Bay West

Bay West Inc.
Five Empire Drive
St. Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099

November 25, 1992

Mr. Mark Koplitz
Pollution Control Specialist
Tanks and Spills Section
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

RE: Remedial Investigation Report - Cargill Molasses, Savage, Minnesota
Leak No. LEAK00004526

Dear Mr. Koplitz:

Enclosed in one copy of the Remedial Investigation Report for the referenced facility. This report is being submitted for your review.

If you have any questions, please call me at 291-0456.

Yours truly,

Shirley McMaster

Shirley McMaster
Vice President, Technical Services

c/enc: R. Rarick, Cargill Molasses
S. Larson, Cargill
K. Volker, Cargill

Bay West

Bay West Inc.
Five Empire Drive
St Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099

REMEDIAL INVESTIGATION REPORT
Cargill Molasses Liquid Products, Inc.

Port Cargill
12120 Lynn Avenue South
Savage, Minnesota
Leak # 00004526

Submitted to:

CARGILL MOLASSES LIQUID PRODUCTS, INC.

Submitted by:

BAY WEST, INC.

Shirley McMaster, P.E.
Vice President, Technical Services

November 25, 1992

TABLE OF CONTENTS

1.0 INTRODUCTION

At the request of Cargill Molasses Liquid Products (Cargill) Inc., Bay West, Inc., (Bay West) has completed a subsurface investigation at their facility located within Port Cargill at 12120 Lynn Avenue South in Savage, Minnesota. This investigation was performed in general accordance with the plan outlined in our May 7, 1992 proposal. This report summarizes the results of the investigation conducted during July 20 and 21, 1992 and September 4, 1992.

1.1 General Information

The facility is located north of the city of Savage, in the NW¼ of the SE¼ of the NE¼ of Section 31, Township 27N, Range 24W of the Bloomington, Minnesota 7.5-minute topographic quadrangle (Figure 1). The site latitude is 45° 47' 15", the longitude is 93° 20' 00". The Minnesota River is immediately to the north and west of the Port Cargill flood control dike. The dike is located approximately 300 feet to the west of the release area.

In September 1991, Cargill personnel noticed sheens on standing rain water near the aboveground fuel oil tank. A leak in either the supply or return line was suspected. These lines run from the fuel oil storage tank, beneath two railroad tracks, to the facility's standby boiler. Excavation activities and subsequent remedial activities are summarized in Bay West's December 19, 1991 report entitled "Subsurface Investigation and Line Excavation, Cargill Molasses Facility, Port Cargill, Savage, Minnesota, LEAK No. 4526." Approximately 25 cubic yards of contaminated soil were removed from the areas shown in Figure 2 and stored on plastic during the excavation of the two trenches. After the lines were exposed, it was found that both lines were corroded with visible pinholes. It was estimated that approximately 50 to 60 gallons of fuel oil were released. Due to the presence of active railroad tracks, it was not possible to remove all the contaminated soil.

Eight soil borings were completed in and around the leak site in October 1991 to determine the horizontal and vertical extent of the contamination from the leak source. The boring locations and approximate extent of soil contamination are shown in Figures 2 and 3.

Following a review of the Bay West report which summarized the above work, on April 3, 1992 the Minnesota Pollution Control Agency (MPCA) requested the completion of monitoring wells at the site. To that end, this report summarizes the investigation to determine the impact of the release on ground water beneath the facility.

1.2 Scope of Work

Work completed by Bay West on July 20 and 21, 1992 included the following

1) Completion of four soil borings for headspace and/or chemical analyses
2) Installation of monitor wells in three of the soil borings
3) Collection of one round of ground water samples for chemical analyses
4) Collection of one round of water level elevation data

In September 4, 1992 a second round of ground water sampling and water level elevations were collected. Hydraulic conductivity measurements were also collected at this time.

2.0 METHODOLOGY

2.1 Soil Boring Completion

Soil borings were completed with a truck-mounted auger drill rig equipped with 4.25-inch inside diameter (I.D.) hollow-stem augers. All borings were completed in accordance with ASTM D 1452 "Soil Investigation and Sampling by Auger Borings." Soil sampling was conducted with a 2-inch outside diameter (O.D.), 2-foot-long split-barrel sampler in general accordance with ASTM D 1586 "Penetration Tests and Split-Barrel Sampling of Soils."

All soil samples were logged by a Bay West geologist. Information collected during the completion of the soil borings included:

- soil classification
- structural features
- depth to water-bearing zones

- depth, location, and identification of contamination encountered
- blow counts, color, and grain-size distribution

Flight augers, drilling rods, and tools, were decontaminated prior to their use at each boring location. To minimize the potential for cross-contamination, split-barrel samplers were decontaminated between sampling events using a tap water and detergent (alconox) wash followed by a tap water rinse.

Monitoring of soils removed during completion of the soil borings was performed on site using headspace analysis at ambient temperature. Headspace analysis was performed in accordance with MPCA's "Jar Headspace Analytical Screening Procedure." Headspace readings were obtained with an HNU photoionization detector (HNU) equipped with a 10.2 eV lamp.

2.2 Monitor Well Installation

Well screens were constructed of 2-inch diameter Schedule 40 PVC with 0.010-inch slot openings. Riser pipe material was construction of 2-inch Schedule 40 PVC. Graded sand pack was placed to one and one-half feet above the screen. A minimum six-inch thick bentonite slurry seal was then placed above the sand pack and the remainder of the annular space was grouted to the surface. All materials used in the construction of the wells were decontaminated prior to installation and were free of chemicals, paint, coatings, etc., that could affect chemical analyses.

2.3 Soil and Ground Water Analyses

As the previous investigation had adequately defined the extent of soil contamination, none of the soil samples were chemically analyzed.

Ground water samples were collected from the monitor wells to determine the concentration of soluble water contamination. All ground water samples were collected in general accordance with methodologies established by the U.S. EPA. All samples were labelled and stored in cleaned coolers with ice prior to being submitted to the laboratory. A chain-of-custody form accompanied all samples.

Ground water samples collected from the on-site wells were initially analyzed for volatile organic compounds (VOCs) using Minnesota Department of Health (MDH) Method 465, and total petroleum hydrocarbons (TPH) using EPA Methods 5030/8020. A second round of samples were analyzed for benzene, toluene, ethyl benzene, xylenes (BTEX), and other select VOCs, EPA Method 8240 and TPH using EPA Method 8020.

3.0 RESULTS AND DISCUSSION

3.1 Regional Geology/Hydrogeology

A review of regional geologic information indicates that the general site stratigraphy includes Pleistocene glacial deposits consisting of alluvium (silts, sands and gravels) overlying the lower part of the Prairie du Chien group. The Prairie du Chien, consisting of dolomite and some sandstone, is approximately 100 feet thick. It is underlain by the Jordan Sandstone which is hydraulically interconnected with the Prairie du Chien. The Jordan Formation, approximately 100 feet thick, is situated over the silty sandy dolomite St. Lawrence Formation. The St. Lawrence Formation does not yield water and generally acts to retard vertical water movement. The St. Lawrence is underlain by the Franconia sandstone and Dresbach Group which yield moderate to large quantities of water and are the source of many of the area's drinking water wells.

3.2 Site Stratigraphy and Soil Sampling

Four soil borings, SB-9 through SB-12, w
ere completed adjacent to the site during the July 1992 investigation (Figure 4). The borings were completed to bedrock, the depth of which ranged from 6 to 9 feet below grade (bg). Soil boring logs are contained in Appendix 1. The soils encountered in borings SB-9 and SB-10 was a dark brown silty clay, while gravel and cobbles were present in the other borings.

Headspace readings were collected at selected depths during the completion of the borings. The results of the headspace analyses are contained in Appendix 2. To summarize, headspace readings ranged from 0 ppm to 1 ppm in the four soil borings. There were no odors, staining or sheens noted on any of the samples collected or any of the cuttings.

3.3 Ground Water Flow

Bay West installed three ground monitor wells to assess the surficial ground water flow paths and to obtain representative ground water samples for chemical analyses. The MDH unique well numbers are 485093 (MW-1), 485094 (MW-2), and 485095 (MW-3). The monitor wells are designed to monitor the water table surface and its fluctuation range within the surficial aquifer.

The wells were installed to the bedrock surface, a depth between eight and 9.5 feet below grade (bg). Monitor well MW-1 was completed at grade; the other two wells were completed as above grade wells. Due to shallow depth to bedrock, and to allow for sufficient depths to seal the wells, the screened sections of the wells were five feet in length. The monitor well completion diagrams and MDH water well records are contained in Appendix 3.

Water level elevations were measured on July 21, 1992 with an ORS oil/water interface probe accurate to 0.01 feet, in order to determine the local ground water flow direction and the hydraulic gradient across the site. The results of the water level measurements (contained in Table 1) indicate that the depth to water varied between 2.4 and 5.1 feet bg. The ground water gradient across the site, calculated from the water table map (Figure 5), was 7.0×10^{-3} ft/ft northeast.

On September 4, 1992, an additional round of water level elevations were collected from the three wells. These results are also contained in Table 1. The depth to water ranged between 3 and 6.3 feet bg. The ground water flow direction was determined to be to the east northeast (Figure 6); the gradient was calculated to be 1.1×10^{-2} ft/ft.

3.4 Ground Water Analyses

Ground water samples were collected from the monitor wells on July 22, 1992 and analyzed for VOCs and TPH as fuel oil. The field sampling data sheets are contained in Appendix 4. The laboratory results are contained in Appendix 5 and summarized in Table 2.

To summarize, while petroleum constituents were detected in all three monitor wells, these compounds were all below the MDH Recommended Allowable Limits (RALs) for drinking water supplies. Acetone, methyl ethyl ketone (MEK), and tetrahydrofuran were also detected in the three wells. These compounds coelute with certain petroleum compounds and, therefore, are sometimes erroneously identified using gas chromatography (GC) methodology. For this reason, the second round of sampling conducted on September 4, 1992 included VOC analysis by gas chromatography/mass spectroscopy (GC/MS) methodology and TPH.

The field sampling data sheets for the September round of samplings can be found in Appendix 6. The laboratory report is contained in Appendix 7. The only compounds detected were acetone, MEK, and tetrahydrofuran. All the concentrations were below the RALs.

3.5 Hydraulic Conductivity

Slug tests were performed on the wells using a Hermit transducer/data logger to record the data. The permeability of well MW-1 was determined to be 0.4 feet/day via Bouwer-Rice Method.

Slug tests were also performed on wells MW-2 and MW-3. The results from these wells were disregarded as it appeared the recovery due to the gravel pack masked the recovery from the natural formation. The results are contained in Appendix 8.

3.6 Vapor Risk/Receptors Survey

The locations of adjacent underground utilities are shown on Figure 7. The gas and water lines could serve as additional contaminant pathways during periods of elevated ground water levels. There were no sewer lines or building basements in the immediate area, therefore, a vapor risk assessment was not conducted.

All available well logs were obtained from the Minnesota Geologic Survey for a one-mile radius of the facility. These logs are contained in Appendix 9; the locations of these wells are shown on Figure 8.

There is one well log available for a well currently in service at the Port Cargill facility (Unique Well No. 208835). The well is completed approximately 240 feet bg in the Jordan sandstone. The well has a surface casing to seven feet bg (top of bedrock) and a grouted liner to 30 feet bg. The well is approximately 100 feet north of the building. Discussions with Cargill personnel at the facility indicated that this well is currently used as a supply of fire, and potable water. It is scheduled to be taken out of drinking water service in the near future.

Cargill personnel also indicated that there are two additional wells on site. The wells are located near the plant entrance, about ½ mile from the release location. The wells were installed in the 1940s and were used as a source of process water at that area of the port. They are currently not in service due to the process shutdown. There are no other known active wells on site.

The remaining well logs for the general vicinity indicate completion depths in bedrock formations in excess of 140 feet bg. The City of Savage is serviced by a municipal water supply whose sources are wells installed into the Jordan Sandstone. Port Cargill is connected to this system.

The MPCA Hydrogeologic Setting and Ground Water Characterization Form has been completed and is attached in Appendix 10.

4.0 SUMMARY/CONCLUSIONS

The main goal of this investigation was to determine the impact of a petroleum product release on the soil and surficial aquifer beneath the site. In order to assess the impact, Bay West completed 12 soil borings and three ground water monitor wells at the site and analyzed ground water samples for select petroleum contaminants. Based upon the results of this investigation, the following conclusions have been reached regarding the on-site hydrogeologic and contaminant conditions:

- The unconsolidated sediment beneath the site consists of primarily a silty clay, with sands, gravels, and cobbles also present in several locations.
- The top of the Prairie du Chien bedrock ranges from 5 to 9 feet bg

- Headspace and chemical analyses of soil samples indicated that petroleum constituents are present in the soil beneath the site. This contamination is most likely due to the release.
- While the initial round of ground water sampling indicated the presence of selected petroleum constituents below the RALs, these constituents were not detected in the second sampling round.
- The primary surficial water-bearing strata is the silty clay unit. The variation in the depth to water is likely due to precipitation and the presence of springs known to exist beneath the facility.
- The presence of MEK, acetone, and tetrahydrofuran detected in ground water samples are likely the result of incomplete manufacturer's decontamination of the PVC well screen.

5.0 RECOMMENDATIONS

Surficial soil contamination remains in the release area. The removal of this contamination would require the extended shutdown and removal of the active railroad tracks. The variable nature of the soil, the shallow depth to water, and the presence of the railroad tracks would make a soil venting system impractical.

Therefore, Bay West recommends no further remedial action at the site due to the following: 1) The release location is an industrial site; 2) the contamination is below grade, thereby restricting human contact; 3) the surficial water-bearing zone is not used for drinking water.

However, Bay West recommends the collection of one additional round of ground water samples and water level elevations. If this round of sampling confirms the absence of petroleum constituents, a request for closure can be made to the MPCA. If contamination is detected above the RALs, sampling should be continued until contaminant levels remain below the RALs for two consecutive sampling rounds.

6.0 DISCLAIMER

The conclusions contained in this report represent our professional opinions. These opinions are based on currently available information and are 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.

TABLE 1

Monitoring Well Construction Summary/Water Level Elevations

Well ID	MW-1	MW-2	MW-3
TOC Elevation (feet)	100.69	99.32	102.49
Grade Elevation (feet)	100.69	97.71	100.81
Casing OD (in.)	2	2	2
Borehole Diameter (in.)	8.25	8.25	8.25
Depth to TOS (feet btoc)	4.73	3.72	3.82
Depth to BOS (feet btoc)	8.73	8.72	8.82
Water level (feet btoc)			
7/21/92	5.1	3.97	5.78
9/4/92	6.32	4.58	6.42
Water table elevation (feet)			
7/21/92	95.59	95.35	96.71
9/4/92	94.37	94.74	96.07

NOTE: Elevation data is referenced to top bolt of fire hydrant located to the northwest of the scale which is northeast of well MW-1 (nominal elevation 100.00 feet).

TIC = top of casing
OD = outside diameter
TOS = top of screen
BOS = bottom of screen
btoc = below top of casing

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TABLE 2

Summary of Detected Compounds

Ground Water Sampling

(ug/1)

	MW-1	MW-2	MW-3	RAL
TPH	ND	ND	300	ND
Benzene	ND	2.3	ND	10
Toluene	3.6	3.3	28.8	1000
Ethyl Benzene	ND	2.4	19.9	700
Xylenes	2.5	7.8	121	10000
MEK	190	5830	77.3	300
Tetrahydrofuran	63.8	3940	21.5	100
Acetone	ND	50.1	ND	700
Choroethane	ND	2.3	ND	NL
1,2-Dichlorobenzene	ND	1.2	1.2	600
1,2,4-Trimethylbenzene	ND	2.3	14.7	NL
1,3,5-Trimethylbenzene	ND	ND	14.7	NL
Isoproplybenzene	ND	ND	3.7	300
Napthalene	ND	ND	1.8	30

NL = None Listed

ND = Not Detected

Tables

Bay West

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Bay West

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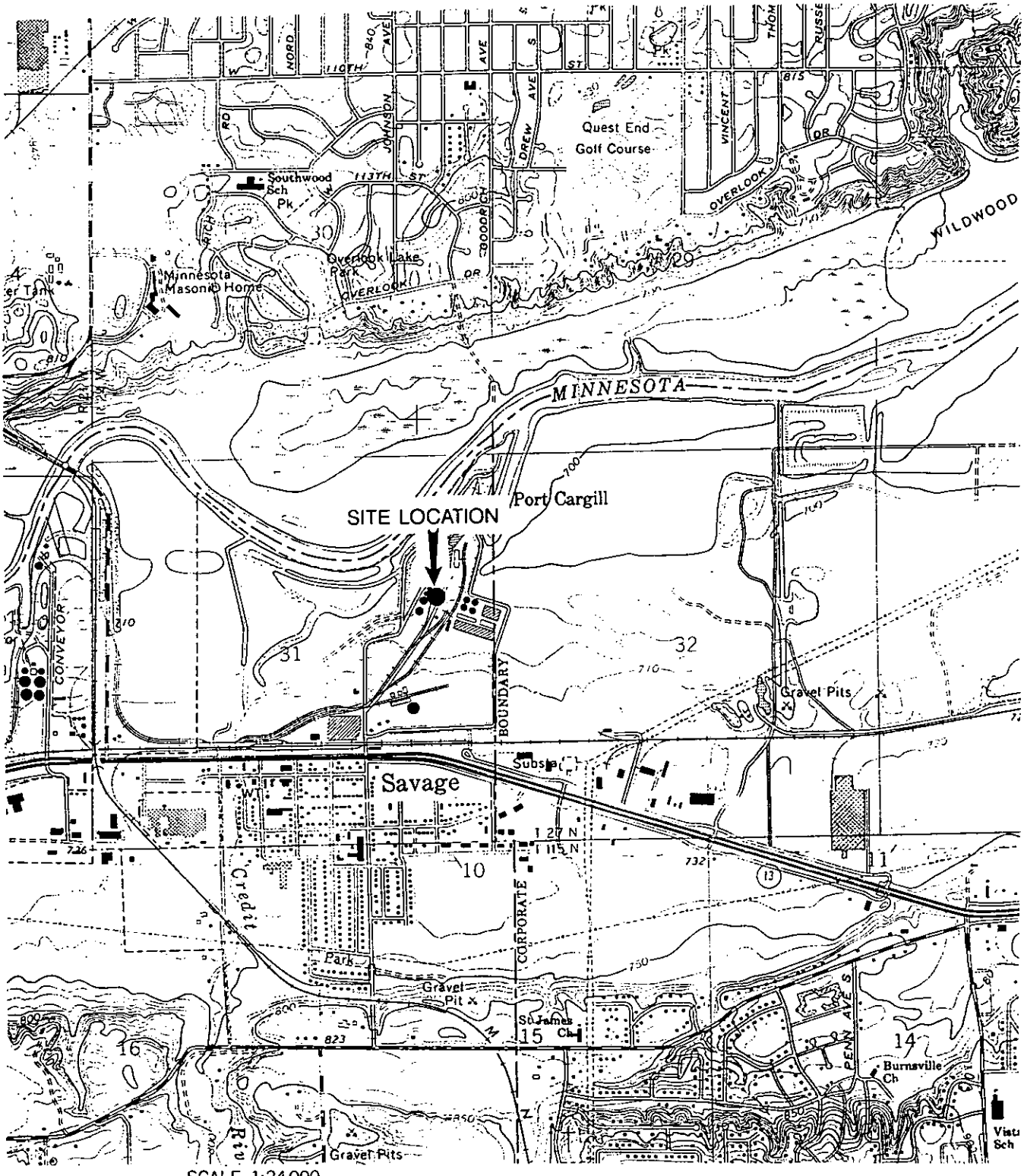
Benzene	ND	2.3	ND	10
Toluene	3.6	3.3	28.8	1000
Ethyl Benzene	ND	2.4	19.9	700
Xylenes	2.5	7.8	121	10000
MEK	190	5830	77.3	300
Tetrahydrofuran	63.8	3940	21.5	100
Acetone	ND	50.1	ND	700
Choroethane	ND	2.3	ND	NL
1,2-Dichlorobenzene	ND	1.2	1.2	600
1,2,4-Trimethylbenzene	ND	2.3	14.7	NL
1,3,5-Trimethylbenzene	ND	ND	14.7	NL
Isoproplybenzene	ND	ND	3.7	300
Napthalene	ND	ND	1.8	30

NL = None Listed

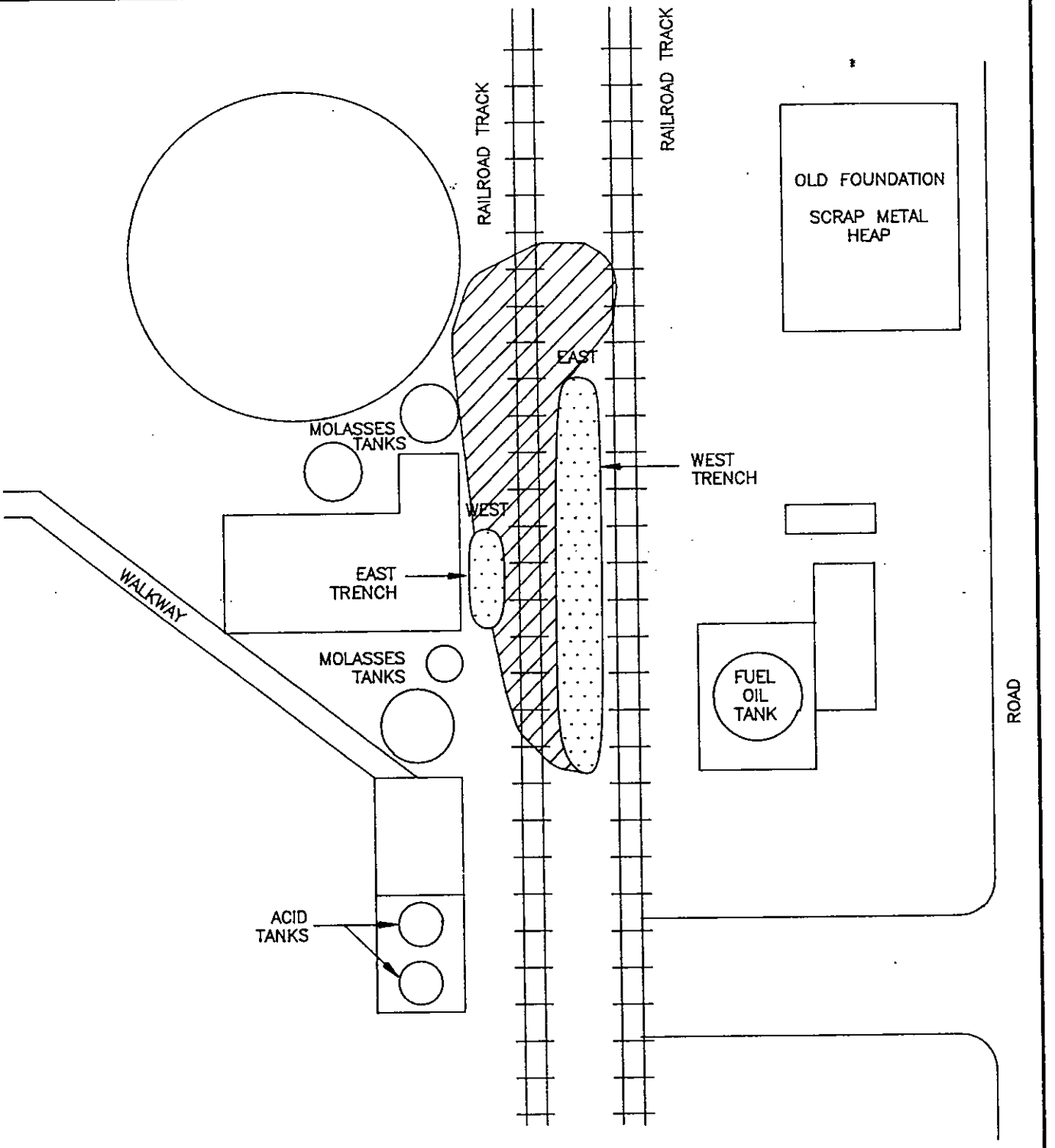
ND = Not Detected

Figures



SOURCE:
USGS 7.5 MINUTE
TOPOGRAPHIC
BLOOMINGTON, MN.
QUADRANGLE

ENGR'G S.M.	DATE	BAY WEST Inc.	
DRAWN K.M.	12/3/91	ENVIRONMENTAL SERVICES	
REV.		St PAUL MN	
PROJECT NAME	CARGILL- MOLASSES		
TITLE	SITE LOCATION MAP		
DWG. NO. 2436-A1	SCALE	FIGURE # 1	



LEGEND:

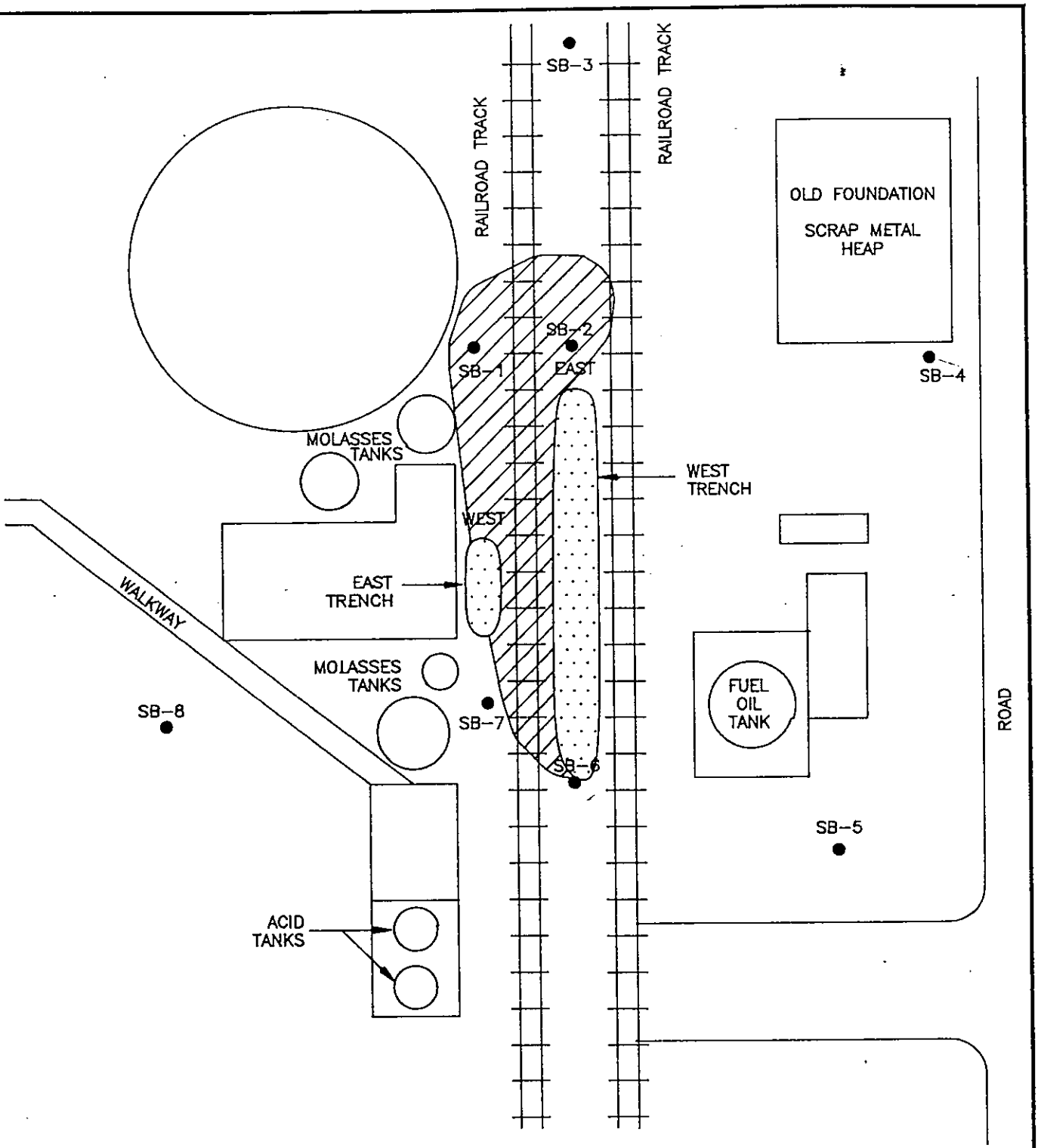
TRENCH LOCATION

REMAINING CONTAMINATION

W — N — E

S

ENGR'G S.M.	DATE		BAY WEST Inc.
DRAWN K.M.	12/9/91		ENVIRONMENTAL SERVICES
REV.	8/31/92		St. PAUL MN
PROJECT NAME	CARGILL– MOLASSES		
TITLE	EXCAVATION LOCATIONS		
DWG. NO. 2436–A2	SCALE NONE	FIGURE # 2	

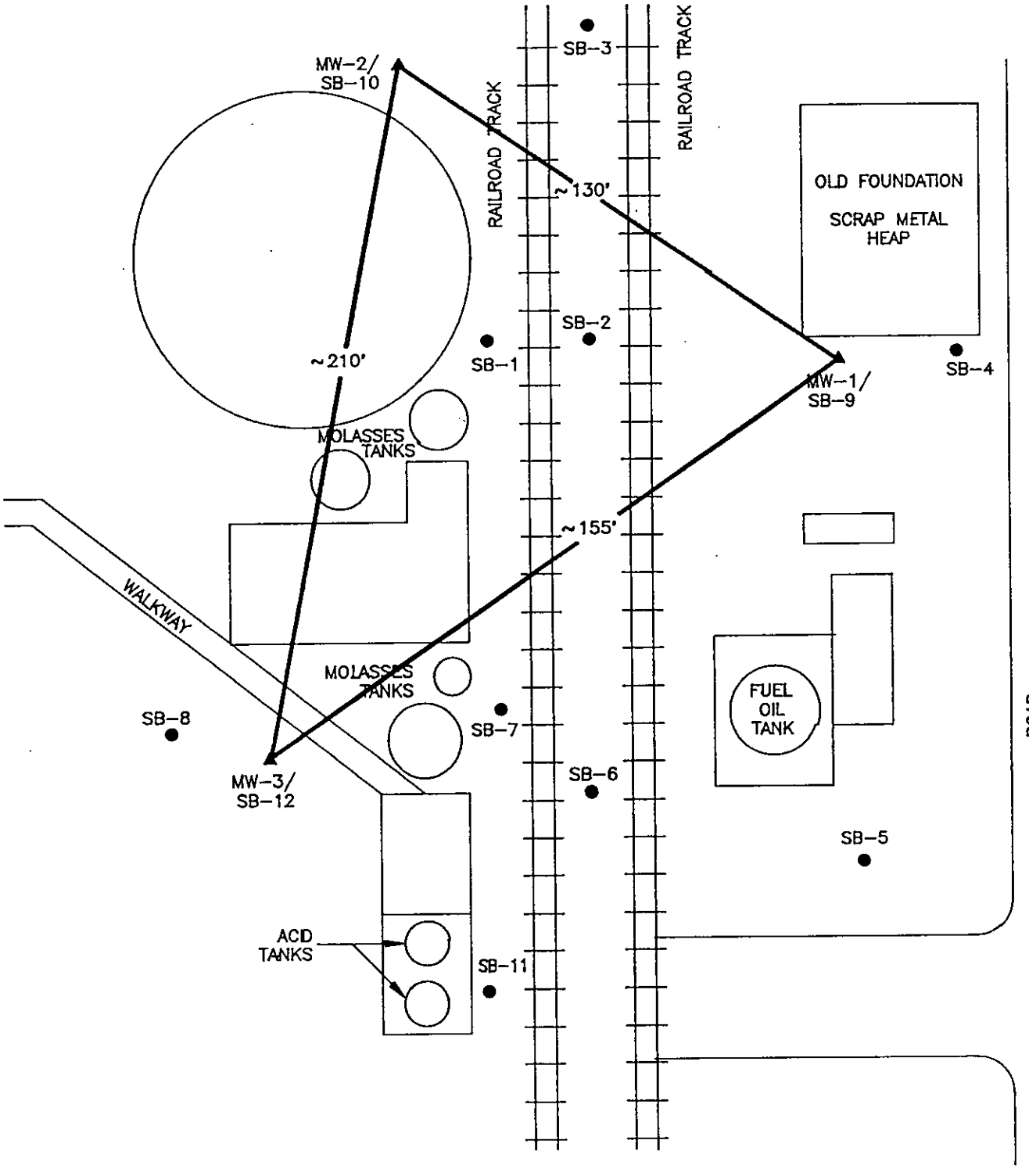


LEGEND:

- SOIL BORING LOCATION
- TRENCH LOCATION
- REMAINING CONTAMINATION

N
W
E
S

ENGR'G S.M.	DATE		BAY WEST Inc.
DRAWN K.M.	12/9/91		ENVIRONMENTAL SERVICES
REV.	8/31/92		St. PAUL MN
PROJECT NAME CARGILL– MOLASSES			
TITLE SITE MAP– SOIL BORING LOCATIONS			
DWG. NO. 2436-A2	SCALE NONE	FIGURE # 3	



LEGEND:

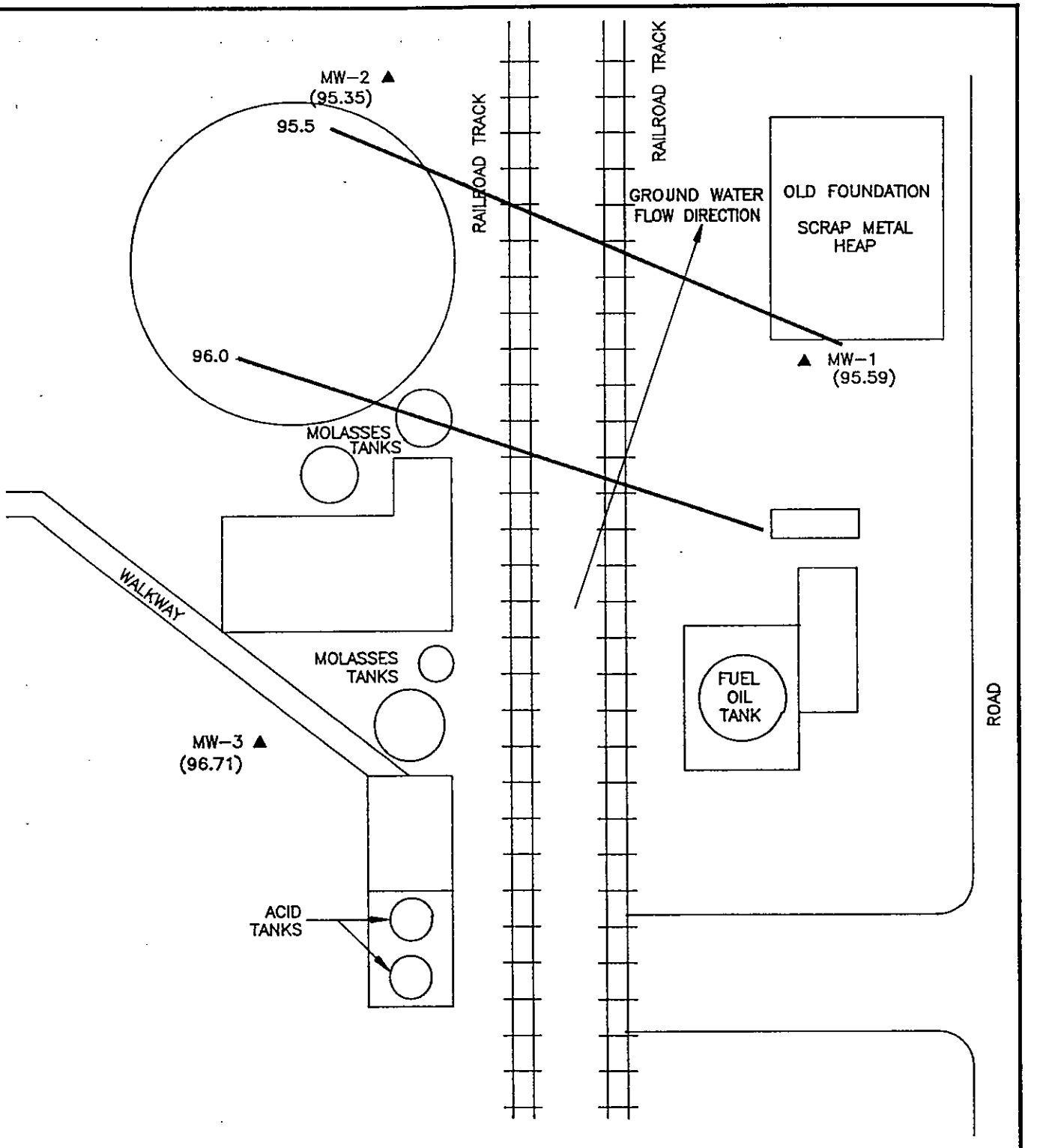
▲ MONITORING WELL/ SOIL BORING LOCATION

● SOIL BORING LOCATION

NOTE:
DISTANCES BETWEEN MONITORING WELLS ARE APPROXIMATE.

W — N — E
S

ENGR'G S.M.	DATE		BAY WEST Inc.
DRAWN K.M.	12/9/91		ENVIRONMENTAL SERVICES St. PAUL MN
REV.	8/31/92		
PROJECT NAME CARGILL– MOLASSES			
TITLE SOIL BORING/MONITORING WELL LOCATIONS			
DWG. NO. 2436–A2	SCALE NONE	FIGURE # 4	



LEGEND:

▲ MONITORING WELL LOCATION

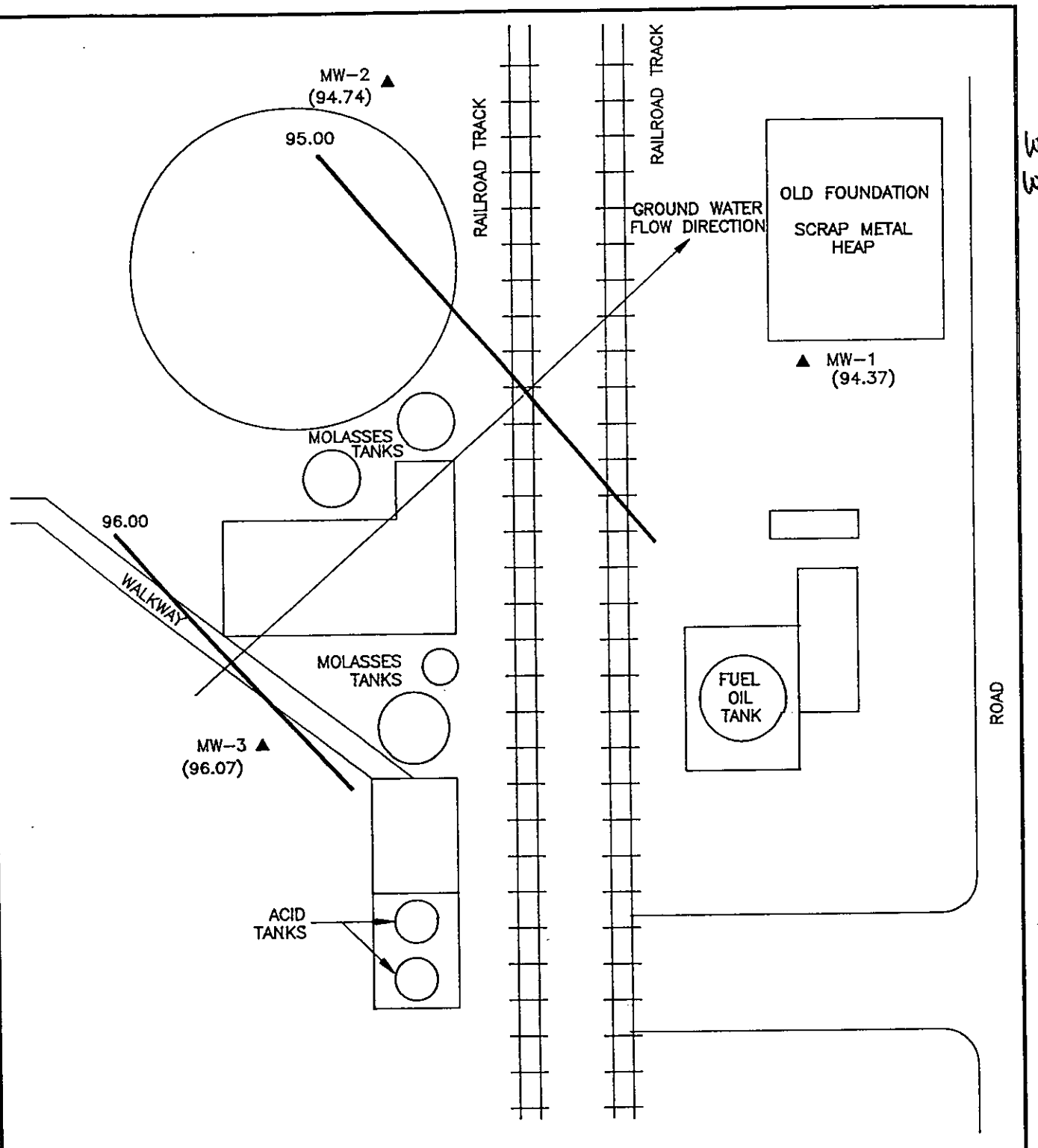
——— GROUND WATER CONTOUR

(96.71) GROUND WATER ELEVATION

W — N — E

S

ENGR'G S.M.	DATE		BAY WEST Inc.
DRAWN K.M.	12/9/91		ENVIRONMENTAL SERVICES
REV.	8/31/92		St PAUL MN
PROJECT NAME CARGILL- MOLASSES			
TITLE GROUND WATER ELEVATIONS, 7/20,21/92			
DWG. NO. 2436-A2	SCALE NONE	FIGURE # 5	



LEGEND:

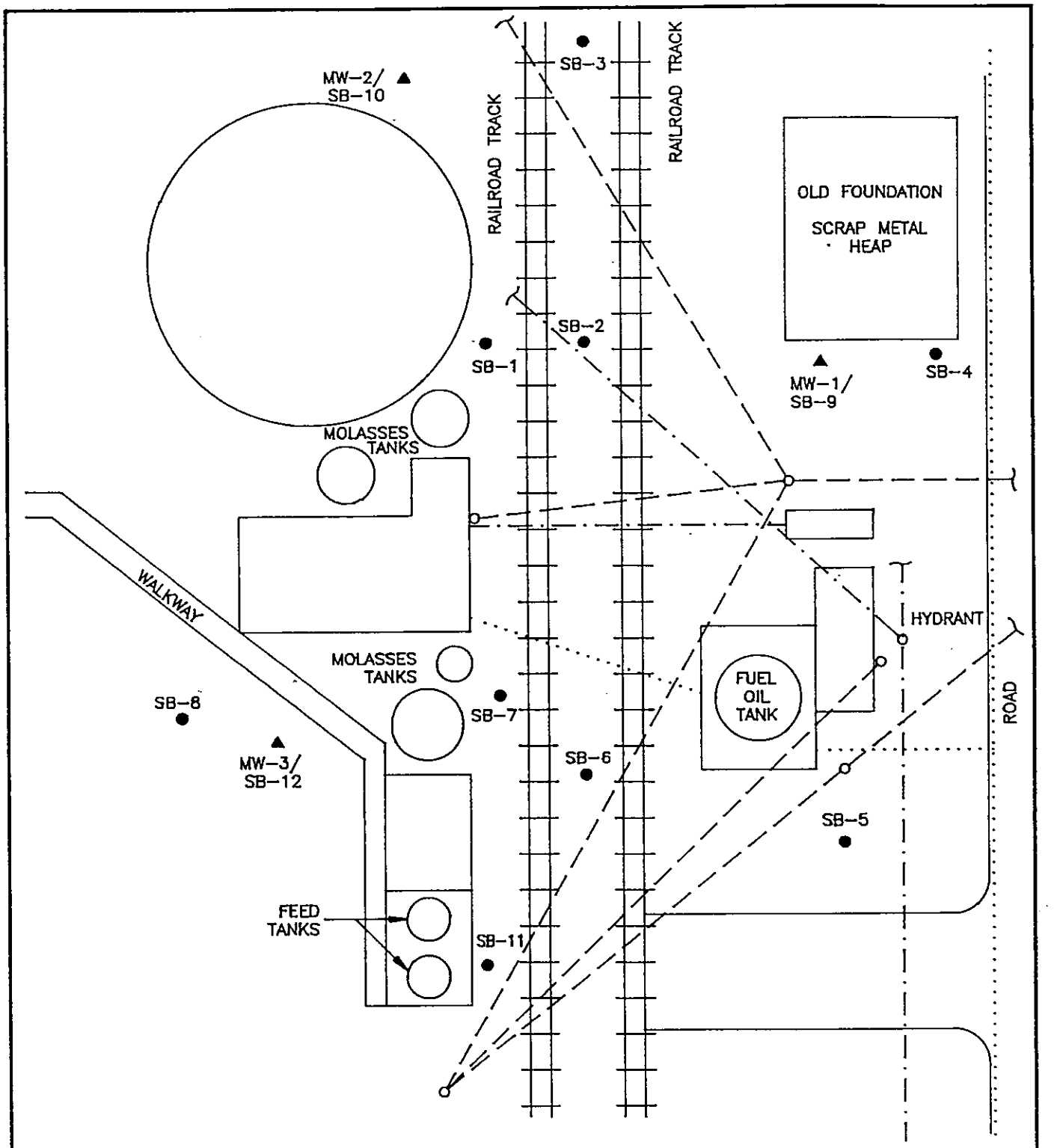
▲ MONITORING WELL LOCATION

GROUND WATER CONTOUR

(96.07) GROUND WATER ELEVATION

W N E S

ENGR'G S.M.	DATE		BAY WEST Inc.
DRAWN K.M.	12/9/91		ENVIRONMENTAL SERVICES St. PAUL MN
REV.	8/31/92		
PROJECT NAME CARGILL- MOLASSES			
TITLE GROUND WATER ELEVATIONS, 9/4/92			
DWG. NO. 2436-A2	SCALE NONE	FIGURE # 6	

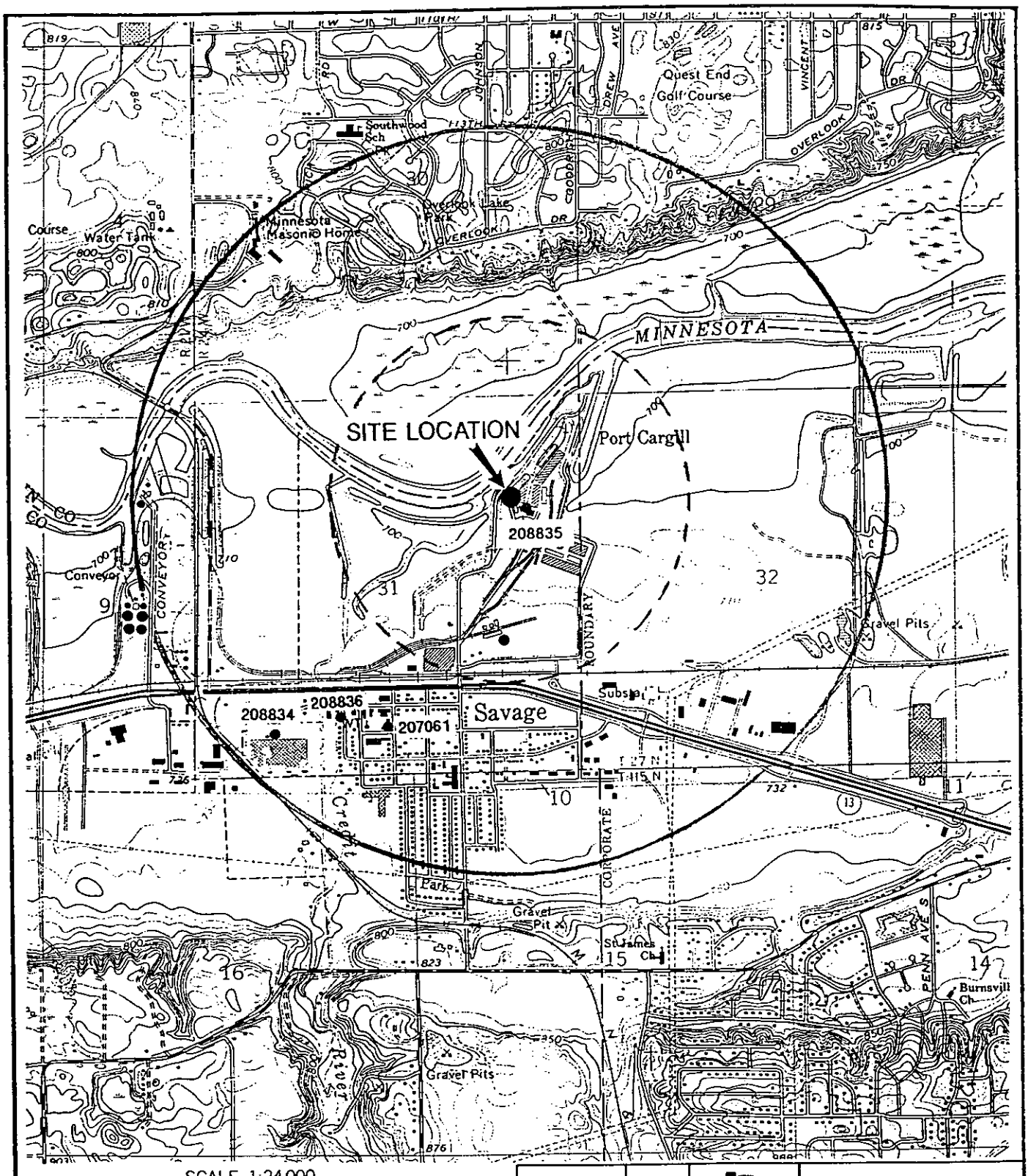


LEGEND:

- ▲ MONITORING WELL/ SOIL BORING LOCATION
- ● SOIL BORING LOCATION
- ..... GAS LINE
- — — — OVERHEAD POWER
- — · — · — WATER LINE

W — N — E
S

ENGR'G S.M.	DATE		BAY WEST Inc. ENVIRONMENTAL SERVICES St PAUL MN
DRAWN K.M.	12/9/91		
REV.	8/31/92		
PROJECT NAME CARGILL– MOLASSES			
TITLE SOIL BORING/MONITORING WELL LOCATIONS			
DWG. NO. 2436–A2	SCALE NONE	FIGURE # 7	



ENGR'G S.M.	DATE		BAY WEST Inc. ENVIRONMENTAL SERVICES St. PAUL MN
DRAWN K.M.	8/31/92		
REV.			
PROJECT NAME	CARGILL MOLASSES		
TITLE	WELL LOCATION MAP		
DWG. NO. 2436-A1	SCALE	FIGURE # 8	

Appendix D

BAY WEST, INC.
ENVIRONMENTAL SERVICES

5 EMPIRE DRIVE ST. PAUL, MN. 55103

Project Name: CARGILL- MOLASSES
Project Number: 2436
Driller: J. HUBBELL
Geologist: T. DAHL

Boring No.: SB - 9
Well No.: MW - 1
Total Depth: 9'
Drilling Method: 4.25" HSA
Sampling Method: 2" S - SPOON
Grade Elevation:
Date Completed: 7-20-92

DEPTH	GRAPHIC SECTION	GRAIN SIZE (C&B, G&P, VCS, CS, MS, FS, VFS, SILT, CLAY)	SAMPLE	REC. (IN)	N-COUNT	USCS	WELL	DESCRIPTION-REMARKS
1						CL		very dark brown (10 YR 2/2) silty gravel- clay fill, angular, very moist
2								
3				18	1 1			
4					1 2			
5								
6								
7								gray brown(10YR 5/2) silty clay- gravel, subrounded, saturated
8				12	15 52			refusal, large rock
9								EOB 9'
10								
11								
12								
13								
14								
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BAY WEST, INC.
ENVIRONMENTAL SERVICES

5 EMPIRE DRIVE ST. PAUL, MN. 55103

Project Name: CARGILL- MOLASSES
Project Number: 2436
Driller: J. HUBBELL
Geologist: T. DAHL

Boring No.: SB - 10
Well No.: MW - 2
Total Depth: 7.5'
Drilling Method: 4.25" HSA
Sampling Method: 2" S - SPOON
Grade Elevation:
Date Completed: 7-20-92

DEPTH	GRAPHIC SECTION	GRAIN SIZE C&B	G&P	VCS	CS	MS	FS	VFS	SILT	CLAY	SAMPLE	REC. (IN)	N-COUNT	USCS	WELL	DESCRIPTION-REMARKS
1														CL		
2																strong swampy odor
3													3			dark gray (10 YR 4/1) silty clay, coarse sand, well graded, soft, very moist
4													3			
5													5	PT		dark gray (10YR 4/1) well graded fine to very coarse sand (10YR 3/2) black peat, very moist, soft
6													4			
7																EOB @ 7.5' no yield bedrock
8																
9																
10																
11																
12																
13																
14																
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BAY WEST, INC.
ENVIRONMENTAL SERVICES

5 EMPIRE DRIVE ST. PAUL, MN. 55103

Project Name: CARGILL- MOLASSES
Project Number: 2436
Driller: J. HUBBELL
Geologist: T. DAHL

Boring No.: SB - 12
Well No.: MW - 3
Total Depth: 7.5'
Drilling Method: 4.25" HSA
Sampling Method: 2" S - SPOON
Grade Elevation:
Date Completed: 7-20-92

DEPTH	GRAPHIC SECTION	GRAIN SIZE (C&B G&P VCS CS MS FS VFS SILT CLAY)	SAMPLE	REC. (IN)	N-COUNT	USCS	WELL	DESCRIPTION-REMARKS
1						GM		dark brown(10YR 4/3) silty, well graded sand and gravel, moist
2						PT		black (10 YR 2/1) peat, moist, soft
3				22	3 23	GM		olive brown (2.5 YR 6/6) silty gravel limestone, very moist
4					30 15			saturated
5								no yield
6								bedrock
7								EOB @ 7.5'
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
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BAY WEST, INC.
ENVIRONMENTAL SERVICES

5 EMPIRE DRIVE ST. PAUL, MN. 55103

Project Name: CARGILL- MOLASSES
Project Number: 2436
Driller: J. HUBBELL
Geologist: T. DAHL

Boring No.: SB - 11
Well No.:
Total Depth: 6'
Drilling Method: 4.25" HSA
Sampling Method: 2" S - SPOON
Grade Elevation:
Date Completed: 7-20-92

DEPTH	GRAPHIC SECTION	GRAIN SIZE (C&B, G&P, VCS, CS, MS, FS, VFS, SILT, CLAY)	SAMPLE	REC. (IN)	N-COUNT	USCS	WELL	DESCRIPTION-REMARKS
1						GM		
2								
3								
4				20	13 53			brown(10 YR 5/3) silty clay- gravel fill, scattered cobbles, moist, hard
5					33 39			angular pebbles, cobbles saturated
6								refusal, bedrock at 6'
7								EOB @ 6'
8								
9								
10								
11								
12								
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Appendix 2

BAY WEST, INC.
ENVIRONMENTAL SERVICES

5 EMPIRE DRIVE ST. PAUL, MN. 55103

HEADSPACE ANALYSIS

Project Name: CARGILL- MOLASSES
Project Number: 2436
Driller: J. HUBBELL
Geologist: T. DAHL
Soil Boring #: SB - 9

Background Sample:
Location, Depth _____

	TLV	HNU	OVM	OVA
Result (ppm):				

DATE	TIME	DEPTH	TLV (ppm)	HNU (ppm)	OVM (ppm)	OVA (ppm)	ANALYTICAL SAMPLE - (Y / N)
7-20-92		3' - 5'		.2			N
		8' - 9'		.2			N

COMMENTS AND NOTES: _____

BAY WEST, INC.
ENVIRONMENTAL SERVICES

5 EMPIRE DRIVE ST. PAUL, MN. 55103

HEADSPACE ANALYSIS

Project Name: CARGILL- MOLASSES
Project Number: 2436
Driller: J. HUBBELL
Geologist: T. DAHL
Soil Boring #: SB - 10

Background Sample:
Location, Depth _____

	TLV	HNU	OVM	OVA
Result (ppm):				

DATE	TIME	DEPTH	TLV (ppm)	HNU (ppm)	OVM (ppm)	OVA (ppm)	ANALYTICAL SAMPLE - (Y / N)
7-20-92		3' - 5'		1			N

COMMENTS AND NOTES: _____

BAY WEST, INC.
ENVIRONMENTAL SERVICES

5 EMPIRE DRIVE ST. PAUL, MN. 55103

HEADSPACE ANALYSIS

Project Name: CARGILL- MOLASSES
Project Number: 2436
Driller: J. HUBBELL
Geologist: T. DAHL
Soil Boring #: SB - 11

Background Sample:
Location, Depth _____

	TLV	HNU	OVM	OVA
Result (ppm):				

DATE	TIME	DEPTH	TLV (ppm)	HNU (ppm)	OVM (ppm)	OVA (ppm)	ANALYTICAL SAMPLE - (Y / N)
7-20-92		3' - 5'		0			N

COMMENTS AND NOTES: _____

BAY WEST, INC.
ENVIRONMENTAL SERVICES

5 EMPIRE DRIVE ST. PAUL, MN. 55103

HEADSPACE ANALYSIS

Project Name: CARGILL- MOLASSES
Project Number: 2436
Driller: J. HUBBELL
Geologist: T. DAHL
Soil Boring #: SB - 12

Background Sample:
Location, Depth _____

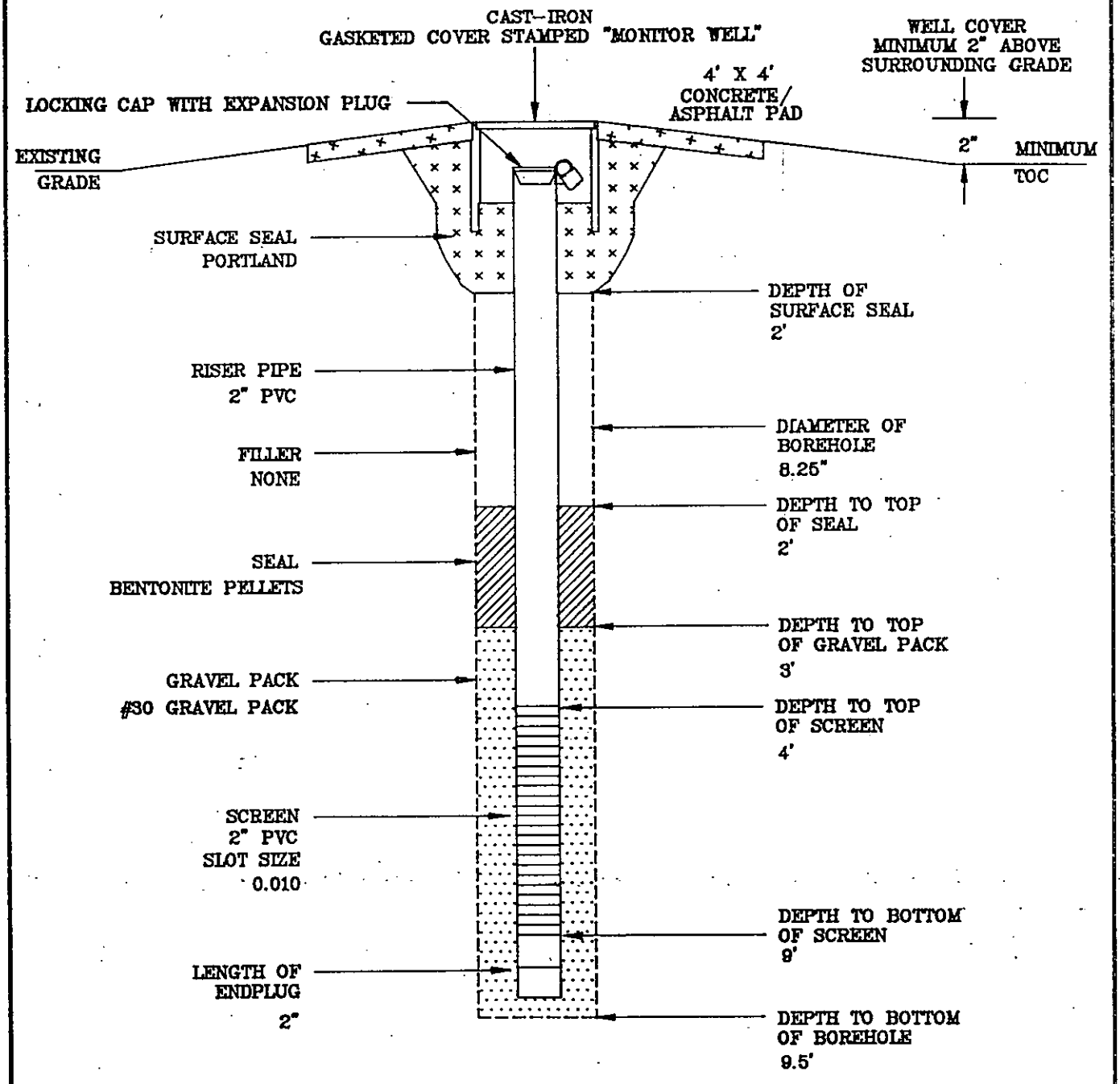
	TLV	HNU	OVM	OVA
Result (ppm):				

DATE	TIME	DEPTH	TLV (ppm)	HNU (ppm)	OVM (ppm)	OVA (ppm)	ANALYTICAL SAMPLE - (Y / N)
7-20-92		3' - 5'		0			N

COMMENTS AND NOTES: _____

Appendix 3

Bay West



WELL NAME – MW-1

SOIL BORING # – SB-9

DRILLER – J. HUBBELL

GEOLOGIST – T. DAHL

DATE COMPLETED – 7-20-92

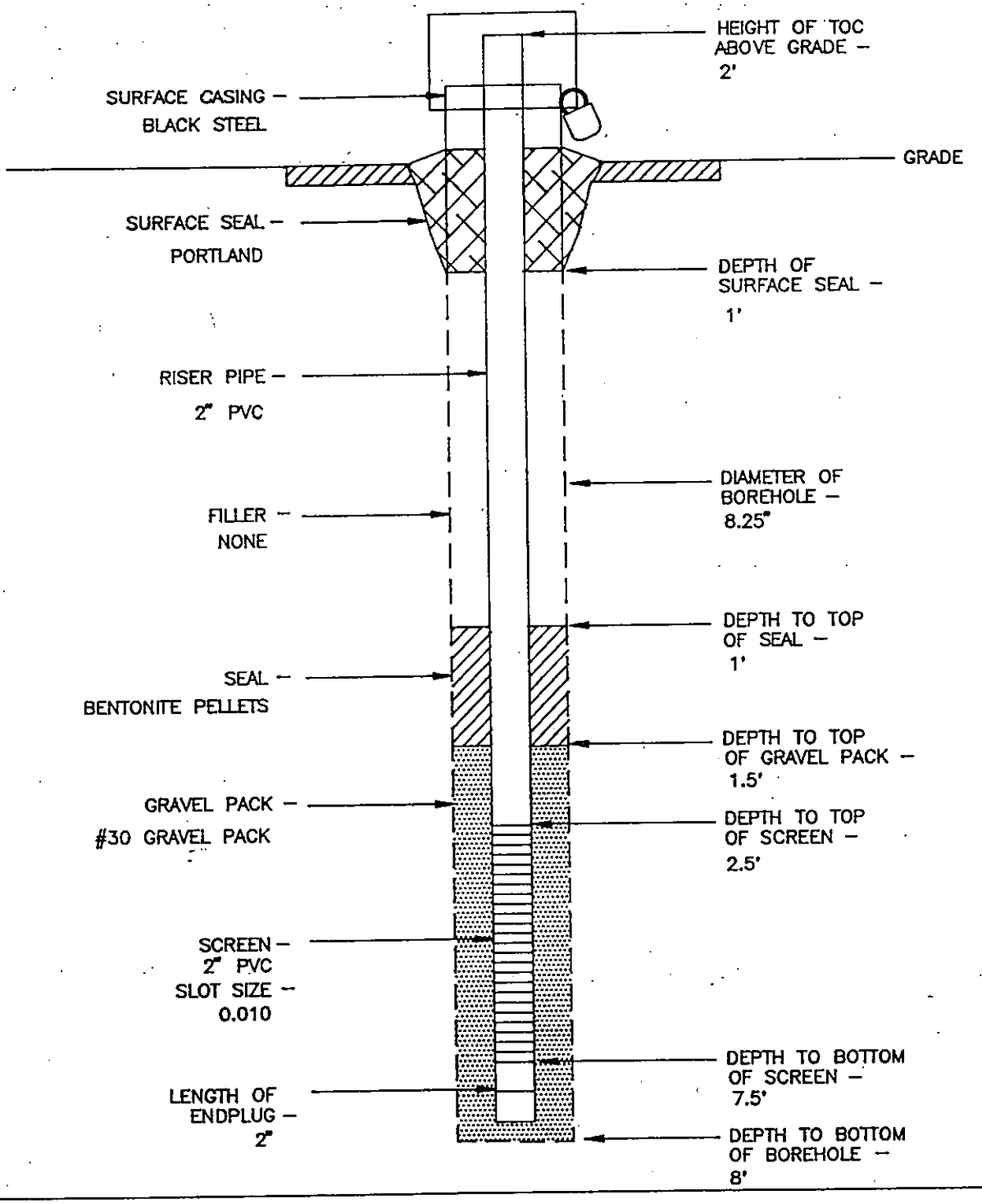
TOC – 100.69

GRADE – 100.69

STATIC WL – 5.1 (TOC)

PROJECT NAME CARGILL– MOLASSES		ENGR'G S.M.	DATE	BAY WEST Inc. ENVIRONMENTAL SERVICES St PAUL MN
TITLE AT-GRADE MONITOR WELL CONSTRUCTION		DRAWN K.M.	7/27/92	
DWG. NO. 2436-MW	SCALE / FIGURE #	REV.		

Bay West



WELL NAME– MW–2

SOIL BORING #– SB–10

DRILLER– J. HUBBELL

TECHNICIAN– T. DAHL

DATE COMPLETED– 7–20–92

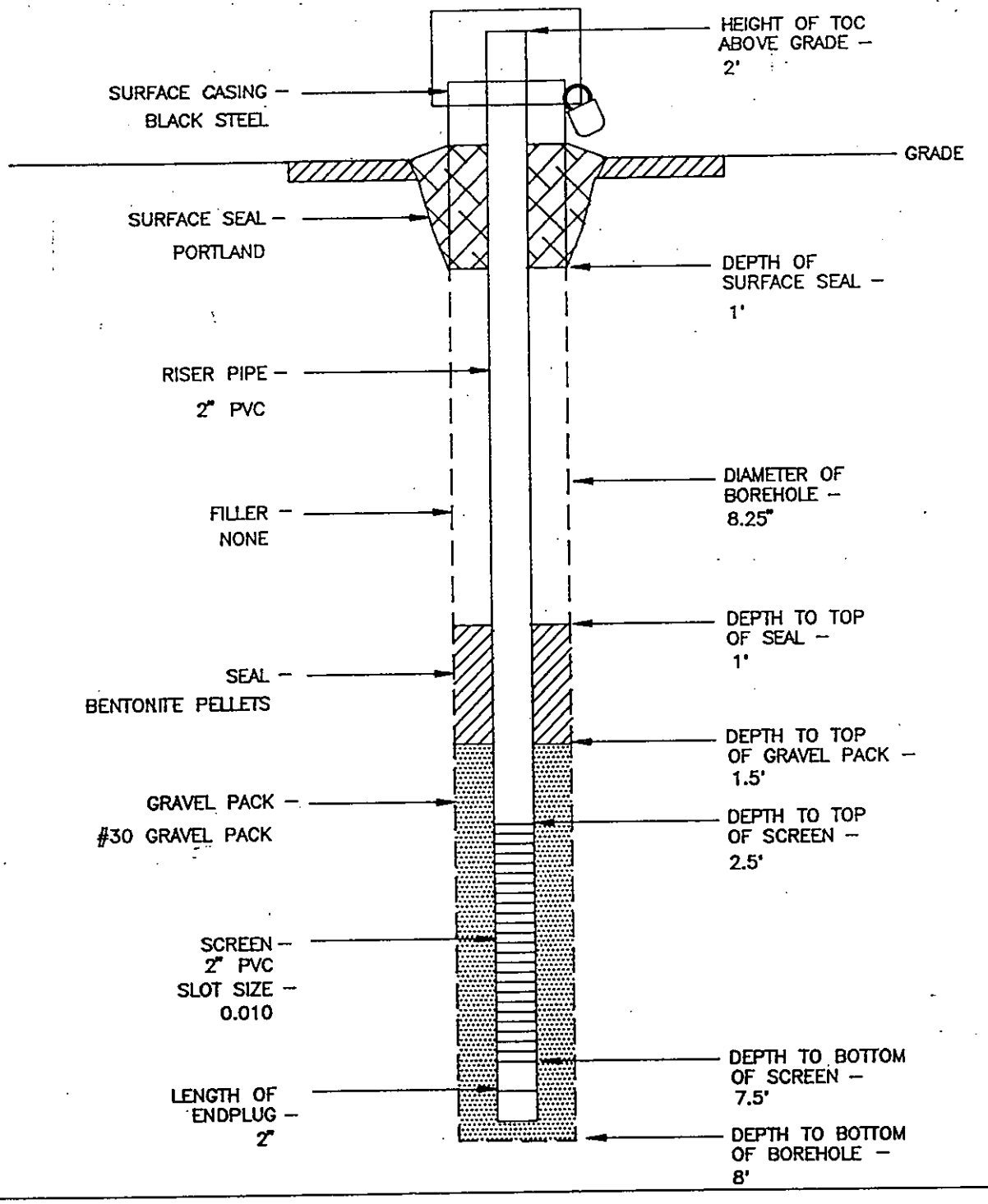
TOC– 99.32

GRADE– 97.71

STATIC WL– 3.97 (TOC)

PROJECT NAME CARGILL– MOLASSES		ENGR'G S.M.	DATE	BAY WEST, INC. ENVIRONMENTAL SERVICES ST. PAUL, MN.
TITLE MONITOR WELL CONSTRUCTION		DRAWN K.M.	7/27/92	
DWG. NO. 2436–MWX	SCALE NONE FIGURE #	REV.		

Bay West



WELL NAME– MW–3

SOIL BORING #– SB–12

DRILLER– J. HUBBELL

TECHNICIAN– T. DAHL

DATE COMPLETED– 7–21–92

TOC– 102.49

GRADE– 100.81

STATIC WL– 5.78 (TOC)

PROJECT NAME CARGILL– MOLASSES			ENGR'G S.M.	DATE	BAY WEST, INC. ENVIRONMENTAL SERVICES ST. PAUL, MN.
TITLE MONITOR WELL CONSTRUCTION			DRAWN K.M.	7/27/92	
DWG. NO. 2436–MWX	SCALE NONE	FIGURE #	REV.		

MINNESOTA DEPARTMENT OF HEALTH

WELL RECORD

Minnesota Statutes Chapter 103I

MINNESOTA UNIQUE WELL NO. 485093

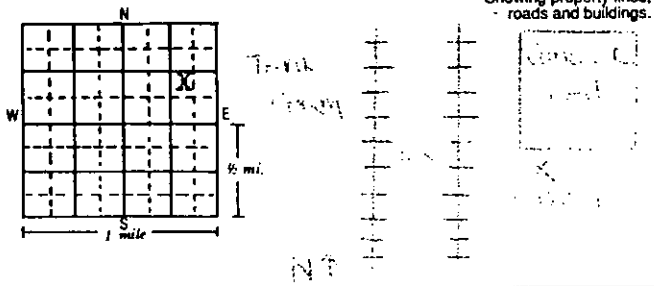
WELL LOCATION

County Name: Scott

Township Name	Township No.	Range No.	Section No.	Fraction
Savage	27N	24W	31	NW ¼ SE ¼ NE ¼

Numerical Street Address or Fire Number and City of Well Location: 12120 Lynn Ave. South, Savage, MN 55378

Show exact location of well in section grid with "X". Sketch map of well location. Showing property lines, roads and buildings.



PROPERTY OWNER'S NAME: Cargill, Molasses Liquid Product Attn: Mr. Randy E. Rarick

Mailing address if different than property address indicated above.

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Silty clay-gravel fill	Dark Brown	Medium hard	0	7
Silty clay-gravel	Gray Brown	Soft	7	10'

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW-1

At-grade completion

WELL CONTRACTOR COPY 485093

WELL DEPTH (completed): 9 ft. Date of Completion: 7-20-92

DRILLING METHOD: ☐ Cable Tool ☐ Driven ☐ Dug ☒ Auger ☐ Rotary ☐ Jetted ☐ _____

DRILLING FLUID: None

USE: ☐ Domestic ☒ Monitoring ☐ Heating/Cooling ☐ Irrigation ☐ Public ☐ Industry/Commercial ☐ Test Well ☐ Dewatering ☐ _____

CASING: ☐ Steel ☒ Plastic — Drive Shoe? ☐ Yes ☒ No — ☐ Threaded ☒ Welded ☐ _____

HOLE DIAM.

CASING DIAMETER / WEIGHT

2 in. to 4 ft.	.69 lbs./ft.	8-1/4 in. to 9 ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.

SCREEN: Make Monoflex; Type PVC; Diam. 2; Slot/Gauze 0.010; Length 5; Set between 4 ft. and 9 ft. FITTINGS: _____

OPEN HOLE: from _____ ft. to _____ ft.

STATIC WATER LEVEL: 5.1 ft. ☒ below ☐ above land surface Date measured 7-21-92

PUMPING LEVEL (below land surface): _____ ft. after _____ hrs. pumping _____ g.p.m.

WELL HEAD COMPLETION: ☐ Pitless adapter manufacturer _____ Model _____ ☒ Casing Protection Manhole

GROUTING INFORMATION: Well grouted? ☒ Yes ☐ No

Grout Material ☒ Neat cement ☒ Bentonite

from 0 to 2 ft.	cement	☐ yds. ☐ bags
from 2 to 3 ft.	Bentonite	☐ yds. ☐ bags
from _____ to _____ ft.	_____	☐ yds. ☐ bags

NEAREST SOURCE OF POSSIBLE CONTAMINATION: 50 feet West direction Fuel Oil type

Well disinfected upon completion? ☐ Yes ☒ No

PUMP: ☒ Not installed Date installed _____

Manufacturer's name _____

Model number _____ HP _____ Volts _____

Length of drop pipe _____ ft. Capacity _____ g.p.m.

Pressure Tank Capacity _____

Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ _____

ABANDONED WELLS: Not in use and not sealed well on property? ☐ Yes ☐ No

WELL CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

Bay Wat, Inc. — 62573

Licensee Business Name — *Lic. or Reg. No.*

Timothy M. Kennedy — 9-21-92

Authorized Representative Signature — *Date*

_____

Name of Driller — *Date*

HE-01205-03 (Rev. 9/91)

MINNESOTA DEPARTMENT OF HEALTH

WELL RECORD

Minnesota Statutes Chapter 103I

MINNESOTA UNIQUE WELL NO. 485095

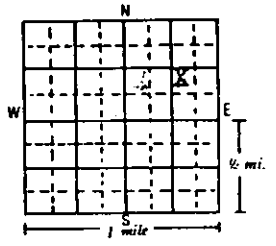
WELL LOCATION

County Name: Scott

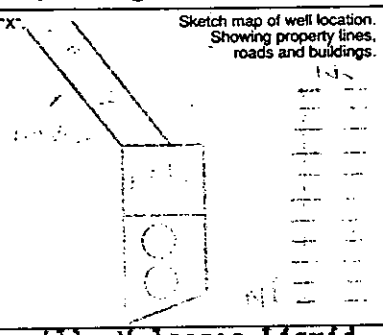
Township Name	Township No.	Range No.	Section No.	Fraction
Savage	27N	24W	31	NW¼ SE¼ NE¼

Numerical Street Address or Fire Number and City of Well Location: 12120 Lynn Ave., South, Savage, MN 55378

Show exact location of well in section grid with "X".



Sketch map of well location. Showing property lines, roads and buildings.



PROPERTY OWNER'S NAME: X Cargill, Molasses Liquid Products Attn: Mr. Randy E. Rarick

Mailing address if different than property address indicated above.

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Silty clay-gravel fill	Dark Brown	Medium Brown	0	2
Peat	Black	Soft	2	3.5
Silty gravel X (limestone)	Olive Brown	Soft	3.5	7.5

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW-3

WELL CONTRACTOR COPY 485095

WELL DEPTH (completed): 7.5 ft. Date of Completion: 7-21-92

DRILLING METHOD: ☐ Cable Tool ☒ Auger ☐ Driven ☐ Rotary ☐ Dug ☐ Jetted ☐ _____

DRILLING FLUID:

USE: ☐ Domestic ☐ Irrigation ☐ Test Well ☒ Monitoring ☐ Public ☐ Dewatering ☐ Heating/Cooling ☐ Industry/Commercial ☐ _____

CASING: ☐ Steel ☒ Plastic — Drive Shoe? ☐ Yes ☒ No — ☒ Threaded ☐ Welded ☐ _____

CASING DIAMETER / WEIGHT

2 in. to XX ft.	.69 lbs./ft.	8-1/4 in. to 8.0 ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.

HOLE DIAM.

SCREEN: Make Monoflex; Type PVC; Slot/Gauze 0.010; Set between 2.5 ft. and 7.5 ft.; Diam. _____; Length _____; FITTINGS: _____

OPEN HOLE: from _____ ft. to _____ ft.

STATIC WATER LEVEL: 5.78 (TOC) ft. ☒ below ☐ above land surface Date measured 7/21/92

PUMPING LEVEL (below land surface): _____ ft. after _____ hrs. pumping _____ g.p.m.

WELL HEAD COMPLETION: ☐ Pitless adapter manufacturer _____ Model _____ ☒ Casing Protection 4" ø Sch 40 steel cover pipe

GROUTING INFORMATION: Well grouted? ☒ Yes ☐ No

Grout Material ☒ Neat cement ☒ Bentonite

from 0 to 1 ft.	cement	☐ yds. ☐ bags
from 1 to 1.5 ft.	Bentonite	☐ yds. ☐ bags
from _____ to _____ ft.	_____	☐ yds. ☐ bags

NEAREST SOURCE OF POSSIBLE CONTAMINATION: 40 feet East direction Fuel Oil type

Well disinfected upon completion? ☐ Yes ☒ No

PUMP: ☒ Not installed Date installed _____

Manufacturer's name _____

Model number _____ HP _____ Volts _____

Length of drop pipe _____ ft. Capacity _____ g.p.m.

Pressure Tank Capacity _____

Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ _____

ABANDONED WELLS: Not in use and not sealed well on property? ☐ Yes ☒ No

WELL CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

Bay West, Inc. — Licensee Business Name — 62573 Lic. or Reg. No.

Timothy D Lindgren — Authorized Representative Signature — 7-21-92 Date

_____ Name of Driller — Date

HE-01205-03 (Rev. 9/91)

MINNESOTA DEPARTMENT OF HEALTH

WELL RECORD

Minnesota Statutes Chapter 103I

MINNESOTA UNIQUE WELL NO. 485094

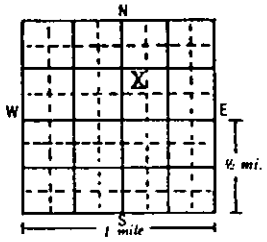
WELL LOCATION

County Name: Scott

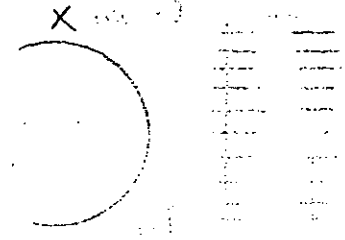
Township Name	Township No.	Range No.	Section No.	Fraction
Savage	27 N	24 W	31	NW¼ SE¼ NE¼

Numerical Street Address or Fire Number and City of Well Location: 12120 Lynn Ave., South, Savage, MN 55378

Show exact location of well in section grid with "X".



Sketch map of well location. Showing property lines, roads and buildings.



PROPERTY OWNER'S NAME: Cargill, Molasses Liquid Products Attn: Mr. Randy E. Rarick

Mailing address if different than property address indicated above.

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Silty clay - gravel fill	Dark Gray	Medium Hard	0	4.5
Peat	Black	Soft	4.5	7.5

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW-2

WELL CONTRACTOR COPY 485094

WELL DEPTH (completed): 7.5 ft. Date of Completion: 7-20-92

DRILLING METHOD: ☐ Cable Tool ☐ Driven ☐ Dug ☒ Auger ☐ Rotary ☐ Jetted ☐ _____

DRILLING FLUID: None

USE: ☐ Domestic ☒ Monitoring ☐ Heating/Cooling ☐ Irrigation ☐ Public ☐ Industry/Commercial ☐ Test Well ☐ Dewatering ☐ _____

CASING: ☐ Steel ☒ Plastic; Drive Shoe? ☐ Yes ☒ No; ☐ Threaded ☒ Welded; ☐ _____

CASING DIAMETER / WEIGHT

2 in. to 2.5 ft.	.69 lbs./ft.	8-1/4 in. to 8.0 ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.

HOLE DIAM.

SCREEN: Make Monoflex; Type PVC; Diam. 2"; Slot/Gauze 0.010; Length 5'; Set between 2.5 ft. and 7.5 ft. FITTINGS: _____

OPEN HOLE: from _____ ft. to _____ ft.

STATIC WATER LEVEL: 3.97 (TOC) ft. ☒ below ☐ above land surface Date measured 7/21/92

PUMPING LEVEL (below land surface): _____ ft. after _____ hrs. pumping _____ g.p.m.

WELL HEAD COMPLETION: ☐ Pitless adapter manufacturer _____ Model _____ ☒ Casing Protection 4" Sch. 40 steel cover pipe

GROUTING INFORMATION: Well grouted? ☒ Yes ☐ No

Grout Material ☒ Neat cement ☒ Bentonite

from 0 to 1 ft.	cement	☐ yds. ☐ bags
from 1 to 1.5 ft.	Bentonite	☐ yds. ☐ bags
from _____ to _____ ft.	_____	☐ yds. ☐ bags

NEAREST SOURCE OF POSSIBLE CONTAMINATION: 70 feet SE direction Fuel Oil type

Well disinfected upon completion? ☐ Yes ☒ No

PUMP: ☒ Not installed Date installed _____

Manufacturer's name _____

Model number _____ HP _____ Volts _____

Length of drop pipe _____ ft. Capacity _____ g.p.m.

Pressure Tank Capacity _____

Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ _____

ABANDONED WELLS: Not in use and not sealed well on property? ☐ Yes ☒ No

WELL CONTRACTOR CERTIFICATION

This well was drilled under my jurisdication and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

Bay West, Inc. — Licensee Business Name — 62573 — Lic. or Reg. No.

Tim Thiel — Authorized Representative Signature — 7-31-92 — Date

_____ — Name of Driller — Date

HE-01205-03 (Rev. 9/91)

Appendix 4

Bay West — FIELD SAMPLING DATA SHEET

PROJECT NAME: Cargill - Molasses	SAMPLE #: MW-1
ADDRESS:	PROJECT #: 2436
CITY, STATE, ZIP: Savage, MN	DATE: 7-21-92
NAME OF SAMPLER: Tom D.	AFFILIATION: Bay West
ANALYTICAL LABORATORY: Bay West	COC #:

WELL DATA	
WELL #:	MW-1
CASING MATERIAL:	PVC
WELL DIAMETER (IN):	2"
WELL DEPTH (FT BTOC):	8.73
DEPTH TO WATER BEFORE PURGING (FT BTOC):	5.1
DEPTH TO WATER AT TIME OF SAMPLING (FT BTOC):	
LENGTH OF WATER COLUMN (FT):	3.63
WELL VOLUME (GAL):	.6

PURGE DATA	
PRE-PUMP METHOD:	BK Pump, Air Driven
VOLUME PRE-PUMPED (GAL):	20
PRE-PUMP RATE (GPM):	2 GPM
I.D.# PROBE/ TAPE USED:	Sonic #1
I.D.# PUMP USED:	
BAILER TYPE:	Teflon

STABILIZATION TEST

VOL #	TIME	VOL (GAL)	TEMP °C	COND (umhos/cm)	pH	OTHER
1	10:00	20	16	1880	6	
2	10:04	21	15	1620	6.2	
3	10:08	22.5	15	1510	6.3	
4	10:11	24	15	1510	6.3	
5	10:14	26	15	1510	6.3	
6						
7						
8						

STABILIZATION DATA	
TOTAL VOLUME (GAL):	27
# CASING VOLUMES:	50
STAB. TEMP °C:	15
STAB. CONDUCTANCE (umhos/cm):	1500
STAB. pH:	6.3

SAMPLING DATA	
SAMPLE TYPE:	H_2O
SAMPLE CONTAINERS:	3 40 ml ___ 1 LA
	___ OTHER ___ 0.5 LA
SAMPLE VOLUME:	
SAMPLE FILTERED:	___ YES ✓ NO
TIME OF SAMPLING:	10:18
SAMPLE PRESERVATION:	ice, HCl

COMMENTS

SAMPLE DESCRIPTION— COLOR: 5Y 5/4 ODOR: No OTHER:
cloudy, brown

OBSERVATIONS:

WEATHER DATA— TEMPERATURE: 75° SKY: Clear WIND: 5-10 mph

Bay West — FIELD SAMPLING DATA SHEET

PROJECT NAME: Cargill, Molasses	SAMPLE #: MW-2
ADDRESS:	PROJECT #: 2436
CITY, STATE, ZIP: Savage, MN	DATE: 7-21-92
NAME OF SAMPLER: Tom O.	AFFILIATION: Bay West
ANALYTICAL LABORATORY: Bay West	COC #:

WELL DATA	
WELL #:	MW-2
CASING MATERIAL:	PVC
WELL DIAMETER (IN):	2"
WELL DEPTH (FT BTOC):	8.72
DEPTH TO WATER BEFORE PURGING (FT BTOC):	3.97
DEPTH TO WATER AT TIME OF SAMPLING (FT BTOC):	
LENGTH OF WATER COLUMN (FT):	4.75
WELL VOLUME (GAL):	.8

PURGE DATA	
PRE-PUMP METHOD:	Bk Pump
VOLUME PRE-PUMPED (GAL):	20
PRE-PUMP RATE (GPM):	.5
I.D.# PROBE/ TAPE USED:	Sonic #1
I.D.# PUMP USED:	
BAILER TYPE:	Teflon

STABILIZATION TEST

VOL #	TIME	VOL (GAL)	TEMP °C	COND (umhos/cm)	pH	OTHER
1	12:10	20	20	2380	7	
2	12:15	21	20	1800	7	
3	12:18	22	20	1800	7	
4						
5			Well Dry, Sampled after			
6			a few minutes			
7						
8						

STABILIZATION DATA	
TOTAL VOLUME (GAL):	23
# CASING VOLUMES:	2.5
STAB. TEMP °C:	20
STAB. CONDUCTANCE (umhos/cm):	1800
STAB. pH:	7

SAMPLING DATA	
SAMPLE TYPE:	H2O
SAMPLE CONTAINERS:	3 40 ml ____ 1 LA
	____ OTHER ____ 0.5 LA
SAMPLE VOLUME:	
SAMPLE FILTERED:	____ YES ✓ NO
TIME OF SAMPLING:	12:30
SAMPLE PRESERVATION:	ice, HCl

COMMENTS

SAMPLE DESCRIPTION— COLOR: Brown ODOR: Swampy OTHER:

OBSERVATIONS:

WEATHER DATA— TEMPERATURE: 75° SKY: clear WIND: calm.

Bay West — FIELD SAMPLING DATA SHEET

PROJECT NAME: Cargill Molasses	SAMPLE #: MW-3
ADDRESS:	PROJECT #: 2436
CITY, STATE, ZIP: Savage, MN	DATE: 7-21-92
NAME OF SAMPLER: Tom O.	AFFILIATION: Bay West
ANALYTICAL LABORATORY: Bay West	COC #:

WELL DATA	
WELL #:	MW-3
CASING MATERIAL:	PVC
WELL DIAMETER (IN):	2"
WELL DEPTH (FT BTOC):	8.82'
DEPTH TO WATER BEFORE PURGING (FT BTOC):	5.78
DEPTH TO WATER AT TIME OF SAMPLING (FT BTOC):	
LENGTH OF WATER COLUMN (FT):	3.04'
WELL VOLUME (GAL):	5

PURGE DATA	
PRE-PUMP METHOD:	Bk Pump, Air Driven
VOLUME PRE-PUMPED (GAL):	
PRE-PUMP RATE (GPM):	2
I.D.# PROBE/ TAPE USED:	Sonic #1
I.D.# PUMP USED:	
BAILER TYPE:	Teflon

STABILIZATION TEST

VOL #	TIME	VOL (GAL)	TEMP °C	COND (umhos/cm)	pH	OTHER
1	1:50	10	21	3700	6.1	
2	1:52	12	19.5	3400	6.2	
3	1:55	14	19	2600	6.2	
4	1:58	16	18.5	3400	6.2	
5	2:00	18	18.5	3400	6.2	
6	2:02	20	18.5	3400	6.2	
7						
8						

STABILIZATION DATA	
TOTAL VOLUME (GAL):	20
# CASING VOLUMES:	4/0
STAB. TEMP °C:	18.5
STAB. CONDUCTANCE (umhos/cm):	3400
STAB. pH:	6.2

SAMPLING DATA	
SAMPLE TYPE:	H2O
SAMPLE CONTAINERS:	4 40 ml ___ 1 LA
	___ OTHER ___ 0.5 LA
SAMPLE VOLUME:	
SAMPLE FILTERED:	___ YES ✓ NO
TIME OF SAMPLING:	2:05
SAMPLE PRESERVATION:	ice, HCl

COMMENTS

SAMPLE DESCRIPTION— COLOR: Cloudy ODOR: no OTHER:
Green-Brown

OBSERVATIONS:

WEATHER DATA— TEMPERATURE: 75° SKY: Clear WIND: 5-10 mph

Bay West Analytical Laboratory

Bay West Inc.
Five Empire Drive
St. Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099
1-800-279-0456

July 31, 1992

Bay West Environmental Services
5 Empire Drive
St. Paul, MN 55103

Attn: Ms. Shirley McMaster

Bay West Environmental Services Project No.: 2436 (COC: GW-1531)
Bay West Laboratory Project ID: 5-2631
Samples Collected: July 21, 1992

The following are results from the samples you submitted for analysis on July 21, 1992.

The data is reported in Tables 1 and 2.

Please contact me if you have any questions or comments.

Sincerely,

Peter Hanson

Peter Hanson
Laboratory Manager

PH/ps

encl.

Bay West Analytical Laboratory

Bay West Inc.
Five Empire Drive
St. Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099
1-800-279-0456

Table 1

Bay West Environmental Services Project No.: 2436
Bay West Laboratory Project ID: 5-2631

Parameter	Quantitation Limit ug/L	TB (24936) ug/L	MW-1 (24939) ug/L	MW-2 (24942) ug/L	MW=3 (24945) ug/L
Total Petroleum Hydrocarbons[a]	50	<50	<50	<50	300

Analyzed: July 23, 1992

Method : EPA 5030/8020 Modified

[a]TPH reported as Fuel Oil and/or Gasoline.

Bay West Analytical Laboratories
Bay West, Inc.
Five Empire Drive
St. Paul, Minnesota
55103-1867
612[illegible]-0456
FAX 291-0099

Table 2

Sample ID: Trip Blank
Project #: 2436

Laboratory Sample # : 24936
Laboratory Project #: 5-2631

Purgeable Halogenated and Non-Halogenated Compounds
MDH 465 Target Compound List

Compound Name	Quantitation Limit ug/L	Reported Value ug/L
Acetone	5.0	ND
Allyl Chloride	1.0	ND
Benzene	1.0	ND
Bromobenzene	1.0	ND
Bromochloromethane	1.0	ND
Bromodichloromethane	1.0	ND
Bromoform	1.0	ND
Bromomethane	1.0	ND
Butylbenzene, n-	1.0	ND
Butylbenzene, sec-	1.0	ND
Butylbenzene, tert-	1.0	ND
Carbon Tetrachloride	1.0	ND
Chlorobenzene	1.0	ND
Chloroethane	1.0	ND
Chloroform	1.0	ND
Chloromethane	1.0	ND
Chlorotoluene, 2-	1.0	ND
Chlorotoluene, 4-	1.0	ND
Dibromochloromethane	1.0	ND
Dibromo-3-chloropropane	1.0	ND
Dibromoethane, 1,2-	1.0	ND
Dibromomethane	1.0	ND
Dichlorobenzene, 1,2-	1.0	ND
Dichlorobenzene, 1,3-	1.0	ND
Dichlorobenzene, 1,4-	1.0	ND
Dichlorodifluoromethane	1.0	ND
Dichloroethane, 1,1-	1.0	ND
Dichloroethane, 1,2-	1.0	ND
Dichloroethene, 1,1-	1.0	ND
Dichloroethene, c-1,2-	1.0	ND
Dichloroethene, t-1,2-	1.0	ND
Dichlorofluoromethane	1.0	ND
Dichloropropane, 1,2-	1.0	ND
Dichloropropane, 1,3-	1.0	ND
Dichloropropane, 2,2-	1.0	ND
Dichloropropene, 1,1-	1.0	ND
Dichloropropene, c-1,3-	1.0	ND
Dichloropropene, t-1,3-	1.0	ND
Ethylbenzene	1.0	ND
Ethyl Ether	1.0	ND
Hexachlorobutadiene	1.0	ND
Isopropylbenzene	1.0	ND
Isopropyltoluene, p-	1.0	ND
Methyl Ethyl Ketone	1.0	ND
Methyl Isobutyl Ketone	1.0	ND
Methyl Tertiary Butyl Ether	1.0	ND
Methylene Chloride	1.0	ND
Naphthalene	1.0	ND
Propylbenzene, n-	1.0	ND
Styrene	1.0	ND
Tetrachloroethane, 1,1,1,2-	1.0	ND
Tetrachloroethane, 1,1,2,2-	1.0	ND
Tetrachloroethene	1.0	ND
Tetrahydrofuran	1.0	ND
Toluene	1.0	ND
Trichlorobenzene, 1,2,3-	1.0	ND
Trichlorobenzene, 1,2,4-	1.0	ND
Trichloroethane, 1,1,1-	1.0	ND
Trichloroethane, 1,1,2-	1.0	ND
Trichloroethene	1.0	ND
Trichlorofluoromethane	1.0	ND
Trichloropropane, 1,2,3-	1.0	ND
Trichlorotrifluoroethane	1.0	ND
Trimethylbenzene, 1,2,4-	1.0	ND
Trimethylbenzene, 1,3,5-	1.0	ND
Vinyl Chloride	1.0	ND
Xylene, m,p-	1.0	ND
Xylene, o-	1.0	ND

Analyzed: July 22, 1992
Method : MDH 465 Modified

ND = Not Detected

Bay West Analytical Laboratory
Bay West Inc.
Five Empire Drive
St Paul, Minnesota
55103-1867
612-291-0456
FAX 291-0099

Table 2

Sample ID: MW-1
Project #: 2436

Laboratory Sample # : 24939
Laboratory Project #: 5-2631

Purgeable Halogenated and Non-Halogenated Compounds
MDH 465 Target Compound List

Compound Name	Quantitation Limit ug/L	Reported Value ug/L
Acetone	5.0	ND
Allyl Chloride	1.0	ND
Benzene	1.0	ND
Bromobenzene	1.0	ND
Bromochloromethane	1.0	ND
Bromodichloromethane	1.0	ND
Bromoform	1.0	ND
Bromomethane	1.0	ND
Butylbenzene, n-	1.0	ND
Butylbenzene, sec-	1.0	ND
Butylbenzene, tert-	1.0	ND
Carbon Tetrachloride	1.0	ND
Chlorobenzene	1.0	ND
Chloroethane	1.0	ND
Chloroform	1.0	ND
Chloromethane	1.0	ND
Chlorotoluene, 2-	1.0	ND
Chlorotoluene, 4-	1.0	ND
Dibromochloromethane	1.0	ND
Dibromo-3-chloropropane	1.0	ND
Dibromoethane, 1,2-	1.0	ND
Dibromomethane	1.0	ND
Dichlorobenzene, 1,2-	1.0	ND
Dichlorobenzene, 1,3-	1.0	ND
Dichlorobenzene, 1,4-	1.0	ND
Dichlorodifluoromethane	1.0	ND
Dichloroethane, 1,1-	1.0	ND
Dichloroethane, 1,2-	1.0	ND
Dichloroethene, 1,1-	1.0	ND
Dichloroethene, c-1,2-	1.0	ND
Dichloroethene, t-1,2-	1.0	ND
Dichlorofluoromethane	1.0	ND
Dichloropropane, 1,2-	1.0	ND
Dichloropropane, 1,3-	1.0	ND
Dichloropropane, 2,2-	1.0	ND
Dichloropropene, 1,1-	1.0	ND
Dichloropropene, c-1,3-	1.0	ND
Dichloropropene, t-1,3-	1.0	ND
Ethylbenzene	1.0	ND
Ethyl Ether	1.0	ND
Hexachlorobutadiene	1.0	ND
Isopropylbenzene	1.0	ND
Isopropyltoluene, p-	1.0	ND
Methyl Ethyl Ketone	10	190
Methyl Isobutyl Ketone	1.0	ND
Methyl Tertiary Butyl Ether	1.0	ND
Methylene Chloride	1.0	ND
Naphthalene	1.0	ND
Propylbenzene, n-	1.0	ND
Styrene	1.0	ND
Tetrachloroethane, 1,1,1,2-	1.0	ND
Tetrachloroethane, 1,1,2,2-	1.0	ND
Tetrachloroethene	1.0	ND
Tetrahydrofuran	10	63.8
Toluene	1.0	3.6
Trichlorobenzene, 1,2,3-	1.0	ND
Trichlorobenzene, 1,2,4-	1.0	ND
Trichloroethane, 1,1,1-	1.0	ND
Trichloroethane, 1,1,2-	1.0	ND
Trichloroethene	1.0	ND
Trichlorofluoromethane	1.0	ND
Trichloropropane, 1,2,3-	1.0	ND
Trichlorotrifluoroethane	1.0	ND
Trimethylbenzene, 1,2,4-	1.0	ND
Trimethylbenzene, 1,3,5-	1.0	ND
Vinyl Chloride	1.0	ND
Xylene, m,p-	1.0	ND
Xylene, o-	1.0	2.5

Analyzed: July 22-23, 1992
Method : MDH 465 Modified

ND = Not Detected

Bay West Analytical Laboratory
Bay West Inc.
Five Empire Drive
St Paul, Minnesota
55103-1867
612-291-0456
FAX [illegible] 0099

Table 2

Sample ID: MW-2
Project #: 2436

Laboratory Sample # : 24942
Laboratory Project #: 5-2631

Purgeable Halogenated and Non-Halogenated Compounds
MDH 465 Target Compound List

Compound Name	Quantitation Limit ug/L	Reported Value ug/L	Compound Name	Quantitation Limit ug/L	Reported Value ug/L
Acetone	5.0	50.1	Dichloropropane, 2,2-	1.0	ND
Allyl Chloride	1.0	ND	Dichloropropene, 1,1-	1.0	ND
Benzene	1.0	2.3	Dichloropropene, c-1,3-	1.0	ND
Bromobenzene	1.0	ND	Dichloropropene, t-1,3-	1.0	ND
Bromochloromethane	1.0	ND	Ethylbenzene	1.0	2.4
Bromodichloromethane	1.0	ND	Ethyl Ether	1.0	ND
Bromoform	1.0	ND	Hexachlorobutadiene	1.0	ND
Bromomethane	1.0	ND	Isopropylbenzene	1.0	ND
Butylbenzene, n-	1.0	ND	Isopropyltoluene, p-	1.0	ND
Butylbenzene, sec-	1.0	ND	Methyl Ethyl Ketone	1000	5830
Butylbenzene, tert-	1.0	ND	Methyl Isobutyl Ketone	1.0	ND
Carbon Tetrachloride	1.0	ND	Methyl Tertiary Butyl Ether	1.0	ND
Chlorobenzene	1.0	ND	Methylene Chloride	1.0	ND
Chloroethane	1.0	2.3	Naphthalene	1.0	ND
Chloroform	1.0	ND	Propylbenzene, n-	1.0	ND
Chloromethane	1.0	ND	Styrene	1.0	ND
Chlorotoluene, 2-	1.0	ND	Tetrachloroethane, 1,1,1,2-	1.0	ND
Chlorotoluene, 4-	1.0	ND	Tetrachloroethane, 1,1,2,2-	1.0	ND
Dibromochloromethane	1.0	ND	Tetrachloroethene	1.0	ND
Dibromo-3-chloropropane	1.0	ND	Tetrahydrofuran	1000	3940
Dibromoethane, 1,2-	1.0	ND	Toluene	1.0	3.3
Dibromomethane	1.0	ND	Trichlorobenzene, 1,2,3-	1.0	ND
Dichlorobenzene, 1,2-	1.0	1.2	Trichlorobenzene, 1,2,4-	1.0	ND
Dichlorobenzene, 1,3-	1.0	ND	Trichloroethane, 1,1,1-	1.0	ND
Dichlorobenzene, 1,4-	1.0	ND	Trichloroethane, 1,1,2-	1.0	ND
Dichlorodifluoromethane	1.0	ND	Trichloroethene	1.0	ND
Dichloroethane, 1,1-	1.0	ND	Trichlorofluoromethane	1.0	ND
Dichloroethane, 1,2-	1.0	ND	Trichloropropane, 1,2,3-	1.0	ND
Dichloroethene, 1,1-	1.0	ND	Trichlorotrifluoroethane	1.0	ND
Dichloroethene, c-1,2-	1.0	ND	Trimethylbenzene, 1,2,4-	1.0	2.3
Dichloroethene, t-1,2-	1.0	ND	Trimethylbenzene, 1,3,5-	1.0	ND
Dichlorofluoromethane	1.0	ND	Vinyl Chloride	1.0	ND
Dichloropropane, 1,2-	1.0	ND	Xylene, m,p-	1.0	5.6
Dichloropropane, 1,3-	1.0	ND	Xylene, o-	1.0	2.2

Analyzed: July 22-23, 1992
Method : MDH 465 Modified

ND = Not Detected

Bay West Analytical Laboratory
Bay West Inc.
Five Em[illegible] Drive
St Paul, Minnesota
55103-1867
612-291-0456
FA[illegible]0099

Table 2

Sample ID: MW-3
Project #: 2436

Laboratory Sample # : 24946
Laboratory Project #: 5-2631

Purgeable Halogenated and Non-Halogenated Compounds
MDH 465 Target Compound List

Compound Name	Quantitation Limit ug/L	Reported Value ug/L
Acetone	5.0	ND
Allyl Chloride	1.0	ND
Benzene	1.0	ND
Bromobenzene	1.0	ND
Bromochloromethane	1.0	ND
Bromodichloromethane	1.0	ND
Bromoform	1.0	ND
Bromomethane	1.0	ND
Butylbenzene, n-	1.0	ND
Butylbenzene, sec-	1.0	ND
Butylbenzene, tert-	1.0	ND
Carbon Tetrachloride	1.0	ND
Chlorobenzene	1.0	ND
Chloroethane	1.0	ND
Chloroform	1.0	ND
Chloromethane	1.0	ND
Chlorotoluene, 2-	1.0	ND
Chlorotoluene, 4-	1.0	ND
Dibromochloromethane	1.0	ND
Dibromo-3-chloropropane	1.0	ND
Dibromoethane, 1,2-	1.0	ND
Dibromomethane	1.0	ND
Dichlorobenzene, 1,2-	1.0	1.2
Dichlorobenzene, 1,3-	1.0	ND
Dichlorobenzene, 1,4-	1.0	ND
Dichlorodifluoromethane	1.0	ND
Dichloroethane, 1,1-	1.0	ND
Dichloroethane, 1,2-	1.0	ND
Dichloroethene, 1,1-	1.0	ND
Dichloroethene, c-1,2-	1.0	ND
Dichloroethene, t-1,2-	1.0	ND
Dichlorofluoromethane	1.0	ND
Dichloropropane, 1,2-	1.0	ND
Dichloropropane, 1,3-	1.0	ND
Dichloropropane, 2,2-	1.0	ND
Dichloropropene, 1,1-	1.0	ND
Dichloropropene, c-1,3-	1.0	ND
Dichloropropene, t-1,3-	1.0	ND
Ethylbenzene	1.0	19.9
Ethyl Ether	1.0	ND
Hexachlorobutadiene	1.0	ND
Isopropylbenzene	1.0	3.7
Isopropyltoluene, p-	1.0	ND
Methyl Ethyl Ketone	5.0	77.3
Methyl Isobutyl Ketone	1.0	ND
Methyl Tertiary Butyl Ether	1.0	ND
Methylene Chloride	1.0	ND
Naphthalene	1.0	1.8
Propylbenzene, n-	1.0	ND
Styrene	1.0	ND
Tetrachloroethane, 1,1,1,2-	1.0	ND
Tetrachloroethane, 1,1,2,2-	1.0	ND
Tetrachloroethene	1.0	ND
Tetrahydrofuran	1.0	21.5
Toluene	1.0	28.8
Trichlorobenzene, 1,2,3-	1.0	ND
Trichlorobenzene, 1,2,4-	1.0	ND
Trichloroethane, 1,1,1-	1.0	ND
Trichloroethane, 1,1,2-	1.0	ND
Trichloroethene	1.0	ND
Trichlorofluoromethane	1.0	ND
Trichloropropane, 1,2,3-	1.0	ND
Trichlorotrifluoroethane	1.0	ND
Trimethylbenzene, 1,2,4-	1.0	14.7
Trimethylbenzene, 1,3,5-	1.0	14.7
Vinyl Chloride	1.0	ND
Xylene, m,p-	5.0	102
Xylene, o-	1.0	19.0

Analyzed: July 22-23, 1992
Method : MDH 465 Modified

ND = Not Detected

GROUND WATER CHAIN-OF-CUSTODY RECORD

BW-GW: 8/91

Bay West

LAB: Bay West | SEND RESULTS TO: Shirley McMaster | CHAIN-OF-CUSTODY NO: GW- 1531

PROJECT NUMBER	PROJECT MANAGER	TURNAROUND REQUEST	SAMPLE RETENTION	
			RETURN	DISPOSE
2436	Shirley M.	Normal		

ITEM NO.	SAMPLE NUMBER (PROJECT NO. - SAMPLE ID)	SAMPLE DATE / TIME	MATRIX	NUMBER & TYPE OF CONTAINER	ANALYSIS CODE(S)	DESCRIPTION / COMMENTS
1	2436 - Trip Blank	7-21 / 7:00	W	3 x 40 ml	07, 21	
2	2436 - MW-1	7-21 / 10:18	W	3 x 40 ml	07, 21	
3	2436 - MW-2	7-21 / 12:30	W	3 x 40 ml	07, 21	
4	2436 - MW-3	7-21 / 2:05	W	3 x 40 ml	07, 21	
5	-					
6	-					
7	-					
8	-					

SAMPLER: Tom Dahl | AFFILIATION: Bay West | DATE: ~~7~~ 7-21-92

TRANS NO.	ITEM NO.	RELINQUISHED BY	ACCEPTED BY	DATE	TIME
1	1→4	Tom Dahl	Ward Swanson	7/21	4:20 pm
2					
3					
4					
5					

Preservative:

All samples must be preserved on ice (4°C), unless specified otherwise.

Matrix:

W = Water
L = Liquid Sample
S = Soil Sample
SD = Solids Sample
SL = Sludge Sample
O = Other (Specify _____)

ANALYSIS CODES

- Cross out any unwanted parameter.
- List any additional parameters in the "Description / Comments" column.

BTEX, MTBE, TPH	01
VOC'S- Drinking Water (EPA 502.2)	02
VOC'S- Ground Water (EPA 601/602)	03
VOC'S- Soil/Solids (EPA 8010/8020)	04
VOC'S (by GC/MS) (EPA 624/8240)	05
Semi-Volatiles (by GC/MS) (EPA 625/8270)	06
VOC'S- Water/Soil (MDH 465 list)	(07)
Pentachlorophenol (PCP) (EPA 604/8040)	08
Phenols (EPA 604/8040)	09
Phthalates (EPA 606/8060)	10
PCBs/Pesticides (EPA 608/8080)	11
PAHs (EPA 610/8100/8310)	12
Herbicides (EPA 615/8150)	13
Lead (total)	14
Priority Pollutant Metals (13)	15
MWCC Metals (4)	16
RCRA Metals (8)	17
BOD, COD (EPA 405.1/410.1)	18
pH, TSS (EPA 150.1/160.2)	19
Oil/Grease (EPA 413.1/9071)	20
TPH ss Fuel 8.1	(21)
	22
	23
	24

Appendix D

Bay West — FIELD SAMPLING DATA SHEET

PROJECT NAME: Cargill, Malone, NJ	SAMPLE #: MW-1
ADDRESS:	PROJECT #: 2436
CITY, STATE, ZIP: Square, NJ	DATE: 9-4-92
NAME OF SAMPLER: Tom Dahl	AFFILIATION: Bay West
ANALYTICAL LABORATORY: Bay west	COC #:

WELL DATA	PURGE DATA
WELL #: MW-1	PRE-PUMP METHOD: Bailer
CASING MATERIAL: PVC	VOLUME PRE-PUMPED (GAL):
WELL DIAMETER (IN): ~~6~~ 2"	PRE-PUMP RATE (GPM):
WELL DEPTH (FT BTOC): 8.95	I.D.# PROBE/ TAPE USED: Sonic
DEPTH TO WATER BEFORE PURGING (FT BTOC): 6.32'	I.D.# PUMP USED:
DEPTH TO WATER AT TIME OF SAMPLING (FT BTOC):	BAILER TYPE: Teflon
LENGTH OF WATER COLUMN (FT): 2.63'	
WELL VOLUME (GAL): .43	

STABILIZATION TEST

VOL #	TIME	VOL (GAL)	TEMP °C	COND (umhos/cm)	pH	OTHER
1		3	16	1620	6.2	
2		4	16	1620	6.2	
3		5	16	1620	6.2	
4						
5						
6						
7						
8						

STABILIZATION DATA	SAMPLING DATA
TOTAL VOLUME (GAL): 5.5	SAMPLE TYPE: H2O
# CASING VOLUMES: 12	SAMPLE CONTAINERS: 6 40 ml ____ 1 LA
STAB. TEMP °C: 16	____ OTHER ____ 0.5 LA
STAB. CONDUCTANCE (umhos/cm): 1620	SAMPLE VOLUME:
STAB. pH: 6.2	SAMPLE FILTERED: ____ YES ✓ NO
	TIME OF SAMPLING: 10:00
	SAMPLE PRESERVATION: ice, HCL

COMMENTS

SAMPLE DESCRIPTION— COLOR: Dk Brn ODOR: Some OTHER: Swampy odor

Silty

OBSERVATIONS:

WEATHER DATA— TEMPERATURE: 70° SKY: Ptly cloudy WIND: 15-20 mph

Bay West — FIELD SAMPLING DATA SHEET

PROJECT NAME: Cargill Molasses	SAMPLE #: MW-2
ADDRESS:	PROJECT #: 2436
CITY, STATE, ZIP: Savage, MN	DATE: 9-4-92
NAME OF SAMPLER: Tom Dahl	AFFILIATION: Bay West
ANALYTICAL LABORATORY: Bay West	COC #:

WELL DATA	
WELL #:	MW-2
CASING MATERIAL:	PVC
WELL DIAMETER (IN):	2"
WELL DEPTH (FT BTOC):	8.95'
DEPTH TO WATER BEFORE PURGING (FT BTOC):	4.58'
DEPTH TO WATER AT TIME OF SAMPLING (FT BTOC):	
LENGTH OF WATER COLUMN (FT):	4.37
WELL VOLUME (GAL):	.7

PURGE DATA	
PRE-PUMP METHOD:	Bailer
VOLUME PRE-PUMPED (GAL):	
PRE-PUMP RATE (GPM):	
I.D.# PROBE/ TAPE USED:	Sonic
I.D.# PUMP USED:	
BAILER TYPE:	Teflon

STABILIZATION TEST

VOL #	TIME	VOL (GAL)	TEMP °C	COND (umhos/cm)	pH	OTHER
1		3	16	1900	7.2	
2		4	16	1900	7.0	
3		5	16	1900	7.0	
4						
5						
6						
7						
8						

STABILIZATION DATA	
TOTAL VOLUME (GAL):	5.5
# CASING VOLUMES:	
STAB. TEMP °C:	16
STAB. CONDUCTANCE (umhos/cm):	1900
STAB. pH:	7.0

SAMPLING DATA	
SAMPLE TYPE:	H2O
SAMPLE CONTAINERS:	6 — 40 ml — 1 LA
	OTHER — 0.5 LA
SAMPLE VOLUME:	
SAMPLE FILTERED:	___ YES — ✓ NO
TIME OF SAMPLING:	~~1035~~ 11:30
SAMPLE PRESERVATION:	ICE, HCl

COMMENTS

SAMPLE DESCRIPTION— COLOR: Dark Yellow Brown ODOR: rotten odor OTHER:

OBSERVATIONS:

WEATHER DATA— TEMPERATURE: 70° SKY: rain WIND: 20 mph

Bay West — FIELD SAMPLING DATA SHEET

PROJECT NAME: Cargill Molasses	SAMPLE #: MW-3
ADDRESS:	PROJECT #: 2436
CITY, STATE, ZIP: Savage, MN	DATE: 9-4-92
NAME OF SAMPLER: Tom Dall	AFFILIATION: Bay west
ANALYTICAL LABORATORY: Bay west	COC #:

WELL DATA	
WELL #:	MW-3
CASING MATERIAL:	PVC
WELL DIAMETER (IN):	2"
WELL DEPTH (FT BTOC):	9'
DEPTH TO WATER BEFORE PURGING (FT BTOC):	6.42'
DEPTH TO WATER AT TIME OF SAMPLING (FT BTOC):	
LENGTH OF WATER COLUMN (FT):	2.58'
WELL VOLUME (GAL):	.41

PURGE DATA	
PRE-PUMP METHOD:	Bailer
VOLUME PRE-PUMPED (GAL):	
PRE-PUMP RATE (GPM):	
I.D.# PROBE/ TAPE USED:	Solinst
I.D.# PUMP USED:	
BAILER TYPE:	Teflon

STABILIZATION TEST

VOL #	TIME	VOL (GAL)	TEMP °C	COND (umhos/cm)	pH	OTHER
1		3	~~6~~ 17	2820	6.35	
2		4	17	2800	6.35	
3		5	17	2850	6.35	
4						
5						
6						
7						
8						

STABILIZATION DATA	
TOTAL VOLUME (GAL):	5.5
# CASING VOLUMES:	
STAB. TEMP °C:	17
STAB. CONDUCTANCE (umhos/cm):	2850
STAB. pH:	6.35

SAMPLING DATA	
SAMPLE TYPE:	H2O
SAMPLE CONTAINERS:	~~6~~ 40 ml ___ 1 LA
	___ OTHER ___ 0.5 LA
SAMPLE VOLUME:	
SAMPLE FILTERED:	___ YES ✓ NO
TIME OF SAMPLING:	12:45
SAMPLE PRESERVATION:	ice, HCl

COMMENTS

SAMPLE DESCRIPTION— COLOR: Yellow Brown ODOR: OTHER:

OBSERVATIONS:

WEATHER DATA— TEMPERATURE: 70° SKY: Cloudy WIND: [illegible]

Appendix 7

Bay West Analytical Laboratory

Bay West Inc.
Five Empire Drive
St. Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099
1-800-279-0456

October 2, 1992

Bay West Environmental Services
5 Empire Drive
St. Paul, MN 55103

Attn: Ms. Shirley McMaster

Bay West Environmental Services Project No.: **2436** **(COC: GW-1586)**
Bay West Laboratory Project ID: **5-2786**
Samples Collected: September 4, 1992

The following are results from the samples you submitted for analysis on September 4, 1992.

The data is reported in Tables 1 and 2.

Please contact me if you have any questions or comments.

Sincerely,

Peter Hanson

Peter Hanson
Laboratory Manager

PH/ly

encl.

Bay West Analytical Laboratory
Bay West, Inc.
Five Empire Drive
St Paul, Minnesota
55103-1867
61[illegible]1-0456
FAX 291-0099

Table 1

Bay West Environmental Services Project No.: 2436
Bay West Laboratory Project ID: 5-2786

VOLATILE ORGANIC COMPOUNDS

GC/MS

Compound Name	Quantitation Limit ug/L	Method Blank ug/L	Trip Blank (26426) ug/L	MW-1 (26428) ug/L	MW-2 (26435) ug/L	MW-3 (26440) ug/L
Chlorethane	10	ND	ND	ND	ND	ND
Acetone	10	11	46	ND	14	ND
2-Butanone(MEK)	10	ND	15	ND	160	ND
Tetrahydrofuran	10	ND	ND	20	30	ND
Benzene	10	ND	ND	ND	ND	ND
Toluene	10	ND	ND	ND	ND	ND
Ethylbenzene	10	ND	ND	ND	ND	ND
m-/p-Xylene	10	ND	ND	ND	ND	ND
o-Xylene	10	ND	ND	ND	ND	ND
Isopropylbenzene	10	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	10	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	10	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	10	ND	ND	ND	ND	ND
Napthalene	10	ND	ND	ND	ND	ND

Analyzed: September 18, 1992
Method : EPA 8240

ND = Not Detected, less than quantitation limit

Bay West Analytical Laboratory

Bay West Inc.
Five Empire Drive
St. Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099
1-800-279-0456

Table 2

Bay West Environmental Services Project No.: **2436**
Bay West Laboratory Project ID: **5-2786**

Parameter	Quantitation Limit ug/L	Trip Blank (26424) ug/L	MW-1 (26427) ug/L	MW-2 (26433) ug/L	MW-3 (26439) ug/L
Total Petroleum Hydrocarbons[a]	50.0	<50	<50	<50	<50

Analyzed: September 10, 1992

Method : EPA 5030/8020 Modified

[a]TPH reported as Fuel Oil and/or Gasoline.

2786

GROUNDWATER CHAIN-OF-CUSTODY RECORD

Bay West

LAB: Bay West, Inc | SEND RESULTS TO: Shirley McMurtrie | CHAIN-OF-CUSTODY NO: GW- 1586

PROJECT NUMBER	PROJECT MANAGER	TURNAROUND REQUEST	SAMPLE RETENTION	
			RETURN	DISPOSE
2436	Shirley M.	Normal		—

ITEM NO.	SAMPLE NUMBER (PROJECT NO. - SAMPLE ID)	SAMPLE DATE / TIME	MATRIX	NUMBER & TYPE OF CONTAINER	ANALYSIS CODE(S)	DESCRIPTION / COMMENTS
1	2436 - Trip Blank	9-4-92 / 7:45	W	3x 40 ml	21, 22	
2	2436 - MW-1	9-4 / 10:00	W	6x 40 ml	21, 22	
3	2436 - MW-2	9-4 / 11:30	W	6x 40 ml	21, 22	
4	2436 - MW-3	9-4 / 12:45	W	6x 40 ml	21, 22	
5	-					
6	-					
7	-					
8	-					

SAMPLER: Tom Dahl | AFFILIATION: Baywest, Inc. | DATE: 9-4-92

TRANS NO.	ITEM NO.	RELINQUISHED BY	ACCEPTED BY	DATE	TIME
1	1-4	Tom Dahl	P. Hodge	9/4	1:55
2					
3					
4					
5					

Preservative:

All samples must be preserved on ice (4°C), unless specified otherwise.

Matrix:

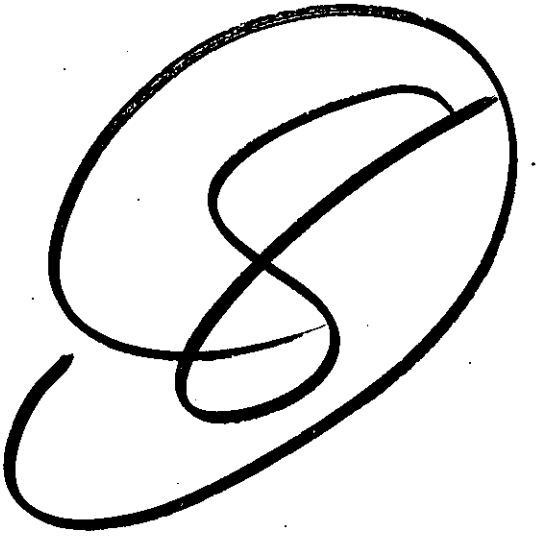
W = Water
L = Liquid Sample
S = Soil Sample
SD = Solids Sample
SL = Sludge Sample
O = Other (Specify _____)

ANALYSIS CODES

- Cross out any unwanted parameter.
- List any additional parameters in the "Description / Comments" column.

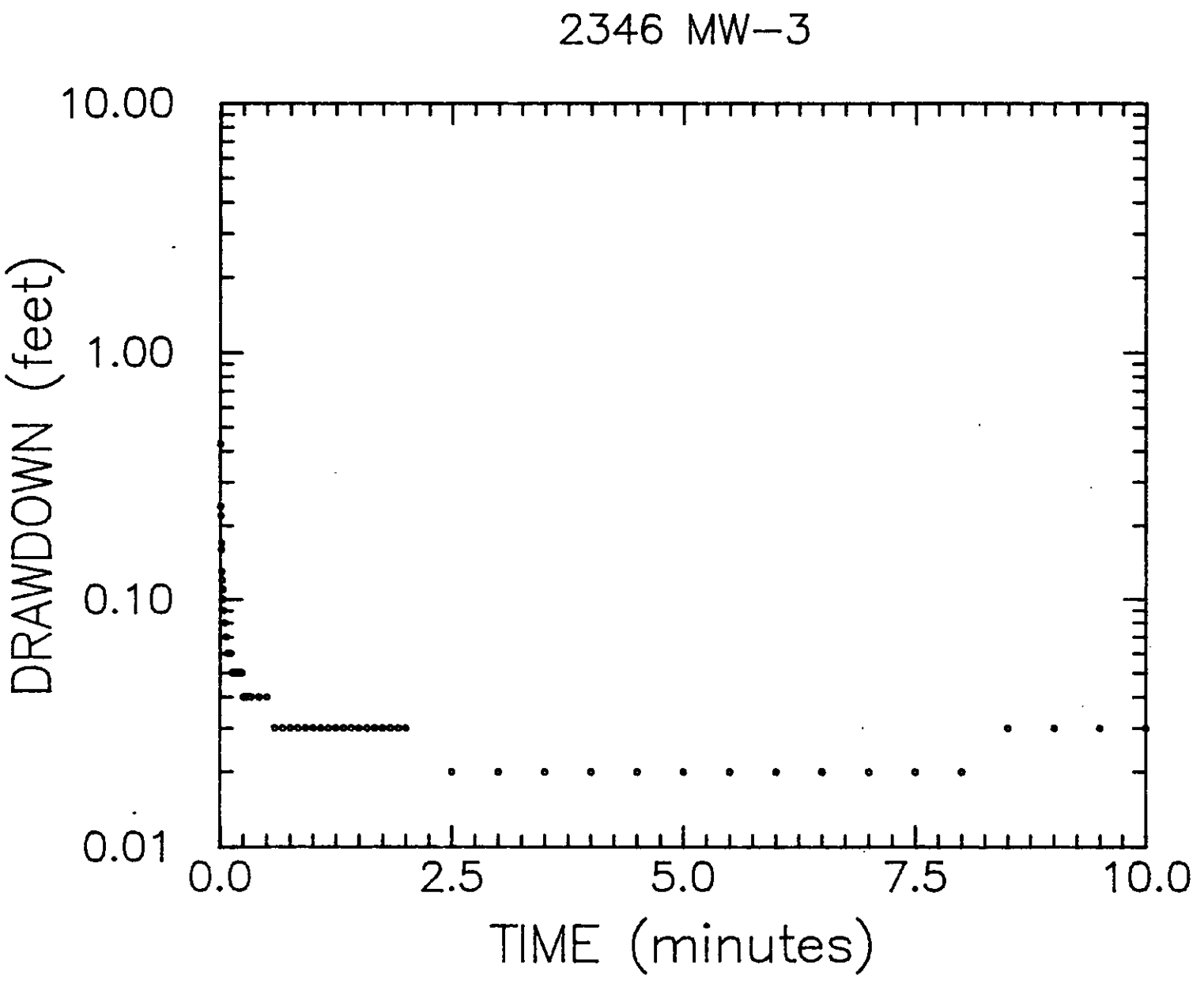
BTEX, MTBE, TPH	01
VOC'S- Drinking Water (EPA 502.2)	02
VOC'S- Ground Water (EPA 601/602)	03
VOC'S- Soil/Solids (EPA 8010/8020)	04
VOC'S (by GC/MS) (EPA 624/8240)	05
Semi-Volatiles (by GC/MS) (EPA 625/8270)	06
VOC'S- Water/Soil (MDH 465 list)	07
Pentachlorophenol (PCP) (EPA 604/8040)	08
Phenols (EPA 604/8040)	09
Phthalates (EPA 606/8060)	10
PCBs/Pesticides (EPA 608/8080)	11
PAHs (EPA 610/8100/8310)	12
Herbicides (EPA 615/8150)	13
Lead (total)	14
Priority Pollutant Metals (13)	15
MWCC Metals (4)	16
RCRA Metals (8)	17
BOD, COD (EPA 405.1/410.1)	18
pH, TSS (EPA 150.1/160.2)	19
Oil/Grease (EPA 413.1/9071)	20
TPH	21
GC/MS for	22
Compounds on	23
attached list	24

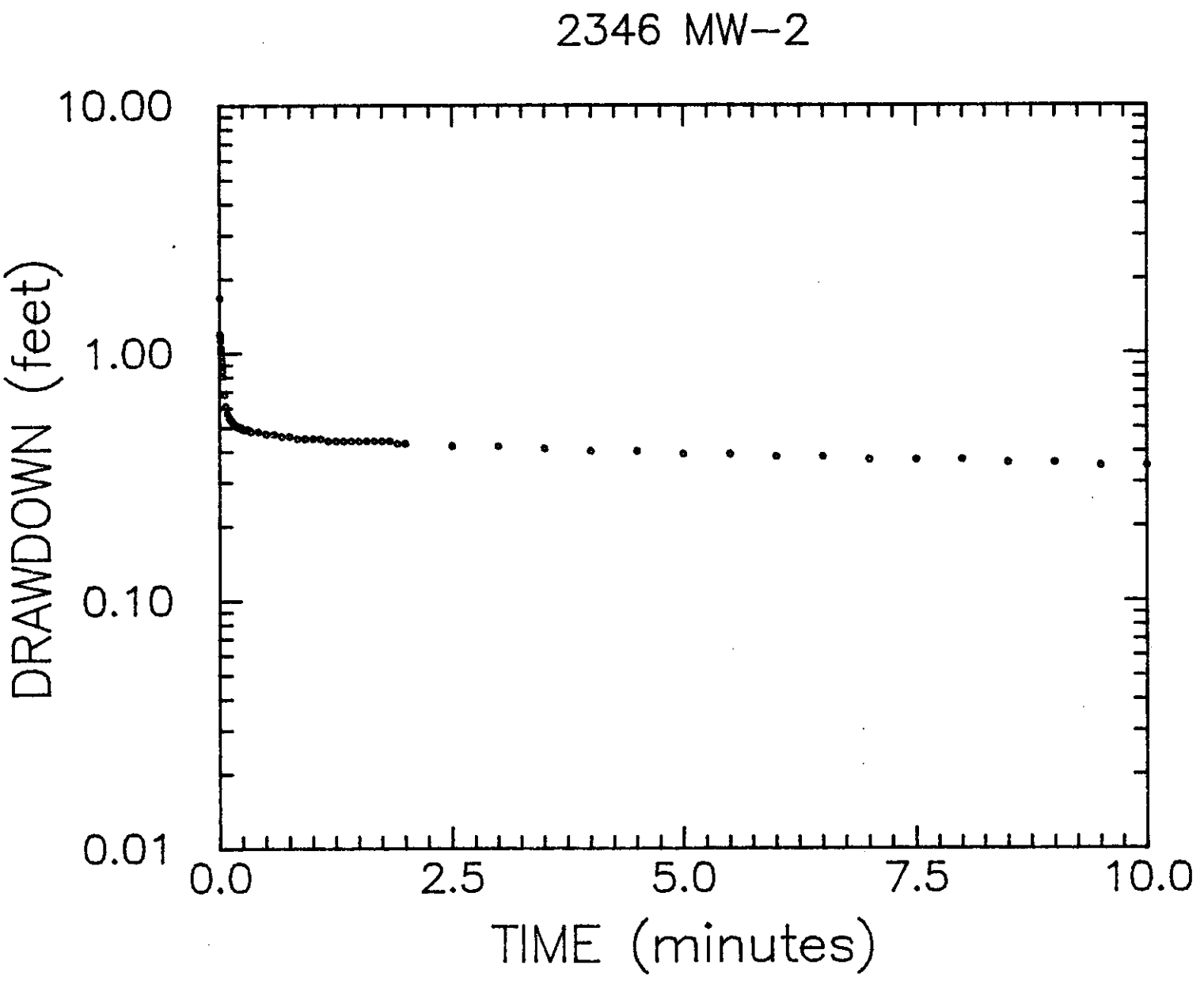
Appendix

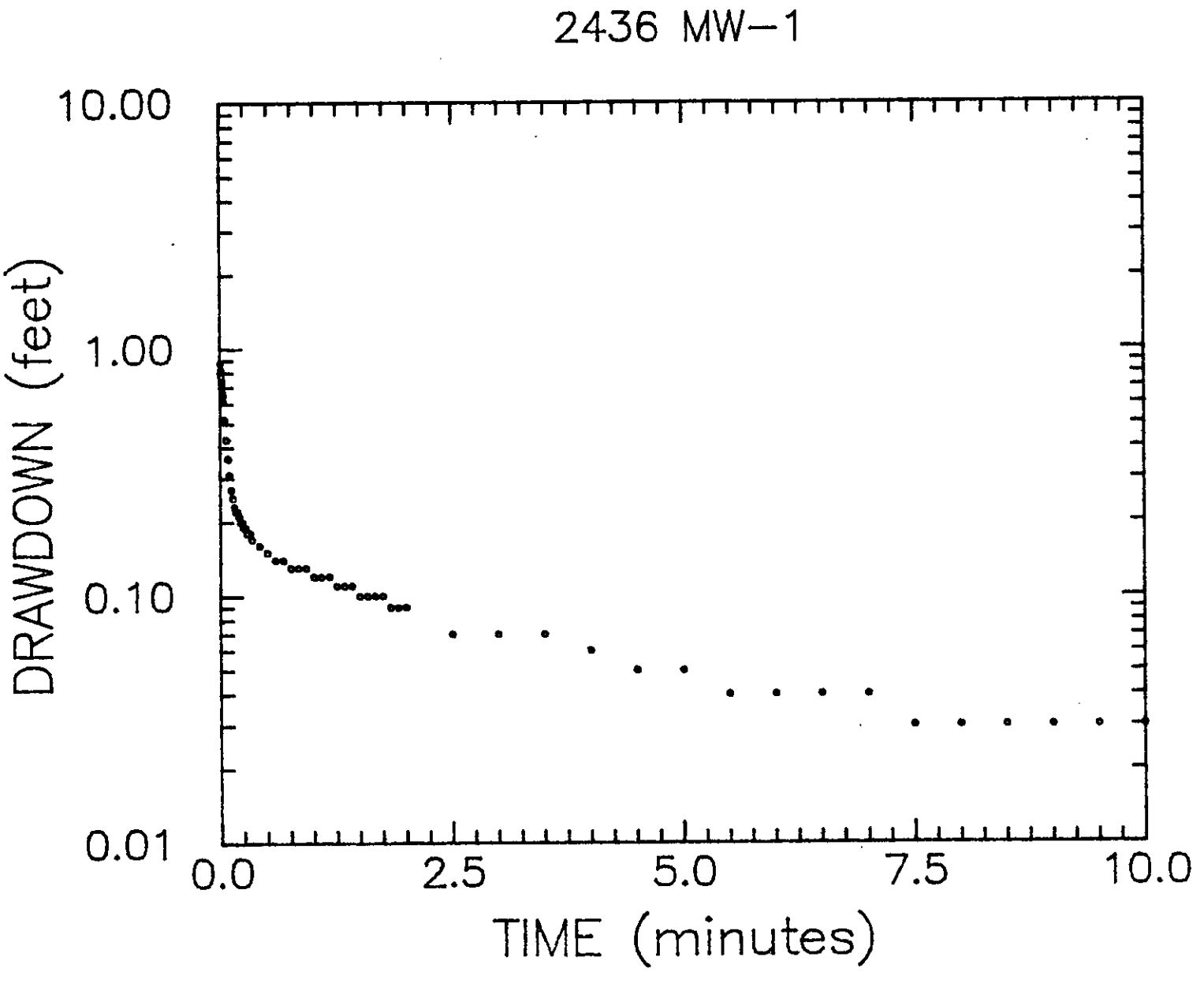


2436 Slug Test Analysis
Bouwer and Rice, 1976

Well ID	MW-1
Yo (ft)	0.17
Yt (ft)	0.90
T (min)	9.750
H	3.63
D	3.63
L	3.63
Rc (ft)	0.083
Rw (ft)	0.34
C	1.25
LN(Re/Rw)	1.72
K (ft/day)	0.4087
K (gpd/ft^2)	3.0564
K (cm/sec)	0.0001


2346 MW-3
10.00
1.00
0.10
0.01
DRAWDOWN (feet)
0.0
2.5
5.0
7.5
10.0
TIME (minutes)


2346 MW-2
10.00
1.00
0.10
0.01
DRAWDOWN (feet)
0.0
2.5
5.0
7.5
10.0
TIME (minutes)


2436 MW-1
10.00
1.00
0.10
0.01
DRAWDOWN (feet)
0.0
2.5
5.0
7.5
10.0
TIME (minutes)

Appendix

9

21-24-STAADDAB

[redacted]

WELL RECORD

ELEV 710±5

TRI-STATE DRILLING CO.

208835

HC

Owner: Cargill, Inc.

Date completed: Aug. 1957

Location: Port Cargill, Minn.

Driller: Ralph Fisele and C. R. Berthiaume

Well Designation: No. 2

Well Type: [x] Rock [ ] Screen [ ] Gravel Packed

Total Depth: 240 feet.

6h W/B

DRILLER'S LOG

From		To	Formation
QUUU 0	to	7	drift
OPDC 7	to	148	~~Shakopee-Oneota~~ dolomite T/703 OPC
JDN 148	to	240	Jordan sandstone T/562

Aquifer: OPDC-JDN

710 / 148 / 562

On Scott-Dakota Co. Line at River
Well in pumphouse across street
From Elevator C.

WELL MATERIALS

7 ft.	20	in. diam. outer casing
30 ft.	16	in. diam. liner pipe (grouted)
ft.		in. diam. screen

Screen type:

Remarks:

PERMANENT PUMP DATA

Mfg. Fairbanks-Morse Model

Serial No. Type lineshaft

40 h.p. Motor, 220 V. 3 Ph.

80 ft. setting 1-7/16 shaft 8 in. col. pipe

Remarks: 800 gpm @ 150' TDH

TEST PUMPING DATA

Static water level ____ feet. Pumped at ____ g.p.m.

with ____ foot level

208 034 * HC

E. H. RENNER & SONS WELL COMPANY

7700 Highway No. 7 St. Louis Park

INVOICES:
(Well) No.
(Pump) No.

27-24-31
CCDBAD
Elev. 726±5

WELL LOG

Date Started June 15 19 56 Date Completed 19 56

Contractor Address Savage, Minn.

Block Twp or city Savage County State of Minnesota

Well: 12" 22'
Cased with 10" Ft. 42' Total Depth of Well from grade
Type and Size
Open Hole 225 Finished in St. Lawrence Water Level 75 (719) Elev.
500 gallons per min. Draw down of 7 feet.

Screen:
Size Make Slot or Gauge Number

Pump:
Make H.P. Type Tank Size
Motor Serial No. Pump Serial No. Drop Pipe feet
Capacity of pump G.P.M. Date Installed

KIND OF FORMATION	COLOR OF FORMATION	STARTED DEPTH	ENDED DEPTH	TOTAL THICKNESS OF FORMATION	REMARKS
Drift		0	6	6	
Shale	White	6	7	1	
Shakopee Dolomite	Pink	7	156	149	
Shale	Yellow	(T	R A C	E)	
Jordan	Yellow	156	219	63	
St. Lawrence	Green	219	337	118	

WL

27-24-51
BLOOMINGTON QUAD
CDBDDB
Elev 720-5
P 56 4 A-B
1640
Bloomington
700

WELL RECORD

TRI-STATE DRILLING CO.

208836
HC *

Owner Village of Savage, Minnesota

Date completed October 29, 1959

Location Savage, Minnesota

Driller Ray Beneke

Well Designation #1

Well Type: [x] Rock [ ] Screen [ ] Gravel Packed

720
8
712

720
152
568

Total Depth 250 feet.

Crescent River Drive
½ Blk. south Minnesota St.
West side of street

DRILLER'S LOG

From	To	Formation
0'	8'	clay
8	152	Shakopee-Oneota dolomite
152'	249'	Jordan sandstone, upper 45' and lower 34' softer than middle section
249'	250'	shale

OPDC
CJDN
CSTL

T/568
T/471

568

OPDC-CJDN

712
471
241

WELL MATERIALS

12 ft. 20 in. diam. outer casing

169 ft. 12 in. diam. liner pipe

ft. in. diam. screen

Screen type

Remarks: 12" casing grouted from top to bottom--16½ yards of 1:1 mix. Well was shot from 240' to 185', approximately 75 yards of sand removed.

PERMANENT PUMP DATA

Mfg. Layne Model

Serial No. Type

h.p. Motor. V. Ph.

ft. setting. in. shaft in. col. pipe

Remarks:

TEST PUMPING DATA

Static water level flow feet. Pumped at 900 g.p.m. with 53½ foot level Sand sample taken after 13 hours of testing--4.8 ppm. Well was developed an additional 18 hours with pump. Sample taken at 600 GPM--1.2 ppm.

207061

27-24-31

[redacted] CDADDD

Elv. 725 ±5

Well Address (Schunk)	116 Vine Street, Savage, Minn.	July 31, 1961	WELL RECORD
Driller's Signature: Dick Tweed	Date		Permit Number
Drilling Company: **Dependable Well Co.**	Address: **9743 Humboldt Ave. So.**		Telephone: **TU. 8-4303**

SIZE OF WELL	3 INCHES	WATER LEVEL	102 FEET
WELL DEPTH	143 FEET	DRAW DOWN	-0- FEET
CASING DEPTH	135 FEET	CAPACITY GALLONS	1,200 PER/HR.

DEPTH OF IMPERVIOUS FORMATION 0 FEET

SAND POINT ..... FEET ..... INCHES/BY ..... INCHES

MAKE AND TYPE MATERIAL: 8' Open hole - Limerock

CASED WITH

WELDED JOINT ( )

SCREWED JOINT (X)

Remarks: Project Plumbing

File - 470

20706 1

Kind of Formation	Color	Started Depth	Ended Depth	Width of Formation	Remarks
QTCG clay	yellow	0	25	25	
QTCG clay	blue	25	125	100	
QFCG broken rock & sand	blue gray	125	135	10	
limerock	white	135	143	8	Water

Duifer

Appendix D

Hydrogeologic Setting and Ground Water Contamination Characterization Petroleum Release Sites

Minnesota Pollution Control Agency
Tanks and Spills Section
May 1992

Complete this worksheet for all sites with ground water contamination. The worksheet has several purposes. It summarizes remedial investigation (RI) results and conclusions for use by Minnesota Pollution Control Agency (MPCA) staff when reviewing the site to determine whether corrective action will be required to remediate ground water contamination. It also provides supplementary information on investigation, design, and reporting requirements (presented in bold type) for sites with ground water contamination. Review this worksheet and all other relevant MPCA documents when developing RI work plans to ensure the investigation meets all RI requirements.

Base answers to the following questions on the results of the ground water receptor survey, RI activities, and published geologic literature. Answer the questions in the space provided, and attach additional sheets if necessary.

1. Identify and describe the geologic units in which ground water has been impacted by the petroleum release. What is the thickness (or estimated thickness) and estimated lateral extent of the impacted unit?

   Surficial sediments approximately five to nine feet thick. The lateral extent of contamination is approximately 70 feet long by 25 feet wide.

At all sites with ground water monitoring wells, the RI must include an estimate of hydraulic conductivity, and provide estimates of the ground water velocity in the impacted unit. Documentation of how you arrived at these estimates must be provided.

2. What is the hydraulic conductivity, effective porosity, horizontal hydraulic gradient, vertical hydraulic gradient, estimated ground water velocity, and flow direction in the impacted unit?
   K = 0.4 ft/day porosity = 30 to 40% dh/hl = 7.0×10^{-3} to 1.1×10^{-2} ft/ft
   v = 36 to 57 ft/day flow direction: NE to East NE dv/dl = Not determined

3. What is the maximum concentration of benzene and total hydrocarbons detected on the site? (parts per billion [ppb] units)
   Benzene Not Detected (Well No. _____, Date _____) Total Hydrocarbons 300 ug/l (Well No. 3, Date 7/21/92)

4. What is the maximum concentration of benzene and total hydrocarbons detected at or beyond the property boundary? (ppb units)
   Benzene Not Detected* (Well No. _____, Date _____) Total Hydrocarbons Not Detected* (Well No. _____, Date _____)

5. Do contaminant concentrations for any compound exceed the Recommended Allowable Limits (RALs) at, or beyond the site boundaries? (Yes/No) No
   Compound _____ (Well No. _____, Date _____)

   * No sampling performed at plant boundaries; but boundaries of release identified.

6. Do sources of contamination (including contaminated soil) remain at the site? (Yes/No) Yes If Yes, briefly describe.

   Contaminated soil remains which due to presence of rail tracks, underground utilities and structures, cannot be excavated.

7. Is municipal water supply available at the site and within one mile downgradient of the site? (Yes/No) Yes

8. Are there presently any water wells which use the impacted aquifer located within one-half mile downgradient of the site, or one mile downgradient of the site if the aquifer material is fractured? (Yes/No) No

9. Are there any plans for ground water development in the impacted aquifer within one-half mile downgradient of the site, or one mile downgradient of the site if the aquifer material is fractured? (Yes/No) No

If you answered "No" to questions 8 and 9, please skip to question 10 and continue.

If you answered "Yes" to questions 8 or 9 and "Yes" to question 5, corrective action will likely be required to remediate ground water contamination at the site. The RI report should include a proposed Corrective Action Design to meet the following cleanup goal and compliance point:

Cleanup goal: **The RALs for VOCs and one part per million total hydrocarbons**

Compliance point: **At and beyond the site boundaries**

At some LUST sites, corrective actions may not be technically capable of achieving remediation to RALs. For a discussion of the options which should be considered when designing corrective actions for sites of this type, please see "LUST Program Cleanup Strategy" (Guidance Document 16).

STOP here if you answered "Yes" to questions 8 or 9.

10. Are there nonpotable water supply wells which use the impacted unit downgradient of the site? (Yes/No) No

11. Does the plume currently discharge to surface water? (Yes/No) No
    If Yes, what is the estimated width of the plume at the shore of the surface water body, and what are the estimated concentrations of the following contaminants at the shore of the surface water body: (The estimation method should be described in the text of the RI report.)

    Benzene _____, Ethyl Benzene _____, Toluene _____, Xylenes _____,
    Total Hydrocarbons _____

If the answer to question 11 is "Yes," the "Use Category" of the surface water body should also be determined in accordance with Minn. Rules ch. 7050 and reported.

12. Does the plume have a projected point of entry to surface water? (Yes/No) No
If Yes, what is the distance from the downgradient edge of the plume to the surface water body?

If you answered "Yes" to question 12, the RI report should characterize the hydrogeologic conditions and land use between the site and the surface water body, and should assess the potential for the plume to discharge to surface water and the likelihood of further ground water use in the vicinity of the plume.

13. Is the impacted unit a bedrock aquifer? (Yes/No) No

14. Has contamination from the site impacted a quaternary surficial or buried aquifer that is presently used as a drinking water aquifer anywhere within a two-mile radius of the site? (Yes/No) No

STOP here if you answered "Yes" to questions 13 or 14. If you answered "No" to both questions, please continue.

15. Identify and describe the uppermost drinking water aquifer in the site vicinity. What is the depth to the top of the uppermost drinking water aquifer? What is the water level in the uppermost drinking water?

16. Is there a confining unit between the impacted unit and the uppermost drinking water aquifer? What is its thickness and extent?

17. Is the uppermost drinking water aquifer a karst unit or a sole source aquifer?

18. Are there any existing or abandoned wells within approximately 1,000 feet downgradient of the site?

19. Are there any other site specific conditions which increase the risk of cross contamination from the impacted unit to a drinking water aquifer?

20. Based on the answers to questions 14 through 18 and any other site specific information available, summarize and assess the risk of cross contamination from the impacted unit to the uppermost drinking water aquifer.

SITE NAME: Cargill Molasses

SITE ID NUMBER: 4526

PETROLEUM TANK RELEASE REPORT CHECKLIST

In order to facilitate report review, the MPCA staff requests your assistance in completing this form which should be attached to all incoming reports. The form will be used to screen reports for completeness and to characterize the degree of contamination at the site.

SITE CHARACTERIZATION

	YES	NO
Emergency:		
Vapor or explosive hazard?	___	X
- if yes, has this been addressed	___	___
Actual drinking water supply impacts	___	X
- if yes, has alternate supply been provided?	___	___
Ground Water and Soil:		
Has ground water been impacted?	X	___
Is there free product?	___	X
- if yes, has recovery been initiated?	___	X
Are there downgradient receptors at risk?	___	X
Did you answer "yes" to any question, 7 through 14, on the Hydrogeologic Setting and Ground Water Characterization Worksheet?	___	X
Is this a progress report?	___	X
- if yes, is it quarterly or annual?	___	

REPORT CONTENTS

Check the appropriate report type and completed sections (as outlined in the "Petroleum Tank Release Reports" document).

( ) Excavation Report Form
[ ] All Applicable section completed
[ ] Figures
[ ] Lab reports with chain of custody forms

(X) IR Report
[X] Introduction
[X] Background, incl Twp/Rng, Lat/Long
[ ] Excavation form
[X] RI Results
[X] Discussion
[X] Conclusions
[X] Recommendations
[ ] Proposed CAD
[X] Appendices, incl IGWIS form
[X] Tables, figures
[X] Hydrogeologic Characterization Worksheet

( ) CAD Report
[ ] Proposed CAD
[ ] Appropriate sections of appendices
[ ] Figures

( ) Progress Reports
[ ] Introduction
[ ] Background
[ ] Corrective action
[ ] Ground Water monitoring results
[ ] Discussion
[ ] Conclusions
[ ] Recommendations
[ ] Appendices
[ ] Tables, figures

If recommendations are included in the report, provide a brief description (e.g., no further action, modification of ground water recovery system, additional monitoring, etc.): One additional round of sampling.

If a CAD is proposed, provide a brief description (e.g., soil venting, pump and treat, bioremediation, etc.): _____

SITE NAME: Cargill Molasses

SITE ID NUMBER: LEAK 00004526

PETROLEUM TANK RELEASE REPORT CHECKLIST

In order to facilitate report review, the MPCA staff requests your assistance in completing this form which should be attached to all incoming reports. The form will be used to screen reports for completeness and to characterize the degree of contamination at the site.

SITE CHARACTERIZATION

	YES	NO
Emergency:		
Vapor or explosive hazard?		x
- if yes, has this been addressed		
Actual drinking water supply impacts		x
- if yes, has alternate supply been provided?		
Ground Water and Soil:		
Has ground water been impacted?		x
Is there free product?		x
- if yes, has recovery been initiated?		
Are there downgradient receptors at risk?		x
Did you answer "yes" to any question, 7 through 14, on the Hydrogeologic Setting and Ground Water Characterization Worksheet?		x
Is this a progress report?		
- if yes, is it quarterly or annual?		

REPORT CONTENTS

Check the appropriate report type and completed sections (as outlined in the "Petroleum Tank Release Reports" document).

(x) Excavation Report Form
- [x] All Applicable section completed
- [x] Figures
- [x] Lab reports with chain of custody forms

(x) IR Report
- [x] Introduction
- [x] Background, incl Twp/Rng, Lat/Long
- [x] Excavation form
- [x] RI Results
- [x] Discussion
- [x] Conclusions
- [x] Recommendations
- [ ] Proposed CAD
- [ ] Appendices, incl IGWIS form
- [x] Tables, figures
- [ ] Hydrogeologic Characterization Worksheet

( ) CAD Report
- [ ] Proposed CAD
- [ ] Appropriate sections of appendices
- [ ] Figures

( ) Progress Reports
- [ ] Introduction
- [ ] Background
- [ ] Corrective action
- [ ] Ground Water monitoring results
- [ ] Discussion
- [ ] Conclusions
- [ ] Recommendations
- [ ] Appendices
- [ ] Tables, figures

If recommendations are included in the report, provide a brief description (e.g., no further action, modification of ground water recovery system, additional monitoring, etc.): No further action

If a CAD is proposed, provide a brief description (e.g., soil venting, pump and treat, bioremediation, etc.): _____