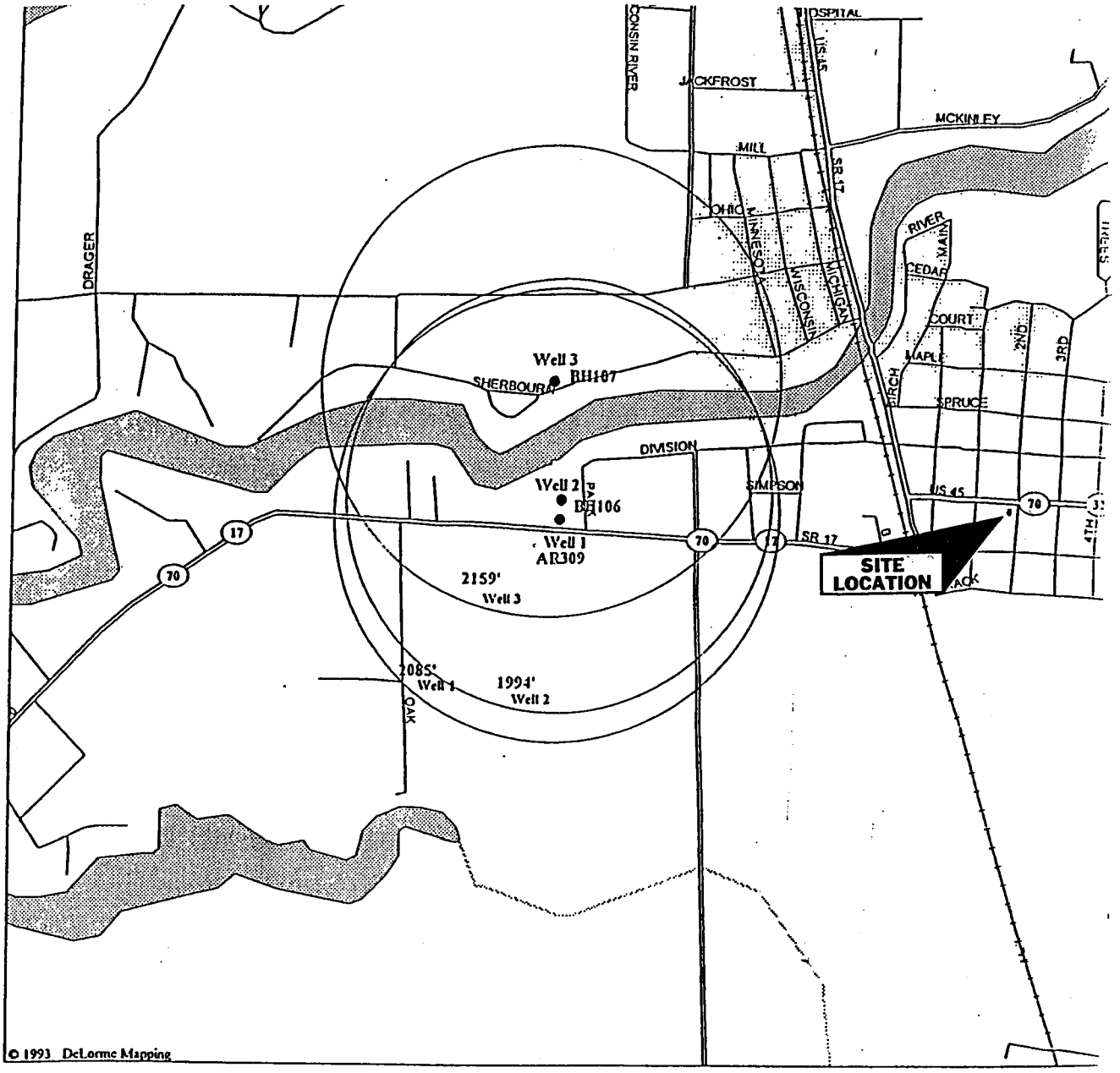
EAGLE CLEANERS, EAGLE RIVER, WI

FIGURE 4

Proposed Boring Locations

APPENDIX B

Municipal Well Locations and Construction Documentation



LEGEND

- Population Center
- State Route
- Town, Small City
- Street, Road
- Major Street/Road
- State Route
- US Highway
- Railroad
- River
- Open Water

Scale 1:15,625 (at center)

1000 Feet

500 Meters

Eagle River Waterworks
Mag 15.00
Mon May 22 14:56:45 1995

N

Large circles denote DNR's calculated groundwater 5-year travel times toward municipal wells

EAGLE CLEANERS - EAGLE RIVER, VILAS COUNTY, WI

FIGURE 3
WELL LOCATION MAP

SCALE: 1" = 1000'	DATE: February 12, 2002
Environmental Compliance Consultants, Inc.	BY: Tim Baker

Owner 88001

EAGLE RIVER(CITY OF)-UTILITY

PO BOX 218

EAGLE RIVER WI 54521

ow 2 phone

Operator 88001

EAGLE RIVER(CITY OF)-UTILITY

PO BOX 218

EAGLE RIVER WI 54521

op 2 phone

LOCATION

County VILAS

Civil Town EAGLE RIVER(CITY OF)

Govt Lot ____ or NE 1/4 of the NE 1/4

Sec. 32 , T 40 , Rg. 10 E/W E

Street 1200 W. PINE STREET

Mailing City

File Location 64 - 9 - 1

Grid fid 764011380

District 7

Basin 160

Well Numbers Perm. 718

Owner 001 Operator 001

Class PUBLIC WATER SUPPLY

Approved Capacity 300 **GPM**

Normal Pumpage 216,000**GPD**

Max pumpage 432,000**GPD**

Status 0

Approved

Completed 12/20/1988

Co Apprvl # 1

General Well Information

Drilled by: LAYNE NORTHWEST CO 582

Total Depth ft 89.0

Drill Method:

Feet to rock

Aquifer SAND/GRAVEL

First Rock is

Multiple Aquifers? N

Gravel Pack Y

Screened? Y 3

WOUND WIRE - STAINLESS STEEL

Additional Geology Information. (Note Diameters are in inches, lengths, thickness & depths are in feet.)

Formation Thickness	
Surface Sand	26.0
Surface Clay	63.0
Devonian	
Silurian	
Maquoketa	
Sinnippe	
Ancell	
Prairie du Chien	
Cambrian	
Precambrian	

Upper Drillhole Diameter	
Upper Drillhole Depth-Ft	
Lower Drillhole Diameter	12.0
Lower Drillhole Length	89.0
More than 2 Drillholes?	N
Primary Casing Diameter	12.0
Primary Casing Depth	72.0
Liner Casing Diameter	8.0
Liner Casing Length	77.0
Liner Casing Depth	77.0

Screen Diameter	8.0
Screen Length	12.0
Sealing Material Depth	60.0
Hours of Yield Test	6.0
GPM of Yield Test	302.0
Static Water (feet)	2.6
Pumping Water Level (ft)	3.8
Specific Capacity(GPM/Ft)	25.2

<File

WGNHS Log No.

Dir E

Owner 88001

EAGLE RIVER(CITY OF)-UTILITY

PO BOX 218

EAGLE RIVER WI 54521

ow 2 phone

Operator 88001

EAGLE RIVER(CITY OF)-UTILITY

PO BOX 218

EAGLE RIVER WI 54521

op 2 phone

LOCATION

County VILAS

Civil Town EAGLE RIVER(CITY OF)

Govt Lot ____ or NE 1/4 of the NE 1/4

Sec. 32 , T 40 , Rg. 10 E/W E

Street 1200 W. PINE STREET

Mailing City

File Location 64 - 9 - 1

Grid fid 764011380

District 7

Basin 171

Well Numbers Perm. 87241

Owner 002 Operator 002

Class PUBLIC WATER SUPPLY

Approved Capacity 350 GPM

Normal Pumpage 237,000GPD

Max pumpage 504,000GPD

Status 0

Approved 05/22/1934

Completed

Co Apprvl # 1

General Well Information

Drilled by: WEISS

Total Depth ft 75.0

Feet to rock 0.0

First Rock is

Drill Method:

Aquifer SAND/GRAVEL

Multiple Aquifers? N

Gravel Pack Y

Screened? Y

Additional Geology Information. (Note Diameters are in inches, lengths, thickness & depths are in feet.)

Formation Thickness	
Surface Sand	51.0
Surface Clay	24.0
Devonian	
Silurian	
Maquoketa	
Sinnippe	
Ancell	
Prairie du Chien	
Cambrian	
Precambrian	

Upper Drillhole Diameter	
Upper Drillhole Depth-Ft	
Lower Drillhole Diameter	20.0
Lower Drillhole Length	75.0
More than 2 Drillholes?	N
Primary Casing Diameter	20.0
Primary Casing Depth	60.0
Liner Casing Diameter	
Liner Casing Length	
Liner Casing Depth	

Screen Diameter	20.0
Screen Length	15.0
Sealing Material Depth	
Hours of Yield Test	
GPM of Yield Test	320.0
Static Water (feet)	2.3
Pumping Water Level (ft)	3.6
Specific Capacity(GPM/Ft)	24.6
<File	
WGNHS Log No.	

Dir E

Owner 88001

EAGLE RIVER(CITY OF)-UTILITY

PO BOX 218

EAGLE RIVER WI 54521

ow 2 phone

Operator 88001

EAGLE RIVER(CITY OF)-UTILITY

PO BOX 218

EAGLE RIVER WI 54521

op 2 phone

LOCATION

County VILAS

Civil Town EAGLE RIVER(CITY OF)

Govt Lot ____ or SW1/4 of the SW1/4

Sec. 29 , T 40 , Rg. 10 E/W E

Street 4854 SHURBURNE

Mailing City STREET

File Location 64 - 9 - 1

Grid fid 764011380

District 7

Basin 171

Well Numbers Perm. 87242

Owner 003 Operator 003

Class PUBLIC WATER SUPPLY

Approved Capacity 950 GPM

Normal Pumpage 347,000GPD

Max pumpage 1,368,000GPD

Status 0

Approved 08/07/1970

Completed 04/01/1971

Co Apprvl # 1

General Well Information

Drilled by: LAYNE NORTHWEST CO 582

Total Depth ft 138.5

Feet to rock 0.0

First Rock is

Drill Method:

Aquifer SAND/GRAVEL

Multiple Aquifers? N

Gravel Pack Y

Screened? Y 3

WOUND WIRE - STAINLESS STEEL

Additional Geology Information. (Note Diameters are in inches, lengths, thickness & depths are in feet.)

Formation Thickness	
Surface Sand	58.5
Surface Clay	80.0
Devonian	
Silurian	
Maquoketa	
Sinnippe	
Ancell	
Prairie du Chien	
Cambrian	
Precambrian	

Upper Drillhole Diameter	36.0
Upper Drillhole Depth-Ft	120.0
Lower Drillhole Diameter	30.0
Lower Drillhole Length	18.5
More than 2 Drillholes?	Y
Primary Casing Diameter	14.0
Primary Casing Depth	98.0
Liner Casing Diameter	
Liner Casing Length	
Liner Casing Depth	

Screen Diameter	14.0
Screen Length	40.0
Sealing Material Depth	82.0
Hours of Yield Test	10.0
GPM of Yield Test	857.0
Static Water (feet)	1.8
Pumping Water Level (ft)	3.1
Specific Capacity(GPM/Ft)	70.4

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WGNHS Log No. VI0054

Dir E

APPENDIX C

Hydraulic Conductivity Calculations using Bouwer and Rice Method

K/O Bulk
Slug Test Analysis: KW-3 (Bouwer and Rice Method)

Screen Length (ft)	L_e	10	L_e/r_w	30.30303
Water in well (ft)	L_w	15	**A**	2.5
Well Radius (ft)	r_c	0.0833	**B**	0.4
Borehole Radius (ft)	r_w	0.33	**t**	79
Porosity	**n**	0.4	y_o	0.78
Aquifer Thickness (ft)	**H**	25	y_t	0.13

Radius of Casing Calculation (Taking into account the thickness and porosity of the gravel envelope):

$$r_{ce} = [r_c^2 + n(r_w^2 - r_c^2)]^{1/2}$$

r_{ce} 0.21845671

Dimensionless ratio ($\ln R_e/r_w$) Calculation:

$$\ln R_e/r_w = [(1.1/\ln(L_w/r_w)) + ((A + B\ln[(H-L_w)/r_w)/(L_e/r_w))]^{-1}$$

$\ln R_e/r_w$ 2.405380791

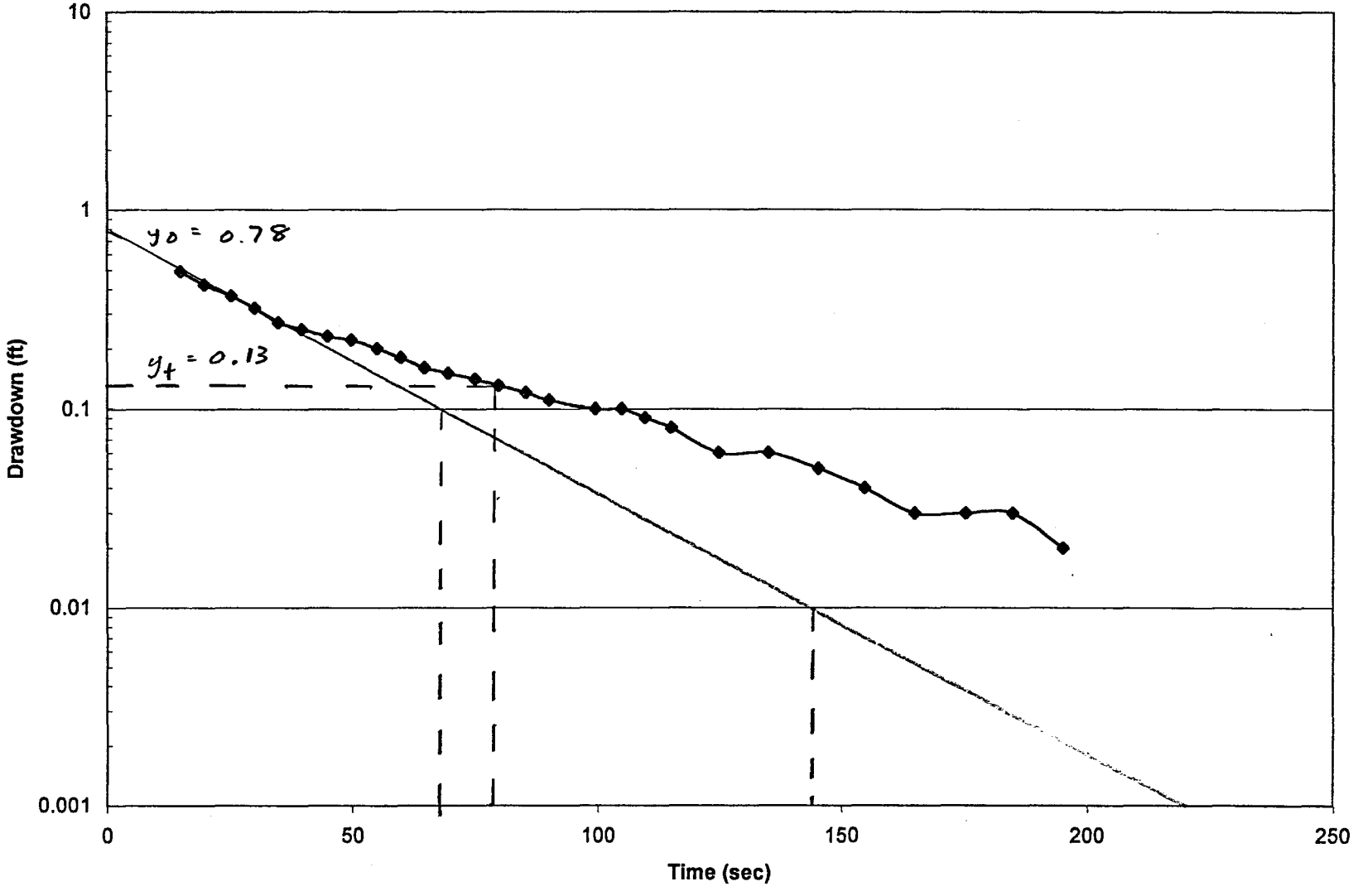
Hydraulic Conductivity (K) Calculation:

$$K = (r_{ce}^2 \ln(R_e/r_w))/(2L_e) * (1/t) * \ln(y_o/y_t)$$

K (ft/sec) 0.000130178

K(cm/sec) 0.003967822

K/O Bulk
Slug Test (Bouwer and Rice): KW-3



$t = 147 - 68 = 79$

APPENDIX D

Jar Headspace Method

The following description of the jar headspace method has been extracted from "Attachment 2, Field Instrument Techniques" to the Wisconsin Department of Natural Resources' guideline document entitled *Closure Assessment for Underground Storage Tanks* (September 1990).

ATTACHMENT 2
FIELD INSTRUMENT TECHNIQUES

Field instruments including photoionization detectors, flame ionization detectors and gas chromatographs may be used to field screen soil and groundwater samples using headspace techniques outlined in this attachment. Other types of field instruments may not be used to screen soil samples in the field without prior approval of the Department of Natural Resources.

Note: The term "headspace sample" is used herein to refer to samples collected for headspace analysis. Samples collected for laboratory analysis must be collected in glass or inert synthetic containers obtained from or approved by the certified laboratory which will analyze the samples.

A. General Requirements:

1. A field instrument shall only be used by operators thoroughly familiar with the operation of the instrument. Operators shall, through training or education, be familiar with each of the following aspects of instrument use:

   - Principles of instrument operation;
   - Interferences;
   - Instrument sensitivity and linear range for petroleum constituents;
   - Calibration procedures;
   - Flame lighting techniques (for FIDs);
   - Battery maintenance.

2. The calibration of field instruments shall be checked at least once per operating day using methods approved by the manufacturer. FIDs shall be checked using methane or other appropriate commercial gases. PIDs shall be checked using an appropriate field standard such as benzene or isobutylene.

3. All samples shall be analyzed in a manner consistent with written procedures which substantially conform to this guidance.

4. If a headspace sample is found through headspace analysis to be contaminated and laboratory analysis is needed to confirm the analysis, the sample sent to the laboratory shall be a split sample from the same sampling point where the headspace sample was collected. Split samples shall be collected and immediately preserved at the same time the headspace sample is collected. Headspace samples shall not be submitted to environmental laboratories for analysis.

5. PID's must have a lamp energy of 10.6 electrovolts or greater.

B. Headspace Sample Containers and Analytical Preparation

1. All headspace sample containers (with the exception of new polyethylene bags) must be thoroughly cleaned using water/detergent solutions, methanol, or other appropriate solvents. Following washing, sample containers shall undergo multiple rinses using distilled water.

2. Headspace sample containers shall be constructed of glass or inert synthetics. Bottles and caps may be reused if tested in advance for VOC carryover. New one quart plastic bags may also be used.

3. Headspace samples shall be collected in accordance with Soil Sampling Requirements. (See Attachment 3 of Closure Assessment Procedures for Underground Storage Tanks).

4. Headspace sample containers are to be filled 1/2 to 3/4 full. All headspace sample containers used at an UST site shall be the same size and shall be filled to the same volume. A headspace fill-line shall be marked on all containers.

5. Polyethylene bags which are used as headspace sample containers must be resealable freezer bags. A consistent sample/headspace ratio must be maintained.

6. Headspace sample containers shall be closed or covered immediately. Sample containers shall be covered with heavy gauge aluminum foil or a tight fitting cap or collar equipped with a tight fitting capped septum. Tight fitting caps or collars may be used only if the field instrument is capable of drawing a sample under tension for a long enough period to take a stable reading.

C. Headspace Sample Analysis

1. Once collected and sealed, headspace samples shall be agitated for at least 30 seconds to break soil clods and release vapors. Headspace samples in containers sealed with aluminum foil shall first be capped to allow agitation without damage to the foil seal. Seals shall be left in place during warming and shall not be pierced until the headspace is analyzed.

2. Headspace samples must be allowed to equilibrate prior to analysis. Minimum equilibration time shall conform to the specifications in the table below.

Minimum Sample Headspace Equilibration Time

Ambient Outside Air Temperature at Time of Sample Collection	Minimum Amount of Time Sample Must Equilibrate at 70°F or Greater Temperature*
< 40°F	40 min.
41 - 55°F	20 min.
56 - 69°F	10 min.
> 70°F	5 min.

* Headspace samples shall be warmed out of direct sunlight by bringing them into a heated environment. At temperatures less than 55°F, headspace sample equilibration time can be reduced to 10 min. through the use of a 70°F water bath.

3. Following equilibration, the sample headspace shall be analyzed promptly. The highest instrument reading shall be recorded. Time averaged readings may also be recorded but they are not a substitute for the highest instrument reading. Meter "quenching" shall be recorded if experienced. Care shall be taken to insert the instrument tip through a single small hole in the foil seal (if used) and to measure headspace at one-half the distance between the foil seal and the sample surface.

NOTE: The Department of Natural Resources interprets FID responses to be petroleum related unless there is independent confirmation that the gas is not petroleum derived.

D. Documentation

If field instruments are used in conjunction with an UST closure assessment the following minimum documentation standards must be adhered to:

1. Record all relevant ambient conditions. At a minimum record:

- Ambient outside temperature
- Temperature where samples are held during equilibration
- Weather conditions (e.g., light rain, windy)

2. Record all relevant instrument conditions including:

   - Instrument make and model
   - Date of last factory calibration
   - Field calibration gas used and concentration
   - Date and time of last field calibration
   - Lamp energy in electrovolts (for PIDs)
   - Instrument gain setting
   - Erratic instrument readings
   - Cleaning or repairs performed in the field

3. Record all field results including:

   - Headspace results as "instrument units as (calibration gas)." Example: 151 instrument units as benzene. DO NOT RECORD RESULTS AS CONCENTRATIONS UNLESS INSTRUMENT READINGS HAVE BEEN CALIBRATED AGAINST PREPARED SOIL/PETROLEUM PRODUCT CALIBRATION CURVES.
   - Relative sample moisture content. Example: Saturated, wet, moist, damp, dry.

4. Record any noticeable petroleum product odor for any sample.

5. Record instrument "quenching" caused by highly contaminated samples.