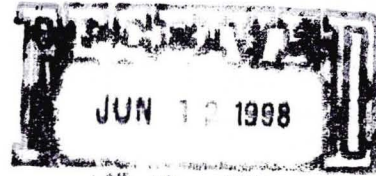




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June 10, 1998



Mr. Chris Saari  
WDNR, Brule Area Headquarters  
P.O. Box 125  
6250 South Ranger Road  
Brule, WI 54820-0125

Re: Remedial Action Report, Quearm Oil Site, Ashland, Wisconsin  
WDNR UID No. 02-02-000105 and 03-02-000975  
PECFA Claim No. 54806-1649-05

Dear Mr. Saari:

Enclosed you will find the Remedial Action Report that documents the soil excavation activities at the Quearm Oil Site. As we have discussed, the final disposition of the soil has not yet been determined and is pending the Wisconsin Attorney General's action against Clean Soils, Inc.

The Case Summary and Close Out Form is currently being prepared by MSA Professional Services, Inc. (MSA) and should be submitted to you in the next month. We understand that until the final disposition of the soil is determined, case closure may not be possible.

Please contact me if you have any further questions regarding the status of the project.

Sincerely,

MSA Professional Services, Inc.

Brian J. Hegge  
Project Manager

BJH:jcp

cc: Fred Gygi, Gygi Heating Company, Ironwood, MI

# Remedial Action Report

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Quearm Oil Company  
105 West 6th Street  
Ashland, Wisconsin 54806

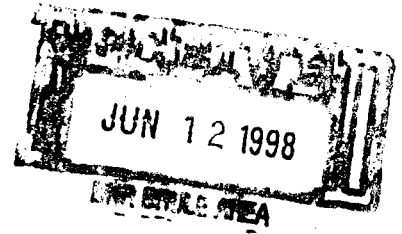
MSA Project No. 212320 and  
212365

DNR File Nos. 02-02-000105 and  
03-02-000975

PECFA File No. 54806-1649-05

The logo for MSA Professional Services, featuring the letters "MSA" in a large, bold, red, sans-serif font.

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# Remedial Action Report

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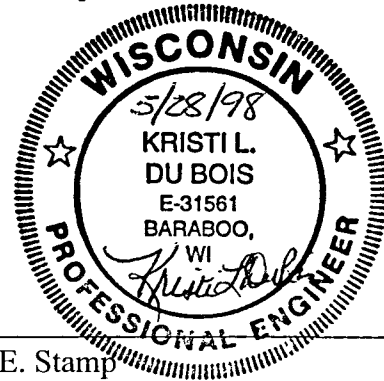
Quearm Oil Company  
105 West 6th Street  
Ashland, WI 54806

MSA Project No. 212320 and  
212365  
DNR File Nos. 02-02-000105 and  
03-02-000975  
PECFA File No. 54806-1649-05

## SUBMITTAL CERTIFICATION

The following submittal certification is provided in accordance with ss. NR 712.09, Wis. Adm. Code, and is applicable only to the Quearm Oil Company project.

I, Kristi L. Du Bois, hereby certify that I am a registered professional engineer in the State of Wis., registered in accordance with the requirement of Chapter A-E4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in Ch. A-E8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in Chs. NR 700 to 726, Wis. Adm. Code.



---

Kristi L. Du Bois, E-31561  
Project Engineer

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P.E. Stamp

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## EXECUTIVE SUMMARY

This report was prepared to meet the requirements of Chapter NR 724.15 and 726 of the Wisconsin Administrative Code and documents excavation activities for the Quearm Oil Company site in Ashland, Wisconsin. The report also presents site history, soil and groundwater sample data and a backup material for a site closure request.

The Quearm Oil Company property contained two separate areas of petroleum contamination associated with above ground storage tanks (ASTs) and with underground storage tanks (USTs).

A petroleum release occurred from an AST in 1989. In response to an order by the Wisconsin Department of Natural Resources (WDNR), Ayres and Associates, Inc. performed a site investigation (SI) in July 1992 near the above ground storage tank (AST) area. During the investigation soil borings were completed and groundwater monitoring wells installed. An area of soil contamination surrounding the ASTs was defined as a result of the SI.

In November 1995 MSA Professional Services, Inc. (MSA) performed an underground storage tank closure assessment on the USTs used for retail gasoline sales. Based on petroleum odors, soil staining and headspace screening results, the WDNR was notified of a release from these USTs. MSA conducted a SI from January 1996 to April 1996 to determine the extent of contamination from the retail gasoline USTs.

Removal of the ASTs took place on December 1 and 2, 1997. Excavation and disposal of 3,349 tons of petroleum contaminated soil from both the area of the ASTs and the area of the former retail gasoline tanks and dispensers took place on December 3, 4 and 5 1997.

## **BACKGROUND INFORMATION**

### **SITE INFORMATION**

Pertinent information regarding the site contact person, site location, and site description follows:

**Contact Person:** Mr. Fred Gygi  
Quearm Oil Company  
631 E. McLeod Avenue  
Ironwood, MI 49938  
(906)932-8088

**Site Location:** 105 West 6th Street  
Ashland, Wisconsin 54806  
SE1/4, SW1/4, Section 33, T48N, R4W  
Ashland County

**Consultant:** MSA Professional Services  
1835 North Stevens  
Rhineland, Wisconsin 54501  
(715)362-3244  
Project Manager: Brian Hegge

### **SITE HISTORY**

The site has been the location of a petroleum bulk facility since the 1930's. The site was sold to Gygi Heating Company, Inc. in 1992. See Figure 1 for the site location.

An approximate 2,000 to 3,000 gallons of gasoline was released from an AST May 31, 1989. In response to the release, excavation of some of the contaminated soil was performed. Additional investigation was recommended by Twin City Testing Corporation, however, development of the property was being pursued and the investigation was not performed at that time (Ayres, 1993).

Ayres and Associates, Inc. performed a SI in July 1992 near the AST facility. During the investigation 10 soil borings were completed and four groundwater monitoring wells were installed. As a result of the investigation, an approximate area of soil contamination surrounding the ASTs was defined. See Table 1 for the soil boring analytical results from the investigation. Monitoring wells installed at the site showed no contamination over the NR 140 enforcement standards (ES). See Table 2 for groundwater sampling analytical results and the Remedial Investigation report (Ayres, 1993) for further information on the site investigation.

MSA performed a closure assessment on the removal of one 1,000 gallon gasoline UST and one 1,000 gallon unleaded gasoline UST on November 14, 1995. The tanks were previously used for retail fuel sales. The purpose of the closure assessment was to determine if petroleum products from the USTs had been released into the environment, and if additional investigation was needed to determine the extent and degree of contamination. Based on petroleum odors, soil staining and headspace screening results, the WDNR was notified of a release from these USTs. See the Underground Storage Tank Closure Assessment Report (MSA, 1995) for further information.

MSA conducted a SI from January 1996 to April 1996 to determine the extent of contamination from the retail gasoline USTs. During the investigation, nine Geoprobe® soil borings were completed and soil samples were collected for field screening and laboratory analysis. The area of soil contamination identified was located in the immediate area surrounding the former retail sales USTs, the southern pump island and the piping run. See the Site Investigation and Remedial Action Options Report (MSA, 1996) for further information.

A Remedial Action Plan was developed by MSA in September 1997 to summarize the remedial action (excavation) planned for the site. Additional activities as part of this report included the development of site specific soil cleanup standards pursuant to NR 720.19. Standards developed were based on leaching analysis and were developed for GRO (250 mg/kg), benzene (19  $\mu\text{g}/\text{kg}$ ), ethylbenzene (69,100  $\mu\text{g}/\text{kg}$ ), toluene (11,180  $\mu\text{g}/\text{kg}$ ) and total xylenes (17,620  $\mu\text{g}/\text{kg}$ ). Refer to the Remedial Action Plan (MSA, 1997) for further information regarding the development of the site specific standards.

All former ASTs and USTs at the site have been removed. DCOMM records show that one 550-gallon diesel fuel UST was removed in 1988. Two 1,000 gallon tanks (unleaded and leaded gasoline) and associated piping were removed on November 14, 1995. On December 3, 1997, seven ASTs and one 300-gallon fuel oil UST were removed from the site. See Figure 2 for the layout of the site which shows locations of the former tanks, monitoring wells and soil borings.

In December 1997 an excavation was performed to remove contaminated soil from the area of the former USTs and ASTs. A discussion of the excavation and presentation of the results follows.

## **GEOLOGY AND HYDROGEOLOGY**

Soil at the site is composed of glacial lake deposits (dark red clay to silty clay) to a depth of as much as 300 ft bgs. Intermittent areas of sand were encountered in some of the soil borings. Depth to sandstone bedrock is estimated to be 70 to 80 ft below ground surface (bgs) near the Quearm Oil site.

Depth to groundwater in the monitoring wells varies from approximately 4 to 18 ft bgs. See Figure 3 for groundwater contours on November 10, 1992. It was not possible to obtain additional data during the September 1997 sampling round due to the inability to locate MW-1, MW-2 and MW-4.



The regional aquifer for the Ashland area is a sandstone aquifer which is approximately 70 to 80 ft bgs (Ayres, 1993).

Hydraulic conductivity of the clay soils is estimated to be  $10^{-6}$  to  $10^{-9}$  cm/s based on grain size analysis (MSA, 1997).

## REMEDIAL ACTION EXCAVATION ACTIVITIES

### EXCAVATION AND SOIL SAMPLING ACTIVITIES

The excavation of the area near the former AST facility and the former fuel dispensing facility took place on December 2, 3 and 4, 1997. Prior to the excavation, seven ASTs and a fuel oil tank were removed from the site. The extent of the excavation was determined by analyzing soil samples with a field gas chromatograph (GC). After PVOCs were no longer detected in field GC samples, confirmatory samples were collected and submitted to a State of Wisconsin certified laboratory. See Figure 4 for the horizontal excavation extent and sample locations.

Excavation depth ranged from three to 16.5 ft bgs. Moist to wet clay was found at depths ranging from 10 to 12 ft bgs. The excavation included the former underground storage tank and dispensing areas and the AST and fuel oil area to the south to Sixth Street, and to the northwest to MW-2. A total of 3,349 tons of soil was removed and hauled to a Cleansoils, Inc. incinerator for disposal.

Soil samples showing no detect of petroleum compounds at final excavation depths were obtained from the entire excavation with the exception of samples L6, L15, L28, L29 and L33. All these samples contained benzene concentrations greater than the site specific standard. See Tables 3 and 4 for soil sample gas chromatograph and analytical results.

Polycyclic aromatic hydrocarbon (PAH) samples were analyzed for all the laboratory samples taken from the AST area. Concentrations were compared to interim guidance concentrations from the Wisconsin Department of Natural Resources (see Table 4). The naphthalene concentration in L28 exceeded the suggested generic residual contamination level for the groundwater pathway.

The excavation proceeded as far south as possible to Sixth Street. Sample L29 was a sidewall sample in that area. Samples L15, L33, and L28 were also sidewall samples. Sample L6 was a bottom sample in the 3 ft portion of the excavation. An estimated amount of contaminated soil remaining is shown on Figure 5. Soil profiles and contaminant concentrations are shown on Figure 6 and 7.

A sanitary sewer line serving the former Quearm Oil building was abandoned in place during the excavation. The sewer line was located at approximately 12 to 13 ft bgs.

## **MONITORING ACTIVITIES**

### **GROUNDWATER MONITORING**

Groundwater monitoring at the site began in October 1992. No contaminants were detected in excess of the NR 140 ES. During the sampling round on September 9, 1997, only MW-3 could be located. Again, there was no detection of contamination in excess of the ES. Monitoring well MW-2 was abandoned during the excavation and MW-4 was covered by a foundation for a convenience store (per WDNR representative). No further sampling activities are planned for the site and the remaining monitoring wells will be properly abandoned by MSA personnel.

## CONCLUSIONS

NR 720.09 allows the development of site specific cleanup standards if the lowest concentration that is practicable is achieved so that contaminants left in place do not pose a threat to public health, safety or welfare. The excavation proceeded as far as practicable and 3,349 tons of soil were removed from the site. Human exposure to remaining contaminated soil is a possibility if the soils are excavated for foundations, or if Sixth Street is repaired in the future, however, the remaining mass is estimated to be a relatively small quantity compared to the original mass.

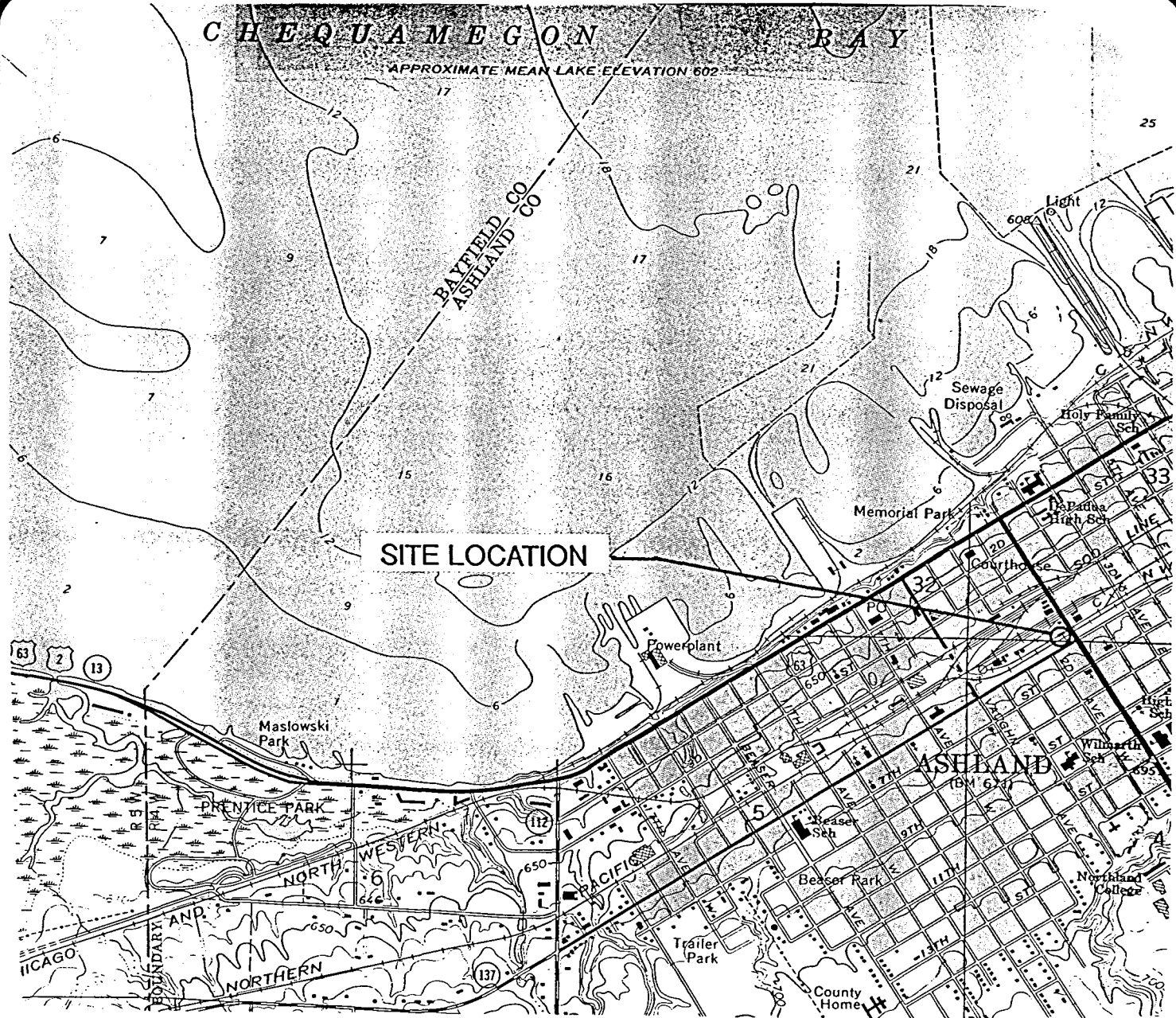
No potable wells exist within a half mile radius of the site. Monitoring well samples obtained at the site since October 1992 show no contamination above NR 140 ES prior to the excavation. The regional aquifer is a sandstone aquifer 70 to 80 ft bgs. Soil above the aquifer consists of glacial lake deposits, mostly dark red clay (Ayres, 1993). Although site specific standards were developed for the site, and those standards were used as performance standards for the site, original contaminant concentrations did not cause any groundwater contamination and could be considered the site specific standards.

MSA recommends that no further action be required at the site. A site closure request will be submitted to the WDNR separately.

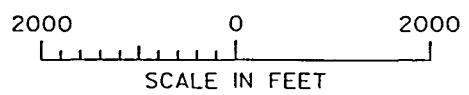
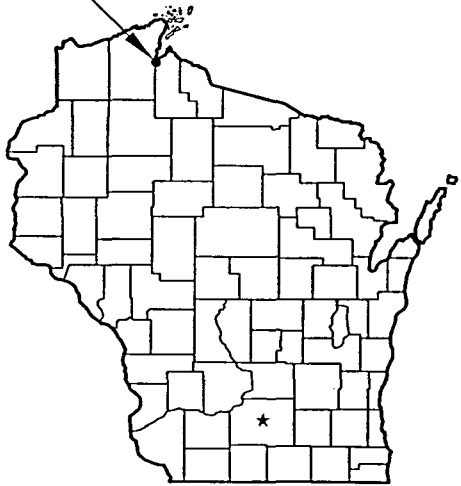
**REFERENCES**

- Owen Ayres & Associates (1993). Remedial Investigation, Quearm Oil Company Bulk Plant.
- Mid-State Associates, Inc. (1995). Underground Closure Assessment Report, Quearm Oil Company.
- Mid-State Associates, Inc. (1996). Site Investigation and Remedial Action Options Report, Quearm Oil LUST Site.
- Mid-State Associates, Inc. (1996). Remedial Action Plan, Quearm Oil AST and UST Sites.
- Wisconsin Department of Natural Resources (1997). Soil Cleanup Levels for Polycyclic Aromatic Hydrocarbons (PAHs) Interim Guidance.





PROJECT LOCATION



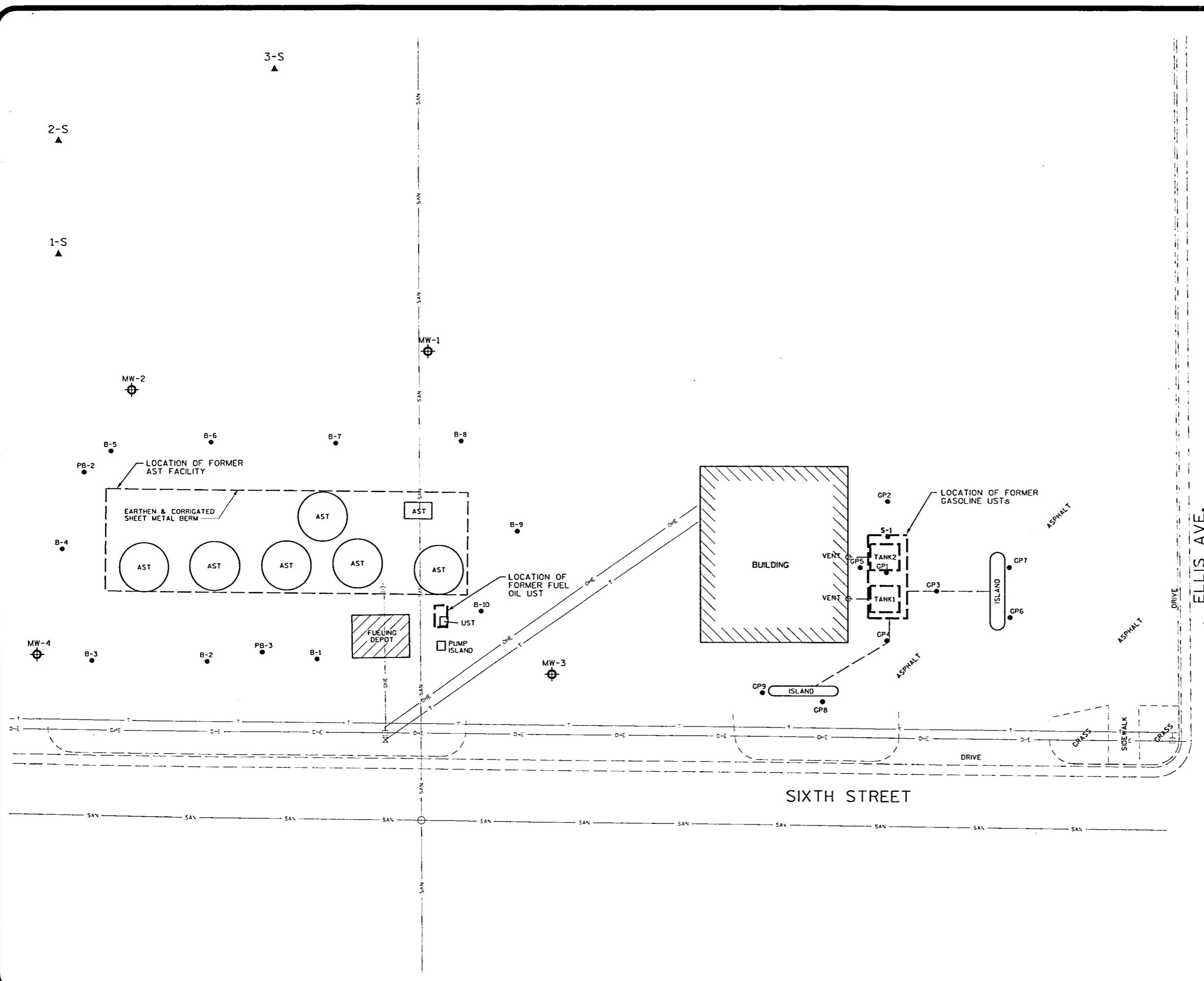
Ashland West and Ashland East Quadrangle  
Wisconsin - Ashland Co.  
7.5 Minute Series (Topographic)

NW/4 Ashland 15' Quadrangle  
Contour Interval 10 Feet



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FIGURE 1  
SITE LOCATION MAP  
QUEARM OIL COMPANY  
ASHLAND, WISCONSIN



**LEGEND**

- CURB & GUTTER
- OVERHEAD ELECTRIC
- UNDERGROUND TELEPHONE
- SANITARY SEWER
- GEOPROBE SOIL BORING
- MONITORING WELL
- SOIL BORING
- SOIL BORING LOCATION SEPTEMBER 1997
- POWER POLE
- MANHOLE

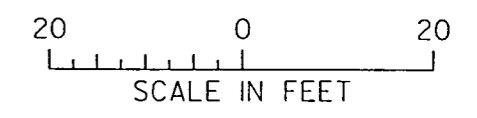


FIGURE 2

**SITE LAYOUT MAP**

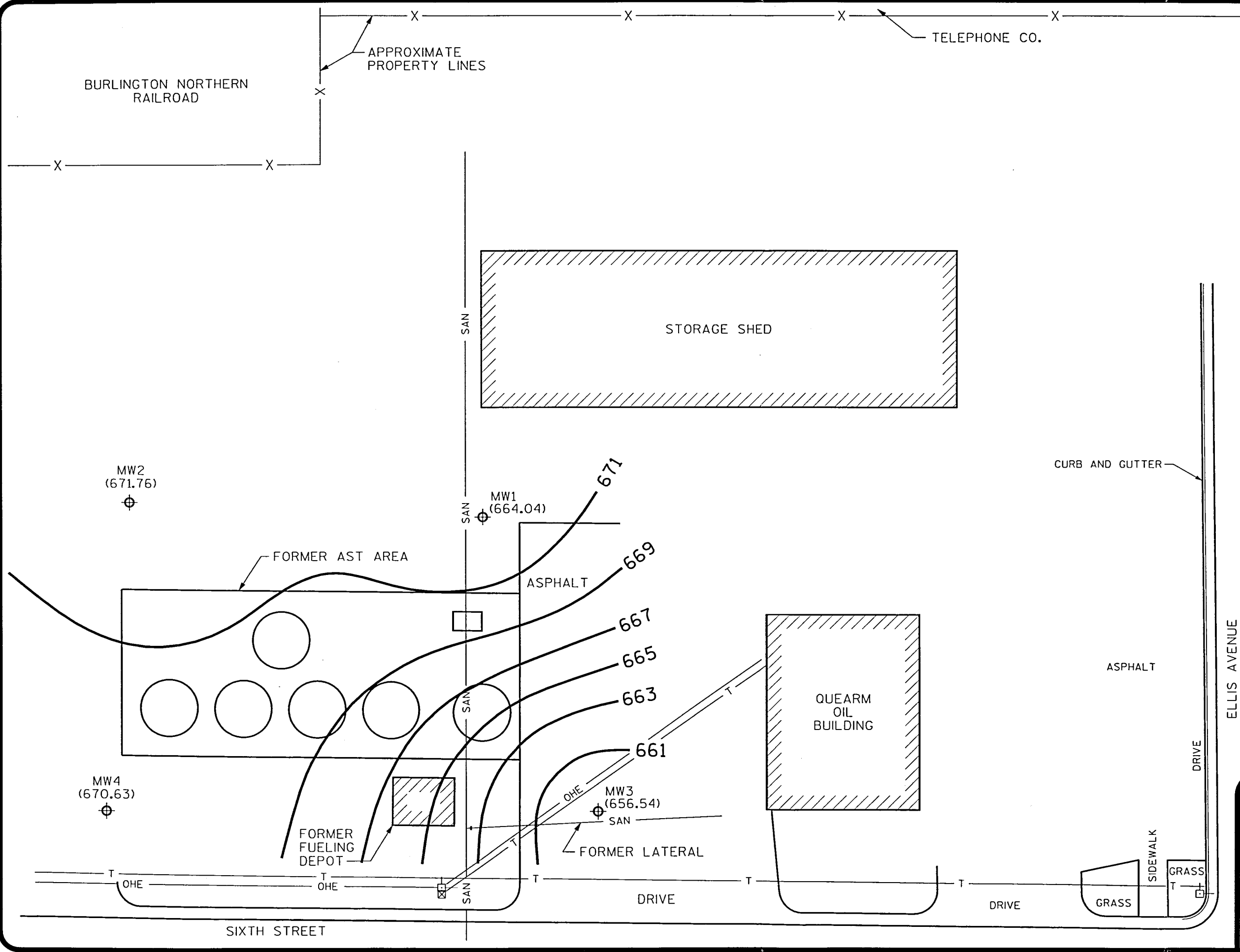
QUEARM OIL SITE  
ASHLAND, WISCONSIN

---

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F.B.	PROJECT 212365BB	SHEET ..... of .....
DRAWN BY RHM	DATE 3-17-98	FILE NO.
CHECKED BY	SCALE AS NOTED	





**LEGEND**

MW1 (671.76) MONITORING WELL WITH GROUNDWATER ELEVATION (AYRES, 1993)

— 661 — GROUNDWATER CONTOUR WITH ELEVATION

**NOTE:**  
FOR ADDITIONAL NOTES AND LEGEND, REFER TO FIGURE 2.

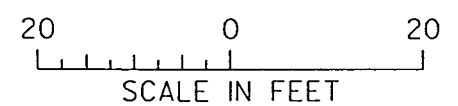
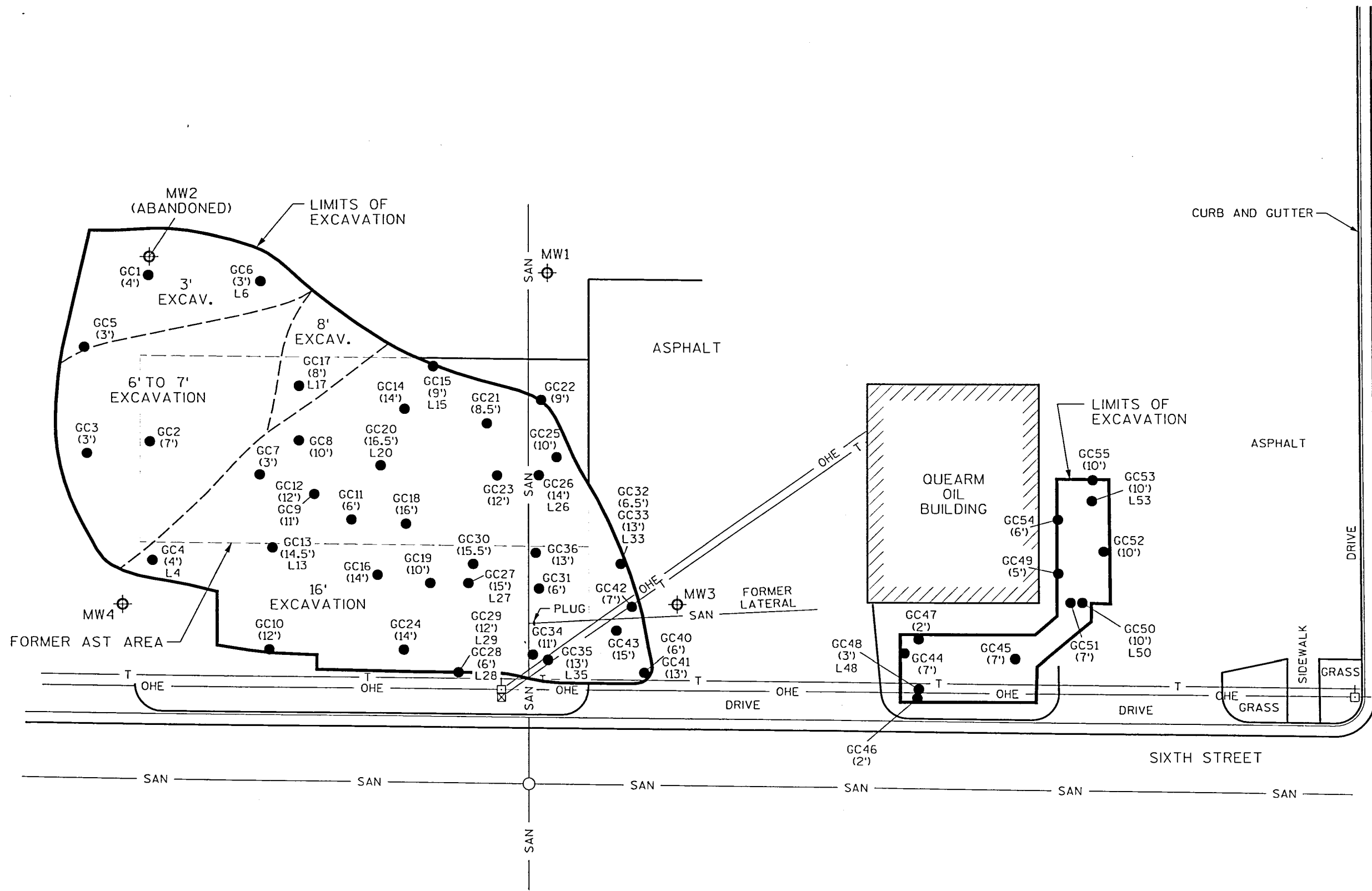


FIGURE 3  
**GROUNDWATER CONTOURS**  
NOVEMBER 10, 1992  
QUEARM OIL SITE  
ASHLAND, WISCONSIN

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F.B. PROJECT 212365AF  
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**LEGEND**

- MW1 MONITORING WELL
- GC55 (10') L6 GAS CHROMATOGRAPH SOIL SAMPLE AND DEPTH WITH CORRESPONDING LABORATORY SAMPLE
- POWER POLE
- TELEPHONE PEDESTAL
- MANHOLE
- OHE OVERHEAD ELECTRIC
- T UNDERGROUND TELEPHONE
- SAN SANITARY SEWER

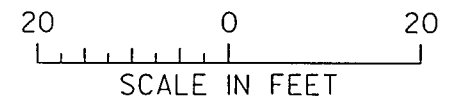


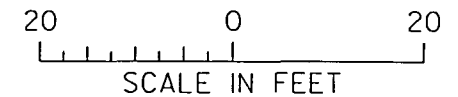
FIGURE 4  
**EXCAVATION AREA AND SOIL SAMPLE LOCATIONS**  
 QUEARM OIL SITE  
 ASHLAND, WISCONSIN

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F.B. PROJECT 212365KD  
 DRAWN BY RHM DATE 3-31-98 SHEET ..... OF .....  
 CHECKED BY *KD* SCALE AS NOTED F.R. NO.

**LEGEND**

- MW1 MONITORING WELL
  - L6 (10') GAS CHROMATOGRAPH SOIL SAMPLE AND DEPTH WITH CONFIRMATORY LABORATORY SAMPLE
  - POWER POLE
  - TELEPHONE PEDESTAL
  - MANHOLE
  - OHE OVERHEAD ELECTRIC
  - T UNDERGROUND TELEPHONE
  - SAN SANITARY SEWER
  - APPROXIMATE EXTENT OF CONTAMINATED SOIL REMAINING WITH CONTAMINANT LEVELS GREATER THAN THE SITE SPECIFIC STANDARDS
- DRO = DIESEL RANGE ORGANICS  
 GRO = GASOLINE RANGE ORGANICS  
 NA = NOT ANALYZED  
 ND = NOT DETECTED



SITE SPECIFIC STANDARDS (µg/Kg)	
Benzene	19
Toluene	11180
Ethylbenzene	69100
Total Xylenes	17620
GRO (mg/Kg)	250
DRO (mg/Kg)	250

L6 @ 3'	µg/Kg
Benzene	<b>21</b>
Toluene	ND
Ethylbenzene	ND
Total Xylenes	ND
GRO	ND
DRO	ND

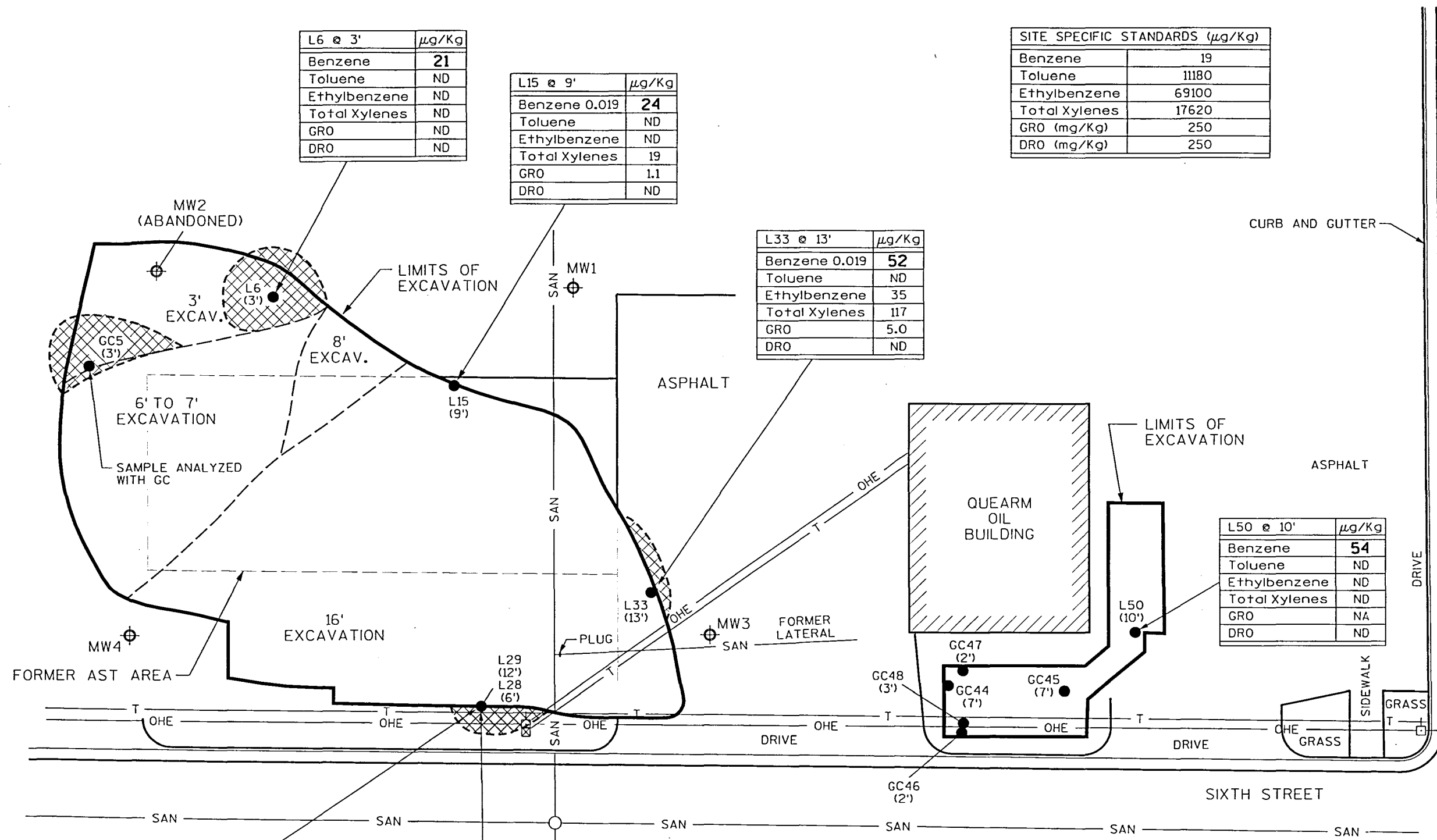
L15 @ 9'	µg/Kg
Benzene 0.019	<b>24</b>
Toluene	ND
Ethylbenzene	ND
Total Xylenes	19
GRO	1.1
DRO	ND

L33 @ 13'	µg/Kg
Benzene 0.019	<b>52</b>
Toluene	ND
Ethylbenzene	35
Total Xylenes	117
GRO	5.0
DRO	ND

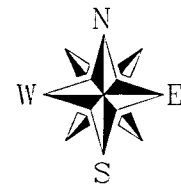
L50 @ 10'	µg/Kg
Benzene	<b>54</b>
Toluene	ND
Ethylbenzene	ND
Total Xylenes	ND
GRO	NA
DRO	ND

L29 @ 12'	µg/Kg
Benzene	<b>550</b>
Toluene	55
Ethylbenzene	240
Total Xylenes	27
GRO	22
DRO	28

L28 @ 6'	µg/Kg
Benzene	<b>510</b>
Toluene	820
Ethylbenzene	980
Total Xylenes	6200
GRO	100
DRO	77



- NOTES:**
- BOLD NUMBERS INDICATE PARAMETER GREATER THAN SITE SPECIFIC STANDARD.
  - SEE TABLE 4 FOR COMPLETE LABORATORY RESULTS.



**FIGURE 5**

**SAMPLE LOCATIONS EXCEEDING SITE SPECIFIC STANDARDS**

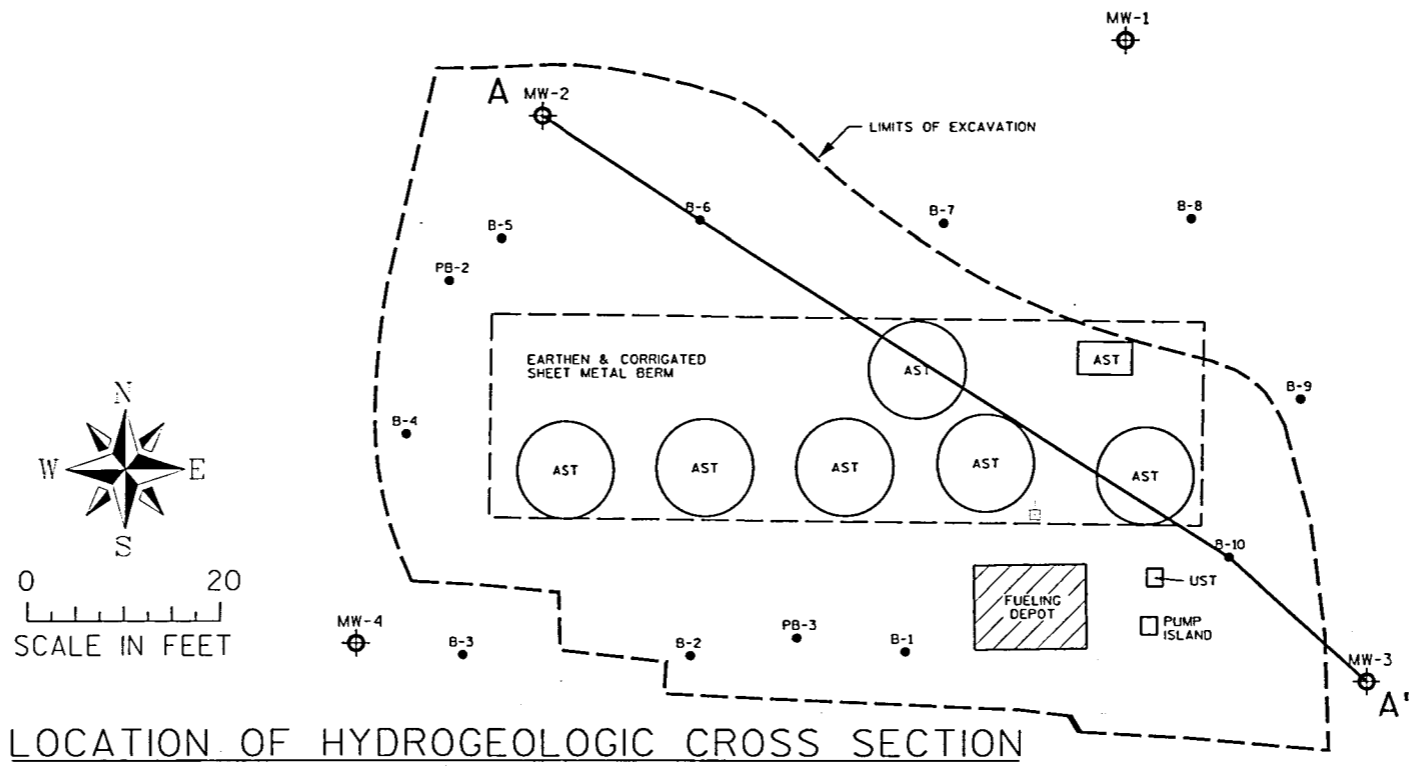
QUEARM OIL SITE  
ASHLAND, WISCONSIN

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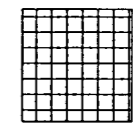
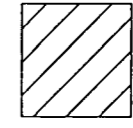
**NOTES:**

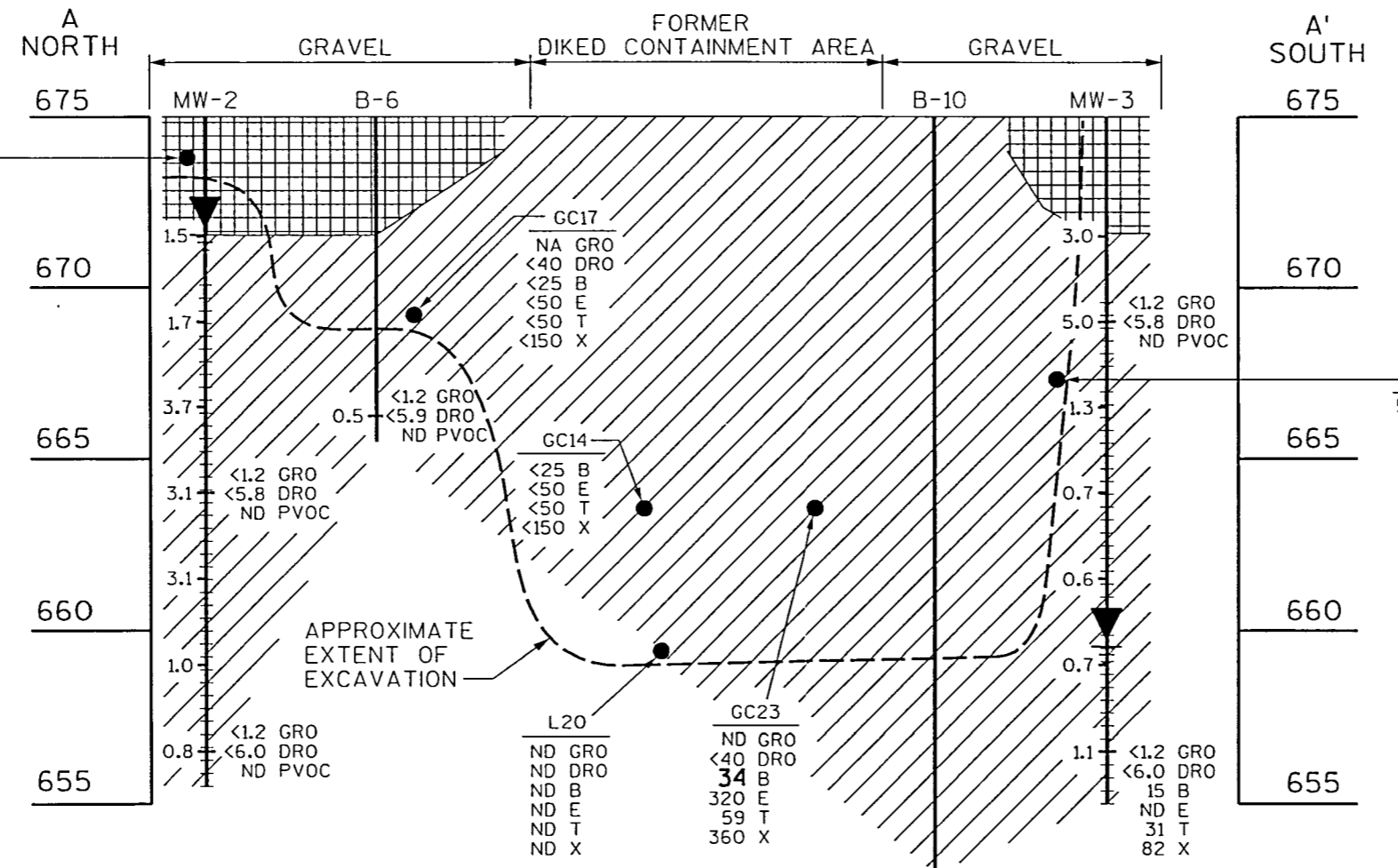
1. INFORMATION BETWEEN SOIL BORINGS IS INTERPRETED BASED UPON AVAILABLE DATA. ACTUAL CONDITIONS BETWEEN SOIL BORINGS ARE UNKNOWN
2. FOR THE PURPOSE OF ILLUSTRATING SUBSOIL CONDITIONS ON THE CROSS SECTIONS, SOME OF THE BORING LOGS HAVE BEEN SIMPLIFIED. FOR A DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT INDIVIDUAL BORINGS REFER TO SOIL BORING LOGS (AYRES, 1993).
3. GRO RESULTS IN mg/Kg AND VOC RESULTS IN µg/Kg.
4. BORINGS PERFORMED AND DATA OBTAINED BY AYRES AND ASSOCIATES, INC.



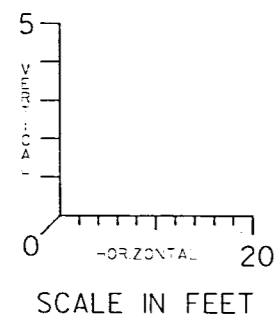
LOCATION OF HYDROGEOLOGIC CROSS SECTION

**LEGEND**

-  FILL
-  DARK RED CLAY
- MW-1 COVERED BY CONVENIENCE STORE FOUNDATION
- MW-2 ABANDONED DURING THE EXCAVATION



- B6 — BORING I.D.
- SOIL BORING
- END OF BORING
- MW3 — WELL I.D.
- 3.7 — GRO = Gasoline Range Organics
- PID READING IN ppm
- 5.0 — DRO = Diesel Range Organics
- SCREENED INTERVAL
- 52 — B = Benzene
- ND = not detected
- 35 — E = Ethylbenzene
- 117 — T = Toluene
- END OF WELL BORING
- X = Xylenes



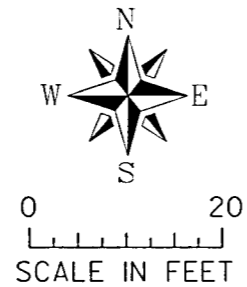
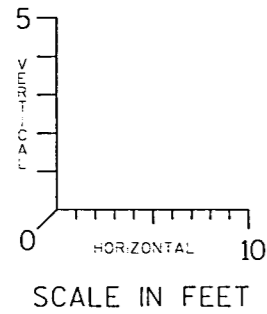
**FIGURE 6**  
**HYDROGEOLOGIC CROSS SECTION A-A'**  
 QUEARM OIL SITE  
 ASHLAND, WISCONSIN

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 715-382-2344 1-800-844-7864 Fax: 715-382-0316

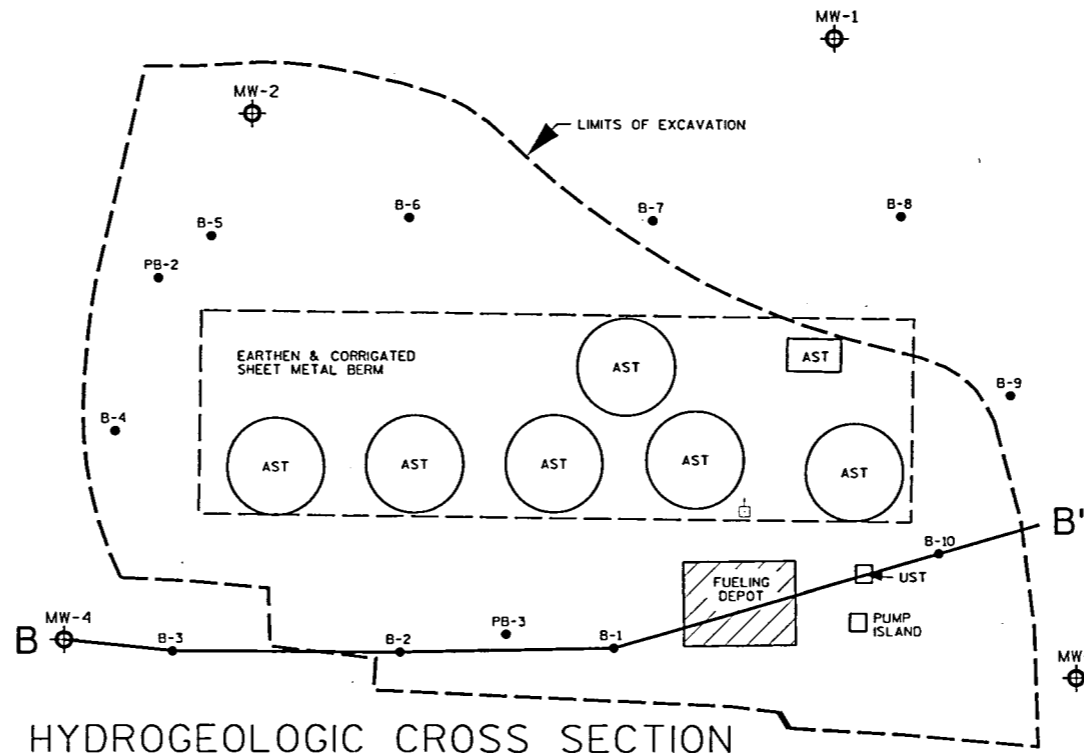
F.B. PROJECT 212365AE  
 DRAWN BY RHM DATE 3-19-98 SHEET ..... of .....  
 CHECKED BY SCALE AS NOTED F.E. NO.

**NOTES:**

1. INFORMATION BETWEEN SOIL BORINGS IS INTERPRETED BASED UPON AVAILABLE DATA. ACTUAL CONDITIONS BETWEEN SOIL BORINGS ARE UNKNOWN
2. FOR THE PURPOSE OF ILLUSTRATING SUBSOIL CONDITIONS ON THE CROSS SECTIONS, SOME OF THE BORING LOGS HAVE BEEN SIMPLIFIED. FOR A DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT INDIVIDUAL BORINGS REFER TO SOIL BORING LOGS.
3. GRO RESULTS IN mg/Kg AND VOC RESULTS IN  $\mu\text{g}/\text{kg}$ .
4. BORINGS PERFORMED AND DATA OBTAINED BY AYRES AND ASSOCIATES, INC.



**LOCATION OF HYDROGEOLOGIC CROSS SECTION**

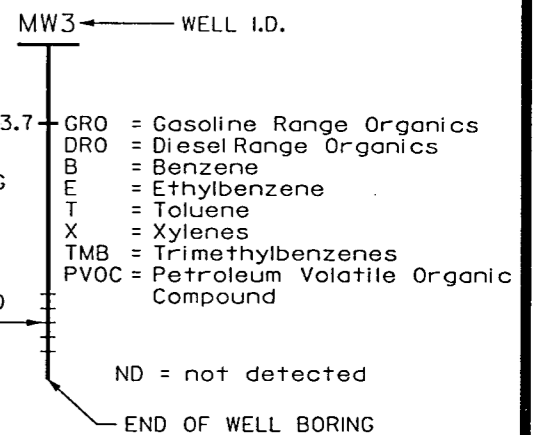
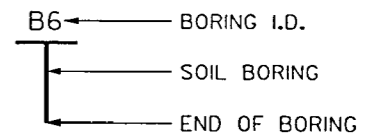


**LEGEND**

- FILL
- DARK RED CLAY
- BOLD NUMBERS INDICATE PETROLEUM HYDROCARBON CONTAMINATION GREATER THAN THE SITE SPECIFIC SOIL STANDARDS

MW-1 COVERED BY CONVENIENCE STORE FOUNDATION

MW-2 ABANDONED DURING EXCAVATION



B WEST

B' EAST

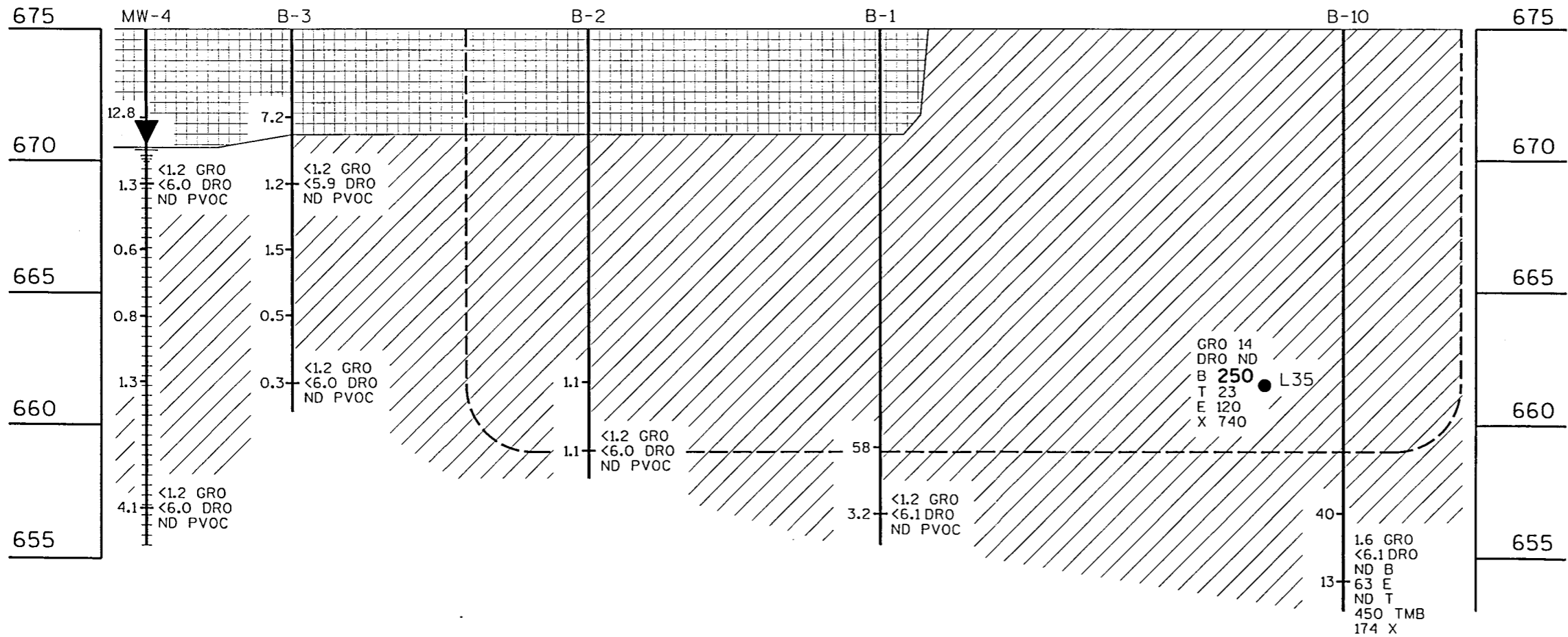


FIGURE 7

**HYDROGEOLOGIC CROSS SECTION B-B'**  
QUEARM OIL SITE  
ASHLAND, WISCONSIN

**MSA** TRANSPORTATION • MUNICIPAL • REMEDIATION  
DEVELOPMENT • ENVIRONMENTAL  
1230 South Boulevard Baraboo, WI 53913  
608-356-2771 1-800-363-4505 Fax: 608-356-2770

DRAWN BY RHM DATE 4-3-98 SHEET \_\_\_\_\_ of \_\_\_\_\_  
CHECKED BY KD SCALE AS NOTED FILE NO. 212365AG



**TABLE 1**  
**SOIL BORING ANALYTICAL RESULTS**  
**QUEARM OIL COMPANY**  
**ASHLAND, WISCONSIN**

	8/24/92	8/24/92	8/24/92	8/24/92	8/24/92	8/24/92	8/24/92	8/24/92	8/24/92	8/26/92	8/26/92	8/26/92
BOREHOLE NUMBER	B1	B1	B2	B2	B3	B3	B4	B5	B5	B6	B7	B8
DEPTH OF SAMPLE (ft. below grade)	12.5-14.5	17.5-19.5	5-7	15-17	5-7	12.5-14.5	7.5-9.5	2.5-4.5	7.5-9.5	7.5-9.5	7.5-9.5	7.5-9.5
ANALYTE (mg/Kg)												
Diesel Range Organics (DRO)	<6.0	<6.1	<5.8	<6.0	<5.9	<6.0	<5.9	<5.7	9.3	<5.9	<5.9	5.9
Gasoline Range Organics (GRO)	5.3	<1.2	2.4	<1.2	<1.2	<1.2	<1.2	<1.1	2.6	<1.2	<1.2	<1.2
Lead	6.90	6.90	6.03	6.00	6.60	5.88	5.97	5.29	6.09	6.18	5.47	6.25
PID Response	301	3.2	192	1.1	1.2	0.3	0.6	93	3.1	0.5		0.5
PVOCs (mg / Kg)												
Benzene	<b>0.14</b>	<0.012	<b>0.17</b>	<0.012	<0.012	<0.012	<0.012	<0.012	<b>0.095</b>	<0.012	<0.012	<0.012
Ethylbenzene	0.22	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.011	0.23	<0.012	<0.012	<0.012
Toluene	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	0.17	<0.012	<0.012	<0.012
M-P Xylene	0.21	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.011	0.5	<0.012	<0.012	<0.012
O-Xylene	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	0.21	<0.012	<0.012	<0.012
1,2,4-Trimethylbenzene	0.63	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.011	0.32	<0.012	<0.012	<0.012
1,3,5-Trimethylbenzene	0.18	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.011	0.29	<0.012	<0.012	<0.012
Methyl-tert-butyl ether	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012

	8/24/92	8/26/92	8/26/92	8/26/92	8/26/92	08/27/92	08/27/92	08/27/92	08/27/92	08/27/92	08/27/92	NR 720
BOREHOLE NUMBER	B9	B10	B10	MW1	MW1	MW2	MW2	MW3	MW3	MW4	MW4	GRCLs
DEPTH OF SAMPLE (ft. below grade)	7.5-9.5	20-22	12.5-14.5	12.5-14.5	17.5-19.5	10-12	17.5-19.5	5-7	17.5-19.5	5-7	17.5-19.5	
ANALYTE (mg/Kg)							<6.0					
Diesel Range Organics (DRO)	<6.0	<6.1	200	<6.0	<6.2	<5.8	<1.2	<5.8	<6.0	<6.0	<6.0	250
Gasoline Range Organics (GRO)	<1.2	1.6	43	<1.2	<1.2	<1.2	5.62	<1.2	<1.2	<1.2	<1.2	250
Lead	5.91	5.48	5.48	5.6	6.08	5.76	0.8	6.1	5.77	5.88	5.1	
PID Response	2.1	13	388	2	1.3	3.1	3.1	5	1.1	1.3	4.1	
PVOCs (mg / Kg)												
Benzene	0.015	<0.012	<b>0.28</b>	<0.012	<0.012	<0.012	<0.012	<0.012	0.015	<0.012	<0.012	0.0055
Ethylbenzene	<0.012	0.063	0.51	<0.012	<0.012	<0.012	<0.012	<0.012	0.015	<0.012	<0.012	2.9
Toluene	0.017	<0.012	0.054	0.021	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	1.5
M-P Xylene	0.037	0.14	<b>3</b>	0.054	0.025	<0.012	<0.012	<0.012	0.031	<0.012	<0.012	4.1
O-Xylene	<0.012	0.034	<b>1.2</b>	0.022	<0.012	<0.012	<0.012	<0.012	0.058	<0.012	<0.012	
1,2,4-Trimethylbenzene	0.022	0.36	4.9	0.039	0.02	<0.012	<0.012	<0.012	0.031	<0.012	<0.012	
1,3,5-Trimethylbenzene	0.015	0.09	1.4	0.02	0.014	<0.012	<0.012	<0.012	0.013	<0.012	<0.012	
Methyl-tert-butyl ether	<0.012	<0.012	<0.048	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	

## NOTES:

1. Samples collected on August 24, 26 and 27, 1992 by Ayres & Associates.
2. Less than sign (<) indicates analyte not detected above method quantification limit.
3. Bold numbers indicate exceedance of NR 720 Generic Residual Contaminant Limit (GRCL)

**Table 2  
Groundwater Sample Analytical Results  
Quearm Oil Company**

Monitoring Well ID	MW-1			MW-2			PAL	ES
	Date Collected	10/10/92	11/10/92	05/16/94	10/10/92	11/10/92		
<b>Analyte</b>								
GRO (mg/L)	<0.1	<0.1	<0.05	<0.1	<1	<0.05		
DRO (mg/L)	0.3	0.25	0.18	0.51	0.34	0.44		
Lead (µg/L)	<1	1		<1	1		1.5	15
<b>PVOCs (µg/L)</b>								
Benzene	<0.1	<1.0	<0.6	<1.0	<1.0	<0.6	0.5	5
Ethylbenzene	<0.1	<1.0	<1.0	<1.0	<1.0	<1.0	140	700
Methyl Tert-butyl Ether (MtBE)		<1.0	<1.0		<1.0	<1.0	12	60
Toluene	<0.1	<1.0	<1.0	<1.0	<1.0	<1.0	68.6	343
1,2,4 Trimethylbenzene		<1.0	<1.0		<1.0	<1.0		
1,3,5 Trimethylbenzene		<1.0	<1.0		<1.0	<1.0		
m/p Xylene	<0.1	<1.0	<1.0	<1.0	<1.0	<1.0		
o-Xylene	<0.1	<1.0	<1.0	<1.0	<1.0	<1.0	124	620
PAHs	ND	ND		ND	ND			

Monitoring Well ID	MW-3				MW-3 DUP	MW-4			PAL	ES
	Date Collected	10/10/92	11/10/92	05/16/94	09/09/97	09/09/97	10/10/92	11/10/92		
<b>Analyte</b>										
GRO (µg/L)	<0.1	0.14	<0.05	0.068	0.068	<0.1	<1			
DRO (µg/L)	0.22	<1	<0.1	0.11	0.11	0.85	0.55			
Lead (µg/L)	<1	1				<1	<1		1.5	15
<b>PVOCs (µg/L)</b>										
Benzene	<5.0	<1.0	<0.6	ND	ND	<1.0	<1.0		0.5	5
Ethylbenzene	<5.0	<1.0	<1.0	ND	ND	<1.0	<1.0		140	700
Methyl Tert-butyl Ether (MtBE)		<1.0	<1.0	ND	ND	<1.0	<1.0		12	60
Toluene	84	130	<1.0	ND	ND	<1.0	<1.0		68.6	343
1,2,4 Trimethylbenzene		<1.0	<1.0	ND	ND		<1.0			
1,3,5 Trimethylbenzene		<1.0	<1.0	ND	ND		<1.0			
m/p Xylene	<5.0	<1.0	<1.0	ND	ND	<1.0	<1.0			
o-Xylene	<5.0	<1.0	<1.0	ND	ND	<1.0	<1.0		124	620
PAHs	ND	ND				ND	ND			

1. Blank - sample not analyzed for that analyte.
2. ND - analyte not detected above laboratory detection limit.
3. PVOCs - Petroleum Volatile Organic Compounds.
4. GRO - Gasoline Range Organics.
5. DRO - Diesel Range Organics.
6. PAHs - Polynuclear Aromatic Hydrocarbons.
7. MW-4 abandoned during December 1997 excavation.
8. MW1, MW-2 and MW-4 could not be found during September 1997 sampling round.



**TABLE 3**  
**EXCAVATION SAMPLE GAS CHROMATOGRAPH RESULTS**  
**QUEARM OIL COMPANY**  
**ASHLAND, WISCONSIN**

SAMPLE NUMBER	GC-1	GC-2	GC-3	GC-4	GC-5	GC-6	GC-7	GC-8	GC-9	GC-10	GC-11	GC-12	GC-13	GC-14	GC-15	Site Spec.
Depth of Sample (ft below grade)	4	7	3	4	3	3	3	10	11	12	6	12	14.5	14	9	Stnds.*
ANALYTE (mg/Kg)																
Gasoline Range Organics (GRO)					160		<b>1100</b>				30					250
Diesel Range Organics (DRO)	<40	<40	160	<40	100	<40	<b>660</b>	<40	<40	<40	<40	<40	<40	<40	<40	250
VOC/PVOCs (mg / Kg)																
Benzene	<0.025	<0.025	<0.025	<0.025	<b>0.54</b>	<0.025	<b>4.7</b>	<b>0.4</b>	0.063	<0.025	0.16	<0.025	<0.025	<0.025	<0.025	0.019
Ethylbenzene	<0.050	<0.050	<0.050	<0.050	2.3	<0.050	15	<0.1	<0.050	<0.050	0.18	<0.050	<0.050	<0.050	<0.050	69.1
Toluene	<0.050	<0.050	<0.050	<0.050	2.7	<50	<b>&gt;100</b>	<0.1	<0.050	<0.050	1.7	<0.050	<0.050	<0.050	<0.050	11.18
Xylenes	<0.150	<0.150	<0.150	<0.150	8	<0.150	<b>90</b>	<0.3	<0.150	<0.150	0.78	<0.150	<0.150	<0.150	<0.150	17.62

SAMPLE NUMBER	GC-16	GC-17	GC-18	GC-19	GC-20	GC-21	GC-22	GC-23	GC-24	GC-25	GC-26	GC-27	GC-28	GC-29	GC-30	GC-31	Site Spec.
Depth of Sample (ft below grade)	14	8	16	10	16.5	8.5	9	12	14	10	14	15	6	12	15.5	6	Stnds.*
ANALYTE (mg/Kg)																	
Gasoline Range Organics (GRO)				<b>430</b>									200	50			250
Diesel Range Organics (DRO)	55	<40	<40	<b>1300</b>	<40	<40	<40	<40	40	<40	<40	<40	<b>670</b>	240	<40	<b>910</b>	250
VOC/PVOCs (mg / Kg)																	
Benzene	<b>0.24</b>	<0.025	<0.025	--	<0.025	<b>0.17</b>	<0.025	0.034	<b>0.11</b>	<0.025	<0.025	<0.025	--	<b>0.35</b>	<0.025	<b>0.095</b>	0.019
Ethylbenzene	0.3	<0.050	<0.050	--	<0.050	<0.050	<0.050	0.32	<0.050	<0.050	<0.050	<0.050	--	0.94	<0.050	1.2	69.1
Toluene	2.6	<0.050	<0.050	--	<0.050	<0.050	0.14	0.059	0.11	<0.050	<0.050	<0.050	--	<0.3	<0.050	0.48	11.18
Xylenes	0.54	<0.150	<0.150	--	<0.150	<0.150	0.76	0.23	0.36	<0.150	<0.150	<0.150	--	2.3	<0.150	2.1	17.62

**NOTES:**

1. Samples collected on December 1, 2, 3 and 4, 1997 and analyzed with a field gas chromatograph.
2. Bold numbers indicate analyte detected above Site Specific Standards.
3. See MSA Remedial Action Plan (1997) for the development of Site Specific Standards
4. Blank - not analyzed for that parameter - low GC PID response.
5. '-- Not analyzed - strong petroleum odor.
6. See Figure 3 for final excavation depths.

**TABLE 3 (continued)**  
**EXCAVATION SAMPLE GAS CHROMATOGRAPH RESULTS**  
**QUEARM OIL COMPANY**  
**ASHLAND, WISCONSIN**

SAMPLE NUMBER	GC-32	GC-33	GC-34	GC-35	GC-36	GC-37	GC-38	GC-39	GC-40	GC-41	GC-42	GC-43	GC-44	GC-45	GC-46	GC-47	Site Spec. Stnds.*
Depth of Sample (ft below grade)	6.5	13	16	13	13	**	**	**	6	13	7	15	7	7	2	2	
ANALYTE (mg/Kg)																	
Gasoline Range Organics (GRO)	110				63												250
Diesel Range Organics (DRO)	450	<40	<40	<40	1200	<40	<40	<40	<40	<40	57	<40					250
VOC/PVOCs (mg / Kg)																	
Benzene	0.6	<0.025	<b>0.38</b>	<b>0.28</b>	<0.6	<0.025	<b>0.082</b>	<0.025	<0.025	<0.025	<b>0.076</b>	<0.025	<0.025	<0.025	<0.025	<0.025	0.019
Ethylbenzene	3	<0.050	0.14	<0.050	<3	0.07	<0.050	<0.050	<0.050	<0.050	0.23	<0.050	<0.050	<0.050	<0.050	<0.050	69.1
Toluene	3	<0.050	<0.05	<0.050	<3	<0.050	<0.050	<0.050	<0.050	<0.050	0.076	<0.050	<0.050	<0.050	1.2	0.32	11.18
Xylenes	9	<0.150	0.2	0.23	<9	<0.150	<0.150	<0.150	<0.150	<0.150	0.23	<0.150	<0.150	<0.150	1.4	0.25	17.62

SAMPLE NUMBER	48	49	50	51	52	53	54	55	Site Spec. Stnds.*
Depth of Sample (ft below grade)	3	5	10	7	10	10	6	10	
ANALYTE (mg/Kg)									
Gasoline Range Organics (GRO)									250
Diesel Range Organics (DRO)									250
VOC/PVOCs (mg / Kg)									
Benzene	<0.025	<0.025	<0.025	<b>0.21</b>	<0.025	<0.025	<0.025	<0.025	0.019
Ethylbenzene	<0.050	<0.050	<0.050	0.37	0.25	<0.050	<0.050	<0.050	69.1
Toluene	0.096	<50	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	11.18
Xylenes	<0.150	0.2	<0.150	0.28	<0.150	<0.150	<0.150	<0.150	17.62

**NOTES:**

1. Samples collected on December 1, 2, 3 and 4, 1997 and analyzed with a field gas chromatograph.
4. Bold numbers indicate analyte detected above Site Specific Standards.
5. See MSA Remedial Action Plan (1997) for the development of Site Specific Standards
4. Blank - not analyzed for that parameter - low GC PID response.
5. '-- Not analyzed - strong petroleum odor.
6. See Figure 3 for final excavation depths.
7. Samples 37, 38 and 39 were assumed to have been collected in the soil surrounding the sanitary sewer line.

**TABLE 4  
EXCAVATION SAMPLE LABORATORY RESULTS  
QUEARM OIL COMPANY  
ASHLAND, WISCONSIN**

SAMPLE NUMBER	L2	L4	L6	L13	L15	L17	L20	L26	Site Spec.	Site Spec.	Site Spec.
Depth of Sample (ft below grade)	7	4	3	14.5	9	8	16.5	14	Stnds.	Stnds.	Stnds.
ANALYTE (mg/Kg)											
Gasoline Range Organics (GRO)	--	1.1	--	--	1.1	--	--	2.8	250		
Diesel Range Organics (DRO)	7.6	--	--	--	--	--	--	--	250		
VOC/PVOCs (µg / Kg)											
Benzene	--	14	<b>21</b>	--	<b>24</b>	--	--	14.0	19		
Toluene	--	--	--	--	--	--	--	--	11,180		
Ethylbenzene	--	--	--	--	--	--	--	--	69,100		
m&p xylene	--	--	--	--	19	--	--	57			
o-xylene	--	--	--	--	--	--	--	31	17,620		
Methyl Tert-Butyl Ether	--	--	--	--	--	--	--	--			
1,3,5-Trimethylbenzene	--	--	--	--	--	--	--	34			
1,2,4-Trimethylbenzene	--	20	--	--	--	--	--	52			
1, 2, 3 Trichlorobenzene	--	--	--	--	--	--	--	--			
n-Butylbenzene	--	--	--	--	29	--	--	80			
sec-Butylbenzene	--	--	--	--	--	--	--	--			
tert-butylbenzene	--	--	--	--	--	--	--	--			
Isopropylbenzene	--	--	--	--	--	--	--	--			
1,2 Dichloroethane	--	--	--	--	--	--	--	--	4.9		
Naphthalene	--	--	--	--	--	--	--	79			
Hexachlorobutadiene	--	--	--	--	--	--	--	--			
n-Propylbenzene	--	--	--	--	20	--	--	--			
PAH (µg/kg)										*	**
Acenaphthene	--	--	--	--	--	--	--	2.9	900,000	69,000	
Acenaphthylene	--	--	--	--	--	--	--	5.6	18,000	1,200	
Anthracene	--	--	--	--	--	--	--	--	5,000,000	6,000,000	
Benzo (a) anthracene	--	--	--	--	--	--	--	4.0	88	30,000	
Benzo (a) pyrene	--	--	--	--	--	--	--	--	8.8	90,000	
Benzo (b) fluoranthene	--	--	--	--	--	--	--	--	88	650,000	
Benzo (g, h, i) perylene	--	--	--	--	--	--	--	--	1,800	12,000,000	
Benzo (k) fluoranthene	--	--	--	--	--	--	--	--	880	1,600,000	
Chrysene	--	--	2.1	--	--	--	--	--	8,800	66,000	
Dibenzo (a, h) anthracene	--	--	--	--	--	--	--	--	8.8	69,000	
Fluoranthene	--	--	--	--	--	--	--	--	600,000	1,000,000	
Fluorene	--	--	--	--	--	--	--	3.3	600,000	200,000	
Indeno (1, 2, 3-cd) pyrene	--	--	--	--	--	--	--	--	88.0	1,200,000	
Methyl -1- Naphthalene	--	--	--	--	--	--	--	3.8	1,100,000	42,000	
Methyl -2- Naphthalene	--	--	--	--	--	--	--	3.8	600,000	30,000	
Naphthalene	--	--	--	--	--	--	--	--	20,000	700	
Phenanthrene	--	--	--	--	--	--	--	9.7	18,000	3,300	
Pyrene	--	--	--	--	2.2	--	--	9.2	500,000	16,000,000	

**NOTES:**

- 1. Samples collected on December 1, 2, 3 and 4, 1997.
- 2. '--' indicates analyte not detected.
- 3. Blank means sample not analyzed for that parameter.
- 4. Bold numbers indicate analyte detected above Site Specific Standards.
- 5. See MSA Remedial Action Plan (1997) for the development of Site Specific Standards.
- 6. \* Suggested Generic Soil Cleanup Levels for PAHs (WDNR, 1997), Direct Contact Pathway (non-industrial)
- 7. \*\*Suggested Generic Soil Cleanup levels for PAHs (WDNR, 1997), Groundwater Pathway
- 8. Shaded area means analyte detected above generic level for PAH - Groundwater Pathway

**TABLE 4 (continued)**  
**EXCAVATION SAMPLE LABORATORY RESULTS**  
**QUEARM OIL COMPANY**  
**ASHLAND, WISCONSIN**

SAMPLE NUMBER	L27	L28	L29	L33	L35	L48	L50	L53	Site Spec.	Cleanup	Cleanup
Depth of Sample (ft below grade)	15	6	12	13	13	13	13	13	Stnds.	Levels	Levels
ANALYTE (mg/Kg)											
Gasoline Range Organics (GRO)	--	110	22	5.0	14				250		
Diesel Range Organics (DRO)	2.9	77	28	--	--	2.3	--	0.90	250		
VOC/PVOCs (µg/Kg)											
Benzene	21	510	550	52	250	--	54	--	19		
Toluene	--	820	55	--	23	--	--	--	11,180		
Ethylbenzene	--	980	240	35	120	12	--	--	69,100		
m&p xylene	--	4300	--	81	530	--	--	--			
o-xylene	--	1900	27	36	210	9.9	--	--	17,620		
Methyl Tert-Butyl Ether	--	--	--	--	--	--	--	--			
1,3,5-Trimethylbenzene	--	1800	340	41	190	77	--	--			
1,2,4-Trimethylbenzene	--	5800	1000	91	570	120	--	--			
1, 2, 3 Trichlorobenzene	--	--	--	--	190	--	--	--			
n-Butylbenzene	--	1200	660	160	470	69	--	--			
sec-Butylbenzene	--	380	50	--	44	--	--	--			
tert-butylbenzene	--	--	--	--	32	--	--	--			
Isopropylbenzene	--	200	27	--	29	--	--	--			
1,2-Dichloroethane	--	--	36	--	24	--	20	--	4.9		
Naphthalene	--	1300	110	78	390	220	--	--			
Hexachlorobutadiene	--	--	--	--	130	--	--	--			
p-Isopropyltoluene	--	270	59	40	63	--	--	--			
n-Propylbenzene	--	620	630	55	71	9.9	--	--			
PAH (µg/kg)	--									*	**
Acenaphthene	--	--	--	2.0	2.0					900,000	69,000
Acenaphthylene	--	--	--	--	--					18,000	1,200
Anthracene	--	--	--	--	--					5,000,000	6,000,000
Benzo (a) anthracene	--	98	3.0	--	--					88	30,000
Benzo (a) pyrene	--	--	--	--	--					8.8	90,000
Benzo (b) fluoranthene	--	--	--	--	--					88	650,000
Benzo (g, h, i) perylene	--	--	--	--	--					1,800	12,000,000
Benzo (k) fluoranthene	--	--	--	--	--					880	1,600,000
Chrysene	--	--	--	--	--					8,800	66,000
Dibenzo (a, h) anthracene	--	--	--	--	--					8.8	69,000
Fluoranthene	--	--	--	--	--					600,000	1,000,000
Fluorene	--	120	3.8	--	--					600,000	200,000
Indeno (1, 2, 3-cd) pyrene	--	--	--	--	--					88.0	1,200,000
Methyl -1- Naphthalene	--	3100	91	4.9	4.9					1,100,000	42,000
Methyl -2- Naphthalene	--	5900	180	5.2	5.2					600,000	30,000
Naphthalene	--	1800	99	--	--					20,000	700
Phenanthrene	--	370	13	4.2	4.2					18,000	3,300
Pyrene	--	260	11	3.7	3.7					500,000	16,000,000

**NOTES:**

1. Samples collected on December 1, 2, 3 and 4, 1997.
2. "--" indicates analyte not detected.
3. Blank means sample not analyzed for that parameter.
4. Bold numbers indicate analyte detected above Site Specific Standards.
5. See MSA Remedial Action Plan (1997) for the development of Site Specific Standards.
6. \* Suggested Generic Soil Cleanup Levels for PAHs (WDNR, 1997), Direct Contact Pathway (non-industrial)
7. \*\*Suggested Generic Soil Cleanup levels for PAHs (WDNR, 1997), Groundwater Pathway
8. Shaded area means analyte detected above generic level for PAH - Groundwater Pathway

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**APPENDICES**



**APPENDIX A**  
**Laboratory Data Sheets**

**NORTHERN LAKE SERVICE, INC.**  
 Analytical Laboratory and Environmental Services  
 400 North Lake Avenue - Crandon, WI 54520  
 Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

**ANALYTICAL REPORT**

PAGE: 1 NLS PROJECT# 38329  
 NLS CUST# 20851

Client: MSA Professional Services  
 Attn: John Sager  
 1835 N. Stevens Street  
 PO Box 1026  
 Rhinelander, WI 54501

Project Description: Quearm Oil  
 Project Title: 212320

Sample ID: Soil, Lab 2 NLS#: 155994  
 Ref. Line 1 of COC 28695 Description: Soil, Lab 2  
 Collected: 12/02/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	85.6	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	ND	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-99%						
DRO (solid)	< 7.6 >	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-104%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460



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### ANALYTICAL REPORT

PAGE: 2      NLS PROJECT# 38329  
                 NLS CUST#      20851

Client:            MSA Professional Services  
                  Attn: John Sager  
                  1835 N. Stevens Street  
                  PO Box 1026  
                  Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212320

Sample ID: Soil, Lab 4      NLS#: 155995  
Ref. Line 2 of COC 28695    Description: Soil, Lab 4  
Collected: 12/02/97    Received: 12/05/97    Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed Lab</u>
Solids, total on solids	81.5	%	0.10		ASTM D2216	12/09/97 721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97 721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97 721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97 721026460
GRO (soil)	< 1.1 >	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97 721026460
	Additional Comments:	spike-110%, duplicate-108%, surrogate-99%				
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97 721026460
	Additional Comments:	spike-102%, duplicate-96%, surrogate-94%				
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97 721026460

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### ANALYTICAL REPORT

PAGE: 3 NLS PROJECT# 38329

NLS CUST# 20851

Client: MSA Professional Services  
Attn: John Sager  
1835 N. Stevens Street  
PO Box 1026  
Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212320

Sample ID: Soil, Lab 6 NLS#: 155996  
Ref. Line 3 of COC 28695 Description: Soil, Lab 6  
Collected: 12/02/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	90.0	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	ND	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-96%						
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-80%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460

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**ANALYTICAL REPORT**

PAGE: 4 NLS PROJECT# 38329  
 NLS CUST# 20851

Client: MSA Professional Services  
 Attn: John Sager  
 1835 N. Stevens Street  
 PO Box 1026  
 Rhinelander, WI 54501

Project Description: Quearm Oil  
 Project Title: 212320

Sample ID: Soil, Lab 13 NLS#: 155997  
 Ref. Line 4 of COC 28695 Description: Soil, Lab 13  
 Collected: 12/02/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	83.1	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	ND	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-93%						
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-92%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460

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**ANALYTICAL REPORT**

PAGE: 5 NLS PROJECT# 38329

NLS CUST# 20851

Client: MSA Professional Services  
 Attn: John Sager  
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 PO Box 1026  
 Rhinelander, WI 54501

Project Description: Quearm Oil  
 Project Title: 212320

Sample ID: Soil, Lab 15 NLS#: 155998  
 Ref. Line 5 of COC 28695 Description: Soil, Lab 15  
 Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	84.1	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	< 1.1 >	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-98%						
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-100%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460

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**ANALYTICAL REPORT**

PAGE: 6 NLS PROJECT# 38329  
 NLS CUST# 20851

Client: MSA Professional Services  
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 Rhinelander, WI 54501

Project Description: Quearm Oil  
 Project Title: 212320

Sample ID: Soil, Lab 17 NLS#: 155999  
 Ref. Line 6 of COC 28695 Description: Soil, Lab 17  
 Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	84.1	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	ND	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-97%						
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-100%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460

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## ANALYTICAL REPORT

PAGE: 7 NLS PROJECT# 38329

NLS CUST# 20851

Client: MSA Professional Services  
Attn: John Sager  
1835 N. Stevens Street  
PO Box 1026  
Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212320

Sample ID: Soil, Lab 20 NLS#: 156000  
Ref. Line 7 of COC 28695 Description: Soil, Lab 20  
Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	84.4	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	ND	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-103%						
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-100%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460

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### ANALYTICAL REPORT

PAGE: 11 NLS PROJECT# 38329

NLS CUST# 20851

Client: MSA Professional Services  
Attn: John Sager  
1835 N. Stevens Street  
PO Box 1026  
Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212320

Sample ID: Soil, Lab 26 NLS#: 156004  
Ref. Line 11 of COC 28695 Description: Soil, Lab 26  
Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	80.8	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/11/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	2.8	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-106%						
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-100%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460

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**ANALYTICAL REPORT**

PAGE: 8 NLS PROJECT# 38329

NLS CUST# 20851

Client: MSA Professional Services  
 Attn: John Sager  
 1835 N. Stevens Street  
 PO Box 1026  
 Rhinelander, WI 54501

Project Description: Quearm Oil  
 Project Title: 212320

Sample ID: Soil, Lab 27 NLS#: 156001  
 Ref. Line 8 of COC 28695 Description: Soil, Lab 27  
 Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	83.1	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	ND	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-95%						
DRO (solid)	< 2.9 >	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-100%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460



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**ANALYTICAL REPORT**

PAGE: 9 NLS PROJECT# 38329  
 NLS CUST# 20851

Client: MSA Professional Services  
 Attn: John Sager  
 1835 N. Stevens Street  
 PO Box 1026  
 Rhinelander, WI 54501

Project Description: Quearm Oil  
 Project Title: 212320

Sample ID: Soil, Lab 28 NLS#: 156002  
 Ref. Line 9 of COC 28695 Description: Soil, Lab 28  
 Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed Lab</u>
Solids, total on solids	86.3	%	0.10		ASTM D2216	12/09/97 721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/10/97 721026460
	<b>Additional Comments:</b> High surrogate value is due to sample matrix. Unidentified hydrocarbons present.					
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97 721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97 721026460
GRO (soil)	110	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97 721026460
	<b>Additional Comments:</b> spike-110%, duplicate-108%, surrogate-130% High surrogate value is due to sample matrix.					
DRO (solid)	77	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97 721026460
	<b>Additional Comments:</b> spike-102%, duplicate-96%, surrogate-112% Peaks present before DRO quantitation window.					
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97 721026460

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### ANALYTICAL REPORT

PAGE: 10 NLS PROJECT# 38329

Client: MSA Professional Services  
Attn: John Sager  
1835 N. Stevens Street  
PO Box 1026  
Rhinelanders, WI 54501

NLS CUST# 20851

Project Description: Quearm Oil  
Project Title: 212320

Sample ID: Soil, Lab 29 NLS#: 156003  
Ref. Line 10 of COC 28695 Description: Soil, Lab 29  
Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	83.2	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/11/97	721026460
	Additional Comments: High surrogate value is due to sample matrix. Unidentified hydrocarbons present.						
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	22	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/12/97	721026460
	Additional Comments: spike-84%, duplicate-86%, surrogate-211% Peaks present after the GRO quantitation window. High surrogate value is due to sample matrix.						
DRO (solid)	28	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460

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### ANALYTICAL REPORT

PAGE: 12 NLS PROJECT# 38329

NLS CUST# 20851

Client: MSA Professional Services  
Attn: John Sager  
1835 N. Stevens Street  
PO Box 1026  
Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212320

Sample ID: Soil, Lab 33 NLS#: 156005  
Ref. Line 12 of COC 28695 Description: Soil, Lab 33  
Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	84.0	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/11/97	721026460
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97	721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97	721026460
GRO (soil)	5.0	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-110%, duplicate-108%, surrogate-121%						
	High surrogate value is due to sample matrix.						
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97	721026460
	Additional Comments: spike-102%, duplicate-96%, surrogate-102%						
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97	721026460

NORTHERN LAKE SERVICE, INC.  
Analytical Laboratory and Environmental Services  
400 North Lake Avenue - Crandon, WI 54520  
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

### ANALYTICAL REPORT

PAGE: 13 NLS PROJECT# 38329

NLS CUST# 20851

Client: MSA Professional Services  
Attn: John Sager  
1835 N. Stevens Street  
PO Box 1026  
Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212320

Sample ID: Soil, Lab 35 NLS#: 156006  
Ref. Line 13 of COC 28696 Description: Soil, Lab 35  
Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed Lab</u>
Solids, total on solids	80.6	%	0.10		ASTM D2216	12/09/97 721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/11/97 721026460
	Additional Comments: High surrogate value is due to sample matrix. Unidentified hydrocarbons present.					
PAHs (solid) by SW846 8310	see attached				SW846 8310	12/19/97 721026460
Organics Extraction for PAHs	yes				SW846 3500	12/11/97 721026460
GRO (soil)	14	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/12/97 721026460
	Additional Comments: spike-84%, duplicate-86%, surrogate-180% Peaks present after the GRO quantitation window. High surrogate value is due to sample matrix.					
DRO (solid)	ND	mg/Kg DWB	2.7	9.0	WI MOD DRO	12/11/97 721026460
Organics Extraction (DRO)	yes				WI MOD DRO	12/08/97 721026460

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### ANALYTICAL REPORT

PAGE: 14 NLS PROJECT# 38329

NLS CUST# 20851

Client: MSA Professional Services  
Attn: John Sager  
1835 N. Stevens Street  
PO Box 1026  
Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212320

Sample ID: MeOH Blank NLS#: 156007  
Ref. Line 14 of COC 28696 Description: MeOH Blank  
Collected: 12/03/97 Received: 12/05/97 Reported: 12/23/97

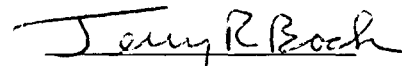
<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed Lab</u>
VOCs (soils) by EPA 8021	see attached				EPA 8021	12/11/97 721026460
GRO (soil)	ND	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97 721026460
Additional Comments: spike-110%, duplicate-108%, surrogate-92%						

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".  
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection  
DWB = Dry Weight Basis

LOQ = Limit of Quantitation  
NA = Not Applicable

ND = Not Detected  
%DWB = (mg/kg DWB)/10000



Reviewed by:

Authorized by:

R. T. Krueger  
Laboratory Manager

## ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbons by EPA 8310 (S)

Page: 1

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	155994 Soil, Lab 2 ug/kg	LOD ug/kg	LOQ ug/kg
Acenaphthene	ND	1.8	5.9
Acenaphthylene	ND	2.2	7.0
Anthracene	ND	2.2	7.1
Benzo (a) anthracene	ND	2.4	7.6
Benzo (a) pyrene	ND	2.7	8.7
Benzo (b) fluoranthene	ND	2.5	7.9
Benzo (g,h,i) perylene	ND	2.5	8.0
Benzo (k) fluoranthene	ND	2.8	9.0
Chrysene	ND	2.2	7.1
Dibenzo (a,h) anthracene	ND	2.1	6.6
Fluoranthene	ND	2.5	8.0
Fluorene	ND	1.5	4.9
Indeno (1,2,3-cd) pyrene	ND	3.4	11
Methyl-1-Naphthalene	ND	1.4	4.5
Methyl-2-Naphthalene	ND	1.5	5.6
Naphthalene	ND	1.5	4.9
Phenanthrene	ND	2.2	7.0
Pyrene	ND	1.9	6.1

Surrogate Recovery on P-Terphenyl = 54.0 %

Analyte Name	155995 Soil, Lab 4 ug/kg	LOD ug/kg	LOQ ug/kg
Acenaphthene	ND	1.9	6.2
Acenaphthylene	ND	2.3	7.4
Anthracene	ND	2.3	7.4
Benzo (a) anthracene	ND	2.5	8.0
Benzo (a) pyrene	ND	2.9	9.1
Benzo (b) fluoranthene	ND	2.6	8.3
Benzo (g,h,i) perylene	ND	2.6	8.5
Benzo (k) fluoranthene	ND	3.0	9.4
Chrysene	ND	2.3	7.4
Dibenzo (a,h) anthracene	ND	2.2	7.0
Fluoranthene	ND	2.6	8.4
Fluorene	ND	1.6	5.1
Indeno (1,2,3-cd) pyrene	ND	3.6	12
Methyl-1-Naphthalene	ND	1.5	4.7
Methyl-2-Naphthalene	ND	1.6	5.9
Naphthalene	ND	1.6	5.1
Phenanthrene	ND	2.3	7.4
Pyrene	ND	2.0	6.4

Surrogate Recovery on P-Terphenyl = 63.0 %

## ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbons by EPA 8310 (S)

Page: 2

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	155996 Soil, Lab 6 ug/kg	LOD ug/kg	LOQ ug/kg
Acenaphthene	ND	1.8	5.6
Acenaphthylene	ND	2.1	6.7
Anthracene	ND	2.1	6.7
Benzo (a) anthracene	ND	2.3	7.2
Benzo (a) pyrene	ND	2.6	8.2
Benzo (b) fluoranthene	ND	2.4	7.5
Benzo (g,h,i) perylene	ND	2.4	7.7
Benzo (k) fluoranthene	ND	2.7	8.5
Chrysene	< 2.1 >	2.1	6.7
Dibenzo (a,h) anthracene	ND	2.0	6.3
Fluoranthene	ND	2.4	7.6
Fluorene	ND	1.5	4.6
Indeno (1,2,3-cd) pyrene	ND	3.3	10
Methyl-1-Naphthalene	ND	1.3	4.3
Methyl-2-Naphthalene	ND	1.5	5.3
Naphthalene	ND	1.5	4.6
Phenanthrene	ND	2.1	6.7
Pyrene	ND	1.8	5.8

Surrogate Recovery on P-Terphenyl = 87.0 %

Analyte Name	155997 Soil, Lab 13 ug/kg	LOD ug/kg	LOQ ug/kg
Acenaphthene	ND	1.9	6.1
Acenaphthylene	ND	2.3	7.2
Anthracene	ND	2.3	7.3
Benzo (a) anthracene	ND	2.5	7.8
Benzo (a) pyrene	ND	2.8	8.9
Benzo (b) fluoranthene	ND	2.6	8.2
Benzo (g,h,i) perylene	ND	2.6	8.3
Benzo (k) fluoranthene	ND	2.9	9.2
Chrysene	ND	2.3	7.3
Dibenzo (a,h) anthracene	ND	2.1	6.8
Fluoranthene	ND	2.6	8.2
Fluorene	ND	1.6	5.0
Indeno (1,2,3-cd) pyrene	ND	3.6	11
Methyl-1-Naphthalene	ND	1.5	4.6
Methyl-2-Naphthalene	ND	1.6	5.8
Naphthalene	ND	1.6	5.0
Phenanthrene	ND	2.3	7.3
Pyrene	ND	2.0	6.3

Surrogate Recovery on P-Terphenyl = 46.0 %

## ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbons by EPA 8310 (S)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	155998 Soil, Lab 15	LOD	LOQ
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>
Acenaphthene	ND	1.9	6.0
Acenaphthylene	ND	2.2	7.1
Anthracene	ND	2.3	7.2
Benzo (a) anthracene	ND	2.4	7.7
Benzo (a) pyrene	ND	2.8	8.8
Benzo (b) fluoranthene	ND	2.5	8.1
Benzo (g,h,i) perylene	ND	2.6	8.2
Benzo (k) fluoranthene	ND	2.9	9.1
Chrysene	ND	2.3	7.2
Dibenzo (a,h) anthracene	ND	2.1	6.7
Fluoranthene	ND	2.5	8.1
Fluorene	ND	1.6	5.0
Indeno (1,2,3-cd) pyrene	ND	3.5	11
Methyl-1-Naphthalene	ND	1.4	4.6
Methyl-2-Naphthalene	ND	1.6	5.7
Naphthalene	ND	1.6	4.9
Phenanthrene	ND	2.2	7.2
Pyrene	< 2.2 >	2.0	6.2

Surrogate Recovery on P-Terphenyl = 49.0 %

Analyte	155999 Soil, Lab 17	LOD	LOQ
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>
Acenaphthene	ND	1.9	6.0
Acenaphthylene	ND	2.2	7.1
Anthracene	ND	2.3	7.2
Benzo (a) anthracene	ND	2.4	7.7
Benzo (a) pyrene	ND	2.8	8.8
Benzo (b) fluoranthene	ND	2.5	8.1
Benzo (g,h,i) perylene	ND	2.6	8.2
Benzo (k) fluoranthene	ND	2.9	9.1
Chrysene	ND	2.3	7.2
Dibenzo (a,h) anthracene	ND	2.1	6.7
Fluoranthene	ND	2.5	8.1
Fluorene	ND	1.6	5.0
Indeno (1,2,3-cd) pyrene	ND	3.5	11
Methyl-1-Naphthalene	ND	1.4	4.6
Methyl-2-Naphthalene	ND	1.6	5.7
Naphthalene	ND	1.6	4.9
Phenanthrene	ND	2.2	7.2
Pyrene	ND	2.0	6.2

Surrogate Recovery on P-Terphenyl = 46.0 %



## ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbons by EPA 8310 (S)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156000 Soil, Lab 20	LOD	LOQ
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>
Acenaphthene	ND	1.9	6.0
Acenaphthylene	ND	2.2	7.1
Anthracene	ND	2.3	7.2
Benzo (a) anthracene	ND	2.4	7.7
Benzo (a) pyrene	ND	2.8	8.8
Benzo (b) fluoranthene	ND	2.5	8.0
Benzo (g,h,i) perylene	ND	2.6	8.2
Benzo (k) fluoranthene	ND	2.9	9.1
Chrysene	ND	2.3	7.2
Dibenzo (a,h) anthracene	ND	2.1	6.7
Fluoranthene	ND	2.5	8.1
Fluorene	ND	1.6	4.9
Indeno (1,2,3-cd) pyrene	ND	3.5	11
Methyl-1-Naphthalene	ND	1.4	4.6
Methyl-2-Naphthalene	ND	1.6	5.7
Naphthalene	ND	1.6	4.9
Phenanthrene	ND	2.2	7.1
Pyrene	ND	2.0	6.2

Surrogate Recovery on P-Terphenyl = 51.0 %

Analyte	156001 Soil, Lab 27	LOD	LOQ
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>
Acenaphthene	ND	1.9	6.1
Acenaphthylene	ND	2.3	7.2
Anthracene	ND	2.3	7.3
Benzo (a) anthracene	ND	2.5	7.8
Benzo (a) pyrene	ND	2.8	8.9
Benzo (b) fluoranthene	ND	2.6	8.2
Benzo (g,h,i) perylene	ND	2.6	8.3
Benzo (k) fluoranthene	ND	2.9	9.2
Chrysene	ND	2.3	7.3
Dibenzo (a,h) anthracene	ND	2.1	6.8
Fluoranthene	ND	2.6	8.2
Fluorene	ND	1.6	5.0
Indeno (1,2,3-cd) pyrene	ND	3.6	11
Methyl-1-Naphthalene	ND	1.5	4.6
Methyl-2-Naphthalene	ND	1.6	5.8
Naphthalene	ND	1.6	5.0
Phenanthrene	ND	2.3	7.3
Pyrene	ND	2.0	6.3

Surrogate Recovery on P-Terphenyl = 54.0 %

## ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbons by EPA 8310 (S)

Page: 5

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	156002 Soil, Lab 28 ug/kg	LOD ug/kg	LOQ ug/kg
Acenaphthene	ND	46	150
Acenaphthylene	ND	54	170
Anthracene	ND	55	180
Benzo (a) anthracene	< 98 >	59	190
Benzo (a) pyrene	ND	68	210
Benzo (b) fluoranthene	ND	62	200
Benzo (g,h,i) perylene	ND	63	200
Benzo (k) fluoranthene	ND	70	220
Chrysene	ND	55	180
Dibenzo (a,h) anthracene	ND	52	160
Fluoranthene	ND	62	200
Fluorene	< 120 >	38	120
Indeno (1,2,3-cd) pyrene	ND	85	270
Methyl-1-Naphthalene	3100	35	110
Methyl-2-Naphthalene	5900	38	140
Naphthalene	1800	38	120
Phenanthrene	370	55	170
Pyrene	260	48	150
Surrogate Recovery on P-Terphenyl = 75.0 %			

Analyte Name	156003 Soil, Lab 29 ug/kg	LOD ug/kg	LOQ ug/kg
Acenaphthene	ND	1.9	6.0
Acenaphthylene	ND	2.3	7.2
Anthracene	ND	2.3	7.3
Benzo (a) anthracene	< 3.0 >	2.5	7.8
Benzo (a) pyrene	ND	2.8	8.9
Benzo (b) fluoranthene	ND	2.6	8.1
Benzo (g,h,i) perylene	ND	2.6	8.3
Benzo (k) fluoranthene	ND	2.9	9.2
Chrysene	ND	2.3	7.3
Dibenzo (a,h) anthracene	ND	2.1	6.8
Fluoranthene	ND	2.6	8.2
Fluorene	< 3.8 >	1.6	5.0
Indeno (1,2,3-cd) pyrene	ND	3.5	11
Methyl-1-Naphthalene	91	1.5	4.6
Methyl-2-Naphthalene	180	1.6	5.7
Naphthalene	99	1.6	5.0
Phenanthrene	13	2.3	7.2
Pyrene	11	2.0	6.3
Surrogate Recovery on P-Terphenyl = 62.0 %			

## ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbons by EPA 8310 (S)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	156004 Soil, Lab 26 ug/kg	LOD ug/kg	LOQ ug/kg
Acenaphthene	< 2.9 >	2.0	6.2
Acenaphthylene	< 5.6 >	2.3	7.4
Anthracene	ND	2.4	7.5
Benzo (a) anthracene	< 4.0 >	2.5	8.1
Benzo (a) pyrene	ND	2.9	9.2
Benzo (b) fluoranthene	ND	2.6	8.4
Benzo (g,h,i) perylene	ND	2.7	8.5
Benzo (k) fluoranthene	ND	3.0	9.5
Chrysene	ND	2.4	7.5
Dibenzo (a,h) anthracene	ND	2.2	7.0
Fluoranthene	ND	2.6	8.4
Fluorene	< 3.3 >	1.6	5.2
Indeno (1,2,3-cd) pyrene	ND	3.7	12
Methyl-1-Naphthalene	< 3.8 >	1.5	4.8
Methyl-2-Naphthalene	< 3.8 >	1.6	5.9
Naphthalene	ND	1.6	5.1
Phenanthrene	9.7	2.3	7.5
Pyrene	9.2	2.0	6.5

Surrogate Recovery on P-Terphenyl = 56.0 %

Analyte Name	156005 Soil, Lab 33 ug/kg	LOD ug/kg	LOQ ug/kg
Acenaphthene	< 2.0 >	1.9	6.0
Acenaphthylene	ND	2.2	7.1
Anthracene	ND	2.3	7.2
Benzo (a) anthracene	ND	2.4	7.8
Benzo (a) pyrene	ND	2.8	8.8
Benzo (b) fluoranthene	ND	2.5	8.1
Benzo (g,h,i) perylene	ND	2.6	8.2
Benzo (k) fluoranthene	ND	2.9	9.1
Chrysene	ND	2.3	7.2
Dibenzo (a,h) anthracene	ND	2.1	6.8
Fluoranthene	ND	2.5	8.1
Fluorene	ND	1.6	5.0
Indeno (1,2,3-cd) pyrene	ND	3.5	11
Methyl-1-Naphthalene	4.9	1.4	4.6
Methyl-2-Naphthalene	< 5.2 >	1.6	5.7
Naphthalene	ND	1.6	5.0
Phenanthrene	< 4.2 >	2.2	7.2
Pyrene	< 3.7 >	2.0	6.2

Surrogate Recovery on P-Terphenyl = 56.0 %

## ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbons by EPA 8310 (S)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156006 Soil, Lab 35	LOD	LOQ
Name	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>
Acenaphthene	ND	2.0	6.2
Acenaphthylene	ND	2.3	7.4
Anthracene	ND	2.4	7.5
Benzo (a) anthracene	ND	2.5	8.1
Benzo (a) pyrene	ND	2.9	9.2
Benzo (b) fluoranthene	ND	2.6	8.4
Benzo (g,h,i) perylene	ND	2.7	8.5
Benzo (k) fluoranthene	ND	3.0	9.5
Chrysene	ND	2.4	7.5
Dibenzo (a,h) anthracene	ND	2.2	7.0
Fluoranthene	< 2.7 >	2.7	8.4
Fluorene	< 2.2 >	1.6	5.2
Indeno (1,2,3-cd) pyrene	ND	3.7	12
Methyl-1-Naphthalene	53	1.5	4.8
Methyl-2-Naphthalene	110	1.6	5.9
Naphthalene	61	1.6	5.2
Phenanthrene	< 2.7 >	2.3	7.5
Pyrene	ND	2.0	6.5

Surrogate Recovery on P-Terphenyl = 66.0 %

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

Page: 1

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	155994 Soil, Lab 2 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
Benzene	ND	6.1	21	
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

Page: 2

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	155994 Soil, Lab 2	LOD	LOQ	Confirmation Method
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 92.0 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 99.0 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	155995 Soil, Lab 4	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	< 14 >	6.1	21	not required
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	< 20 >	8.1	28	not required

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	155995 Soil, Lab 4	LOD	LOQ	<u>Confirmation Method</u>
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 91.0 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 101 %				



## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	155996 Soil, Lab 6	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	21	6.1	21	not required
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

Page: 6

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	155996 Soil, Lab 6 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 93.0 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 104 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	155997 Soil, Lab 13	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	ND	6.1	21	
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	155997 Soil, Lab 13	LOD	LOQ	<u>Confirmation Method</u>
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 99.0 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 105 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	155998 Soil, Lab 15 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
Benzene	24	6.1	21	not required
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	29	6.2	22	not required
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	20	5.6	20	not required
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	155998 Soil, Lab 15 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	< 19 >	13	44	not required
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 98.0 %  
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 102 %

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	155999 Soil, Lab 17 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
Benzene	ND	6.1	21	
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	155999 Soil, Lab 17 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 96.0 %  
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 103 %



## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156000 Soil, Lab 20	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	ND	6.1	21	
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156000 Soil, Lab 20	LOD	LOQ	Confirmation Method
Name	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 93.0 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 106 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	156004 Soil, Lab 26	LOD ug/kg	LOQ ug/kg	Confirmation Method
Benzene	< 14 >	6.1	21	not required
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	80	6.2	22	not required
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	79	10	36	not required
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	< 31 >	12	43	not required
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	52	8.1	28	not required

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	156004 Soil, Lab 26 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
1,3,5-Trimethylbenzene	34	6.5	22	not required
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	57	13	44	not required
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 106 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 103 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156001 Soil, Lab 27	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	< 21 >	6.1	21	not required
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156001 Soil, Lab 27	LOD	LOQ	
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>Confirmation Method</u>
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 97.0 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 98.0 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXA)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156002 Soil, Lab 28	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	510	60	210	not required
Bromobenzene	ND	62	210	
Bromochloromethane	ND	130	450	
Bromodichloromethane	ND	130	420	
Bromoform	ND	86	300	
Bromomethane	ND	100	360	
n-Butylbenzene	1200	64	220	not required
sec-Butylbenzene	< 380 >	130	450	not required
tert-Butylbenzene	ND	52	180	
Carbon Tetrachloride	ND	96	330	
Chlorobenzene	ND	50	170	
Chloroethane	ND	81	280	
Chloroform	ND	110	390	
Chloromethane	ND	92	320	
2-Chlorotoluene	ND	72	250	
4-Chlorotoluene	ND	82	280	
Dibromochloromethane	ND	94	330	
1,2-Dibromo-3-Chloropropane	ND	70	240	
1,2-Dibromoethane	ND	88	310	
Dibromomethane	ND	92	320	
1,2-Dichlorobenzene	ND	63	220	
1,3-Dichlorobenzene	ND	130	450	
1,4-Dichlorobenzene	ND	58	200	
Dichlorodifluoromethane	ND	120	410	
1,1-Dichloroethane	ND	110	380	
1,2-Dichloroethane	ND	110	370	
1,1-Dichloroethene	ND	50	170	
cis-1,2-Dichloroethene	ND	88	340	
trans-1,2-Dichloroethene	ND	110	390	
1,2-Dichloropropane	ND	220	110	
1,3-Dichloropropane	ND	100	350	
2,2-Dichloropropane	ND	110	370	
1,1-Dichloropropene	ND	58	200	
cis-1,3-Dichloropropene	ND	65	220	
trans-1,3-Dichloropropene	ND	90	310	
Ethylbenzene	980	63	210	not required
Hexachlorobutadiene	ND	160	540	
Isopropylbenzene	200	58	200	not required
p-Isopropyltoluene	270	78	260	not required
Methylene chloride	ND	120	410	
Naphthalene	1300	160	540	not required
n-Propylbenzene	620	56	190	not required
ortho-Xylene	1900	54	190	not required
Styrene	ND	140	460	
1,1,1,2-Tetrachloroethane	ND	110	390	
1,1,1,2,2-Tetrachloroethane	ND	140	500	
Tetrachloroethene	ND	61	210	
Toluene	820	54	180	not required
1,2,3-Trichlorobenzene	ND	100	340	
1,2,4-Trichlorobenzene	ND	210	740	
1,1,1-Trichloroethane	ND	120	400	
1,1,2-Trichloroethane	ND	120	400	
Trichloroethene	ND	65	220	
Trichlorofluoromethane	ND	120	430	
1,2,3-Trichloropropane	ND	110	410	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXA)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156002 Soil, Lab 28	LOD	LOQ	Confirmation Method
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,2,4-Trimethylbenzene	5800	58	200	not required
1,3,5-Trimethylbenzene	1800	78	270	not required
Vinyl chloride	ND	95	330	
meta,para-Xylene	4300	150	500	not required
MTBE	ND	120	410	
Isopropylether	ND	88	340	

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 189 %  
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 102 %



## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	156003 Soil, Lab 29 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
Benzene	550	6.1	21	not required
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	660	6.2	22	not required
sec-Butylbenzene	50	6.6	23	not required
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	36	6.6	23	not required
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	240	6.4	22	not required
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	27	6.5	22	not required
p-Isopropyltoluene	59	6.3	22	not required
Methylene chloride	ND	9.4	32	
Naphthalene	110	10	36	not required
n-Propylbenzene	630	5.6	20	not required
ortho-Xylene/Styrene	< 27 >	12	43	not required
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	55	6.7	23	not required
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	1000	8.1	28	not required

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte Name	156003 Soil, Lab 29 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
1,3,5-Trimethylbenzene	340	6.5	22	not required
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 139 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 107 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156005 Soil, Lab 33	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	52	6.1	21	not required
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	160	6.2	22	not required
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	35	6.4	22	not required
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	40	6.3	22	not required
Methylene chloride	ND	9.4	32	
Naphthalene	78	10	36	not required
n-Propylbenzene	55	5.6	20	not required
ortho-Xylene/Styrene	< 36 >	12	43	not required
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	91	8.1	28	not required

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156005 Soil, Lab 33	LOD	LOQ	Confirmation Method
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,3,5-Trimethylbenzene	41	6.5	22	not required
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	81	13	44	not required
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 110 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 103 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156006 Soil, Lab 35	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	250	6.1	21	not required
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	470	6.2	22	not required
sec-Butylbenzene	44	6.6	23	not required
tert-Butylbenzene	32	6.0	21	not required
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	24	6.6	23	not required
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	120	6.4	22	not required
Hexachlorobutadiene	130	8.0	31	not required
Isopropylbenzene	29	6.5	22	not required
p-Isopropyltoluene	63	6.3	22	not required
Methylene chloride	ND	9.4	32	
Naphthalene	390	10	36	not required
n-Propylbenzene	71	5.6	20	not required
ortho-Xylene/Styrene	210	12	43	not required
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	23	6.7	23	not required
1,2,3-Trichlorobenzene	190	27	92	not required
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	570	8.1	28	not required

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156006 Soil, Lab 35	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
1,3,5-Trimethylbenzene	190	6.5	22	not required
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	530	13	44	not required
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 123 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 104 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

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Customer: MSA Professional Services

Project Description: Quearn Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156007 MeOH Blank	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	ND	6.1	21	
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	6.7	23	
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

Page: 26

Customer: MSA Professional Services

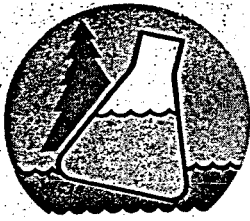
Project Description: Quearm Oil Project Title: 212320

Northern Lake Service Project Number: 38329

Analyte	156007 MeOH Blank	LOD	LOQ	Confirmation Method
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 91.0 %  
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 102 %





# NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520-1298

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 28695

## SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <b>MSA</b>		PROJECT TITLE <b>QUEARM OIL</b>	
ADDRESS <b>1230 SOUTH BLVD</b>		PROJECT NO. <b>212320</b>	P.O. NO.
CITY <b>BARABOO, WI</b>	STATE <b>WI</b>	ZIP <b>53913</b>	CONTACT <b>JOHN SAGER</b>
		PHONE <b>800-844-7854</b>	

ITEM NO.	NLS LAB. NO.	SAMPLE ID	DNR ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE		COLLECTION REMARKS
				DATE	TIME			Meq/L		
1.	155994	LAB 2		12-2-97	11:00	SOIL	GRAB	2	4	
2.	155995	LAB 4			11:15			2	4	
3.	155996	LAB 6			11:30			2	4	
4.	155997	LAB 13			3:00			2	4	
5.	155998	LAB 15		12-3-97				2	4	
6.	155999	LAB 17						2	4	
7.	156000	LAB 20						2	4	
8.	156001	LAB 27						2	4	
9.	156002	LAB 28						2	4	
10.	156003	LAB 29						2	4	
11.	156004	LAB 26						2	4	
12.	156005	LAB 33						2	4	

SAMPLE TYPE: SW=surface water WW=wastewater GW=groundwater describe others			DW=drinking water TIS=tissue AIR=air			PROD=product SOIL=soil SED=sediment			CONTAINER P = plastic G = glass V = glass vial B = plastic bag describe others			PRESERVATIVES & PREPARATION NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid <b>F = field filtered</b>		
--	--	--	--	--	--	---	--	--	---	--	--	---	--	--

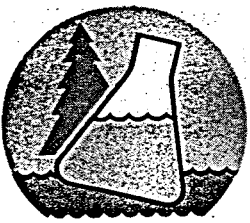
COLLECTED BY (signature) <i>Cheryl Joyce</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME <b>12-4-97 5:00pm</b>
RELINQUISHED BY (signature) <i>Brian Maki</i>	RECEIVED BY (signature)	DATE/TIME <b>12-5-97 11:35 AM</b>
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME <i>see note</i>
DISPATCHED BY (signature)	METHOD OF TRANSPORT	DATE/TIME <b>12-5-97</b>

RECEIVED AT NLS BY (signature) <i>David Hammond</i>	DATE/TIME <b>12-5-97 11:35</b>	CONDITION <b>good</b>	TEMP.
SEAL INTACT? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	SEAL #	REMARKS & OTHER INFORMATION <i>Hand delivered</i>	

**IMPORTANT:** 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.

- 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
- 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

**DUPLICATE COPY**



# NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520-1298

Tel: (715) 478-2777 • Fax: (715) 478-3060

2 of 2

NO. 28696

## SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <b>MSA</b>		DNR LICENSE		FID	
ADDRESS <b>1230 SOUTH BLVD</b>		PROJECT TITLE <b>Quearm Oil</b>		PROJECT NO. <b>212320</b>	
CITY <b>BARABOO, WI</b>		STATE <b>53913</b>		ZIP	
CONTACT <b>JOHN SAGER</b>		PHONE <b>800 844 7854</b>		P.O. NO.	

ITEM NO.	NLS LAB. NO.	SAMPLE ID	DNR ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE				COLLECTION REMARKS
				DATE	TIME			MEDIA				
12	156006	LAB 35		12-3-97		SOIL	GRAB	2	4			
14	156007	MEDIA BLANK						1				
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												

<b>SAMPLE TYPE:</b> SW=surface water WW=wastewater GW=groundwater describe others	DW=drinking water TIS=tissue AIR=air	PROD=product SOIL=soil SED=sediment	<b>CONTAINER</b> P = plastic G = glass V = glass vial B = plastic bag describe others	<b>PRESERVATIVES &amp; PREPARATION</b> NP = nothing added S = sulfuric acid N = nitric acid Z = zinc acetate OH = sodium hydroxide HA = hydrochloric & ascorbic acid H = hydrochloric acid <b>F = field filtered</b>
---	--	---	--	--

COLLECTED BY (signature) <i>John Sager</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME <b>12-4-97 5:00 pm</b>	
RELINQUISHED BY (signature) <i>Bill Mak</i>	RECEIVED BY (signature)	DATE/TIME <b>12-5-97 11:35 AM</b>	
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME	
DISPATCHED BY (signature)	METHOD OF TRANSPORT	DATE/TIME	
RECEIVED AT NLS BY (signature) <i>John Sager</i>	DATE/TIME <b>12-5-97 11:35</b>	CONDITION <b>OK</b>	TEMP.
SEAL INTACT? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	SEAL #	REMARKS & OTHER INFORMATION <i>Hand delivered</i>	

**IMPORTANT:** 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.  
 2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.  
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

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# NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

## ORDER OF ANALYSIS

RESULTS ORDERED BY: <u>CASEY JOYCE</u>	CHAIN OF CUSTODY RECORD NUMBER: <u>28695</u>
MSA 1230 SOUTH BLVD BARABOO, WI 53513	<u>28696</u>
	QUOTATION NUMBER:
	ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?
SEND RESULTS TO: <u>SAME</u>	SEND INVOICE TO: <u>SAME</u>

Note "L" for low level ICP analysis, and "F" for furnace analysis.

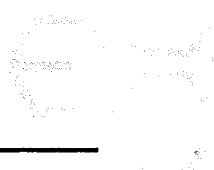
Samples on line #s: 1-13 to be analyzed for the parameters checked below:

- |   |  |   |  |
|---|--|---|--|
| <input type="checkbox"/> Alkalinity, total    | <input type="checkbox"/> Cyanide, total    | <input type="checkbox"/> Phenols              | <input type="checkbox"/> Acid Extractables by 625/8270   |
| <input type="checkbox"/> Alkalinity, bicarb.  | <input type="checkbox"/> Amenable          | <input type="checkbox"/> Phosphorus, total    | <input type="checkbox"/> Base/Neutral Extractables by 625/8270   |
| <input type="checkbox"/> Aluminum             | <input type="checkbox"/> Fluoride          | <input type="checkbox"/> Tot. reactive        | <input type="checkbox"/> BNAs by 625/8270  |
| <input type="checkbox"/> Antimony             | <input type="checkbox"/> Hardness          | <input type="checkbox"/> Dis. reactive        | <input type="checkbox"/> Chlorinated Hydrocarbons by 612   |
| <input type="checkbox"/> Arsenic              | <input type="checkbox"/> Iron              | <input type="checkbox"/> Potassium            | <input type="checkbox"/> Haloethers by 611   |
| <input type="checkbox"/> Barium               | <input type="checkbox"/> Lead              | <input type="checkbox"/> Selenium             | <input type="checkbox"/> Nitrosamines by 607   |
| <input type="checkbox"/> Beryllium            | <input type="checkbox"/> Magnesium         | <input type="checkbox"/> Silica               | <input type="checkbox"/> Pesticides-Organochlorine by 608/8080   |
| <input type="checkbox"/> B.O.D.-5             | <input type="checkbox"/> Manganese         | <input type="checkbox"/> Silver               | <input type="checkbox"/> Pesticides-Organophosphate by 8141  |
| <input type="checkbox"/> Boron                | <input type="checkbox"/> Mercury           | <input type="checkbox"/> Sodium               | <input type="checkbox"/> PCBs by 608/8080  |
| <input type="checkbox"/> Cadmium              | <input type="checkbox"/> Molybdenum        | <input type="checkbox"/> Solids, total        | <input type="checkbox"/> Phenols by GC 604/8040  |
| <input type="checkbox"/> Calcium              | <input type="checkbox"/> Nickel            | <input type="checkbox"/> Tot. dissolved       | <input type="checkbox"/> Phenoxy Acid Herbicides by 8150   |
| <input type="checkbox"/> C.O.D.               | <input type="checkbox"/> Nitrogen, total   | <input type="checkbox"/> Tot. suspended       | <input type="checkbox"/> TCLP-metals <input type="checkbox"/> TCLP-VOCs <input type="checkbox"/> TCLP-BNAs |
| <input type="checkbox"/> Chloride             | <input type="checkbox"/> Ammonia           | <input type="checkbox"/> Sulfate              | <input type="checkbox"/> TCLP-pesticides/herbicides  |
| <input type="checkbox"/> Chromium             | <input type="checkbox"/> Nitrate           | <input type="checkbox"/> Sulfide              | <input type="checkbox"/> VOCs by EPA 601+602 or 8010+8020  |
| <input type="checkbox"/> Chromium, hexavalent | <input type="checkbox"/> Nitrite           | <input type="checkbox"/> Surfactants (MBAS)   | <input checked="" type="checkbox"/> -by EPA 8021   |
| <input type="checkbox"/> Cobalt               | <input type="checkbox"/> Nitrate + Nitrite | <input type="checkbox"/> Thallium             | <input type="checkbox"/> -by EPA 624/8260  |
| <input type="checkbox"/> Coliform, fecal      | <input type="checkbox"/> Total Kjeldahl    | <input type="checkbox"/> Tin                  | <input type="checkbox"/> -by EPA 524.2 (SDWA)  |
| <input type="checkbox"/> Coliform, total      | <input type="checkbox"/> Total Organic     | <input type="checkbox"/> T.O.C.               | <input type="checkbox"/> BTEX by 8020  |
| <input type="checkbox"/> Color                | <input type="checkbox"/> Oil & Grease      | <input type="checkbox"/> Turbidity            | <input type="checkbox"/> PVOCs by 8020   |
| <input type="checkbox"/> Conductivity         | <input type="checkbox"/> pH                | <input type="checkbox"/> Vanadium             | <input checked="" type="checkbox"/> GRO-WI Modified <input type="checkbox"/> GRO + PVOCs                   |
| <input type="checkbox"/> Copper               | _____                                      | <input type="checkbox"/> Zinc                 | <input checked="" type="checkbox"/> DRO-WI Modified  |
| _____   | _____                                      | <input type="checkbox"/> Munic.Sludge,WI List | <input checked="" type="checkbox"/> PAHs by 610LC/8310   |

Samples on line #s: 14 to be analyzed for the parameters checked below:

- |   |  |   |  |
|---|--|---|--|
| <input type="checkbox"/> Alkalinity, total    | <input type="checkbox"/> Cyanide, total    | <input type="checkbox"/> Phenols              | <input type="checkbox"/> Acid Extractables by 625/8270   |
| <input type="checkbox"/> Alkalinity, bicarb.  | <input type="checkbox"/> Amenable          | <input type="checkbox"/> Phosphorus, total    | <input type="checkbox"/> Base/Neutral Extractables by 625/8270   |
| <input type="checkbox"/> Aluminum             | <input type="checkbox"/> Fluoride          | <input type="checkbox"/> Tot. reactive        | <input type="checkbox"/> BNAs by 625/8270  |
| <input type="checkbox"/> Antimony             | <input type="checkbox"/> Hardness          | <input type="checkbox"/> Dis. reactive        | <input type="checkbox"/> Chlorinated Hydrocarbons by 612   |
| <input type="checkbox"/> Arsenic              | <input type="checkbox"/> Iron              | <input type="checkbox"/> Potassium            | <input type="checkbox"/> Haloethers by 611   |
| <input type="checkbox"/> Barium               | <input type="checkbox"/> Lead              | <input type="checkbox"/> Selenium             | <input type="checkbox"/> Nitrosamines by 607   |
| <input type="checkbox"/> Beryllium            | <input type="checkbox"/> Magnesium         | <input type="checkbox"/> Silica               | <input type="checkbox"/> Pesticides-Organochlorine by 608/8080   |
| <input type="checkbox"/> B.O.D.-5             | <input type="checkbox"/> Manganese         | <input type="checkbox"/> Silver               | <input type="checkbox"/> Pesticides-Organophosphate by 8141  |
| <input type="checkbox"/> Boron                | <input type="checkbox"/> Mercury           | <input type="checkbox"/> Sodium               | <input type="checkbox"/> PCBs by 608/8080  |
| <input type="checkbox"/> Cadmium              | <input type="checkbox"/> Molybdenum        | <input type="checkbox"/> Solids, total        | <input type="checkbox"/> Phenols by GC 604/8040  |
| <input type="checkbox"/> Calcium              | <input type="checkbox"/> Nickel            | <input type="checkbox"/> Tot. dissolved       | <input type="checkbox"/> Phenoxy Acid Herbicides by 8150   |
| <input type="checkbox"/> C.O.D.               | <input type="checkbox"/> Nitrogen, total   | <input type="checkbox"/> Tot. suspended       | <input type="checkbox"/> TCLP-metals <input type="checkbox"/> TCLP-VOCs <input type="checkbox"/> TCLP-BNAs |
| <input type="checkbox"/> Chloride             | <input type="checkbox"/> Ammonia           | <input type="checkbox"/> Sulfate              | <input type="checkbox"/> TCLP-pesticides/herbicides  |
| <input type="checkbox"/> Chromium             | <input type="checkbox"/> Nitrate           | <input type="checkbox"/> Sulfide              | <input type="checkbox"/> VOCs by EPA 601+602 or 8010+8020  |
| <input type="checkbox"/> Chromium, hexavalent | <input type="checkbox"/> Nitrite           | <input type="checkbox"/> Surfactants (MBAS)   | <input checked="" type="checkbox"/> -by EPA 8021   |
| <input type="checkbox"/> Cobalt               | <input type="checkbox"/> Nitrate + Nitrite | <input type="checkbox"/> Thallium             | <input type="checkbox"/> -by EPA 624/8260  |
| <input type="checkbox"/> Coliform, fecal      | <input type="checkbox"/> Total Kjeldahl    | <input type="checkbox"/> Tin                  | <input type="checkbox"/> -by EPA 524.2 (SDWA)  |
| <input type="checkbox"/> Coliform, total      | <input type="checkbox"/> Total Organic     | <input type="checkbox"/> T.O.C.               | <input type="checkbox"/> BTEX by 8020  |
| <input type="checkbox"/> Color                | <input type="checkbox"/> Oil & Grease      | <input type="checkbox"/> Turbidity            | <input type="checkbox"/> PVOCs by 8020   |
| <input type="checkbox"/> Conductivity         | <input type="checkbox"/> pH                | <input type="checkbox"/> Vanadium             | <input checked="" type="checkbox"/> GRO-WI Modified <input type="checkbox"/> GRO + PVOCs                   |
| <input type="checkbox"/> Copper               | _____                                      | <input type="checkbox"/> Zinc                 | <input type="checkbox"/> DRO-WI Modified   |
| _____   | _____                                      | <input type="checkbox"/> Munic.Sludge,WI List | <input type="checkbox"/> PAHs by 610LC/8310  |

SPECIAL INSTRUCTIONS: \_\_\_\_\_



RECEIVED  
M.S.A. PROFESSIONAL SERVICES, INC.

DEC 10 1997

December 8, 1997

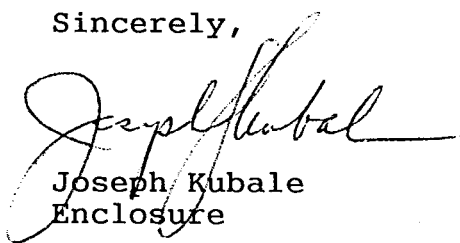
Brian Hegge  
MSA Professional Services  
P.O. Box 1026  
Rhineland, WI 54501-1026

Re: Technical Memorandum For Quearm Oil Site

Dear Mr. Hegge;

Enclosed is the Technical Memorandum for work recently performed at the Quearm Oil site in Ashland, Wisconsin. If you have any questions concerning this information, give me a call.

Sincerely,

  
Joseph Kubale  
Enclosure

Environmental Chemistry Consulting Services, Inc.

2525 Advance Road, Suite A • Madison, WI 53704 • Phone 608-221-8700 • FAX (608) 221-4889

---

**TECHNICAL MEMORANDUM**

December 8, 1997

**To:** Brian Hegge  
MSA Professional Services  
**From:** Joseph Kubale  
ECCS  
**Re:** Field Analytical Methods  
Quearm Oil Site, Ashland, Wisconsin

This Technical Memorandum provides documentation of the field analytical test methods used to analyze soil samples collected during the Quearm Oil Site Remediation on 12/2/97 through 12/4/97. Soil samples were analyzed for the volatile organic compounds (VOCs) benzene, toluene, ethyl benzene and xylenes (BTEX) by gas chromatography (GC-PID). Soil samples were also analyzed for Gasoline Range Organics (GRO) and Diesel Range Organics (DRO) by GC-FID.

**BTEX Method Summary**

Soil samples were analyzed using heated headspace methods for BTEX with the following method detection limits:

	<u>Soil</u>
Benzene	25 ug/kg
Toluene	50 ug/kg
Ethyl Benzene	50 ug/kg
Xylenes	150 ug/kg

For soil samples, five (5) grams of sample is transferred to a 20 mL scintillation vial. Five (5) mL of methanol is added and the vial immediately capped and shaken. In a 40 mL VOC vial, thirty (30) grams of VOC free water is added and then 600 µL of the methanol sample extract is added to the water. The vials are heated in a water bath at 60° C for 30 minutes with periodic shaking. The volatile compounds are transferred from the liquid phase to the vapor phase in the vial. An aliquot of the headspace is removed and injected into the GC. The GC column separates the volatile compounds which are then detected with a photo-ionization detector (PID). Identification is performed by matching retention times and quantitation performed against a five point standard curve.

**Procedure**

1. Standards Preparation - Primary standards are purchased from Absolute Standards as methanol mixes at certified concentrations. Secondary standards are prepared in methanol and stored on ice when not in use. Headspace standard curve mixes are prepared at six concentrations (0.5, 1, 2, 5, 10, and 20 ug/L) by injecting an appropriate aliquot of secondary standard into a properly prepared 40 mL vial as described below.

---

Environmental Chemistry Consulting Services, Inc.

2. Headspace Preparation (Soil) - Each 40 mL vial (samples, blanks, standards and quality control samples) to be analyzed is prepared in identical fashion. Five grams of sample is transferred into a clean scintillation vial. Five mL of methanol is added and the vial immediately capped and shaken. In a clean VOC vial, thirty grams of VOC free water is added and then 600  $\mu$ L of the methanol sample extract is added. The vial is heated in a water bath to 60° C for 30 minutes with periodic shaking.

3. Gas Chromatographic Analysis - A 100  $\mu$ L aliquot of the headspace is removed with a gas tight syringe and immediately injected into the GC and analyzed. Target compounds (BTEX) are identified by matching retention times of standards to retention times of samples and quantified using linear regression against an external standard curve.

4. Quality Control - Quality control consisted of the following items:

- Continuing calibration standards analyzed at a frequency of every ten samples or less and at the end of a run. Since the primary data quality objective was to show benzene levels less than 25 ug/kg for soils, the 0.5 ug/L standard was used as the continuing calibration standard.
- blank samples analyzed at a minimum of one per day.
- spiked samples analyzed at a frequency of every twenty samples or less.
- A surrogate (tetrachloroethane) will be added to all samples and standards. Interim surrogate recovery limits are  $\pm$  40 %.
- information documented in log book #14, pp 77-8, 81-82.

#### Instrument Conditions

A Photovac 10S55 gas chromatograph equipped with a photo-ionization detector was used with the following instrument conditions:

column - CPSIL 5 with pre-column in series, backflush after 80 seconds, isothermal temp. Set at 40°C  
carrier gas - zero grade air at 13 mL per minute  
sensitivity - slope up - 10, slope down - 12, peak width-4 chart speed - .5 cm/min, minimum area - 50 mVs

#### GRO Method Summary

Soil samples were analyzed using heated headspace methods for GRO with a 10 mg/kg reporting limit. Only those samples containing significant GC-PID response are then analyzed for GRO.

### Procedure

1. Standards Preparation - Primary Wisconsin GRO standards are purchased from Absolute Standards as methanol mixes at certified concentrations. Headspace standard curve mixes are prepared at three concentrations (200, 500, and 1000 ug/L) by injecting an appropriate aliquot of secondary standard into a properly prepared 40 mL vial as described below.

2. Headspace Preparation (Soil) - Each 40 mL vial (samples, blanks, standards and quality control samples) to be analyzed is prepared in identical fashion. Five grams of sample is transferred into a clean scintillation vial. Five mL of methanol is added and the vial immediately capped and shaken. In a clean VOC vial, thirty grams of VOC free water is added and then 600  $\mu$ L of the methanol sample extract is added. The vial is heated in a water bath to 60° C for 30 minutes with periodic shaking.

3. Gas Chromatographic Analysis - A 500  $\mu$ L sample aliquot is injected into the GC equipped with a Flame Ionization detector (FID). The ten component standard establishes the window for the gasoline range organic compounds. The samples are quantified by the sum area of all peaks within the established GRO window.

4. Quality Control - Quality control consisted of the following items:

- Continuing calibration standards analyzed at a frequency of every ten samples or less and at the end of a run.
- blank samples analyzed at a minimum of one per day.
- information documented in log book #14, p 84.

### Instrument Conditions

A Dimension II gas chromatograph was equipped with a Flame Ionization detector and DB-624 megabore capillary column. The system has a HP3396 for data handling.

### DRO Method Summary

Soil samples were analyzed using a mini-extraction method with a 40 mg/kg reporting limit.

### Procedure

1. Standards Preparation - Primary Wisconsin DRO standards are purchased from Absolute Standards as methylene chloride mixes at certified concentrations. Secondary standards are prepared in hexane/acetone and stored on ice when not in use. Standard curve mixes are prepared at five concentrations (20, 40, 80, 120, and 200 ug/ml).

2. Sample Preparation - Each 20 mL vial (samples and quality control samples) to be extracted and analyzed is prepared in identical fashion. Five grams of silica sand (blanks and control spikes) or sample is transferred into a

clean scintillation vial. Five grams of anhydrous sodium sulfate are added to the vial, mixed well, and surrogate added. Ten milliliters of solvent are added to the vial, vortexed for 30 seconds. An aliquot is transferred to an autosampler vial for analysis.

3. Gas Chromatographic Analysis - A 2.0  $\mu$ L sample aliquot is injected into the GC equipped with a Flame Ionization detector (FID). The ten component standard establishes the window for the diesel range organic compounds. The samples are quantified by the sum area of all peaks within the established DRO window.

4. Quality Control - Quality control consisted of the following items:

- Continuing calibration standards analyzed at a frequency of every ten samples or less and at the end of a run.
- blank samples analyzed at a minimum of one per day.
- duplicate samples analyzed at a frequency of every twenty samples or less.
- spiked samples analyzed at a frequency of every twenty samples or less.
- A surrogate (n-nonane) will be added to all samples and standards. Interim surrogate recovery limits are  $\pm$  40 %.
- information documented in log book #14, pp. 77,79-80, 83.

#### Instrument Conditions

A HP5890A gas chromatograph was equipped with a Flame Ionization detector and DB-5 megabore capillary column. The system has HP3365 Chemstation for data handling.



TABLE 1  
SUMMARY OF TEST RESULTS  
QUEARM OIL  
ASHLAND, WISCONSIN  
DECEMBER 2-4, 1997

Sample ID	Sample Type	Concentration (ug/kg )				mg/kg	
		Benzene	Ethyl Benzene	Toluene	Xylenes	GRO	DRO
GC-1	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-2	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-3	SOIL	< 25	< 50	< 50	< 150	NA	160
GC-4	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-5	SOIL	540	2300	2700	8000	160	100
GC-6	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-7	SOIL	4700	15000	> 100000	90000	1100	660
GC-8	SOIL	400	< 100	< 100	< 300	NA	<40
GC-9	SOIL	63	< 50	< 50	< 150	NA	<40
GC-10	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-11	SOIL	160	180	1700	780	30	<40
GC-12	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-13	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-14	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-15	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-16	SOIL	240	300	2600	540	NA	55
GC-17	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-18	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-19	SOIL	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	430	1300
GC-20	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-21	SOIL	170	< 50	< 50	< 150	NA	<40
GC-22	SOIL	< 25	< 50	140	760	NA	<40
GC-23	SOIL	34	320	59	230	NA	<40
GC-24	SOIL	110	< 50	110	360	NA	40
GC-25	SOIL	< 25	< 50	< 50	< 150	NA	<40

NA = Not Analyzed, low GC-PID response  
NA<sup>1</sup> = Not Analyzed, strong petroleum odor.

TABLE 1  
 SUMMARY OF TEST RESULTS  
 QUEARM OIL  
 ASHLAND, WISCONSIN  
 DECEMBER 2-4, 1997

Sample ID	Sample Type	Concentration (ug/kg )				mg/kg	
		Benzene	Ethyl Benzene	Toluene	Xylenes	GRO	DRO
GC-26	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-27	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-28	SOIL	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>	200	670
GC-29	SOIL	350	940	< 300	2300	50	240
GC-30	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-31	SOIL	95	1200	480	2100	NA	910
GC-32	SOIL	<600	<3000	<3000	<9000	110	450
GC-33	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-34	SOIL	380	140	< 50	200	NA	<40
GC-35	SOIL	280	< 50	< 50	230	NA	<40
GC-36	SOIL	<600	<3000	<3000	<9000	63	1200
GC-37	SOIL	< 25	70	< 50	< 150	NA	<40
GC-38	SOIL	82	< 50	< 50	< 150	NA	<40
GC-39	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-40	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-41	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-42	SOIL	76	230	76	230	NA	57
GC-43	SOIL	< 25	< 50	< 50	< 150	NA	<40
GC-44	SOIL	< 25	< 50	< 50	< 150	NA	NR
GC-45	SOIL	< 25	< 50	< 50	< 150	NA	NR
GC-46	SOIL	< 25	< 50	1200	1400	NA	NR
GC-47	SOIL	< 25	< 50	320	250	NA	NR
GC-48	SOIL	< 25	< 50	96	< 150	NA	NR
GC-49	SOIL	< 25	< 50	< 50	200	NA	NR
GC-50	SOIL	< 25	< 50	< 50	< 150	NA	NR
GC-51	SOIL	210	370	< 50	280	NA	NR
GC-52	SOIL	< 25	250	< 50	< 150	NA	NR
GC-53	SOIL	< 25	< 50	< 50	< 150	NA	NR
GC-54	SOIL	< 25	< 50	< 50	< 150	NA	NR
GC-55	SOIL	< 25	< 50	< 50	< 150	NA	NR

NR = Not Requested

NA = Not Analyzed, low GC-PID response

NA<sup>1</sup> = Not Analyzed, strong petroleum odor.

**NORTHERN LAKE SERVICE, INC.**  
Analytical Laboratory and Environmental Services  
400 North Lake Avenue - Crandon, WI 54520  
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

### ANALYTICAL REPORT

PAGE: 1      NLS PROJECT# 38328  
NLS CUST#      20851

Client:            MSA Professional Services  
                  Attn: John Sager  
                  1835 N. Stevens Street  
                  PO Box 1026  
                  Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212365

Sample ID: Soil, Lab 48      NLS#: 155990  
Ref. Line 1 of COC 28697    Description: Soil, Lab 48  
Collected: 12/04/97    Received: 12/05/97    Reported: 12/17/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	83.5	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/10/97	721026460
	Additional Comments: High surrogate value is due to sample matrix. Unidentified hydrocarbons present.						
GRO (soil)	2.3	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-97%, duplicate-96%, surrogate-100%						

Sample ID: Soil, Lab 50      NLS#: 155991  
Ref. Line 2 of COC 28697    Description: Soil, Lab 50  
Collected: 12/04/97    Received: 12/05/97    Reported: 12/17/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	83.5	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
GRO (soil)	ND	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
	Additional Comments: spike-97%, duplicate-96%, surrogate-95%						

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NORTHERN LAKE SERVICE, INC.  
Analytical Laboratory and Environmental Services  
400 North Lake Avenue - Crandon, WI 54520  
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

### ANALYTICAL REPORT

PAGE: 2 NLS PROJECT# 38328

NLS CUST# 20851

Client: MSA Professional Services  
Attn: John Sager  
1835 N. Stevens Street  
PO Box 1026  
Rhineland, WI 54501

Project Description: Quearm Oil  
Project Title: 212365

Sample ID: Soil, Lab 53 NLS#: 155992  
Ref. Line 3 of COC 28697 Description: Soil, Lab 53  
Collected: 12/04/97 Received: 12/05/97 Reported: 12/17/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
Solids, total on solids	83.6	%	0.10		ASTM D2216	12/09/97	721026460
VOCs (soils) by EPA 8021	see attached				SW846 8021	12/09/97	721026460
GRO (soil)	< 0.90 >	mg/Kg DWB	0.40	1.4	WI MOD GRO	12/11/97	721026460
Additional Comments: spike-97%, duplicate-96%, surrogate-99%							

Sample ID: MeOH Blank NLS#: 155993  
Ref. Line 4 of COC 28697 Description: MeOH Blank  
Collected: 12/04/97 Received: 12/05/97 Reported: 12/17/97

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>LOD</u>	<u>LOQ</u>	<u>Method</u>	<u>Analyzed</u>	<u>Lab</u>
VOCs (soils) by EPA 8021	see attached				EPA 8021	12/09/97	721026460

Values in brackets represent results greater than the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation".  
Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

LOD = Limit of Detection  
DWB = Dry Weight Basis

LOQ = Limit of Quantitation  
NA = Not Applicable

ND = Not Detected  
%DWB = (mg/kg DWB)/10000

*Steven R. Cuyper*  
Reviewed by:

Authorized by:  
R. T. Krueger  
Laboratory Manager

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXA)

Page: 1

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212365

Northern Lake Service Project Number: 38328

Analyte Name	155990 Soil, Lab 48 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
Benzene	ND	6.0	21	
Bromobenzene	ND	6.2	21	
Bromochloromethane	ND	13	45	
Bromodichloromethane	ND	13	42	
Bromoform	ND	8.6	30	
Bromomethane	ND	10	36	
n-Butylbenzene	69	6.4	22	not required
sec-Butylbenzene	ND	13	45	
tert-Butylbenzene	ND	5.2	18	
Carbon Tetrachloride	ND	9.6	33	
Chlorobenzene	ND	5.0	17	
Chloroethane	ND	8.1	28	
Chloroform	ND	11	39	
Chloromethane	ND	9.2	32	
2-Chlorotoluene	ND	7.2	25	
4-Chlorotoluene	ND	8.2	28	
Dibromochloromethane	ND	9.4	33	
1,2-Dibromo-3-Chloropropane	ND	7.0	24	
1,2-Dibromoethane	ND	8.8	31	
Dibromomethane	ND	9.2	32	
1,2-Dichlorobenzene	ND	6.3	22	
1,3-Dichlorobenzene	ND	13	45	
1,4-Dichlorobenzene	ND	5.8	20	
Dichlorodifluoromethane	ND	12	41	
1,1-Dichloroethane	ND	11	38	
1,2-Dichloroethane	ND	11	37	
1,1-Dichloroethene	ND	5.0	17	
cis-1,2-Dichloroethene	ND	8.8	34	
trans-1,2-Dichloroethene	ND	11	39	
1,2-Dichloropropane	ND	22	11	
1,3-Dichloropropane	ND	10	35	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	5.8	20	
cis-1,3-Dichloropropene	ND	6.5	22	
trans-1,3-Dichloropropene	ND	9.0	31	
Ethylbenzene	< 12 >	6.3	21	not required
Hexachlorobutadiene	ND	16	54	
Isopropylbenzene	ND	5.8	20	
p-Isopropyltoluene	ND	7.8	26	
Methylene chloride	ND	12	41	
Naphthalene	220	16	54	not required
n-Propylbenzene	< 9.9 >	5.6	19	not required
ortho-Xylene	ND	5.4	19	
Styrene	ND	14	46	
1,1,1,2-Tetrachloroethane	ND	11	39	
1,1,1,2,2-Tetrachloroethane	ND	14	50	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	5.4	18	
1,2,3-Trichlorobenzene	ND	10	34	
1,2,4-Trichlorobenzene	ND	21	74	
1,1,1-Trichloroethane	ND	12	40	
1,1,2-Trichloroethane	ND	12	40	
Trichloroethene	ND	6.5	22	
Trichlorofluoromethane	ND	12	43	
1,2,3-Trichloropropane	ND	11	41	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXA)

Page: 2

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212365

Northern Lake Service Project Number: 38328

Analyte	155990 Soil, Lab 48	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
1,2,4-Trimethylbenzene	120	5.8	20	not required
1,3,5-Trimethylbenzene	77	7.8	27	not required
Vinyl chloride	ND	9.5	33	
meta,para-Xylene	ND	15	50	
MTBE	ND	12	41	
Isopropylether	ND	8.8	34	

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 134 %  
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 101 %

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXA)

Page: 3

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212365

Northern Lake Service Project Number: 38328

Analyte Name	155991 Soil, Lab 50 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
Benzene	54	6.0	21	confirmed by EPA 8021
Bromobenzene	ND	6.2	21	
Bromochloromethane	ND	13	45	
Bromodichloromethane	ND	13	42	
Bromoform	ND	8.6	30	
Bromomethane	ND	10	36	
n-Butylbenzene	ND	6.4	22	
sec-Butylbenzene	ND	13	45	
tert-Butylbenzene	ND	5.2	18	
Carbon Tetrachloride	ND	9.6	33	
Chlorobenzene	ND	5.0	17	
Chloroethane	ND	8.1	28	
Chloroform	ND	11	39	
Chloromethane	ND	9.2	32	
2-Chlorotoluene	ND	7.2	25	
4-Chlorotoluene	ND	8.2	28	
Dibromochloromethane	ND	9.4	33	
1,2-Dibromo-3-Chloropropane	ND	7.0	24	
1,2-Dibromoethane	ND	8.8	31	
Dibromomethane	ND	9.2	32	
1,2-Dichlorobenzene	ND	6.3	22	
1,3-Dichlorobenzene	ND	13	45	
1,4-Dichlorobenzene	ND	5.8	20	
Dichlorodifluoromethane	ND	12	41	
1,1-Dichloroethane	ND	11	38	
1,2-Dichloroethane	< 20 >	11	37	not required
1,1-Dichloroethene	ND	5.0	17	
cis-1,2-Dichloroethene	ND	8.8	34	
trans-1,2-Dichloroethene	ND	11	39	
1,2-Dichloropropane	ND	22	11	
1,3-Dichloropropane	ND	10	35	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	5.8	20	
cis-1,3-Dichloropropene	ND	6.5	22	
trans-1,3-Dichloropropene	ND	9.0	31	
Ethylbenzene	ND	6.3	21	
Hexachlorobutadiene	ND	16	54	
Isopropylbenzene	ND	5.8	20	
p-Isopropyltoluene	ND	7.8	26	
Methylene chloride	ND	12	41	
Naphthalene	ND	16	54	
n-Propylbenzene	ND	5.6	19	
ortho-Xylene	ND	5.4	19	
Styrene	ND	14	46	
1,1,1,2-Tetrachloroethane	ND	11	39	
1,1,2,2-Tetrachloroethane	ND	14	50	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	5.4	18	
1,2,3-Trichlorobenzene	ND	10	34	
1,2,4-Trichlorobenzene	ND	21	74	
1,1,1-Trichloroethane	ND	12	40	
1,1,2-Trichloroethane	ND	12	40	
Trichloroethene	ND	6.5	22	
Trichlorofluoromethane	ND	12	43	
1,2,3-Trichloropropane	ND	11	41	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXA)

Page: 4

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212365

Northern Lake Service Project Number: 38328

Analyte	155991 Soil, Lab 50	LOD	LOQ	<u>Confirmation Method</u>
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,2,4-Trimethylbenzene	ND	5.8	20	
1,3,5-Trimethylbenzene	ND	7.8	27	
Vinyl chloride	ND	9.5	33	
meta,para-Xylene	ND	15	50	
MTBE	ND	12	41	
Isopropylether	ND	8.8	34	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 101 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 104 %				



## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXA)

Page: 5

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212365

Northern Lake Service Project Number: 38328

Analyte Name	155992 Soil, Lab 53 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
Benzene	ND	6.0	21	
Bromobenzene	ND	6.2	21	
Bromochloromethane	ND	13	45	
Bromodichloromethane	ND	13	42	
Bromoform	ND	8.6	30	
Bromomethane	ND	10	36	
n-Butylbenzene	ND	6.4	22	
sec-Butylbenzene	ND	13	45	
tert-Butylbenzene	ND	5.2	18	
Carbon Tetrachloride	ND	9.6	33	
Chlorobenzene	ND	5.0	17	
Chloroethane	ND	8.1	28	
Chloroform	ND	11	39	
Chloromethane	ND	9.2	32	
2-Chlorotoluene	ND	7.2	25	
4-Chlorotoluene	ND	8.2	28	
Dibromochloromethane	ND	9.4	33	
1,2-Dibromo-3-Chloropropane	ND	7.0	24	
1,2-Dibromoethane	ND	8.8	31	
Dibromomethane	ND	9.2	32	
1,2-Dichlorobenzene	ND	6.3	22	
1,3-Dichlorobenzene	ND	13	45	
1,4-Dichlorobenzene	ND	5.8	20	
Dichlorodifluoromethane	ND	12	41	
1,1-Dichloroethane	ND	11	38	
1,2-Dichloroethane	ND	11	37	
1,1-Dichloroethene	ND	5.0	17	
cis-1,2-Dichloroethene	ND	8.8	34	
trans-1,2-Dichloroethene	ND	11	39	
1,2-Dichloropropane	ND	22	11	
1,3-Dichloropropane	ND	10	35	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	5.8	20	
cis-1,3-Dichloropropene	ND	6.5	22	
trans-1,3-Dichloropropene	ND	9.0	31	
Ethylbenzene	ND	6.3	21	
Hexachlorobutadiene	ND	16	54	
Isopropylbenzene	ND	5.8	20	
p-Isopropyltoluene	ND	7.8	26	
Methylene chloride	ND	12	41	
Naphthalene	ND	16	54	
n-Propylbenzene	ND	5.6	19	
ortho-Xylene	ND	5.4	19	
Styrene	ND	14	46	
1,1,1,2-Tetrachloroethane	ND	11	39	
1,1,2,2-Tetrachloroethane	ND	14	50	
Tetrachloroethene	ND	6.1	21	
Toluene	ND	5.4	18	
1,2,3-Trichlorobenzene	ND	10	34	
1,2,4-Trichlorobenzene	ND	21	74	
1,1,1-Trichloroethane	ND	12	40	
1,1,2-Trichloroethane	ND	12	40	
Trichloroethene	ND	6.5	22	
Trichlorofluoromethane	ND	12	43	
1,2,3-Trichloropropane	ND	11	41	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXA)

Page: 6

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212365

Northern Lake Service Project Number: 38328

Analyte Name	155992 Soil, Lab 53 ug/kg	LOD ug/kg	LOQ ug/kg	Confirmation Method
1,2,4-Trimethylbenzene	ND	5.8	20	
1,3,5-Trimethylbenzene	ND	7.8	27	
Vinyl chloride	ND	9.5	33	
meta,para-Xylene	ND	15	50	
MTBE	ND	12	41	
Isopropylether	ND	8.8	34	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 91.0 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 101 %				

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

Page: 1

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212365

Northern Lake Service Project Number: 38328

Analyte	155993 MeOH Blank	LOD	LOQ	Confirmation Method
Name	ug/kg	ug/kg	ug/kg	
Benzene	ND	6.1	21	
Bromobenzene	ND	6.8	22	
Bromochloromethane	ND	7.1	24	
Bromodichloromethane	ND	7.7	26	
Bromoform	ND	6.6	22	
Bromomethane	ND	11	37	
n-Butylbenzene	ND	6.2	22	
sec-Butylbenzene	ND	6.6	23	
tert-Butylbenzene	ND	6.0	21	
Carbon Tetrachloride	ND	8.1	28	
Chlorobenzene	ND	5.8	20	
Chloroethane	ND	7.0	24	
Chloroform	ND	8.8	30	
Chloromethane	ND	16	55	
2-Chlorotoluene	ND	6.1	21	
4-Chlorotoluene	ND	6.4	22	
Dibromochloromethane	ND	6.9	24	
1,2-Dibromo-3-Chloropropane	ND	6.2	21	
1,2-Dibromoethane	ND	5.2	18	
Dibromomethane	ND	6.3	22	
1,2-Dichlorobenzene	ND	6.2	21	
1,3-Dichlorobenzene	ND	6.3	22	
1,4-Dichlorobenzene	ND	6.6	23	
Dichlorodifluoromethane	ND	6.0	20	
1,1-Dichloroethane	ND	7.4	26	
1,2-Dichloroethane	ND	6.6	23	
1,1-Dichloroethene	ND	8.0	31	
cis-1,2-Dichloroethene	ND	5.4	18	
trans-1,2-Dichloroethene	ND	6.8	23	
1,2-Dichloropropane	ND	7.4	26	
1,3-Dichloropropane	ND	7.7	27	
2,2-Dichloropropane	ND	11	37	
1,1-Dichloropropene	ND	6.8	23	
cis-1,3-Dichloropropene	ND	7.1	24	
trans-1,3-Dichloropropene	ND	6.9	24	
Ethylbenzene	ND	6.4	22	
Hexachlorobutadiene	ND	8.0	31	
Isopropylbenzene	ND	6.5	22	
p-Isopropyltoluene	ND	6.3	22	
Methylene chloride	ND	9.4	32	
Naphthalene	ND	10	36	
n-Propylbenzene	ND	5.6	20	
ortho-Xylene/Styrene	ND	12	43	
1,1,1,2-Tetrachloroethane	ND	8.2	28	
1,1,2,2-Tetrachloroethane	ND	9.3	32	
Tetrachloroethene	ND	6.1	21	
Toluene	< 9.4 >	6.7	23	not required
1,2,3-Trichlorobenzene	ND	27	92	
1,2,4-Trichlorobenzene	ND	8.2	28	
1,1,1-Trichloroethane	ND	8.4	29	
1,1,2-Trichloroethane	ND	6.8	23	
Trichloroethene	ND	5.9	20	
Trichlorofluoromethane	ND	8.7	30	
1,2,3-Trichloropropane	ND	9.8	34	
1,2,4-Trimethylbenzene	ND	8.1	28	

## ANALYTICAL RESULTS: VOC's by EPA 8021 - Methanol Extract (CXB)

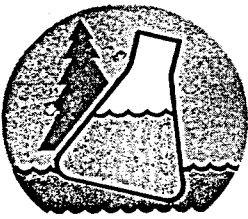
Page: 2

Customer: MSA Professional Services

Project Description: Quearm Oil Project Title: 212365

Northern Lake Service Project Number: 38328

Analyte	155993 MeOH Blank	LOD	LOQ	Confirmation Method
<u>Name</u>	<u>ug/kg</u>	<u>ug/kg</u>	<u>ug/kg</u>	
1,3,5-Trimethylbenzene	ND	6.5	22	
Vinyl chloride	ND	7.8	27	
meta,para-Xylene	ND	13	44	
MTBE	ND	6.8	23	
Isopropylether	ND	35	120	
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 96.0 %				
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 101 %				



# NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520-1298

Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 28697

## SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT <b>MSA</b>		DNR LICENSE		FID	
ADDRESS <b>1230 SOUTH BLVD</b>		PROJECT TITLE <b>Quartern OIL</b>		PROJECT NO. <b>212365</b>	
CITY <b>BARABOO</b>		STATE <b>WI</b>		ZIP <b>53913</b>	
CONTACT <b>JOHN SAGER</b>		PHONE <b>800 844-7854</b>			

ITEM NO.	NLS LAB. NO.	SAMPLE ID	DNR ID	COLLECTION		SAMPLE TYPE	GRAB/COMP.	CONTAINER/PRESERVATIVE			COLLECTION REMARKS
				DATE	TIME			Meth			
1.	155990	LAB 48		12-4-97	11:00	SOIL	GRAB	2	1		
2.	155991	LAB 50		11	12:30	↓	↓	2	1		
3.	155992	LAB 53		11	1:00	↓	↓	2	1		
4.	155993	MeOH Blank						1			
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											

SAMPLE TYPE:

SW=surface water      DW=drinking water      PROD=product  
 WW=wastewater      TIS=tissue      SOIL=soil  
 GW=groundwater      AIR=air      SED=sediment

describe others

CONTAINER

P = plastic  
G = glass  
V = glass vial  
B = plastic bag

describe others

PRESERVATIVES & PREPARATION

NP = nothing added      OH = sodium hydroxide  
 S = sulfuric acid      HA = hydrochloric & ascorbic acid  
 N = nitric acid      H = hydrochloric acid  
 Z = zinc acetate

**F = field filtered**

COLLECTED BY (signature) <i>John Sager</i>	CUSTODY SEAL NO. (IF ANY)	DATE/TIME <b>12-4-97 5:00</b>
RELINQUISHED BY (signature) <i>Bill Maki</i>	RECEIVED BY (signature)	DATE/TIME <b>12/5/97 11:35 AM</b>
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature)	METHOD OF TRANSPORT	DATE/TIME <b>12/10/97</b>

RECEIVED AT NLS BY (signature) <i>David Hamilton</i>	DATE/TIME <b>12-5-97 11:35</b>	CONDITION <b>good</b>	TEMP
SEAL INTACT? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	SEAL #	REMARKS & OTHER INFORMATION <b>Hand delivered</b>	

**IMPORTANT:** 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM MUST BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.  
 2. PLEASE USE ONE LINE PER SAMPLE, NOT PER BOTTLE.  
 3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

**DUPLICATE COPY**

# NORTHERN LAKE SERVICE, INC.

400 NORTH LAKE AVENUE

CRANDON, WI 54520 (715)478-2777

## ORDER OF ANALYSIS

RESULTS ORDERED BY:	CHAIN OF CUSTODY RECORD NUMBER: <u>28697</u>
CASEY JOYCE MSA Professional Services, INC. 1230 SOUTH BLVD BARABOO, WI 53913	QUOTATION NUMBER:
	ANALYZE FOR DISSOLVED OR TOTAL PARAMETERS?
	SEND INVOICE TO:
SEND RESULTS TO:	SEND INVOICE TO:
SAME	SAME

Note "L" for low level ICP analysis, and "F" for furnace analysis.

Samples on line #s: 1-3 to be analyzed for the parameters checked below:

- |   |  |   |  |
|---|--|---|--|
| <input type="checkbox"/> Alkalinity, total    | <input type="checkbox"/> Cyanide, total    | <input type="checkbox"/> Phenols              | <input type="checkbox"/> Acid Extractables by 625/8270   |
| <input type="checkbox"/> Alkalinity, bicarb.  | <input type="checkbox"/> Amenable          | <input type="checkbox"/> Phosphorus, total    | <input type="checkbox"/> Base/Neutral Extractables by 625/8270   |
| <input type="checkbox"/> Aluminum             | <input type="checkbox"/> Fluoride          | <input type="checkbox"/> Tot. reactive        | <input type="checkbox"/> BNAs by 625/8270  |
| <input type="checkbox"/> Antimony             | <input type="checkbox"/> Hardness          | <input type="checkbox"/> Dis. reactive        | <input type="checkbox"/> Chlorinated Hydrocarbons by 612   |
| <input type="checkbox"/> Arsenic              | <input type="checkbox"/> Iron              | <input type="checkbox"/> Potassium            | <input type="checkbox"/> Haloethers by 611   |
| <input type="checkbox"/> Barium               | <input type="checkbox"/> Lead              | <input type="checkbox"/> Selenium             | <input type="checkbox"/> Nitrosamines by 607   |
| <input type="checkbox"/> Beryllium            | <input type="checkbox"/> Magnesium         | <input type="checkbox"/> Silica               | <input type="checkbox"/> Pesticides-Organochlorine by 608/8080   |
| <input type="checkbox"/> B.O.D.-5             | <input type="checkbox"/> Manganese         | <input type="checkbox"/> Silver               | <input type="checkbox"/> Pesticides-Organophosphate by 8141  |
| <input type="checkbox"/> Boron                | <input type="checkbox"/> Mercury           | <input type="checkbox"/> Sodium               | <input type="checkbox"/> PCBs by 608/8080  |
| <input type="checkbox"/> Cadmium              | <input type="checkbox"/> Molybdenum        | <input type="checkbox"/> Solids, total        | <input type="checkbox"/> Phenols by GC 604/8040  |
| <input type="checkbox"/> Calcium              | <input type="checkbox"/> Nickel            | <input type="checkbox"/> Tot. dissolved       | <input type="checkbox"/> Phenoxy Acid Herbicides by 8150   |
| <input type="checkbox"/> C.O.D.               | <input type="checkbox"/> Nitrogen, total   | <input type="checkbox"/> Tot. suspended       | <input type="checkbox"/> TCLP-metals <input type="checkbox"/> TCLP-VOCs <input type="checkbox"/> TCLP-BNAs |
| <input type="checkbox"/> Chloride             | <input type="checkbox"/> Ammonia           | <input type="checkbox"/> Sulfate              | <input type="checkbox"/> TCLP-pesticides/herbicides  |
| <input type="checkbox"/> Chromium             | <input type="checkbox"/> Nitrate           | <input type="checkbox"/> Sulfide              | <input type="checkbox"/> VOCs by EPA 601+602 or 8010+8020  |
| <input type="checkbox"/> Chromium, hexavalent | <input type="checkbox"/> Nitrite           | <input type="checkbox"/> Surfactants (MBAS)   | <input checked="" type="checkbox"/> -by EPA 8021   |
| <input type="checkbox"/> Cobalt               | <input type="checkbox"/> Nitrate + Nitrite | <input type="checkbox"/> Thallium             | <input type="checkbox"/> -by EPA 624/8260  |
| <input type="checkbox"/> Coliform, fecal      | <input type="checkbox"/> Total Kjeldahl    | <input type="checkbox"/> Tin                  | <input type="checkbox"/> -by EPA 524.2 (SDWA)  |
| <input type="checkbox"/> Coliform, total      | <input type="checkbox"/> Total Organic     | <input type="checkbox"/> T.O.C.               | <input type="checkbox"/> BTEX by 8020  |
| <input type="checkbox"/> Color                | <input type="checkbox"/> Oil & Grease      | <input type="checkbox"/> Turbidity            | <input type="checkbox"/> PVOCs by 8020   |
| <input type="checkbox"/> Conductivity         | <input type="checkbox"/> pH                | <input type="checkbox"/> Vanadium             | <input checked="" type="checkbox"/> GRO-WI Modified <input type="checkbox"/> GRO + PVOCs                   |
| <input type="checkbox"/> Copper               |  | <input type="checkbox"/> Zinc                 | <input checked="" type="checkbox"/> DRO-WI Modified  |
|   |  | <input type="checkbox"/> Munic.Sludge,WI List | <input type="checkbox"/> PAHs by 610LC/8310  |

Samples on line #s: \_\_\_\_\_ to be analyzed for the parameters checked below:

- |   |  |   |  |
|---|--|---|--|
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SPECIAL INSTRUCTIONS: \_\_\_\_\_