Silver Celebration 25/20

Minnesota Pollution Control Agency

Celebrating our 25th anniversary and the 20th anniversary of the Clean Water Act

September 3, 1992

Mr. Brad Ragan
Brad Ragan Tire Center
5110 Service Drive
Winona, Minnesota 55987

Dear Mr. Ragan:

RE: Petroleum Tank Release Site Closure
Site: Brad Ragan Tire Center, 5110 Service Drive, Winona
Site ID#: LEAK00002049

The Minnesota Pollution Control Agency (MPCA) staff has determined that the cleanup performed in response to the petroleum tank release at the site referenced above has adequately addressed the petroleum contamination, and therefore the file regarding this release will be closed.

On October 25, 1989, a petroleum tank release was reported to the MPCA. Since then, the following corrective actions have been taken in response to the release:

- An 8,000 gallon diesel fuel underground storage tank (UST) and a 5,000 gallon #2 fuel oil UST were excavated and removed from the above-mentioned site on October 25, 1989.

- Approximately 117 tons of petroleum contaminated soil were excavated to a depth of approximately 11 feet below grade. Soil contamination levels of up to 384 parts per million (ppm), total petroleum hydrocarbons, were detected from the base of the final excavation. The 117 tons of petroleum contaminated soil were thermally treated at Mathy's Construction, Onalaska, Wisconsin.

- Six soil borings were advanced on the site. Sediments at the site consist of sand with intermittent gravels. One sample from boring B-1, advanced through the former tank excavation, indicated contamination levels of 2,200 ppm total hydrocarbons as fuel oil at approximately 15 feet below grade.

- Three of the borings were completed as monitoring wells. Ground water was found to be present at approximately 12 to 15 feet below grade. Ground water flow direction is to the northwest toward the Mississippi River. The monitoring wells were sampled on four occasions. The only petroleum contaminants above-detectable limits in the ground water, were from monitoring well MW-1, which detected benzene at 1 microgram/liter (µg/L) and

total hydrocarbons as gasoline at 2 µg/L on October 24, 1990. Low levels of methylene chloride were also detected, but the presence of this contaminant was ascribed to laboratory contamination.

Based on the currently available information, we concur with the conclusions of Twin City Testing Corporation, that these actions have adequately addressed the petroleum tank release. Therefore, MPCA staff does not intend to require any more investigation or cleanup work in response to this release. However, the MPCA reserves the right to reopen this file and require additional work if in the future more work is determined to be necessary, and this letter does not release any party from liability for this contamination.

Because you performed the requested work, the state may reimburse you for a major portion of your costs. The Petroleum Tank Release Cleanup Act establishes a fund which in certain circumstances provides partial reimbursement for petroleum tank release cleanup costs. This fund is administered by the Petroleum Tank Release Compensation Board (Petro Board). More specific eligibility rules are available from the Petro Board (612/297-1119 or 612/297-4203).

Thank you for your cooperation with the MPCA in responding to this petroleum tank release to protect the public health and the environment of the state of Minnesota. If you have any questions regarding this correspondence, please call me at 612/297-8577.

Sincerely,

Donald K. Milless

Donald K. Milless
Pollution Control Specialist Senior
Tanks and Spills Section
Hazardous Waste Division

DKM:baj

cc: Ed Kohner, Fire Chief, Winona
Jim Pomeroy, City Clerk, Winona
Kevin Dixon, Winona County Solid Waste Officer, Winona
Lin Nelson, Twin City Testing, Rochester

twin city testing corporation
662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-3601

May 1, 1992

Brad Ragan Tire
5110 Service Drive
Winona, MN 55987

Subj: Quarterly Monitoring Progress Report
Brad Ragan Tire
Winona, Minnesota
MPCA Leak ID #LEAK00002049

Dear Mr. Johnson:

Enclosed are two copies of our Quarterly Monitoring Progress Report for the referenced project. We were authorized by you to perform this assessment in April, 1990.

If you have any questions concerning the information in this report, or if we can be of any additional service, please contact us at 507-288-7060.

Sincerely,

TWIN CITY TESTING CORPORATION

Lin M. Nelson
Project Manager

Enclosure

RECEIVED
MAY - 8 1992
MPCA, HAZARDOUS WASTE DIVISION

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PROGRESS REPORT

for

Brad Ragan Tire

Project Site:
5110 Service Drive
Winona, Minnesota
TCT #4800 92-06

1.0 INTRODUCTION AND BACKGROUND

Twin City Testing Corporation (TCT) is pleased to present the results of our continued environmental assessment of Brad Ragan Tire in Winona, Minnesota. This work was performed in accordance with our workplan and authorized by Mr. Jim Johnson of Brad Ragan Tire on April 9, 1990, for the above referenced site.

The Brad Ragan Tire site is located at 5110 Service Drive in Winona, Minnesota in the SW 1/4 of Section 18, T.107N, R.8W (see Figure 1). It is in a light industrial area on the northwest side of Winona, Minnesota. The site is bordered as follows:

South: Frontage road of Highway 61.

West: City street, and beyond by the Highway Department.

North: Vacant lot.

East: Commercial Building and Apartment Building.

Surface topography of the area is generally flat. According to the USGS topographic maps, the average surface elevation of the site is approximately 660 feet above mean sea level. The ground cover at the site is predominantly gravel.

The site is presently serviced by the City of Winona water and sewer utilities; however, the only utility near the project area is a natural gas line.

According to Minnesota Geological Survey (MGS) data, the main groundwater aquifers for the area are in the unconsolidated surficial deposits and in the Mount Simon Sandstone. These main aquifers in the Winona area are hydrogeologically interconnected. Regional groundwater flow in the unconsolidated aquifer is anticipated to be controlled by flow in the Mississippi River. Groundwater flow in the bedrock aquifer is anticipated to be to the northeast. Groundwater flow at the site, is to the northwest toward the Mississippi River.

Based on the Minnesota Department of Health (MDH) Data, several water wells are located within an approximate one mile radius from the site. The closest well is located approximately 1,200 feet to the north. According to the available log for the well, it is completed in the Cambrium Eau Claire Formation and Mount Simon Sandstone at depths of 145 to 235 feet below grade.

The area of this assessment formerly contained one 8,000 gallon diesel fuel and one 5,000 fuel oil underground storage tank. During the removal of the tanks in October, 1989, a TCT representative detected indications of hydrocarbon contamination beneath the base of the fuel oil tank, subsequent to tank removal. The excavation observation was reported to Brad Ragan Tire in TCT report #8300-90-062 dated December 29, 1989.

Subsequent to the discovery of hydrocarbon contamination, excavation crews removed approximately 4 feet of contaminated soils from beneath the tank, but contaminated soils were still encountered at this depth. Excavation was ceased at this depth because the building footings were encountered. Groundwater was not encountered. Analytical results for the soil sample collected from the base of the excavation, indicated total petroleum hydrocarbons as fuel oil at a concentration of 2,200ppm.

Since all the contaminated soils at the site could not be excavated, a remedial investigation

(RI) report was completed on October 17, 1990. The RI included the installation of three monitoring wells at the site location shown in Figure 2. The results of the RI indicated a generalized profile of unconsolidated fill (sand and silty sands), overlying coarse alluvium (medium to coarse grained sands). The water table was present at approximately 13 to 15 feet below grade, flowing in a northerly direction. The average hydraulic gradient of the aquifer was 0.001 ft/ft. Evidence of hydrocarbon contamination was detected only in the soil boring sample from beneath the former tank location. Concentrations of benzene, toluene, xylenes, and ethyl benzene were also detected in that same location. Fuel oil, benzene, toluene, xylenes, or ethyl benzene were not detected in the balance of the borings.

Recommendations from the RI indicated that neither further remedial excavation, nor soil remediation was warranted at that time. Although groundwater remediation was not recommended, quarterly sampling events was recommended to ensure groundwater was not impacted.

1.1 Scope of Work

TCT's scope of services for this phase of the project consisted of the following:

- Groundwater sampling of monitoring wells MW-1 through MW-3 at Brad Ragan Tire.
- Chemical analysis of the samples for benzene, ethyl benzene, toluene, xylenes(BETX) and total hydrocarbons as fuel oil(THFO).
- Preparing a report presenting field and laboratory data along with opinions and recommendations.

2.0 PURPOSE

The purpose of this report is to:

- Present the results from the most recent groundwater sampling event.
- Measure groundwater elevations to determine the groundwater flow direction.
- Identify any trends in contaminant concentrations.
- Make recommendations concerning continued assessment.

3.0 DEPTH TO GROUNDWATER MEASUREMENTS

On July 18, 1991 and February 5, 1992 a representative of TCT collected depth to groundwater measurements from monitoring wells MW-1, MW-2, and MW-3. These measurements along with previous recorded data are presented in Table 1. Groundwater level measurements indicate that the groundwater flow direction is to the northwest, toward Lake Goodview and the Mississippi River. Groundwater level and flow probably fluctuate dependent upon the stage of the Mississippi River. Evidence of groundwater fluctuations are documented by groundwater level variations of over one foot that were observed between the monitoring periods.

TABLE 1

GROUNDWATER ELEVATION DATA
5110 Service Drive
Winona, Minnesota
TCT# 4800 91-06

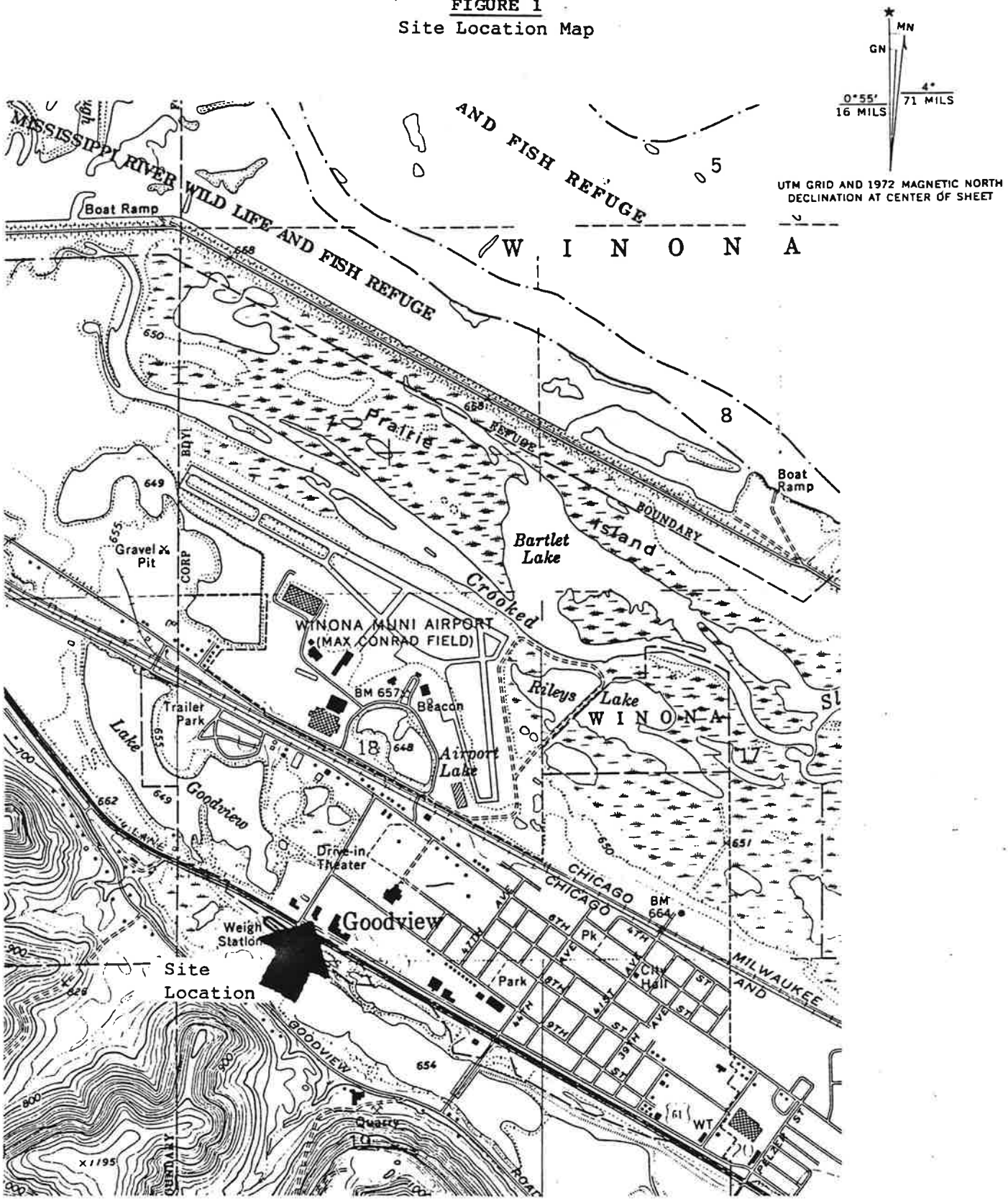
Location	Date	Reference Elevation*	Depth to Groundwater	Water Table Elevation
MW-1	07-18-91	667.97	16.81	651.16
	02-05-92	667.97	18.29	649.68
MW-2	07-18-91	666.08	15.83	650.25
	02-05-92	666.08	16.36	649.72
MW-3	07-18-91	667.87	16.61	651.26
	02-05-92	667.87	18.15	649.72

* Top of riser pipe
NR = No reading taken

twin city testing corporation

FIGURE 1

Site Location Map



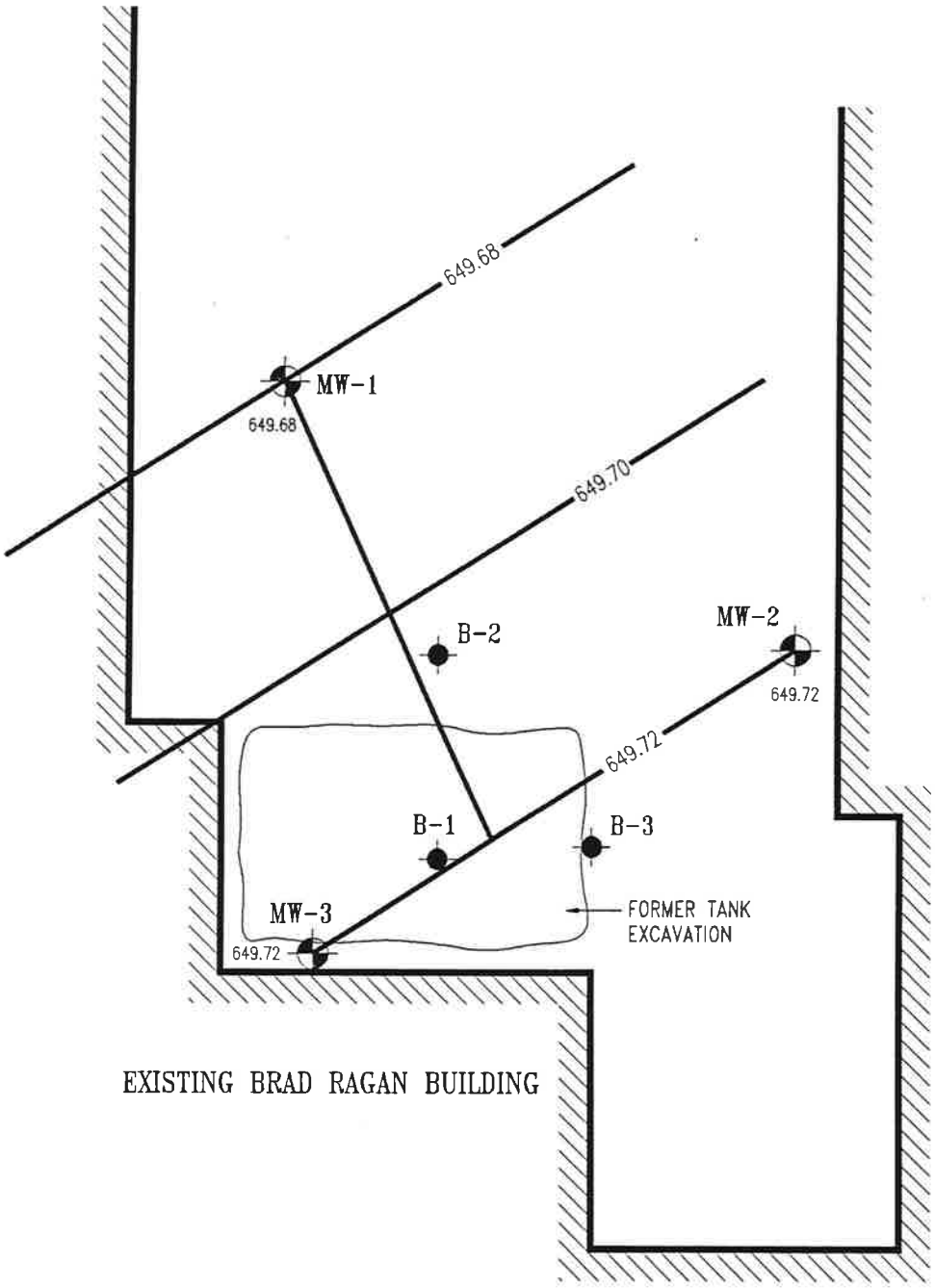
WINONA WEST, MINN.—WIS.

44091-A6-TF-024

1972

DMA 7672 II SW—SERIES V872

BRAD RAGAN TIRE	JOB NO. 4800 90-287	SCALE: 1" = 2000'	DRAWN BY —	CHECKED BY



LEGEND:

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- GROUNDWATER CONTOUR
- 649.70 GROUNDWATER ELEVATION

NORTH

FIGURE NUMBER: 2	DATE: 4-30-92
PROJECT:	PROJECT NO. 4800 92-287
EQUIPOTENTIAL MAP BRAD RAGAN TIRE WINONA, MINNESOTA	DRAWN BY: JULIA STEFFENS
	REVIEWED BY: LIN NELSON
	SCALE: 1"=30' (APPROXIMATELY)
	AUTOCAD DWG: 4231\92-287A

4.0 GROUNDWATER SAMPLING

On July 18, 1991 and February 5, 1992 a representative from TCT collected groundwater samples from monitoring wells MW-1, MW-2, and MW-3. The samples were analyzed for volatile hydrocarbons, BETX, using EPA Method 8020; volatile organic compounds using MNDH 465D; and total hydrocarbons as fuel oil USGS Method 82-1004. All wells were stabilized prior to sample collection in accordance with the methods in Appendix A. "Sampling Information Forms," providing stabilization data and details recorded at the time of sampling are presented in Appendix B.

Tables 2, 3, and 4 contain a tabulation of volatile organic compound results. Complete chemistry reports are presented in Appendix C.

TABLE 2

GROUNDWATER ANALYTICAL RESULTS ABOVE DETECTION LIMITS (µg/L)

07-18-92 91

Compound:	Method Blank	MW-1	MW-2	MW-3	MDL	RAL
Acetone	ND	ND	ND	ND	10	700
Ethyl ether	ND	ND	ND	ND	5	1000
Benzene	ND	ND	ND	ND	1	10
Toluene	ND	ND	ND	ND	1	1000
Cumene	ND	ND	ND	ND	1	
o-xylene	ND	ND	ND	ND	1	
p-m-xylene	ND	ND	ND	ND	1	10,000
Tetrahydrofuran	ND	ND	ND	ND	5	100
Methyl ethyl ketone	ND	ND	ND	ND	5	300
Ethyl Benzene	ND	ND	ND	ND	1	700
Methyl isobutyl ketone	ND	ND	ND	1	1	300
Chloromethane	NP	NP	NP	NP	P/NP	
Vinyl Chloride	NP	NP	NP	NP	P/NP	0.10
Chloroethane	NP	NP	NP	NP	P/NP	
Methylene chloride	1	1	1	1	1	50
Allylchloride	NP	NP	NP	NP	P/NP	1
1,1-Dichloroethane	ND	ND	ND	ND	1	70
Cis-1,2-dichloroethylene	ND	ND	ND	ND	1	
1,2-Dichloroethane	ND	ND	ND	ND	1	4
1,1,1-Trichloroethane	ND	ND	ND	ND	1	600
Bromodichloromethane	ND	ND	ND	ND	1	3
2,3-Dichloro-1-propene	ND	ND	ND	ND	1	
1,1-Dichloro-1-propene	ND	ND	ND	ND	1	
Trichloroethylene	ND	ND	ND	ND	1	
Dibromochloromethane	ND	ND	ND	ND	1	10
Cis-1,3-dichloro-1-propene	ND	ND	ND	ND	1	2
2-Chloroethyl vinyl ether	ND	ND	ND	ND	2	
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	1	20
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	1	2
Pentachloroethane	ND	ND	ND	ND	2	
1,1,2-Trichlorotrifluorethane	ND	ND	ND	ND	1	
Dichlorodifluoromethane	ND	ND	ND	ND	5	1000
Bromoethane	NP	NP	NP	NP	P/NP	0.10
Total hydrocarbons as fuel oil	ND	ND	ND	ND	0.20	

All values are in ug/L. ug/L is equal to parts-per-billion(ppb).
For conversion to parts-per-million(ppm), multiply results by 0.001.
ND = Not Detected
MDL = Method Detection Limit
RAL = Recommended Allowable Limits for Drinking Water Contaminants

TABLE 3

GROUNDWATER ANALYTICAL RESULTS ABOVE DETECTION LIMITS (ug/L)

02-05-92

	Method Blank	MW-1	MW-2	MW-3	PQL	RAL
Parameter:						
Benzene	ND	ND	ND	ND	5	10
Toluene	ND	ND	ND	ND	5	1000
Ethyl Benzene	ND	ND	ND	ND	5	700
Total Xylenes	ND	ND	ND	ND	5	10,000
Total Hydrocarbons as Fuel oil	ND	ND	ND	ND	30	

All values are in ug/L. ug/L is equal to parts-per-billion (ppb).
For conversion to parts-per-million (ppm), multiply results by 0.001.

PQL = Practical Quantitation Limit
RAL = Recommended Allowable Limits for Drinking Water Contaminants
ND = Not Detected

TABLE 4

GROUNDWATER ANALYTICAL RESULTS ABOVE DETECTION LIMITS (ug/L)

02-05-92

Compound:	Method Blank	MW-1	MW-2	MW-3	MDL	RALs
Dichlorodifluoromethane	ND	2	2	ND	2	1000
Chloromethane	ND	ND	ND	ND	2	
Vinyl Chloride	ND	ND	ND	ND	2	0.10
Bromoethane	ND	ND	ND	ND	2	0.10
Chloroethane	ND	ND	ND	ND	2	
Dichlorofluoromethane	ND	ND	ND	ND	2	
Trichlorofluoromethane	ND	ND	ND	ND	2	2,000
Trichlorofluoroethane	ND	1	1	ND	1	
Ethyl Ether	ND	ND	ND	ND	5	1000
Acetone	ND	ND	ND	ND	10	700
1,1-Dichloroethene	ND	ND	ND	ND	1	6
Allyl Chloride	ND	ND	ND	ND	10	1
Methylene Chloride	5	3	2	2	1	50
Methyl Tertiary Butyl Ether	ND	ND	ND	ND	1	
Trans-1,2-Dichloroethane	ND	ND	ND	ND	1	
1,1-Dichloroethane	ND	ND	ND	ND	1	70
Methyl Ethyl Ketone	ND	ND	ND	ND	5	300
2,2-Dichloropropane	ND	ND	ND	ND	1	
cis-1,2-Dichloroethene	ND	ND	ND	ND	1	70
Chloroform	ND	ND	ND	ND	1	60
Bromochloromethane	ND	ND	ND	ND	1	
Tetrahydrofuran	ND	ND	ND	ND	10	100
1,1,1-Trichloroethane	ND	ND	1	ND	1	600
1,2-Dichloropropane	ND	ND	ND	ND	1	
Carbon Tetrachloride	ND	ND	ND	ND	1	3
1,2-Dichloroethane	ND	ND	ND	ND	1	4
Trichloroethene	ND	ND	ND	ND	1	
1,2-Dichloropropane	ND	ND	ND	ND	1	5
Bromodichloromethane	ND	ND	ND	ND	1	3
Dibromomethane	ND	ND	ND	ND	1	
Methyl Isobutyl Ketone	ND	ND	ND	ND	5	300
cis-1,3-Dichloropropene	ND	ND	ND	ND	1	2
trans-1,3-Dichloropropene	ND	ND	ND	ND	1	2

(continued)

MDL = Method Detection Limit
RAL = Recommended Allowable LImits for Drinking Water Contaminants
ND = Not Detected

4.1 Groundwater Quality Assessment

A review of the chemical analysis on July 18, 1991 and February 5, 1992 indicate that neither concentrations of benzene, toluene, ethyl benzene, and total xylenes(BETX), nor total hydrocarbons as fuel oil(THFO) were detected in monitoring wells MW-1, MW-2, or MW-3. Low levels of Methylene Chloride were detected in MW-1, MW-2, and MW-3, but as the compound was also detected in the laboratory blank, the presence is likely due to laboratory contamination.

During the sampling, no measurable free hydrocarbons or hydrocarbon odors were detected in the wells. Low levels of dichlorodifluoromethane and trichlorofluoroethane were detected in monitoring wells MW-1 and MW-2, and 1,1,1-trichloroethane in MW-2; however, they were all well below the Recommended Allowable Limits (RALs) for drinking water contaminants.

The depth to groundwater measurements taken on February 5, 1992 were used to create a groundwater equipotential map that indicates the direction and slope of the water table (Figure 2). A review of the groundwater equipotential map indicates that the flow direction is to the northwest with a gradient of approximately 0.0004 ft/ft.

5.0 DISCUSSION

Analytical results for the last two sampling periods show that there is no evidence indicating that hydrocarbon contamination is impacting groundwater at the Brad Ragan Tire site, as total hydrocarbons as fuel oil were not detected in the groundwater sampled.

Groundwater was determined to be present in the unconsolidated surficial sediments at depths of approximately 13 to 15 feet below grade. Flow direction was determined to be to the northwest with a gradient of 0.0004 ft/ft.

6.0 RECOMMENDATIONS

Due to the lack of any detectable hydrocarbon impacts to the groundwater, as assessed in this report, TCT recommends site closure with no further action, precluding abandonment of the monitoring wells.

7.0 STANDARD OF CARE

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

This report was prepared by: Lin M. Nelson
Lin M. Nelson
Project Manager

Barry Hentz
Project Manager

This report was reviewed by: Kevin Pierson
Kevin Pierson
Senior Project Manager/ Hydrogeologist

TABLE 4 (continued)

GROUNDWATER ANALYTICAL RESULTS ABOVE DETECTION LIMITS (ug/L)
02-05-92

	Method Blank	MW-1	MW-2	MW-3	MDL	RALs
Compound:						
1,1,2-Trichloroethane	ND	ND	ND	ND	1	
1,3-Dichloropropane	ND	ND	ND	ND	1	
Tetrachloroethene	ND	ND	ND	ND	1	
Dibromochloromethane	ND	ND	ND	ND	1	10
1,2-Dibromoethane	ND	ND	ND	ND	2	.004
Chlorobenzene	ND	ND	ND	ND	1	100
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	1	20
Isopropyl benzene	ND	ND	ND	ND	1	300
Bromoform	ND	ND	ND	ND	5	40
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	1	2
1,2,3-Trichloropropane	ND	ND	ND	ND	1	40
n-Propyl benzene	ND	ND	ND	ND	1	
Bromobenzene	ND	ND	ND	ND	1	
1,3,5-Trimethyl benzene	ND	ND	ND	ND	1	
2-Chlorotoluene	ND	ND	ND	ND	1	
4-Chlorotoluene	ND	ND	ND	ND	1	
tert-Butyl benzene	ND	ND	ND	ND	1	
1,2,4-Trimethylbenzene	ND	ND	ND	ND	1	
sec-Butylbenzene	ND	ND	ND	ND	1	
p-Isopropyltoluene	ND	ND	ND	ND	1	
1,3-Dichlorobenzene	ND	ND	ND	ND	1	300
1,4-Dichlorobenzene	ND	ND	ND	ND	1	10
n-Butylbenzene	ND	ND	ND	ND	1	
1,2-Dichlorobenzene	ND	ND	ND	ND	1	600
1,2Dibromo-3Chloropropane	ND	ND	ND	ND	5	.3
1,2,4-Trichlorobenzene	ND	ND	ND	ND	1	
Hexachlorobutadiene	ND	ND	ND	ND	1	1
Naphthalene	ND	ND	ND	ND	1	30
1,2,3-Trichlorobenzene	ND	ND	ND	ND	1	

All values are in ug/L. ug/L is equal to parts-per-billion(ppb).
For conversion to parts-per-million(ppm), multiply results by 0.001.
ND = Not Detected
MDL = Method Detection Limit
RAL = Recommended Allowable Limits for Drinking Water Contaminants

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twin city testing
corporation

3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

October 17, 1990

Brad Ragan Tire
5110 Service Drive
Winona, MN 55987

Attn: Jim Johnson

Subj: Remedial Assessment Report
Brad Ragan Tire
Winona, Minnesota
MPCA Leak ID #LEAK00002049

Dear Mr. Johnson:

Enclosed are two copies of our Remedial Assessment report for the referenced project. We were authorized by you to perform this assessment on April 7, 1990.

If you have any questions concerning the information in this report, or if we can be of additional service, please contact us at 507-288-7060.

Very truly yours

TWIN CITY TESTING CORPORATION

Bradley J. Peschong
Environmental Geologist

BJP/lls

Encs

AN EQUAL OPPORTUNITY EMPLOYER

REMEDIAL ASSESSMENT

BRAD RAGAN TIRE

5110 SERVICE DRIVE

WINONA, MINNESOTA

MPCA LEAK ID# LEAK 00002049

#4800 90-287

1.0 INTRODUCTION

1.1 Purpose

This report presents the results of the Remedial Assessment which Twin City Testing Corporation (TCT) performed for Brad Ragan Tire at the referenced site. The purpose of this assessment was to (1) provide information on the extent of soil contamination at the project site, 2) determine if hydrocarbon contamination has impacted groundwater in the area, and 3) make recommendations regarding remedial action, or additional assessment, if required. TCT was authorized to perform this assessment by Mr. Jim Johnson of Brad Ragan Tire on April 9, 1990.

We understand that the Minnesota Pollution Control Agency (MPCA) had been notified of this site. The MPCA LEAK ID number is #LEAK00002049.

1.2 Scope of Services

The scope of services we have performed on the site included the following:

1. collect background site information in order to prepare a site specific safety plan,
2. advance six (6) soil borings, and complete three (3) as groundwater monitoring wells,
3. screen the recovered soils from the borings with a photoionization detector (PID) for indications of organic vapors related to petroleum contamination, and collect soil samples for laboratory analysis,
4. analyze select soil samples for concentrations of benzene, ethyl benzene, toluene, xylenes, total hydrocarbons as gasoline, and total hydrocarbons as fuel oil,
5. develop the monitoring wells, and record water level measurements,
6. collect representative groundwater samples from the monitoring wells for analysis of concentrations of total hydrocarbons as fuel oil, volatile organic compounds as listed on the Minnesota Department of Health list 465C, and lead,
7. complete and submit the Minnesota Department of Health "Unique Well Number" forms for the installed monitoring wells,
8. analyze data and assess soil and water impact, and
9. prepare a report containing data and recommendations concerning further assessment, if required.

1.3 Background Information

The Brad Ragan Tire site is located at 5110 Service Drive in Winona, Minnesota in the SW 1/4 of Section 18, T.107N, R.8W (See Figure 1).

The area of this assessment formerly contained one 8,000 gallon diesel fuel and one 5,000 fuel oil underground storage tank.

During removal of the tanks in October, 1989, a TCT environmental field technician detected indications of hydrocarbon contamination beneath the base of the fuel oil tank, subsequent to tank removal. The excavation observation was reported to Brad Ragan Tire in TCT Report #8300-90-062 dated December 29, 1989.

Subsequent to the discovery of hydrocarbon contamination, excavation crews removed approximately 4 feet of contaminated soils beneath the tank, but contaminated soils were still encountered in the excavation at this depth. Excavation was ceased at the site when the building footings had been exposed. Groundwater was not encountered.

The Brad Ragan site is located in a light industrial area on the northwest side of Winona, Minnesota. The site is bordered as follows:

South: Frontage road of Highway 61.

West: City street, and beyond by Highway Department.

North: Vacant lot.

East: Commercial Building and Apartment Building

Surface topography of the area is generally flat. According to USGS topographic maps, the average surface elevation of the site is approximately 660 feet above mean sea level. The ground surface of the site is predominantly gravel.

The site is presently serviced by City of Winona water and sewer utilities, however, the only utility near the project area is a natural gas line (See Figure 2).

Based on Minnesota Department of Health (MDH) Data, several water wells are located within an approximate one mile radius of the site. The location of selected wells are noted in Appendix A. The closest well is located approximately 1200 feet to the north. According to the available log for the well, the well is completed in the Cambrian Eau Claire Formation and Mt. Simon Sandstone at depths of 145 feet to 235 feet below grade.

The purpose of this assessment was to provide information of the extent of soil contamination at the site, and to document the potential impact of hydrocarbon contamination on the groundwater, if any.

1.4 Regional Geology

Geology of the region is characterized by Quaternary alluvium and valley fill deposits overlying Cambrian bedrock. In the area of this assessment, the Quaternary deposits consist of clay, silt, sand, and gravels associated with the Mississippi River. Regionally, the thickness of these deposits is estimated to be 50 to 150 feet.

Underlying the unconsolidated deposits are the Cambrian undifferentiated Mount Simon Sandstone through Jordan Sandstone. A stratigraphic column for the area is presented in Figure 3.

1.5 Regional Hydrogeology

According to Minnesota Geological Survey (MGS) data, the main groundwater aquifers for the area are in the unconsolidated surficial deposits and in the Mount Simon Sandstone. These main aquifers in the Winona area are hydrologically interconnected. Regional groundwater flow in the unconsolidated aquifer is anticipated to be controlled by flow in the Mississippi River. Groundwater flow in the bedrock aquifer is anticipated to be to the northeast.

2.0 PROJECT RESULTS

2.1 Soils

2.1.1 Soil Borings

During this assessment, six (6) soil borings were advanced to depths of 14 1/2 to 23 feet below grade, with three completed as groundwater monitoring wells. The locations of the wells and borings are shown in Figure 2. Boring logs are presented in Appendix B. Drilling procedures and methodology is presented in Appendix C, with geologic cross sections referenced on Figure 4 and presented in Figure 5 and 6.

2.1.2 Site Geology

Site geology, based on the borings advanced at the site, consists generally of fill overlying coarse alluvium. Typically, the fill ranged between 3 1/2 to 8 feet thick, and consists of sand and silty sands. In B1, in the area of the tank excavation, recent fill materials were detected to 14 1/2 feet below grade. The coarse alluvium consisted of medium to coarse grained sands, sometimes with gravels.

2.1.3 Soil Screening and Sampling

As the soil borings were advanced, recovered soil samples were screened with a photoionization detector (PID), utilizing a "headspace" screening procedure for indications of petroleum contamination based on the presence of organic vapors. Background levels during site activity were approximately 0.4 to 0.5 ppm (parts-per-million). The location, depth, and relative degree of contamination, based on PID readings, are presented on the soil boring logs, in Appendix B.

PID readings above background were detected in borings B1 and B6 (MW-3). The highest PID reading noted was in the 14 1/2 to 16 foot depth interval of B1, where readings were 18 ppm. All other PID readings detected were less than 1 ppm.

Soil samples were collected for laboratory analysis from representative contaminated intervals, or from the interval immediately above the water table. Selected soil samples were analyzed for total hydrocarbons as gasoline, total hydrocarbons as fuel oil, benzene, ethyl benzene, toluene, and xylenes.

2.2 Groundwater

2.2.1 Monitoring Well Installation

Groundwater monitoring wells were installed in three of the borings B4, B5, and B6, (MW-1, MW-2, and MW-3, respectively). The locations are shown on Figure 2. Wells MW-1, MW-2, and MW-3, were completed with the screened interval at depths of approximately 10 to 20 feet below the ground surface. All wells were constructed with a 10.2 foot screened interval. The construction details for each well are illustrated on the "Monitoring Well Installation" forms presented in Appendix D, and summarized in Table 1. The Minnesota Department of Health Water Well "Unique Well Number" forms are also attached in Appendix D.

In general, groundwater was present at each boring location at a depth of 12 to 15 feet below grade.

2.2.2 Groundwater Development and Sampling

Depth to groundwater was measured in the monitoring wells prior to, and subsequent to development. Measurements and development data are presented on

the Sampling Information sheets in Appendix E and summarized in Table 1. Methodology for well development is included in Appendix C. A groundwater equipotential map for June 21, 1990 is presented in Figure 7.

Groundwater levels recorded infer that the apparent direction of the hydraulic gradient is to the north, with a gradient of approximately 0.001 ft/ft.

Groundwater samples collected from the monitoring wells were analyzed for total hydrocarbons as fuel oil and volatile organic compounds as listed on the Minnesota Department of Health List 465C, and lead.

During the sampling, no measurable free hydrocarbons or hydrocarbon odors were detected in the wells.

2.3 Analytical Results

2.3.1 Soils

The analytical results of the soil boring sampling are presented in Tables 2 and 3. The chemical laboratory reports are included in Appendix F.

A review of the soil sampling analytical results indicates that the only indications of hydrocarbon contamination detected were in the 14.5 to 16.5 foot depth interval of B1. Concentrations of total hydrocarbons as fuel oil were

detected at a concentration of 2,200 ppm. Benzene was detected at concentrations of 4 ppb, toluene at 4 ppb, xylenes at 160 ppb, and ethyl benzene at 38 ppb.

No indications of benzene, toluene, xylenes, ethyl benzene, or total hydrocarbons as gasoline or fuel oil were detected in the analyzed portion of the remaining samples.

2.3.2 Groundwater

The results of the groundwater chemical laboratory analysis is summarized in Tables 4 and 5. The laboratory reports are attached in Appendix F.

A review of the groundwater laboratory analysis indicates that no volatile hydrocarbons attributable to fuel oil were detected in the water sampled from the wells. Low levels of methylene chloride were detected in MW-1, but as the compound also was detected in the laboratory blank, the presence is likely due to laboratory contamination.

2.4 Hydraulic Conductivity

Hydraulic conductivity of the saturated sediments was determined utilizing the "Hazen" approximation on sediments from B4 (MW-1) and B6 (MW-2). The Hazen approximation relies on the effective grain size d_{10}, which is the grain size diameter at which 10% by weight of the soil particles are finer, and 90% are coarser. The calculations for the hydraulic conductivity estimation, and the

grain size gradation curves from B4 (MW-1) and B6 (MW-2) are attached in Appendix G.

By utilizing Hazen methodology, the hydraulic conductivity of materials in the area was determined to be approximately 10^{-1} cm/s.

The calculated hydraulic conductivity at the site is consistent with published hydraulic conductivities for medium to coarse grained sand sediments, which range from 1 cm/s to 10^{-4} cm/s[1].

3.0 DISCUSSION

The results of our subsurface assessment indicates a generalized profile of unconsolidated fill (sand and silty sands), overlying coarse alluvium (medium to coarse grained sands). The water table is present at approximately 13 to 15 feet below grade, flowing in a northerly direction. The average hydraulic gradient of the aquifer is 0.001 ft/ft, with a calculated hydraulic conductivity of 10^{-1} cm/s. The velocity of groundwater flow in the aquifer is estimated to be on the order of 80 meters (250 feet) per year. Groundwater velocity calculations are included in Appendix G.

Based on our assessment, evidence of hydrocarbon contamination was detected only in the soils beneath the former tank location. Concentrations of fuel oil detected in the 14 1/2 to 16 1/2 foot depth interval of B1 were 2,200 ppm.

[1] Groundwater, Freeze and Cherry, 1979, pg. 29.

Concentrations of benzene in the interval were detected at 4 ppb, toluene at 4 ppb, xylenes at 160 ppb, and ethyl benzene at 38 ppb. No fuel oil, benzene, toluene, xylenes, ethyl benzene were detected in the balance of the borings. PID readings obtained during field activities indicate that the highest PID readings were also detected in the 14 1/2 to 16 12 foot depth interval of B1, where readings were 18 ppm. PID readings were also detected in B1 (12' - 14') and in MW-3 (0 feet - 11 1/2 feet), however the readings were all less than 1 ppm.

Based on this assessment, widespread fuel oil contamination does not appear to be present in soils at the site, and further remedial excavation is not warranted. Additionally, due to the apparent limited vertical and horizontal extent, in-situ soil remediation methods do not appear warranted.

A review of the groundwater analytical data indicates that there are no suggestions of hydrocarbon contamination impacting groundwater at the Brad Ragan site, as no volatile hydrocarbon compounds or fuel oil were detected in the sampled groundwater. Therefore, the MPCA "Hydrogeologic Setting" worksheet, and "Groundwater Receptor" survey are not required for the project at this time.

As no volatile hydrocarbons or fuel oil were detected in groundwater of the site, no groundwater remediation is necessary at this time. TCT recommends, however, that three additional quarterly sampling events be conducted to ensure continuing non-impact to the aquifer. If volatile hydrocarbons or fuel oil are not detected during the proposed sampling period, TCT will recommend project closure.

4.0 CONCLUSIONS

Based on the results of our assessment our conclusions are:

1. Groundwater was determined to be present in unconsolidated surficial sediments at depths of approximately 13 to 15 feet below grade, but sampling and chemical analysis did not detect any evidence of fuel oil or volatile hydrocarbons from the Brad Ragan site impacting groundwater.

2. The groundwater flow direction at the site is to the north, with a hydraulic conductivity calculated to be 10^{-2} cm/s. The flow velocity is calculated to be on the order of 80 meters per year.

3. As soil contamination remaining in-place at the site appears aerially and vertically limited, no further remedial excavation is necessary. Additionally, given the limited extent, in-situ soil remediation methods do not appear warranted.

5.0 RECOMMENDATIONS

The following recommendations are made:

1. The MPCA should be provided with a copy of this assessment.

2. The existing groundwater monitoring wells should be sampled for three quarters to document ongoing groundwater conditions. The samples collected should be analyzed for volatile organic compounds as listed on the MDH List 465C, and total hydrocarbons as fuel oil.

3. The feasibility of additional response action should be reviewed following the additional sampling event. Assuming no volatile compounds or fuel oil are detected in the groundwater, TCT will recommend project closure to the MPCA project manager following completion of the proposed sampling.

6.0 STANDARD OF CARE

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

This report was prepared by: Bradley J. Peschong

Bradley J. Peschong
Environmental Geologist

Date: October 17, 1990

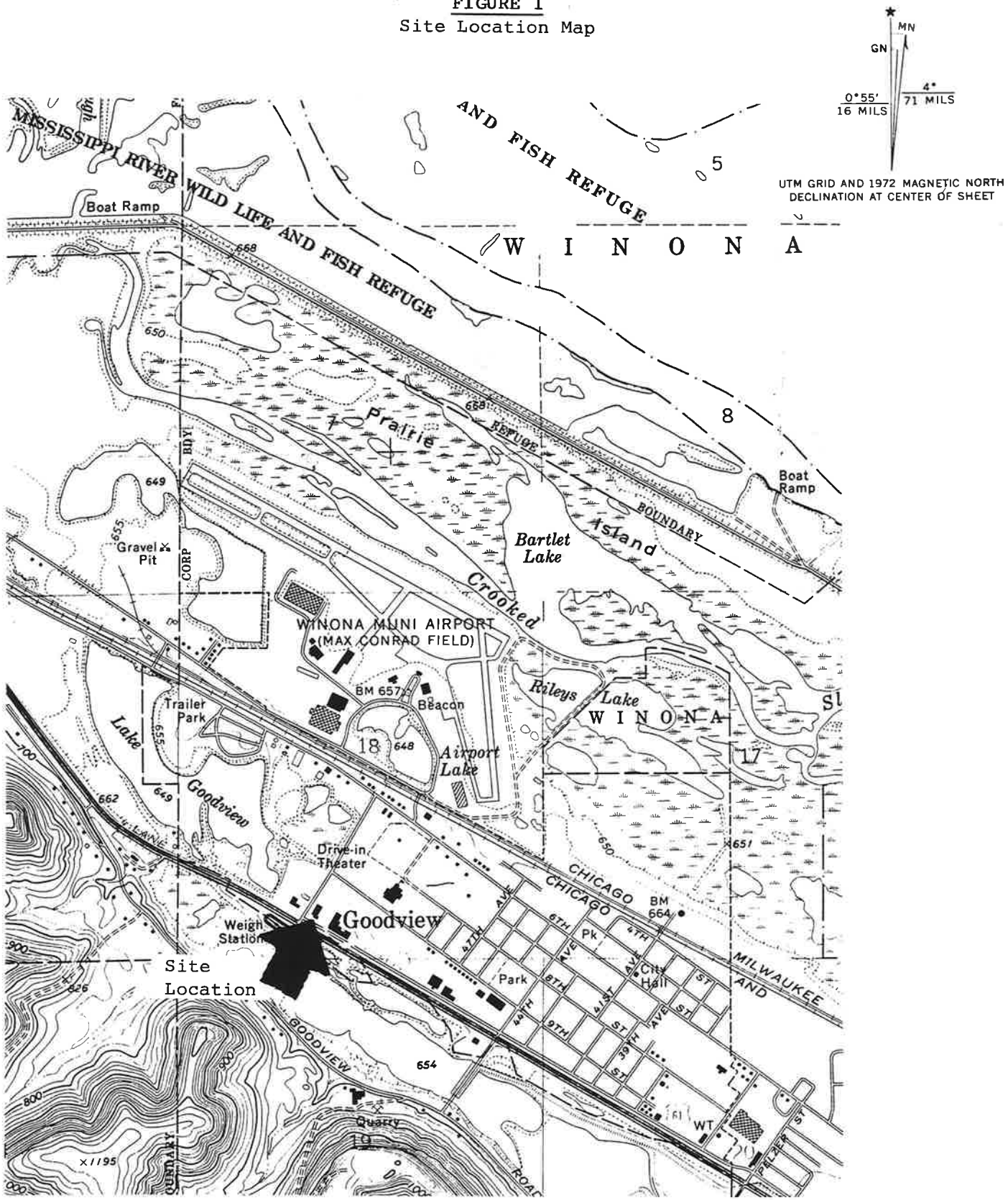
This report was reviewed by: Mark Oppen (MB)

Mark Oppen, Manager
Environmental Project Services

twin city testing corporation

FIGURE 1

Site Location Map



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DMA 7672 II SW—SERIES V872

BRAD RAGAN TIRE	JOB NO. 4800 90-287	SCALE: 1" = 2000'	DRAWN BY	CHECKED BY

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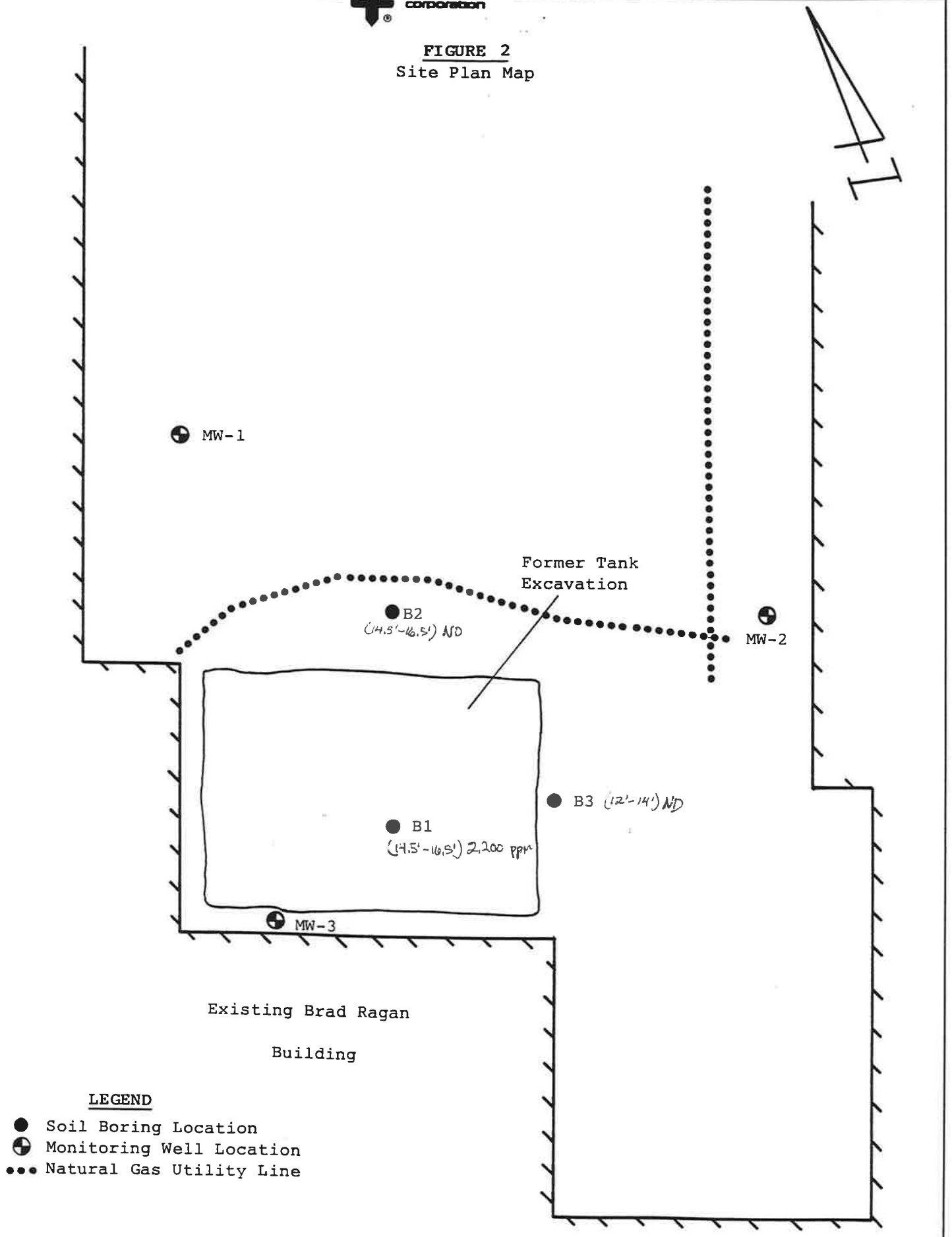
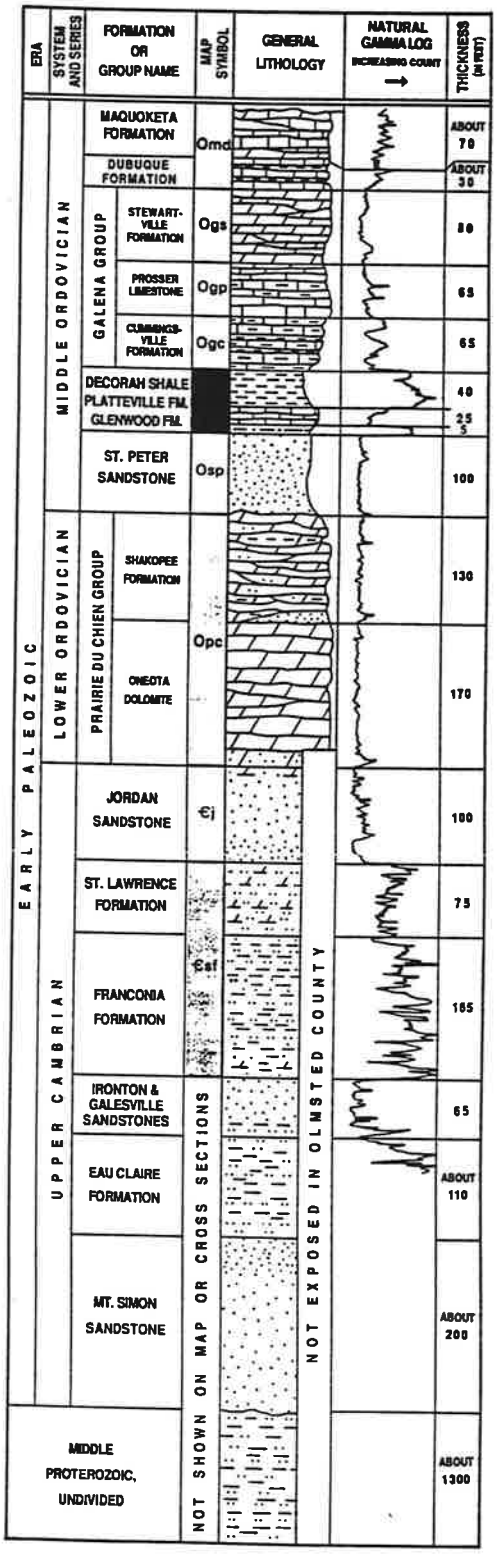
FIGURE 2
Site Plan Map



BRAD RAGAN TIRE	JOB NO. 4800 90-287	SCALE: 1" = 20'	DRAWN BY BP	CHECKED BY

FIGURE 3

Stratigraphic Nomenclature



BRAD RAGAN TIRE	JOB NO. 4800-90-287	SCALE: -	DRAWN BY -	CHECKED BY RS

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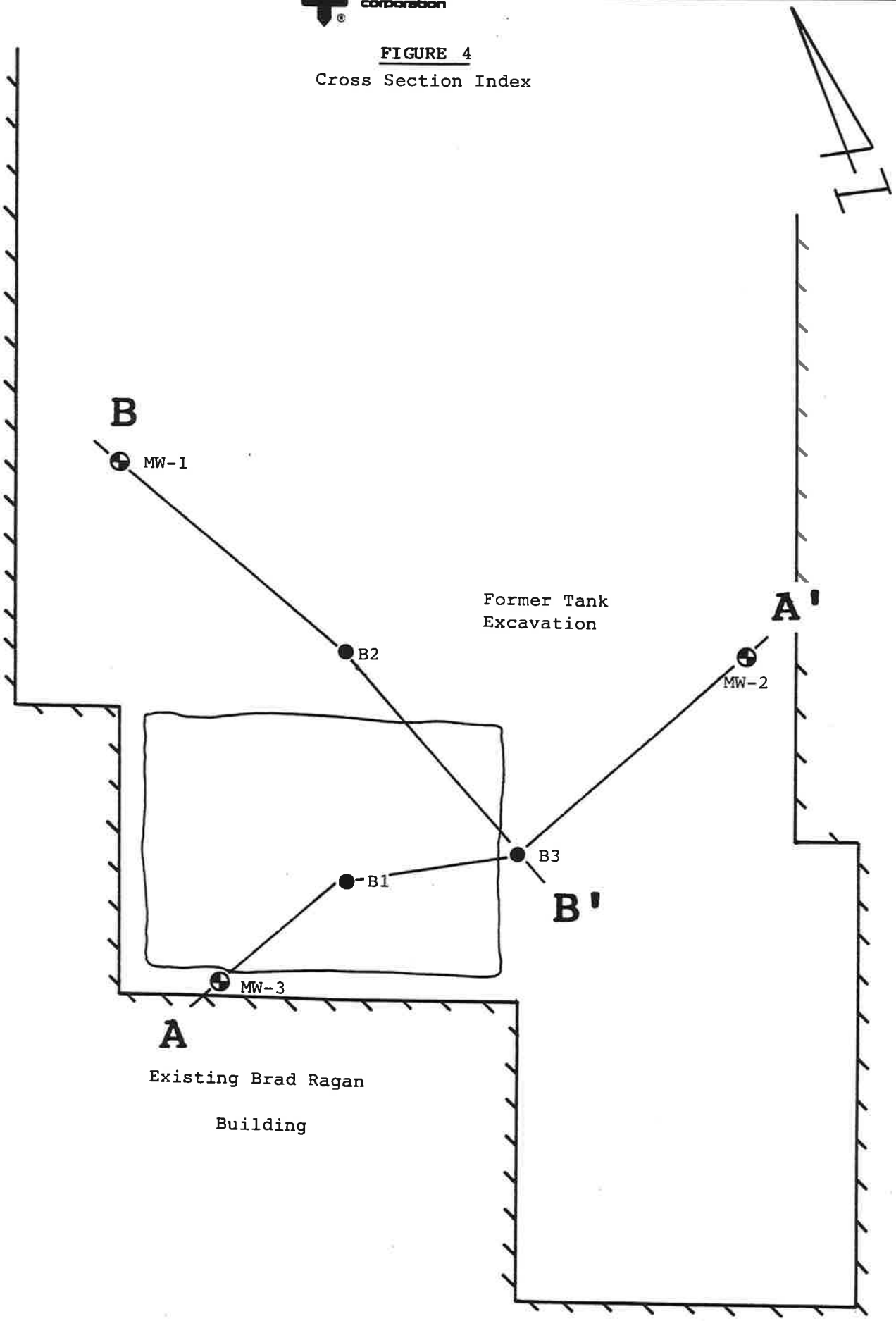
FIGURE 4

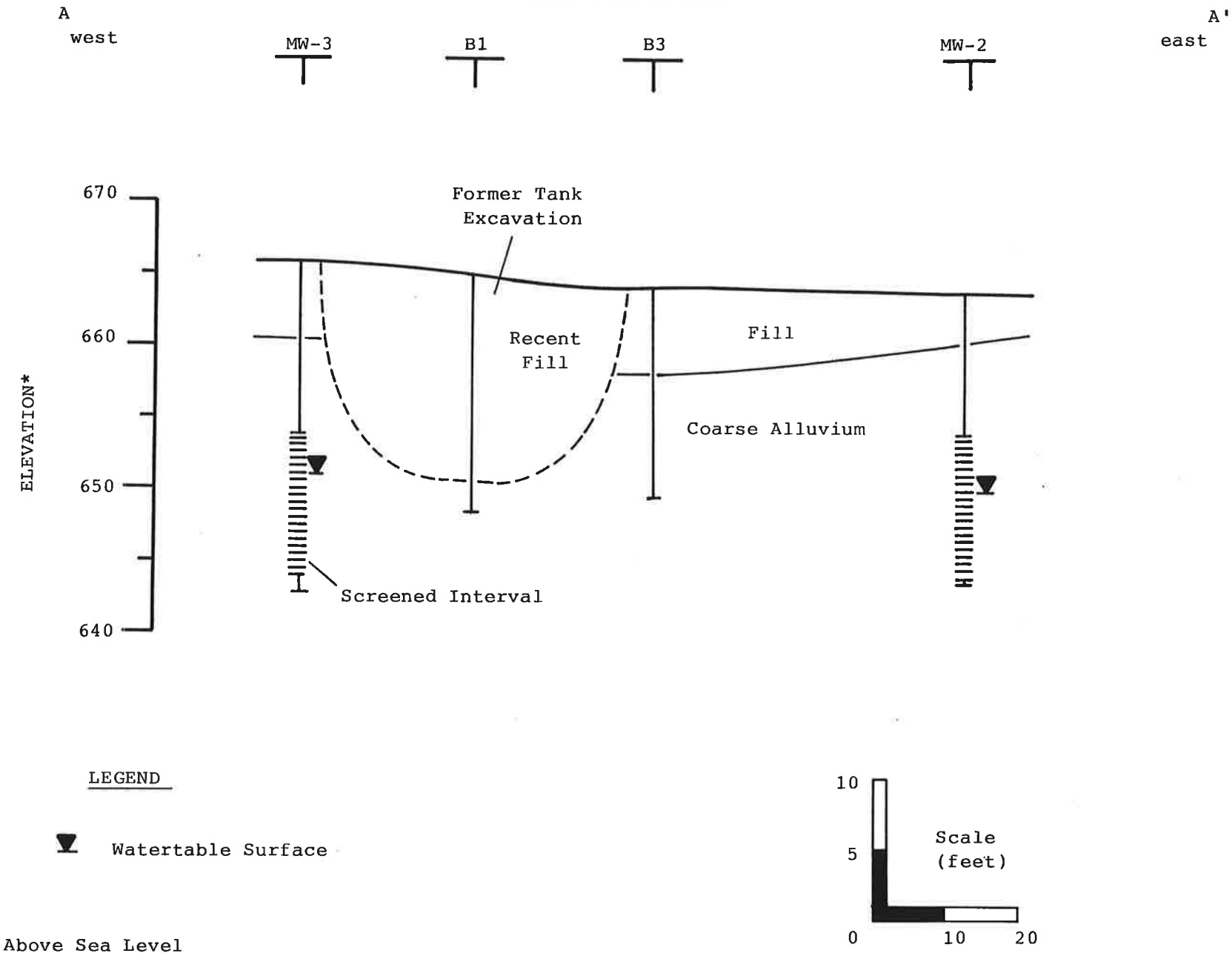
Cross Section Index



BRAD RAGAN TIRE	JOB NO. 4800 90-287	SCALE: 1" = 20'	DRAWN BY BP	CHECKED BY

4800 90-287

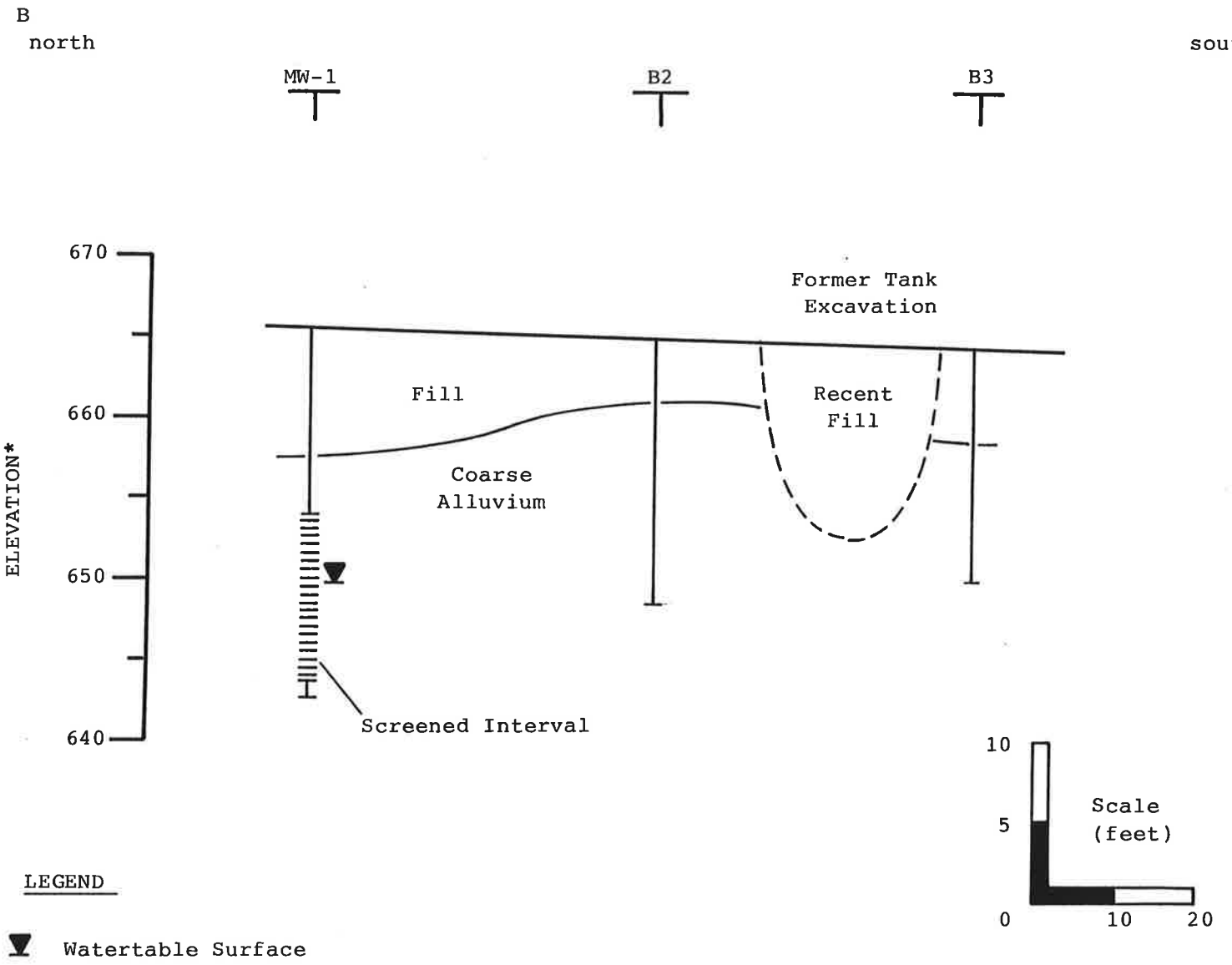
FIGURE 5
Cross Section A-A'



*Feet Above Sea Level

4800 90-287

FIGURE 6
Cross Section B-B'

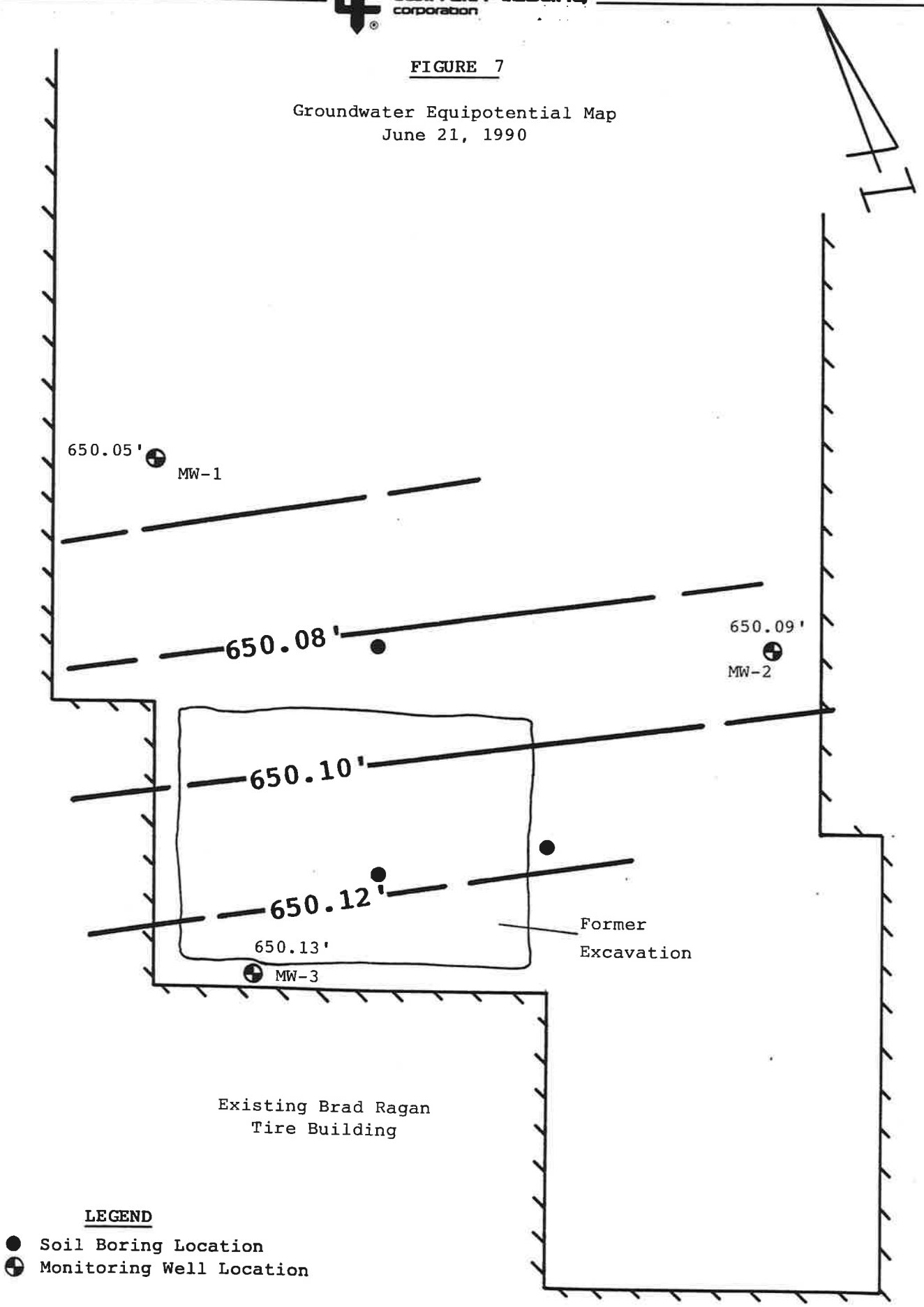


*Feet Above Sea Level

twin city testing corporation

FIGURE 7

Groundwater Equipotential Map
June 21, 1990



BRAD RAGAN TIRE	JOB NO. 4800 90-287	SCALE: 1" = 20'	DRAWN BY BP	CHECKED BY

TABLE 1

MONITORING WELL DATA SUMMARY

Well	Top of Riser Elevation (ft) *	Groundwater Depth**	Groundwater Elevations (ft)* (Elev.)	(Date)	Elevation of Screened Interval*
MW-1	667.97	17.92	650.05	6-21-90	653.77 - 643.57
MW-2	666.08	15.99	650.09	6-21-90	653.98 - 643.78
MW-3	667.87	17.74	650.13	6-21-90	653.77 - 643.57

* Feet Above Sea Level

** Feet Below Top of Riser

TABLE 2

SOIL ANALYTICAL RESULTS - BETX

Parameter	B-1, 14.5-16.5'	B-2, 14.5-16.5'	B-3, 12-14'	B-4, MW-1, 12-14'	B-5, MW-2,12-14'	B-6, MW-3, 12-14'	MDL (ug/kg)
Total hydrocarbons as gasoline	51,000*	ND	ND	ND	ND	ND	1
Benzene	4	ND	ND	ND	ND	ND	1
Toluene	4	ND	ND	ND	ND	ND	1
Total xylenes	160	ND	ND	ND	ND	ND	1
Ethyl benzene	38	ND	ND	ND	ND	ND	1

*Higher boiling hydrocarbons present, non-typical of gasoline.

All values are in ug/kg which is equal to parts-per-billion (ppb).

ND = Not Detected

MDL = Method Detection Limit

TABLE 3

SOIL ANALYTICAL RESULTS - FUEL OIL

Sample Identification	Total Hydrocarbons as #2 Fuel Oil (mg/kg)
B-1, 14.5-16.5'	2,200
B-2, 14.5-16.5'	ND
B-3, 12-14'	ND
B-4/MW-1, 12-14'	ND
B-5, MW-2, 12-14'	ND
B-6/MW-3, 12-14'	ND
Method Detection Limit	2.0

All values are in mg/kg which is equal to parts-per-million (ppm).

ND - Not Detected

TABLE 4

GROUNDWATER ANALYTICAL RESULTS - VOLATILES

Compound	Method Blank	MW-1	MW-2	MW-3	MDL (ug/L)
Acetone	ND	ND	ND	ND	10
Ethyl ether	ND	ND	ND	ND	5
Benzene	ND	ND	ND	ND	1
Toluene	ND	ND	ND	ND	1
Cumene	ND	ND	ND	ND	1
o-Xylene	ND	ND	ND	ND	1
m-p-Xylenes[1]	ND	ND	ND	ND	1
Tetrahydrofuran	ND	ND	ND	ND	5
Methyl ethyl ketone	ND	ND	ND	ND	5
Ethyl benzene	ND	ND	ND	ND	1
Methyl isobutyl ketone	ND	ND	ND	ND	1
Chloromethane	NP	NP	NP	NP	P/NP
Vinyl chloride	NP	NP	NP	NP	P/NP
Chloroethane	NP	NP	NP	NP	P/NP
Methylene chloride	7	1	ND	ND	1
Allyl chloride	ND	ND	ND	ND	1
1,1-Dichloroethane	ND	ND	ND	ND	1
Cis-1,2-dichloroethylene	ND	ND	ND	ND	1
1,2-Dichloroethane	ND	ND	ND	ND	1
1,1,1-Trichloroethane	ND	ND	ND	ND	1
Bromodichloromethane	ND	ND	ND	ND	1
2,3-Dichloro-1-propene	ND	ND	ND	ND	1
1,1-Dichloro-1-propene	ND	ND	ND	ND	1
Trichloroethylene	ND	ND	ND	ND	1
Chlorodibromoethane	ND	ND	ND	ND	1
Cis-1,3-dichloro-1-propene	ND	ND	ND	ND	1
2-Chloroethyl vinyl ether	ND	ND	ND	ND	1
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	2
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	1
Pentachloroethane	ND	ND	ND	ND	1
1,1,2-Trichlorotrifluoroethane	ND	ND	ND	ND	2
Dichlorodifluoromethane	NP	NP	NP	NP	1
Bromomethane	NP	NP	NP	NP	P/NP
Dichlorofluoromethane	NP	NP	NP	NP	P/NP
Trichlorofluoromethane	NP	NP	NP	NP	P/NP
1,1-Dichloroethylene	ND	ND	ND	ND	5
Trans-1,2-Dichloroethylene	ND	ND	ND	ND	1
Chloroform	ND	ND	ND	ND	1
Dibromomethane	ND	ND	ND	ND	1
Carbon tetrachloride	ND	ND	ND	ND	5
Dichloroacetonitrile	ND	ND	ND	ND	1
1,2-Dichloropropane	ND	ND	ND	ND	2
Trans-1,3-dichloro-1-propene	ND	ND	ND	ND	1
1,3-Dichloropropane	ND	ND	ND	ND	1
1,1,2-Trichloroethane	ND	ND	ND	ND	1
1,2-Dibromoethane	ND	ND	ND	ND	1
Bromoform	ND	ND	ND	ND	1
1,2,3-Trichloropropane	ND	ND	ND	ND	5
Tetrachloroethylene	ND	ND	ND	ND	1
Chlorobenzene	ND	ND	ND	ND	1
1,2-Dichlorobenzene	ND	ND	ND	ND	1
1,3-Dichlorobenzene	ND	ND	ND	ND	1
1,4-Dichlorobenzene	ND	ND	ND	ND	1

[1]Compounds not separated by this method.

All values are in ug/L which is equivalent to parts-per-billion (ppb).

P/NP = Present/Not Present
ND = Not Detected
MDL = Method Detection Limit

TABLE 5

GROUNDWATER ANALYTICAL RESULTS - FUEL OIL

Sample Identification	Total Hydrocarbons as #2 Fuel Oil (mg/L)
MW-1	ND
MW-2	ND
MW-3	ND
Method Detection Limit	0.1

All values are in mg/L which is equivalent to parts-per-million (ppm).

ND - Not Detected