30181 State Highway 59
Suite 1A
Loxley, AL 36551
Telephone 251-447-0944
Fax 251-447-0942
www.atcgroupservices.com

January 13, 2021

Mr. Emil Johnson
ADEM, UST Corrective Action Section
Groundwater Branch
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2400

[redacted]

RE: Corrective Action Plan
Former RaceWay Store No. 808
21403 Highway 231 North
Pell City, St. Clair County, Alabama
Facility ID No. 14001-115-009593
UST Incident No. UST17-06-01
Cost Proposal No. 20
ATC Project No. RTAL080820

Dear Mr. Johnson:

ATC Group Services LLC (ATC), on behalf of RaceTrac Petroleum, Inc. (RaceTrac), is pleased to submit the following Corrective Action Plan for the above-referenced site for your review and approval.

If you have any questions or comments regarding this submittal, please contact Paul Naman at 251.490.0308, or by email at paul.naman@atcgs.com.

Sincerely,

ATC GROUP SERVICES LLC

Paul M. Naman, P.G.
Senior Geologist/Project Manager

Richard Stevens
Program Manager

c: Eric Blaylock, RaceTrac

CORRECTIVE ACTION PLAN

FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ST. CLAIR COUNTY, ALABAMA

UST INCIDENT NO. UST17-06-01
ATC PROJECT NO. RTAL080820

Prepared for
Mr. Eric Blaylock
Remediation Manager
RaceTrac Petroleum, Inc.
200 Galleria Parkway SE. Suite 900
Atlanta, Georgia 30339

Prepared by
ATC Group Services LLC
30181 State Highway 59, Ste. 1A
Loxley, Alabama 36551
Phone: 251.447.0944
Fax: 251.509.0721
www.atcgroupservices.com

January 13, 2021

Paul M. Naman, P.G.
Project Manager

Richard Stevens
Program Manager

[redacted]

1.0 UST RELEASE FACT SHEET & SITE CLASSIFICATION FORM

UST RELEASE FACT SHEET

GENERAL INFORMATION:

SITE NAME: Former RaceWay Store No. 808

ADDRESS: 21403 Highway 231 North, Pell City, St. Clair County, Alabama

FACILITY I.D. NO.: 14001-115-009593

UST INCIDENT NO.: UST 17-06-01

RESULTS OF EXPOSURE ASSESSMENT:

How many private drinking water wells are located within 1,000 ft. of site?	None
How many public water supply wells are located within 1 mile of the site?	None
Have any drinking water supply wells been impacted by contamination from this release?	{ } Yes {X} No
Is there an imminent threat of contamination to any drinking water wells?	{ } Yes {X} No
Have vapors or contaminated groundwater posed a threat to the public?	{ } Yes {X} No
Are any underground utilities impacted or imminently threatened by the release?	{ } Yes {X} No
Have surface waters been impacted by the release?	{ } Yes {X} No
Is there an imminent threat of contamination to surface waters?	{ } Yes {X} No
What is the type of surrounding population?	Commercial/Residential

CONTAMINATION DESCRIPTION:

Type of contamination at site: { X} Gasoline { } Diesel { } Waste Oil
{ } Kerosene { } Other _____

Free product present in wells? { } Yes { X } No Maximum thickness measured: NA

Maximum TPH concentrations measured in soil: BTEX 1,627.4 mg/L (DI-3-P3 from Closure)
N/A

Maximum BTEX or PAH concentrations measured in groundwater: 0.24 mg/L benzene (MW-9); 2.507 mg/L BTEX (MW-9); 2.0 mg/L MTBE (MW-7); and 0.41 mg/L naphthalene (MW-9) on (05/20/20)

Exposure assessment information provided by G&RK Consulting Associates, LLC
*

ADEM Form 479 8/02

ADEM GROUNDWATER BRANCH

UST SITE CLASSIFICATION SYSTEM

CHECKLIST

Please read all of the following statements and mark either yes or no if the statement applies to your site. If you have conducted a Preliminary or Secondary Investigation, all questions should be answered. Closure site assessment reports may not provide you with all the necessary information, but answer the statements with the knowledge obtained during the closure site assessment.

SITE NAME:	Former RaceWay Store No. 808
SITE ADDRESS:	21403 Highway 231 North
	Pell City, St. Clair County, Alabama
FACILITY I.D. NO.:	14001-115-009593
UST INCIDENT NO.:	17-06-01
OWNER NAME:	RaceTrac Petroleum, Inc.
OWNER ADDRESS:	200 Galleria Parkway SE., Suite 900, Atlanta, GA 30339
NAME & ADDRESS OF PERSON COMPLETING THIS FORM:	Paul Naman ATC Group Services LLC 30181 State Highway 59, Ste. 1A Loxley, Alabama 36551

CLASSIFICATION	*DESCRIPTION*	*YES*	*NO*
CLASS A	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
A.1	Vapor concentrations at or approaching explosive levels that could cause health effects, are present in a residence or building.	☐	☒
A.2	Vapor concentrations at or approaching explosive levels are present in subsurface utility system(s), but no buildings or residences are impacted.	☐	☒
CLASS B	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
B.1	An active public water supply well, public water supply line, or public surface water intake is impacted or immediately threatened.	☐	☒
B.2	An active domestic water supply well, domestic water supply line or domestic surface water intake is impacted or immediately threatened.	☐	☒
B.3	The release is located within a designated Wellhead Protection Area I.	☐	☒
CLASS C	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
C.1	Ambient vapor/particulate concentrations exceed concentrations of concern from an acute exposure, or safety viewpoint.	☐	☒
C.2	Free product is present on the groundwater, at ground surface, on surface water bodies, in utilities other than water supply lines, or in surface water runoff.	☐	☒

CLASS D	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
D.1	There is a potential for explosive levels, or concentrations of vapors that could cause acute effects, to accumulate in a residence or other building.	☐	☒
D.2	A non-potable water supply well is impacted or immediately threatened.	☐	☒
D.3	Shallow contaminated surface soils are open to public access, and dwellings, parks, playgrounds, day care centers, schools or similar use facilities are within 500 feet of those soils.	☐	☒
CLASS E	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
E.1	A sensitive habitat or sensitive resources (sport fish, economically important species, threatened and endangered species, etc.) are impacted and affected.	☐	☒
CLASS F	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
F.1	Groundwater is impacted and a public well is located within 1 mile of the site.	☐	☒
F.2	Groundwater is impacted and a domestic well is located within 1,000 feet of the site.	☐	☒
F.3	Contaminated soils and/or groundwater are located within designated Wellhead Protection Areas (Areas II or III).	☐	☒
CLASS G	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
G.1	Contaminated soils and/or groundwater are located within areas vulnerable to contamination from surface sources.	☐	☒
GLASS H	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
H.1	Impacted surface water, stormwater or groundwater discharges within 500 feet of a surface water body used for human drinking water, whole body water-contact sports, or habitat to a protected or listed endangered plant and animal species.	☐	☒
CLASS I	LONG TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
I.1.	Site has contaminated soils and/or groundwater but does not meet any of the above mentioned criteria.	☒	☐

ADDITIONAL COMMENTS:

_____

_____

_____

Complete the classification evaluation questions listed above. Upon completion, determine the highest rank of the site (A.1 is the highest rank) based on the statements answered with a yes.

Enter the determined classification ranking:	I.1

ADEM GROUNDWATER BRANCH
SITE CLASSIFICATION CHECKLIST
(5/8/95)

2.0 INTRODUCTION

On behalf of RaceTrac Petroleum, Inc. (RaceTrac), ATC Group Services LLC (ATC) has prepared this Corrective Action Plan Report for the facility identified as Former RaceWay Store No. 808 located at 21403 Highway 231 North, Pell City, St. Clair County, Alabama (Facility I.D. No.: 14001-115-009593, UST 17-06-01). The site location is located in **Figure 1.** A detailed site map is included in **Figure 2**.

The Corrective Action Plan (CAP) Report was prepared by ATC, in response to the Alabama Department of Environmental Management (ADEM) correspondence dated September 30, 2020.

3.0 CHRONOLOGY OF EVENTS LEADING TO THE CORRECTIVE ACTION PLAN

May/June 2017	UST and Product Line Closure Investigation Report
September 2017	Preliminary Investigation Report
February 2018	Secondary Investigation Report
April 2019	ARBCA Tier I/II evaluation
2019 - 2020	Groundwater Monitoring Reports conducted quarterly

4.0 SUMMARY OF PREVIOUSLY CONDUCTED SITE ASSESSMENTS

The ADEM issued incident number UST 17-06-01 to the site.

4.1 Corrective Action Plan Development

Pursuant to the ADEM correspondence dated September 30, 2020, directive, ATC has developed this CAP for remediation of the subject property. The remedial action plan is detailed in the following sections. A tabularized summary of historical site groundwater data is included in **Tables 1** and **2**.

5.0 PROPOSED REMEDIATION METHOD(S)

Based on the site-specific data, monitoring for natural attenuation appears to be the most appropriate, cost effective remedial strategy that is protective of human health and the environment in the site vicinity. Natural attenuation relies on processes such as biodegradation, dispersion, dilution, volatilization, and sorption to achieve proposed goals. Site characterization data that support the recommendation for natural attenuation at this site included: 1) no active drinking water wells have been identified within 1,000 feet of the site, 2) based on the historical groundwater sampling results, the extent of the contaminant plume appears to be approximately

delineated, and 3) recent analytical data indicates that dissolved concentrations of petroleum constituents in the monitoring wells are approximately equal to or below the calculated site-specific target levels (SSTLs) in all wells, except MW-1 and MW-7, and no free product has been observed at the site.

6.0 GROUNDWATER MONITORING ONLY PLAN

This *Groundwater Monitoring Work Plan* was developed by ATC, relative to the site, as part of the continuing activities that were previously conducted on the site.

6.1 Scope of Work

Currently, the site contains fifteen monitoring wells (MW-1 through MW-14, and DW-1). Monitoring well locations are illustrated on **Figure 2**.

The Scope of Work includes the performance of the following activities for the fifteen monitoring wells, in each of the respective groundwater sampling events.

- Measurements of water levels and development of approximate groundwater surface contours and flow direction maps;
- Inspection for free product in the monitoring wells;
- Collection of groundwater samples from the monitoring wells and subsequent chemical analysis;
- Measurements of pH, conductivity, temperature, oxidation reduction potential (ORP), and dissolved oxygen (DO) in the field;
- Interpretation of the analytical data and development of petroleum hydrocarbons extent maps; and
- Development of a groundwater monitoring report summarizing the findings of each investigation.

All data will be incorporated in ADEM's Natural Attenuation Monitoring Report (NAMR) forms and submitted to the ADEM. These monitoring events will be conducted tri-annually, until a No-Further-Action (NFA) status is issued for the site.

6.2 Groundwater Flow and Water Levels

Prior to groundwater sample collection, groundwater elevations will be recorded in the monitoring wells referenced from the top of casing (TOC). The groundwater level measurements will be

subsequently utilized in the development of approximate groundwater flow direction and surface contour maps.

6.3 Groundwater Sampling and Chemical Analysis

Groundwater samples will be collected from each monitoring well; a total of fifteen groundwater samples will be collected, unless free product is observed. Subsequent to the groundwater sample collection, these samples will be transferred to SGS Labs in Lafayette, Louisiana, for chemical analysis. The samples will be analyzed for the presence of benzene, toluene, ethyl-benzene, and total xylenes (BTEX), methyl tertiary-butyl ether (MTBE), and naphthalene by EPA Method 8260B.

A field technician or environmental professional who is familiar with proper sampling techniques will collect the groundwater samples. Powder free latex or nitrile gloves will be used for sample collection and will be changed and disposed of between samples. All of the wells will be purged, prior to sampling. A well will be considered fully purged, once one of the following conditions is met:

- A minimum of three well volumes has been removed, or
- The well is purged dry.

Groundwater parameters will be measured during the purging process, using a YSI 556 MPS (Multi-probe System), or similar equipment. Groundwater samples will be collected by lowering a disposable bailer into each well, allowing groundwater to fill through the base, and retrieving the sample from the bailer.

Samples, for laboratory analysis, will be placed in 40 ml HCL pre-preserved glass vials (BTEX, MTBE, and naphthalene), capped with Teflon-lined caps, labeled and placed in plastic bags on ice in a secured cooler for transport to the analytical laboratory.

Chain of custody forms will be developed and included with the collected groundwater samples in the cooler, during the shipment to the laboratory.

6.4 Free Product Inspection

Prior to groundwater sampling, free product inspection will be conducted in the monitoring wells using an oil/water interface probe. If free product is encountered in any of the monitoring wells, the free product layer thickness will be recorded by the field personnel, and if a bailer is used, the free product will be recovered using a disposable bailer and stored on site in a 55-gallon drum.

6.5 Proposed Reporting Requirements

Tri-annual groundwater monitoring events are proposed, in order to gather groundwater analytical data of the chemicals of concern and to establish a historical trend of reported constituent values. These values will be utilized through time to show that remediation by natural attenuation is occurring and that closure through natural attenuation is feasible.

ATC proposes tri-annual groundwater sampling and reporting. ATC will submit cost proposals for tri-annual sampling and reporting, after ADEM approves this CAP Report.

7.0 FIGURES

A Topographic Location Map is included as **Figure 1**. A Site Map, with current and former site features including UST system locations (current and former), groundwater monitoring wells, and site structures is illustrated in **Figure 2.** Potentiometric surface maps for the last three site monitoring events conducted by the previous consultant (PPM) on May 20, 2020, March 9, 2020, and November 15, 2019, are included in **Appendix A** as **Figure 3**, respectively.

Isoconcentration maps showing the distribution of dissolved-phase benzene for the last three sampling events conducted by the previous consultant (PPM) on May 20, 2020, March 9, 2020, and November 15, 2019, are included in **Appendix B** as **Figure 4**, respectively. Isoconcentration maps showing the distribution of dissolved-phase MTBE for the last three sampling events conducted by the previous consultant (PPM) on May 20, 2020, March 9, 2020, and November 15, 2019, are included in **Appendix B** as **Figure 5**, respectively. Isoconcentration maps showing the distribution of dissolved-phase naphthalene for the last three sampling events conducted by the previous consultant (PPM) on May 20, 2020, March 9, 2020, and November 15, 2019, are included in **Appendix B** as **Figure 6**, respectively.

8.0 TABLES

Included in **Tables** are historical groundwater analytical results, as well as groundwater elevation data. Groundwater elevation data is summarized in **Table 1** and groundwater analytical results are summarized in **Table 2**.

9.0 APPENDICES WITH SUPPORTING DATA

Following is a list of the attached appendices, with supporting data:

- Appendix A – Potentiometric Surface Maps from May 20, 2020, March 9, 2020, and November 15, 2019 (Previous Consultant PPM)

- Appendix B – Dissolved-Phase Benzene, MTBE, and Naphthalene Isoconcentration Maps from May 20, 2020, March 9, 2020, and November 15, 2019 (Previous Consultant PPM)

- Appendix C – Site-Specific Health and Safety Plan

10.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

The purpose of this section is to provide the quality assurance/quality control guidelines and methods for collecting environmental samples and field data. This document addresses the methods, procedures, and techniques to be used during typical data collections.

The Senior Engineer/Geologist is responsible for assuring that the standards established in this CAP report are followed.

To provide for proper identification in the field and proper tracking in the laboratory, all samples will be labeled in a clear and consistent fashion. Sample labels are to be waterproof and to have a pre-assigned unique number. Field personnel will maintain a bound field notebook. This notebook must be water resistant, with sequentially numbered pages. Field activities will be recorded in ink. The notebook, along with the Chain-of-Custody Record, will contain sufficient information to allow reconstruction of the sample collection and handling procedures at a later time.

10.1 Procedure

Upon arrival at the site, the wells will be located using the site map and the covers removed. Once all of the covers are removed, the depth to water in each well will be obtained, using the oil/water Interface probe. The probe of the meter will be decontaminated between wells, according to the techniques described herein. Following depth to water measurement, the down-hole water conditions will be analyzed using the YSI 556, or similar instrument. Once the readings of the instrument have stabilized, the information obtained from the unit will be recorded in the field book beside the well station identification number. The probes and leader for the instrument will be decontaminated between wells, using the procedures described below.

10.1.1 Sampling Equipment and Collection Techniques

ATC personnel will handle all sampling, instruments, and sample containers with powder free latex and/or nitrile gloves, which are changed between wells and tasks. ATC will use new, disposable, polyethylene bailers for purging and sampling groundwater at its sites.

Following water level measurements and any down-hole data collection, a new bailer will be unwrapped and suspended from new nylon masonry twine. The bailer will be lowered carefully, to prevent splashing upon contact with the surface of the water in the well and allowed to fill from

the bottom. Once filled, the bailer will be slowly lifted from the water, to prevent unnecessary surging of the well. Once free of the water, the bailer will be quickly removed from the well. The bailer will be emptied into a bucket, which will be marked to show the amount of water currently contained within. This process will be repeated until approximately three well volumes of water are removed from the well using the bailer. Once the purging process is complete, sample collection will begin.

The full bailer is prepared for sample collection by inserting the drain tube into the bottom of the bailer. Groundwater will then be dispensed into laboratory-supplied containers.

10.1.2 Field Analytical or Measurement Techniques

Several natural attenuation parameters will be measured in the field. These parameters include depth to water, ORP, pH, conductivity, DO, and temperature in degrees Celsius.

10.2 Equipment

10.2.1 YSI 556 Multifunction Water Quality Monitoring Instrument

A YSI 556 multifunction water quality monitoring, or similar instrument will be utilized, to collect all of the field parameters, except for depth to water. Prior to each use, the equipment will be properly calibrated. Before using in the field, ATC personnel will perform a calibration check with the manufacturers recommended calibration solution.

10.2.2 Solinst Model 122 Oil/Water Interface Probe

ATC will bring its own Solinst Water Level meter to the site, to determine the depth to water in each well. This instrument requires no calibration, in order to function correctly.

10.3 Sample Handling and Preservation Techniques

Groundwater samples will be collected in pre-labeled, laboratory-supplied containers. Upon filling with a representative sample of groundwater, each container will be capped, checked for proper labeling, logged onto the chain of custody, sleeved in bubble wrap, and placed into an ice-filled cooler. All preservation chemicals will be pre-measured into the bottles at the laboratory. The ice in the cooler will serve to further preserve the samples between the time of collection in the field and extraction and/or analysis in the laboratory.

10.4 Equipment Decontamination Procedures

The only articles that will be in contact with the contents of more than one well during this sampling event will be the probes of the interface probe and the multifunction water quality instrument. Prior to use and between each well, the portions of the instruments that will come into contact with groundwater will be rinsed with a spray of tap water and then sprayed with a mixture of tap water and Alconox laboratory detergent. The probe will be rinsed a second time with the spray of water and stored clean until the next use.

10.5 Chain of Custody Procedures

The filled sample bottles will be recorded onto the chain of custody form. The date and time that the sample was collected, recorded, and checked against the sample bottle label. The samples will be bagged and placed into an ice-filled cooler for transport back to the ATC office. At the office, the samples will be removed from the cooler and placed into the sample refrigerator or packaged for pick-up by the SGS Labs courier.

10.6 Laboratory Techniques

ATC has chosen to send samples to SGS Labs in Lafayette, Louisiana, for analysis.

10.6.1 Analytical Methods

The analytical methods chosen for this sampling event were based on the chemicals of concern released into the environment and the indicators for natural attenuation.

The specific methods used are:

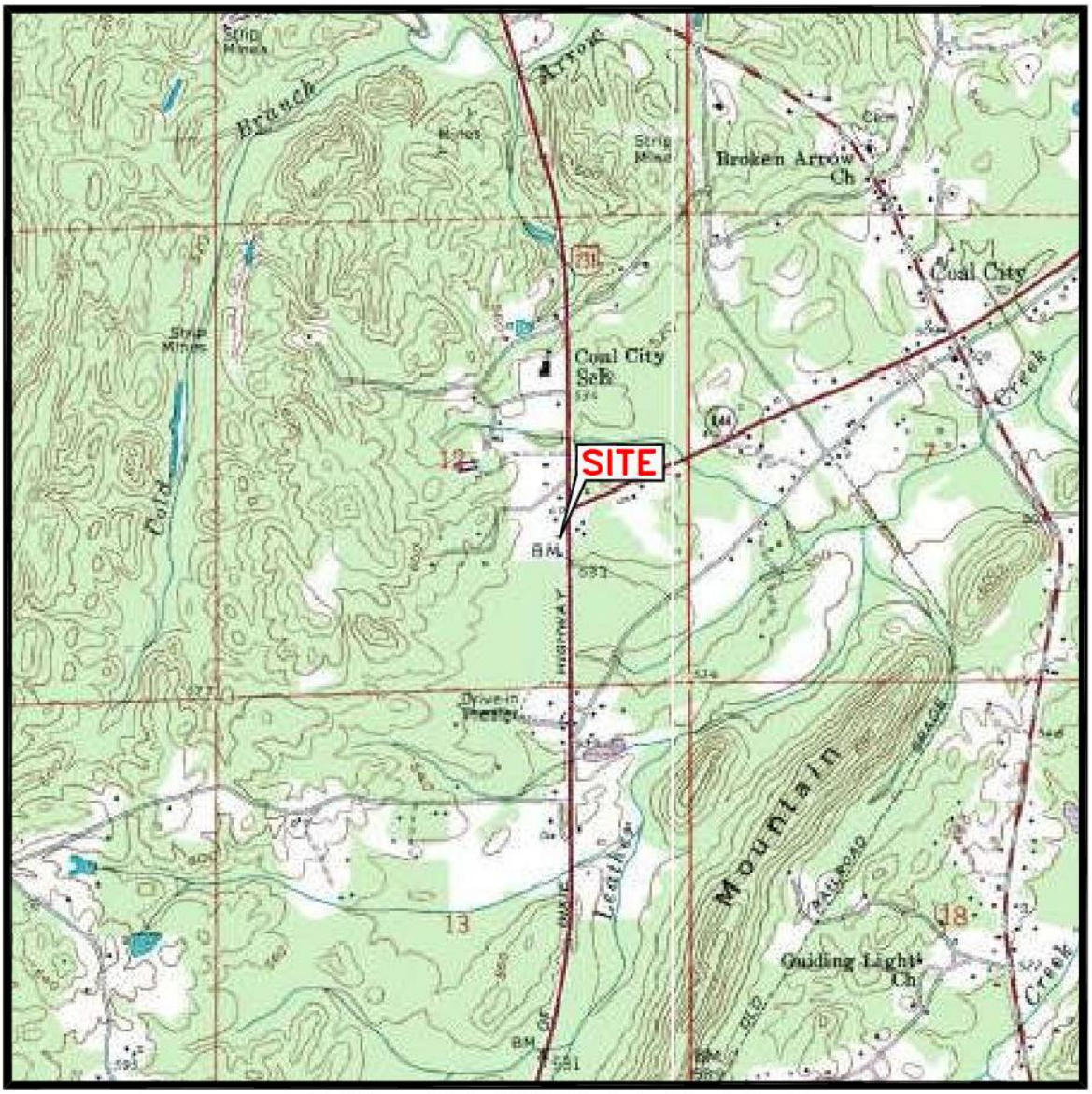
8260B: BTEX, MTBE, Naphthalene

10.7 QA/QC Procedures

The sample location will be noted in the field book for comparison to the known sample location.

11.0 SITE HEALTH AND SAFETY PLAN

A site-specific Health and Safety Plan has been prepared for the site and is included in **Appendix C.**



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP

MAP SOURCE: 7.5 MINUTE SERIES, PELL CITY, ALABAMA, 1972

QUAD LOCATION

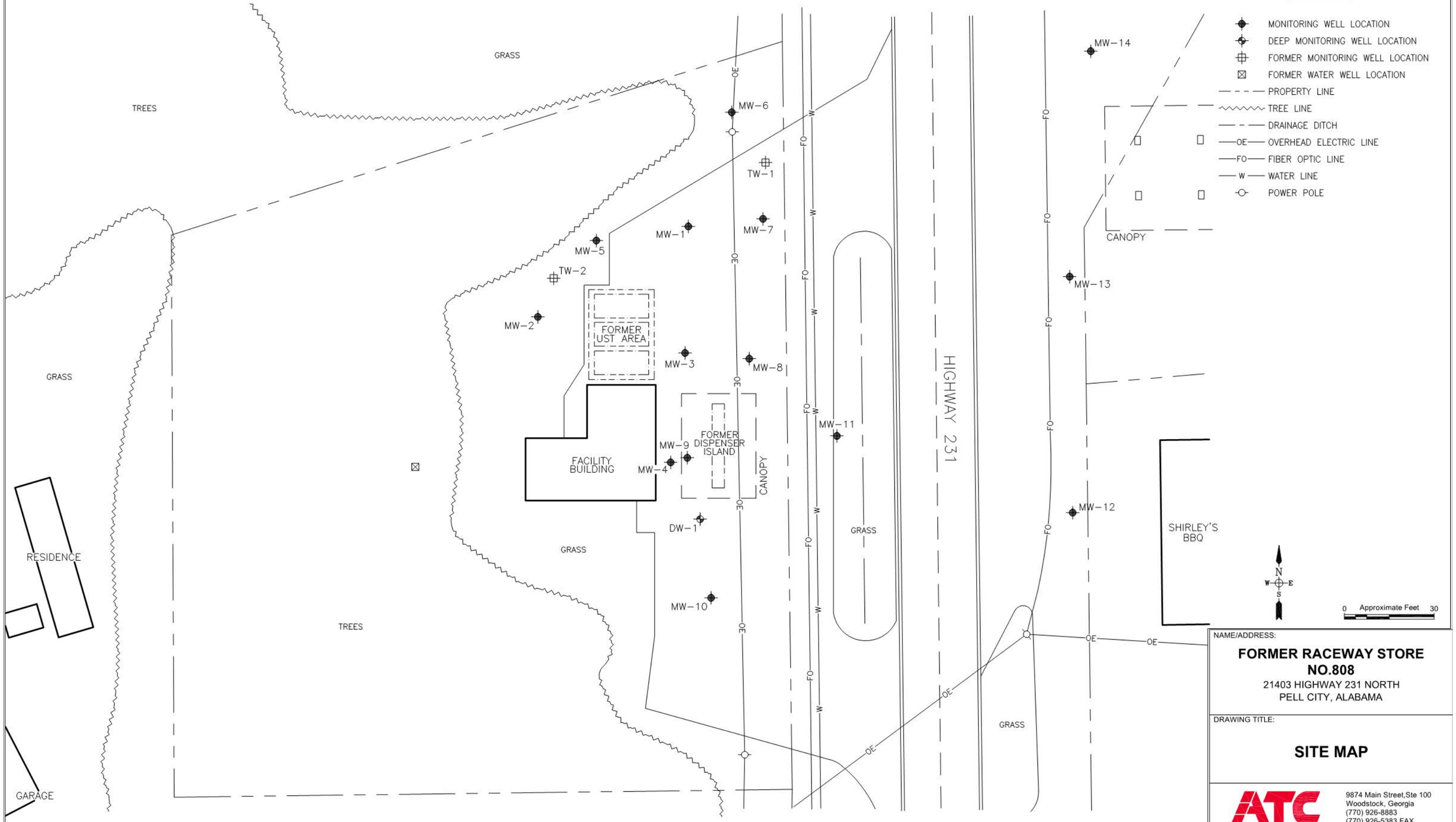
SCALE 1:24,000

0 2,000 4,000

SCALE FEET

N

FIGURE TITLE: **SITE LOCATION MAP**		DATE: 1-11-21
ADDRESS: **FORMER RACEWAY STORE NO.808** 21403 HIGHWAY 231 NORTH PELL CITY, ALABAMA		PROJECT NO.: RTAL080820 FIGURE: 1



NAME/ADDRESS:

FORMER RACEWAY STORE NO.808

21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DRAWING TITLE:

SITE MAP

ATC
9874 Main Street,Ste 100
Woodstock, Georgia
(770) 926-8883
(770) 926-5383 FAX

DRAWN BY:	EL
CHECKED BY:	JE
PROJECT NO.	RTAL080820

FIGURE NO. **2**

Table 1: Summary of Liquid Level Data

Former RaceWay Store No. 808
21403 Highway 231 North
Pell City, Alabama
UST Incident No. UST17-06-01

Well ID	Date Liquid Level Measured	Well Depth (ft-BTOC)	Screen Interval (ft)	Top of Casing Elevation (ft)	Depth to Product (ft, BGS)	Depth to Water (ft, BGS)	Free Product Thickness (ft)	Water Table Elevation (ft)
MW-1	08/22/17	18.2	3.2-18.2	533.86	--	5.26	--	528.60
	02/01/18				--	2.57	--	531.29
	08/22/18				--	5.02	--	528.84
	10/30/18				--	7.33	--	526.53
	04/09/19				--	ATOC	--	>533.86
	08/02/19	18.1			--	6.51	--	527.35
	11/15/20	NM			--	NM	--	NM
	03/09/20	15.1			--	3.55	--	530.31
	04/03/20				--	2.28	--	531.58
	05/20/20				--	3.57	--	530.29
MW-2	08/22/17	18.1	3.1-18.1	534.41	--	4.55	--	529.86
	02/01/18				--	2.61	--	531.80
	08/22/18				--	2.85	--	531.56
	10/30/18				--	6.31	--	528.10
	04/09/19	18.2			--	2.40	--	532.01
	08/02/19	17.9			--	5.08	--	529.33
	11/15/20	18.0			--	4.34	--	530.07
	03/09/20	18.2			--	1.98	--	532.43
	04/03/20				--	1.49	--	532.92
	05/20/20	18.1			--	1.76	--	532.65
MW-3	08/22/17	18.1	3.1-18.1	534.09	--	5.38	--	528.71
	02/01/18				--	3.76	--	530.33
	08/22/18				--	5.42	--	528.67
	10/30/18				--	7.02	--	527.07
	04/09/19	17.9			--	2.20	--	531.89
	08/02/19				--	6.19	--	527.90
	11/15/20	18.1			--	7.67	--	526.42
	03/09/20				--	3.97	--	530.12
	04/03/20				--	2.72	--	531.37
	05/20/20	13.9			--	4.40	--	529.69
MW-4	08/22/17	18.0	3.0-18.0	534.24	--	5.11	--	529.13
	02/01/18				--	3.74	--	530.50
	08/22/18				--	5.89	--	528.35
	10/30/18				--	6.86	--	527.38
	04/09/19				--	3.14	--	531.10
	08/02/19	17.9			--	6.37	--	527.87
	11/15/20	18.2			--	7.46	--	526.78
	03/09/20	18.1			--	4.55	--	529.69
	04/03/20	18.2			--	3.80	--	530.44
	05/20/20	18.0			--	5.36	--	528.88
MW-5	02/01/18	12.0	2.0-12.0	534.07	--	0.30	--	533.77
	08/22/18				--	1.62	--	532.45
	10/30/18				--	7.05	--	527.02
	04/09/19	12.4			--	ATOC	--	>534.07
	08/02/19	12.3			--	6.78	--	527.29
	11/15/20	12.2			--	3.71	--	530.36
	03/09/20	12.4			--	0.20	--	533.87
	04/03/20				--	ATOC	--	>534.07
	05/20/20				--	0.56	--	533.51

Table 1: Summary of Liquid Level Data

Former RaceWay Store No. 808
21403 Highway 231 North
Pell City, Alabama
UST Incident No. UST17-06-01

Well ID	Date Liquid Level Measured	Well Depth (ft-BTOC)	Screen Interval (ft)	Top of Casing Elevation (ft)	Depth to Product (ft, BGS)	Depth to Water (ft, BGS)	Free Product Thickness (ft)	Water Table Elevation (ft)
MW-6	02/01/18	12.4	2.4-12.4	533.32	--	2.61	--	530.71
	08/22/18				--	4.83	--	528.49
	10/30/18				--	6.99	--	526.33
	04/09/19	12.6			--	0.18	--	533.14
	08/02/19	12.5			--	5.88	--	527.44
	11/15/20	12.4			--	8.10	--	525.22
	03/09/20	12.7			--	0.43	--	532.89
	04/03/20				--	0.36	--	532.96
	05/20/20	12.4			--	0.37	--	532.95
MW-7	02/01/18	12.2	2.2-12.2	533.81	--	3.95	--	529.86
	08/22/18				--	4.94	--	528.87
	10/30/18				--	7.64	--	526.17
	04/09/19	12.3			--	4.00	--	529.81
	08/02/19	12.2			--	6.92	--	526.89
	11/15/20	12.3			--	8.54	--	525.27
	03/09/20	12.2			--	6.06	--	527.75
	04/03/20	12.3			--	5.58	--	528.23
	05/20/20	12.2			--	5.69	--	528.12
MW-8	02/01/18	12.5	2.5-12.5	533.98	--	4.23	--	529.75
	08/22/18				--	5.36	--	528.62
	10/30/18				--	7.38	--	526.60
	04/09/19	12.4			--	3.86	--	530.12
	08/02/19				--	6.26	--	527.72
	11/15/20	12.3			--	8.13	--	525.85
	03/09/20	12.4			--	4.35	--	529.63
	04/03/20	12.5			--	3.10	--	530.88
	05/20/20	12.2			--	4.57	--	529.41
MW-9	02/01/18	13.3	3.3-13.3	534.05	--	3.86	--	530.19
	08/22/18				--	4.63	--	529.42
	10/30/18				--	6.48	--	527.57
	04/09/19	13.1			--	2.59	--	531.46
	08/02/19				--	6.00	--	528.05
	11/15/20	13.3			--	7.11	--	526.94
	03/09/20				--	4.50	--	529.55
	04/03/20				--	3.90	--	530.15
	05/20/20	13.0			--	5.45	--	528.60
MW-10	08/22/18	12.5	2.0-12.0	533.85	--	5.07	--	528.78
	10/30/18				--	6.74	--	527.11
	04/09/19	12.4			--	3.76	--	530.09
	08/02/19	12.5			--	6.36	--	527.49
	11/15/20	12.3			--	7.15	--	526.70
	03/09/20	12.6			--	4.82	--	529.03
	04/03/20				--	4.05	--	529.80
	05/20/20	12.4			--	5.68	--	528.17
MW-11	04/03/20	12.2	2.0-11.7	533.25	--	2.68	--	530.57
	05/20/20	12.1			--	3.58	--	529.67
MW-12	04/03/20	13.6	3.3-13.0	531.03	--	1.78	--	529.25
	05/20/20	13.2			--	3.44	--	527.59

Table 1: Summary of Liquid Level Data

Former RaceWay Store No. 808
21403 Highway 231 North
Pell City, Alabama
UST Incident No. UST17-06-01

Well ID	Date Liquid Level Measured	Well Depth (ft-BTOC)	Screen Interval (ft)	Top of Casing Elevation (ft)	Depth to Product (ft, BGS)	Depth to Water (ft, BGS)	Free Product Thickness (ft)	Water Table Elevation (ft)
MW-13	04/03/20	13.4	3.2-12.9	532.04	--	2.15	--	529.89
	05/20/20	14.4			--	2.82	--	529.22
MW-14	04/03/20	14.2	4.1-13.8	532.36	--	3.00	--	529.36
	05/20/20	14.1			--	3.90	--	528.46
DW-1	02/01/18	68.2	48.2-68.2	534.23	--	51.04	--	483.19
	08/22/18				--	4.82	--	529.41
	10/30/18				--	6.82	--	527.41
	04/09/19	67.7			--	4.73	--	529.50
	08/02/19	66.8			--	5.82	--	528.41
	11/15/20	67.2			--	8.78	--	525.45
	03/09/20	66.8			--	19.65	--	514.58
	04/03/20	66.6			--	19.33	--	514.90
	05/20/20				--	7.52	--	526.71

NOTES:
BGS - Below Ground Surface / ft - feet / ND - No Data / Water Table Elevation (WTE)

Table 2: Summary of Groundwater Analtyical Data (BTEX, MTBE, Naphthalene)

Former RaceWay Store No. 808
21403 Highway 231 North
Pell City, Alabama
UST Incident No. UST17-06-01

Analytical Method		EPA Method 8260						
Chemical of Concern		Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
Well ID	Date Collected							
MW-1	08/22/17	<0.0010	<0.0010	<0.0010	<0.0030	BDL	**1.49**	<0.0050
	02/01/18	<0.005	<0.005	<0.005	<0.005	BDL	0.579	<0.005
	08/22/18	<0.005	<0.005	<0.005	<0.005	BDL	0.778	<0.005
	10/30/18	<0.005	<0.005	<0.005	<0.005	BDL	**1.37**	<0.005
	04/09/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.082	<0.0010
	08/02/19	<0.0050	<0.0050	<0.0050	<0.030	BDL	0.95	<0.010
	11/15/19	NS	NS	NS	NS	NS	NS	NS
	03/09/20	0.010	<0.0050	<0.0050	<0.030	0.010	**1.4**	<0.010
	05/20/20	<0.0050	<0.0050	<0.005	<0.030	BDL	1.2	<0.010
SSTLs		**0.3231**	**64.61**	**45.23**	**175**	**NSE**	**1.292**	**1.292**
MW-2	08/22/17	<0.0010	<0.0010	<0.0010	<0.0030	BDL	0.00231	<0.0050
	02/01/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	08/22/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	10/30/18	<0.00050	<0.00050	<0.001	<0.001	BDL	0.002	<0.001
	04/09/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0038	0.0010
	08/02/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.003	0.0019
	11/15/19	<0.00050	<0.00050	0.0011	<0.0030	0.0011	0.0014	0.0019
	03/09/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.00054	0.0026
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.00070	<0.0010
SSTLs		**0.3467**	**69.33**	**48.53**	**175**	**NSE**	**1.387**	**1.387**
MW-3	08/22/17	0.00174	0.00395	0.00270	0.0100	0.01839	0.583	<0.0050
	02/01/18	0.027	<0.005	0.017	<0.005	0.044	0.390	<0.005
	08/22/18	<0.005	<0.005	<0.005	<0.005	BDL	0.342	<0.005
	10/30/18	<0.005	<0.005	<0.005	<0.005	BDL	0.520	<0.005
	04/09/19	0.00085	<0.00050	0.00077	<0.0030	0.00162	0.70	<0.0010
	08/02/19	<0.00050	<0.00050	0.00053	<0.0030	0.00053	0.63	<0.0010
	11/15/20	<0.0025	<0.0025	<0.0025	<0.015	BDL	0.59	<0.0050
	03/09/20	0.0092	<0.0050	<0.0050	<0.030	0.0092	0.80	<0.010
	05/20/20	<0.0025	<0.0025	<0.0025	<0.015	BDL	0.78	<0.0050
SSTLs		**0.4206**	**8.748**	**22.64**	**175**	**NSE**	**1.682**	**1.682**
MW-4	08/22/17	<0.0010	<0.0010	<0.0010	<0.0030	BDL	<0.0010	<0.0050
	02/01/18	<0.001	<0.001	<0.001	<0.001	BDL	0.027	<0.001
	08/22/18	<0.001	<0.001	<0.001	<0.001	BDL	0.028	<0.001
	10/30/18	0.003	<0.001	<0.001	<0.001	0.003	0.027	<0.001
	04/09/19	0.0011	<0.00050	<0.00050	<0.0030	0.0011	0.040	<0.0010
	08/02/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.018	<0.0010
	11/15/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.019	<0.0010
	03/09/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.031	<0.0010
	05/20/20	0.00070	<0.00050	<0.00050	<0.0030	0.000070	0.029	<0.0010
SSTLS		**0.4206**	**8.748**	**22.64**	**175**	**NSE**	**1.682**	**1.682**
MW-5	02/01/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	08/22/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	10/30/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	04/09/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	08/02/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	11/15/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	03/09/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
SSTLS		**0.3231**	**64.61**	**42.23**	**175**	**NSE**	**1.292**	**1.292**

Table 2: Summary of Groundwater Analtyical Data (BTEX, MTBE, Naphthalene)

Former RaceWay Store No. 808
21403 Highway 231 North
Pell City, Alabama
UST Incident No. UST17-06-01

Analytical Method		EPA Method 8260						
Chemical of Concern		Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
Well ID	Date Collected							
MW-6	02/01/18	<0.001	<0.001	<0.001	<0.001	BDL	0.088	<0.001
	08/22/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	10/30/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	04/09/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	08/02/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0027	<0.0010
	11/15/20	<0.00050	0.020	<0.00050	<0.0030	0.020	<0.00050	<0.0010
	03/09/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
SSTLS		**0.1421**	**28.43**	**19.90**	**175**	**NSE**	**0.5686**	**0.5686**
MW-7	02/01/18	<0.005	<0.005	<0.005	<0.005	BDL	0.965	<0.005
	08/22/18	<0.005	<0.005	<0.005	<0.005	BDL	0.845	<0.005
	10/30/18	<0.005	<0.005	<0.005	<0.005	BDL	**1.35**	<0.005
	04/09/19	<0.0050	<0.0050	<0.0050	<0.030	BDL	**1.3**	<0.010
	08/02/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	**1.5**	<0.0010
	11/15/20	<0.0050	<0.0050	<0.0050	<0.030	BDL	**1.2**	<0.010
	03/09/20	0.0065	<0.005	<0.0050	<0.030	0.0065	**1.5**	<0.010
	05/20/20	<0.0050	<0.0050	<0.0050	<0.030	BDL	**2.0**	<0.010
SSTLS		**0.2502**	**50.05**	**35.03**	**175**	**NSE**	**1.001**	**1.001**
MW-8	02/01/18	0.048	0.208	0.055	0.197	0.508	0.095	<0.025
	08/22/18	**1.20**	0.390	1.05	0.387	3.027	0.322	0.264
	10/30/18	0.08	<0.025	0.116	<0.025	0.196	0.638	0.052
	04/09/19	0.051	<0.0050	0.11	<0.030	0.161	0.56	0.016
	08/02/19	0.028	0.040	0.021	0.045	0.132	0.61	0.0044
	11/15/20	0.026	0.057	0.023	0.097	0.203	0.52	0.013
	03/09/20	0.12	0.0054	0.088	<0.030	0.2134	0.56	0.016
	05/20/20	0.022	0.013	0.0090	<0.030	0.044	1.3	<0.010
SSTLS		**0.4206**	**8.748**	**22.64**	**175**	**NSE**	**1.682**	**1.682**
MW-9	02/01/18	0.259	1.26	0.226	5.74	7.485	0.165	0.153
	08/22/18	0.188	0.306	0.320	1.28	2.094	0.277	0.142
	10/30/18	0.209	0.330	0.206	1.26	2.005	0.531	0.132
	04/09/19	0.26	0.092	0.14	2.7	3.192	0.62	0.28
	08/02/19	0.065	0.034	0.15	0.83	1.079	0.64	0.16
	11/15/20	0.24	0.02	0.093	0.53	0.883	0.68	0.087
	03/09/20	**0.78**	0.14	0.49	4.7	6.11	0.81	0.43
	05/20/20	0.24	0.017	0.15	2.1	2.507	0.71	0.41
SSTLs		**0.4206**	**8.748**	**22.64**	**175**	**NSE**	**1.682**	**1.682**
MW-10	08/28/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	10/30/18	<0.001	<0.001	<0.001	<0.001	BDL	0.002	<0.001
	04/09/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0040	<0.0010
	08/02/19	<0.00050	0.00081	<0.00050	<0.0030	0.00081	0.0043	0.0032
	11/15/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0034	<0.0010
	03/09/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0042	<0.0010
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0041	<0.0010
SSTLs		**0.3637**	**7.565**	**19.85**	**175**	**NSE**	**1.455**	**1.455**
MW-11	04/03/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0042	<0.0010
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0039	<0.0010
SSTLs		**0.3744**	**7.788**	**20.16**	**175**	**NSE**	**1.498**	**1.498**

Table 2: Summary of Groundwater Analtyical Data (BTEX, MTBE, Naphthalene)

Former RaceWay Store No. 808
21403 Highway 231 North
Pell City, Alabama
UST Incident No. UST17-06-01

Analytical Method		EPA Method 8260						
Chemical of Concern		Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
Well ID	Date Collected							
MW-12	04/03/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
SSTLs		**0.0880**	**1.830**	**4.736**	**175**	**NSE**	**0.3518**	**0.3518**
MW-13	04/03/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0085	<0.0010
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0083	<0.0010
SSTLs		**0.0805**	**1.674**	**4.334**	**161.0**	**NSE**	**0.3220**	**0.3220**
MW-14	04/03/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0046	<0.0010
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.0046	<0.0010
SSTLs		**0.0444**	**0.9235**	**2.390**	**88.79**	**NSE**	**0.1776**	**0.1776**
DW-1	02/01/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	08/22/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	10/30/18	<0.001	<0.001	<0.001	<0.001	BDL	<0.001	<0.001
	04/09/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.00070	<0.0010
	08/02/19	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	0.0030
	11/15/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	03/09/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
	05/20/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	<0.00050	<0.0010
SSTLs		**0.4206**	**8.748**	**22.64**	**175**	**NSE**	**1.682**	**1.682**
DUPLICATES								
DUP (MW-9)	04/09/19	0.27	0.093	0.14	2.7	3.203	0.62	0.27
DUP (MW-9)	08/02/19	0.056	0.028	0.11	0.85	1.044	0.70	0.14
DUP (MW-9)	11/15/19	0.25	0.020	0.092	0.56	0.922	0.67	0.082
DUP (MW-9)	03/09/20	0.78	0.14	0.49	4.6	6.01	0.83	0.51
DUP (MW-11)	04/03/20	<0.00050	<0.00050	<0.00050	<0.0030	BDL	0.00	<0.0010
DUP (MW-9)	05/20/20	0.25	0.020	0.17	2.2	2.64	0.75	0.39

NOTES

BDL - Sum of BTEX Constituents Below Laboratory Detection Limits
BTEX - Summary of Benzene, Toluene, Ethylbenzene & Xylenes
Data provided in mg/L
Highlighted data exceeds SSCALs
NSE - No Standard Established
SSTLs - Site Specific Target Levels

APPENDIX A

Figure 3 – Groundwater Elevation Map (May 20, 2020) – (Previous Consultant –PPM)
Figure 3 – Groundwater Elevation Map (March 9, 2020) (Previous Consultant –PPM)
Figure 3 – Groundwater Elevation Map (November 15, 2019) (Previous Consultant –PPM)

N

0 15 30

SCALE: 1"=30'
(Approximate)

MW-6
532.89

TW-1

MW-5
533.87

MW-1
530.31

MW-7
527.75

TW-2

533.00

MW-2
532.43

528.00

FORMER
UST PIT

MW-3
530.12

MW-8
529.63

532.00

529.00

WOODED
AREA

531.00

FORMER
WATER WELL
(ABANDONED)

FORMER
STORE

MW-9
529.55

CANOPY

530.00

MW-4
529.69

DW-1
514.58

MW-10
529.03

HIGHWAY 231

PETROL
WORLD

SHIRLEY'S
BBQ

RESIDENCE

GARAGE

NOTE:
DW-1 DATA NOT USED TO CONTOUR AS IT IS SCREENED AT A DEEPER INTERVAL, AND DATA APPEARS SUSPECT.

LEGEND:

- TYPE II MONITORING WELL LOCATION
- TYPE III MONITORING WELL LOCATION
- TEMPORARY MONITORING WELL LOCATION
- 530.31 — GROUNDWATER ELEVATION (ft.)
- 528.00 — GROUNDWATER ELEVATION CONTOUR (ft.)
- GROUNDWATER FLOW DIRECTION

PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	03/24/20
PROJECT NUMBER:	PHASE:
466159	GWM04

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

GROUNDWATER ELEVATION MAP
(MARCH 9, 2020)

FIGURE NUMBER
3

N

0 15 30

SCALE: 1"=30'
(Approximate)

MW-14
528.46

MW-6
532.95

PETROL
WORLD

529.00

MW-1
530.29

MW-5
533.51

MW-7
528.12

MW-13
529.22

533.00

MW-2
532.65

FORMER
UST PIT

MW-3
529.69

MW-8
529.41

532.00

531.00

530.00

FORMER
STORE

MW-9
528.60

CANOPY

MW-11
529.67

529.00

FORMER
WATER WELL
(ABANDONED)

MW-4
528.88

529.00

HIGHWAY 231

528.00

MW-12
527.59

DW-1
526.71

SHIRLEY'S
BBQ

RESIDENCE

MW-10
528.17

GARAGE

NOTE:
DW-1 DATA NOT USED TO CONTOUR AS IT IS SCREENED AT A DEEPER INTERVAL.

LEGEND:

- TYPE II MONITORING WELL LOCATION
- TYPE III MONITORING WELL LOCATION
- 531.58 GROUNDWATER ELEVATION (ft.)
- 528.00 GROUNDWATER ELEVATION CONTOUR (ft.)
- GROUNDWATER FLOW DIRECTION

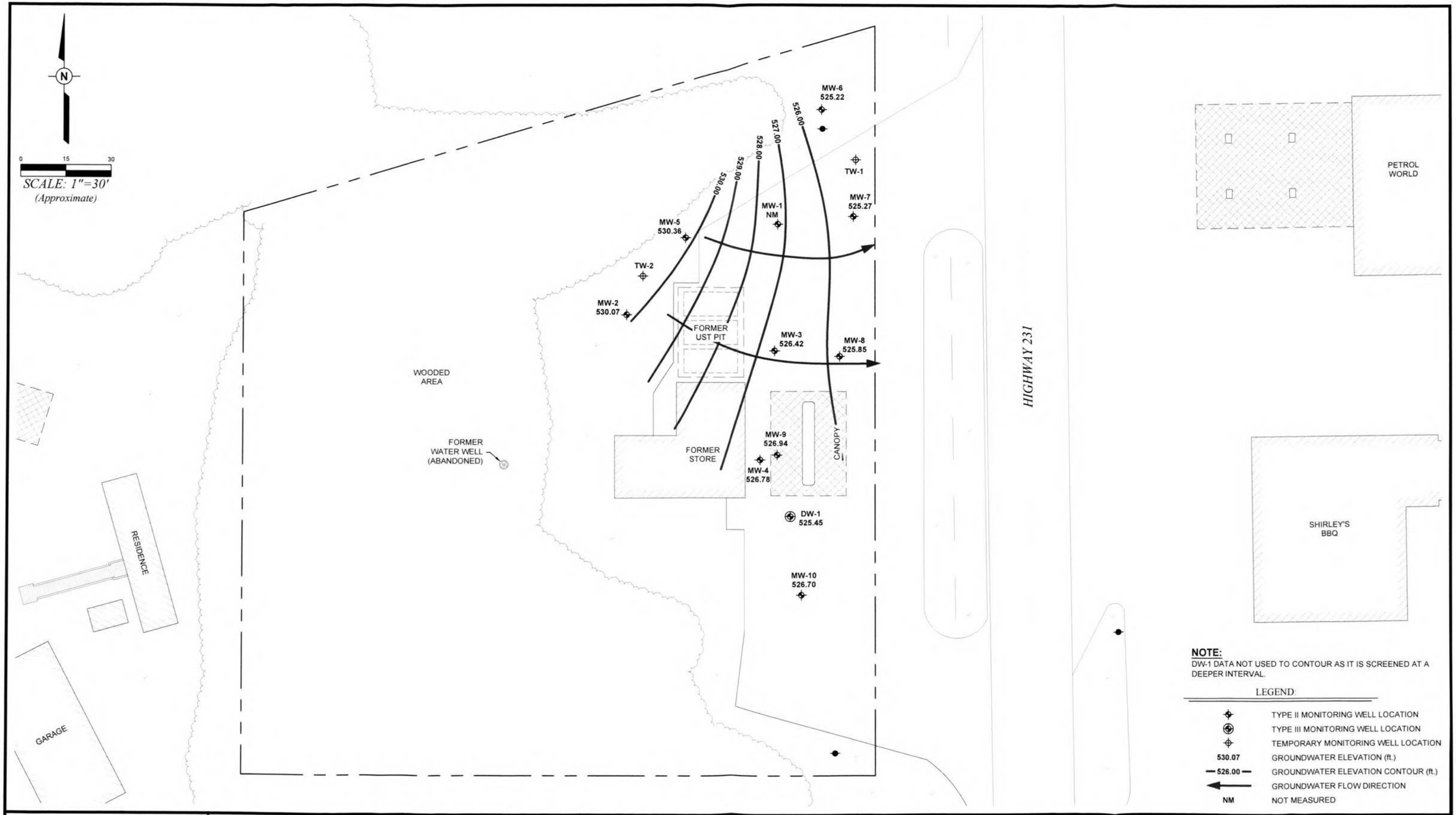
PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	04/13/19
PROJECT NUMBER:	PHASE:
466159	GWM05

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

GROUNDWATER ELEVATION MAP
(MAY 20, 2020)

FIGURE NUMBER
3



PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	11/25/19
PROJECT NUMBER:	PHASE:
466159	GWM03

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

GROUNDWATER ELEVATION MAP
(NOVEMBER 15, 2019)

FIGURE NUMBER
3

APPENDIX B

Figure 4 – Dissolved Benzene Isoconcentration Map (May 20, 2020) (Previous Consultant –PPM)
Figure 4 – Dissolved Benzene Isoconcentration Map (March 9, 2020) (Previous Consultant –PPM)
Figure 4 – Dissolved Benzene Isoconcentration Map (November 15, 2019) (Previous Consultant –PPM)
Figure 5 – Dissolved MTBE Isoconcentration Map (May 20, 2020) (Previous Consultant –PPM)
Figure 5 – Dissolved MTBE Isoconcentration Map (March 9, 2020) (Previous Consultant –PPM)
Figure 5 – Dissolved MTBE Isoconcentration Map (November 15, 2019) (Previous Consultant –PPM)
Figure 6 – Dissolved Naphthalene Isoconcentration Map (May 20, 2020) (Previous Consultant –PPM)
Figure 6 – Dissolved Naphthalene Isoconcentration Map (March 9, 2020) (Previous Consultant –PPM)
Figure 6 – Dissolved Naphthalene Isoconcentration Map (November 15, 2019) (Previous Consultant –PPM)

N

0 15 30

SCALE: 1"=30'
(Approximate)

MW-6
<0.0005

TW-1

MW-1
0.010

MW-7
0.0065

MW-5
<0.0005

TW-2

MW-2
<0.0005

FORMER
UST PIT

MW-3
0.0092

MW-8
0.12

WOODED
AREA

FORMER
WATER WELL
(ABANDONED)

FORMER
STORE

MW-9
0.78

CANOPY

MW-4
<0.0005

0.1

0.005

DW-1
<0.0005

MW-10
<0.0005

HIGHWAY 231

PETROL
WORLD

SHIRLEY'S
BBQ

RESIDENCE

GARAGE

NOTE:
DW-1 DATA NOT USED TO CONTOUR AS IT IS SCREENED AT A DEEPER INTERVAL.

LEGEND:

- TYPE II MONITORING WELL LOCATION
- TYPE III MONITORING WELL LOCATION
- TEMPORARY MONITORING WELL LOCATION
- 0.78 — BENZENE CONCENTRATION (mg/L) (VALUE IN RED EXCEEDS SSCAL)
- 0.005 — BENZENE CONCENTRATION CONTOUR (mg/L)

PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	03/24/20
PROJECT NUMBER:	PHASE:
466159	GWM04

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED BENZENE ISOCONCENTRATION MAP
(MARCH 9, 2020)

FIGURE NUMBER
4

N

0 15 30

SCALE: 1"=30'
(Approximate)

MW-6
<0.00050

MW-1
<0.0050

MW-7
<0.0050

MW-5
<0.00050

MW-2
<0.00050

FORMER
UST PIT

MW-3
<0.0025

MW-8
0.022

0.005

0.10

FORMER
STORE

CANOPY

MW-9
0.24

MW-4
0.00070

DW-1
<0.00050

MW-10
<0.00050

MW-11
<0.00050

HIGHWAY 231

MW-14
<0.00050

PETROL
WORLD

MW-13
<0.00050

MW-12
<0.00050

SHIRLEY'S
BBQ

FORMER
WATER WELL
(ABANDONED)

RESIDENCE

GARAGE

NOTE:
DW-1 DATA NOT USED TO CONTOUR AS IT IS SCREENED AT A DEEPER INTERVAL.

LEGEND:

- TYPE II MONITORING WELL LOCATION
- TYPE III MONITORING WELL LOCATION
- 0.00070 — BENZENE CONCENTRATION (mg/L)
- 0.005 — BENZENE CONCENTRATION CONTOUR (mg/L)

PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	04/13/19
PROJECT NUMBER:	PHASE:
466159	GWM05

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED BENZENE ISOCONCENTRATION MAP
(MAY 20, 2020)

FIGURE NUMBER
4

N

0 15 30

SCALE: 1"=30'
(Approximate)

MW-6
<0.00050

TW-1

MW-1
NS

MW-7
<0.0050

MW-5
<0.00050

TW-2

MW-2
<0.00050

FORMER
UST PIT

MW-3
<0.0025

MW-8
0.026

0.005

0.1

WOODED
AREA

FORMER
WATER WELL
(ABANDONED)

FORMER
STORE

MW-9
0.24

CANOPY

MW-4
<0.00050

DW-1
<0.00050

MW-10
<0.00050

HIGHWAY 231

PETROL
WORLD

SHIRLEY'S
BBQ

RESIDENCE

GARAGE

NOTE:
DW-1 DATA NOT USED TO CONTOUR AS IT IS SCREENED AT A DEEPER INTERVAL.

LEGEND:

⌖	TYPE II MONITORING WELL LOCATION
⊕	TYPE III MONITORING WELL LOCATION
⌖	TEMPORARY MONITORING WELL LOCATION
0.24	BENZENE CONCENTRATION (mg/L)
—0.005—	BENZENE CONCENTRATION CONTOUR (mg/L)
NS	NOT SAMPLED

PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	11/25/19
PROJECT NUMBER:	PHASE:
466159	GWM03

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED BENZENE ISOCONCENTRATION MAP
(NOVEMBER 15, 2019)

FIGURE NUMBER
4

N

0 15 30

SCALE: 1"=30'
(Approximate)

MW-6
<0.0005

0.020

TW-1

0.1

1.0

MW-1
1.4

MW-7
1.5

MW-5
<0.0005

TW-2

MW-2
0.00054

FORMER
UST PIT

MW-3
0.80

MW-8
0.56

WOODED
AREA

FORMER
WATER WELL
(ABANDONED)

FORMER
STORE

MW-9
0.81

CANOPY

MW-4
0.031

DW-1
<0.0005

0.020

MW-10
0.0042

HIGHWAY 231

PETROL
WORLD

SHIRLEY'S
BBQ

RESIDENCE

GARAGE

NOTE:
DW-1 DATA NOT USED TO CONTOUR AS IT IS SCREENED AT A DEEPER INTERVAL.

LEGEND:

- TYPE II MONITORING WELL LOCATION
- TYPE III MONITORING WELL LOCATION
- TEMPORARY MONITORING WELL LOCATION
- 1.4 — MTBE CONCENTRATION (mg/L) (VALUE IN RED EXCEEDS SSCAL)
- 0.020 — MTBE CONCENTRATION CONTOUR (mg/L)

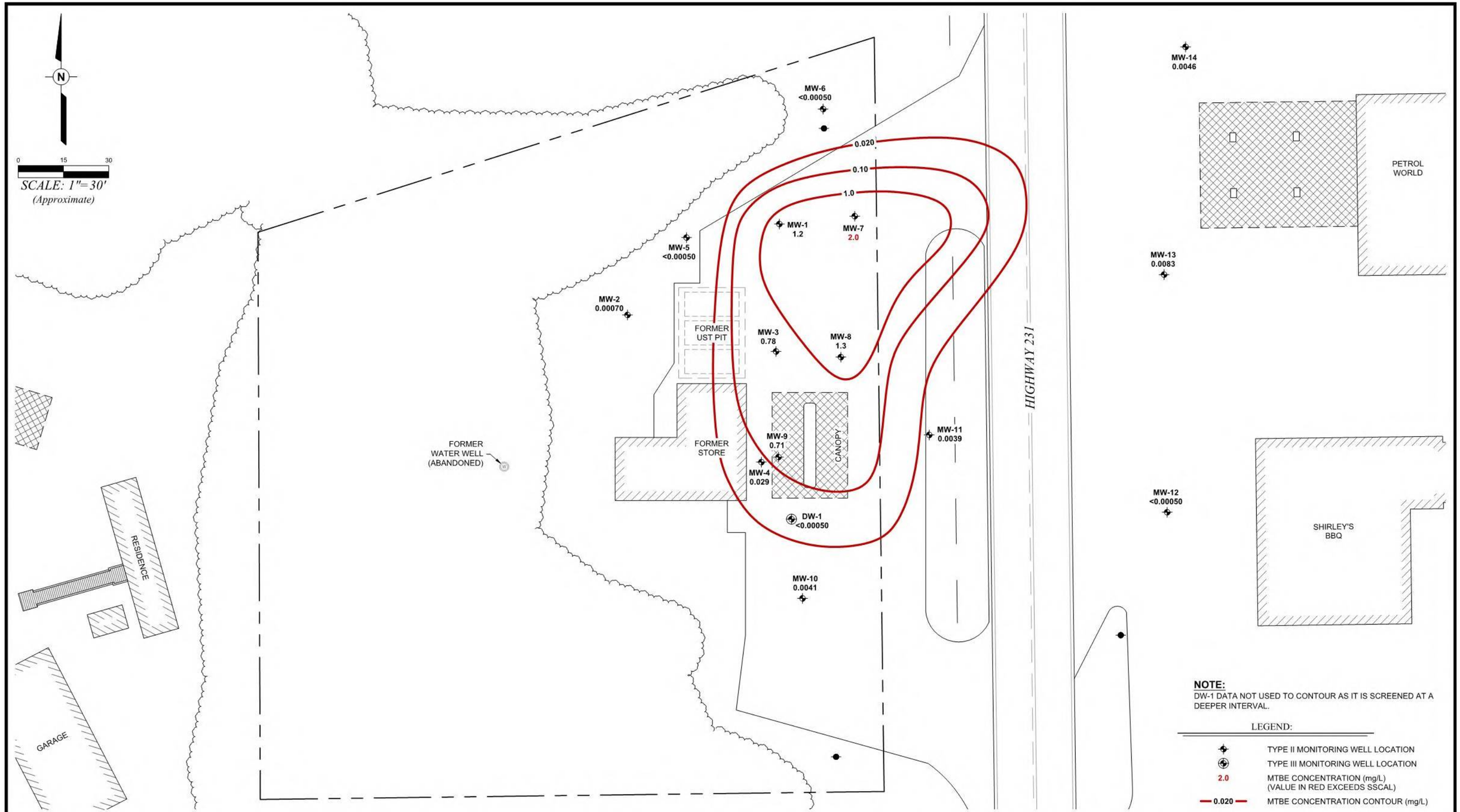
PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	03/24/20
PROJECT NUMBER:	PHASE:
466159	GWM04

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED MTBE ISOCONCENTRATION MAP
(MARCH 9, 2020)

FIGURE NUMBER
5



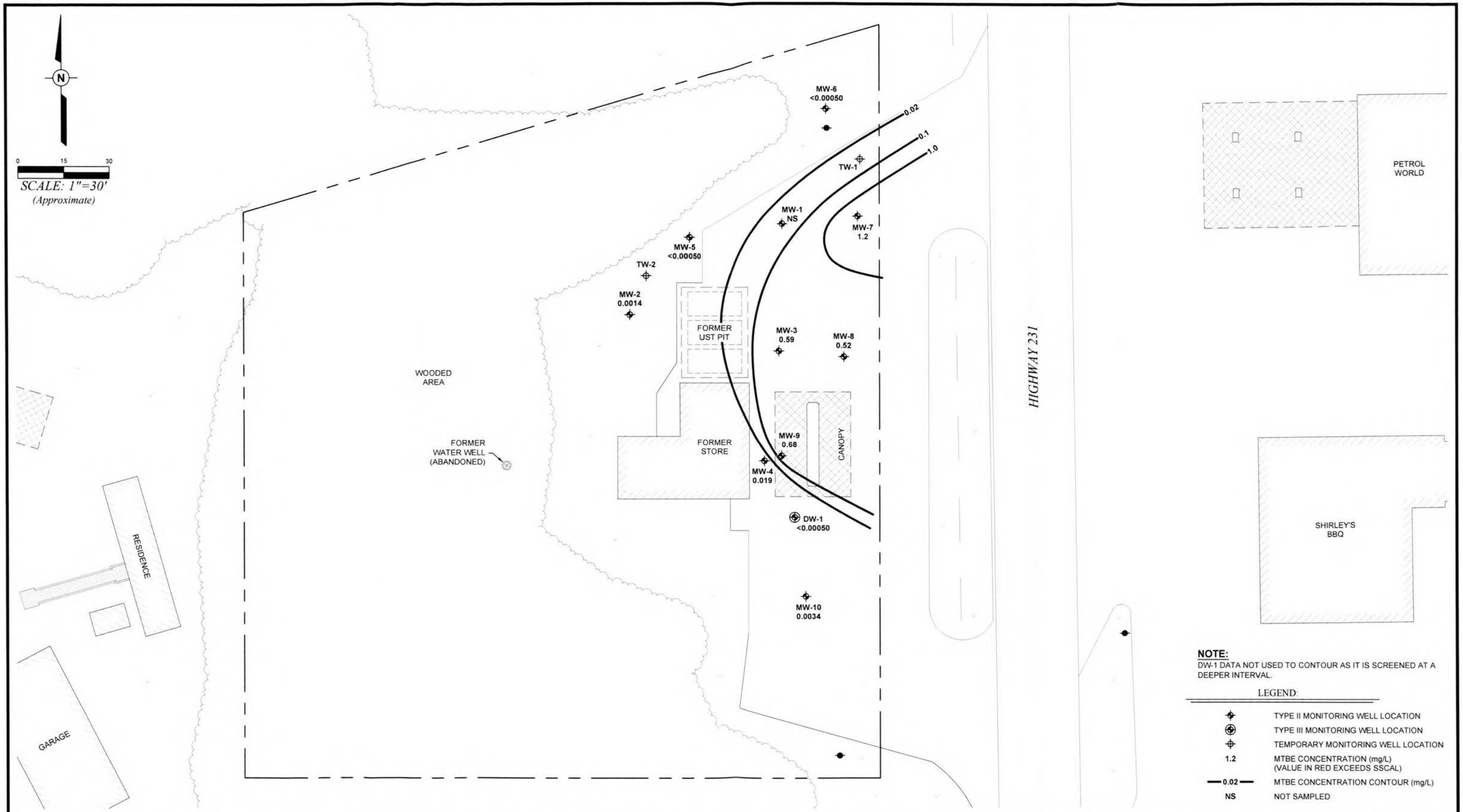
PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	04/13/19
PROJECT NUMBER:	PHASE:
466159	GWM05

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED MTBE ISOCONCENTRATION MAP
(MAY 20, 2020)

FIGURE NUMBER
5



NOTE:
DW-1 DATA NOT USED TO CONTOUR AS IT IS SCREENED AT A DEEPER INTERVAL.

LEGEND:

⌖	TYPE II MONITORING WELL LOCATION
⊕	TYPE III MONITORING WELL LOCATION
⌖	TEMPORARY MONITORING WELL LOCATION
1.2	MTBE CONCENTRATION (mg/L) (VALUE IN RED EXCEEDS SSCAL)
—0.02—	MTBE CONCENTRATION CONTOUR (mg/L)
NS	NOT SAMPLED

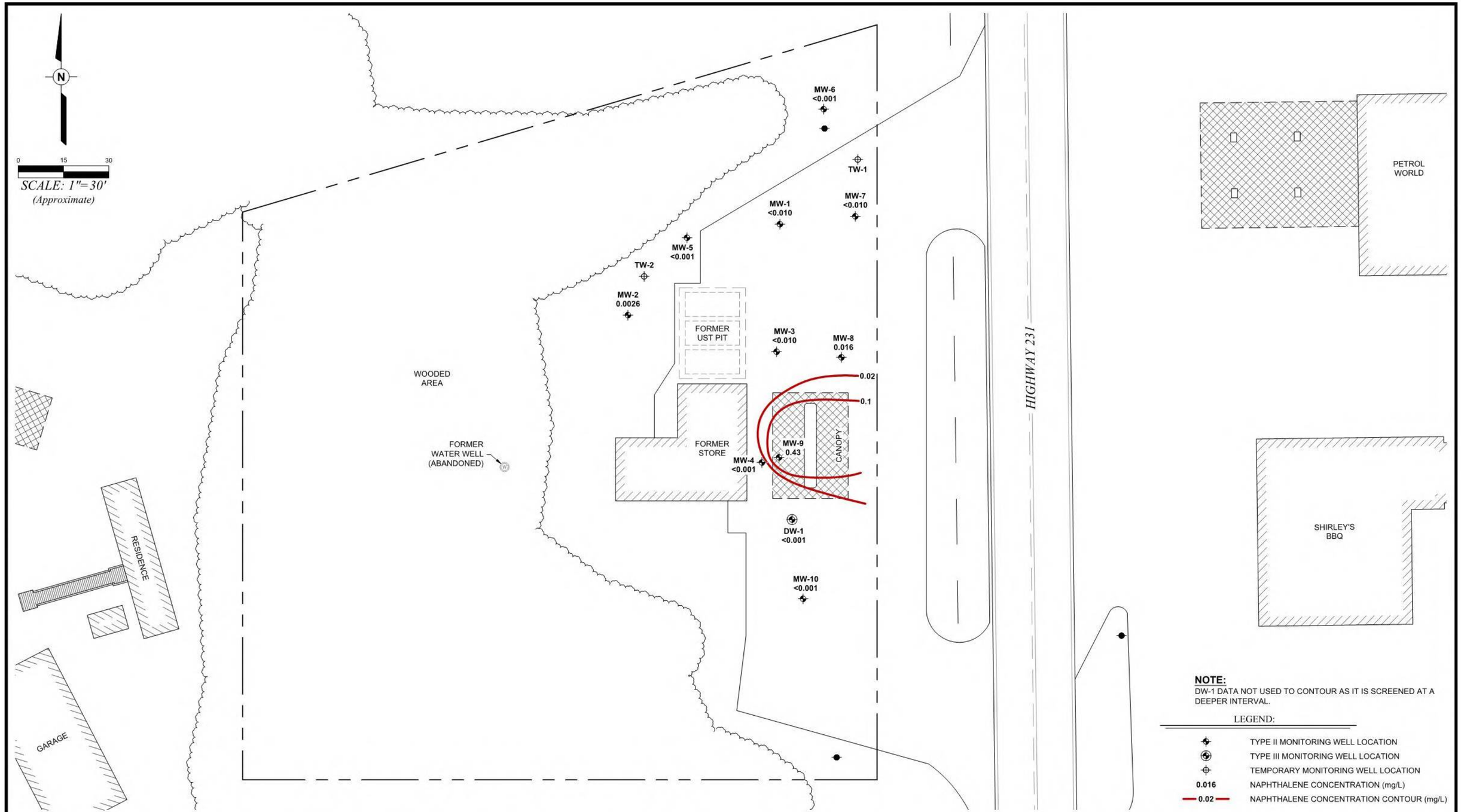
PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	11/25/19
PROJECT NUMBER:	PHASE:
466159	GWM03

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED MTBE ISOCONCENTRATION MAP (NOVEMBER 15, 2019)

FIGURE NUMBER
5



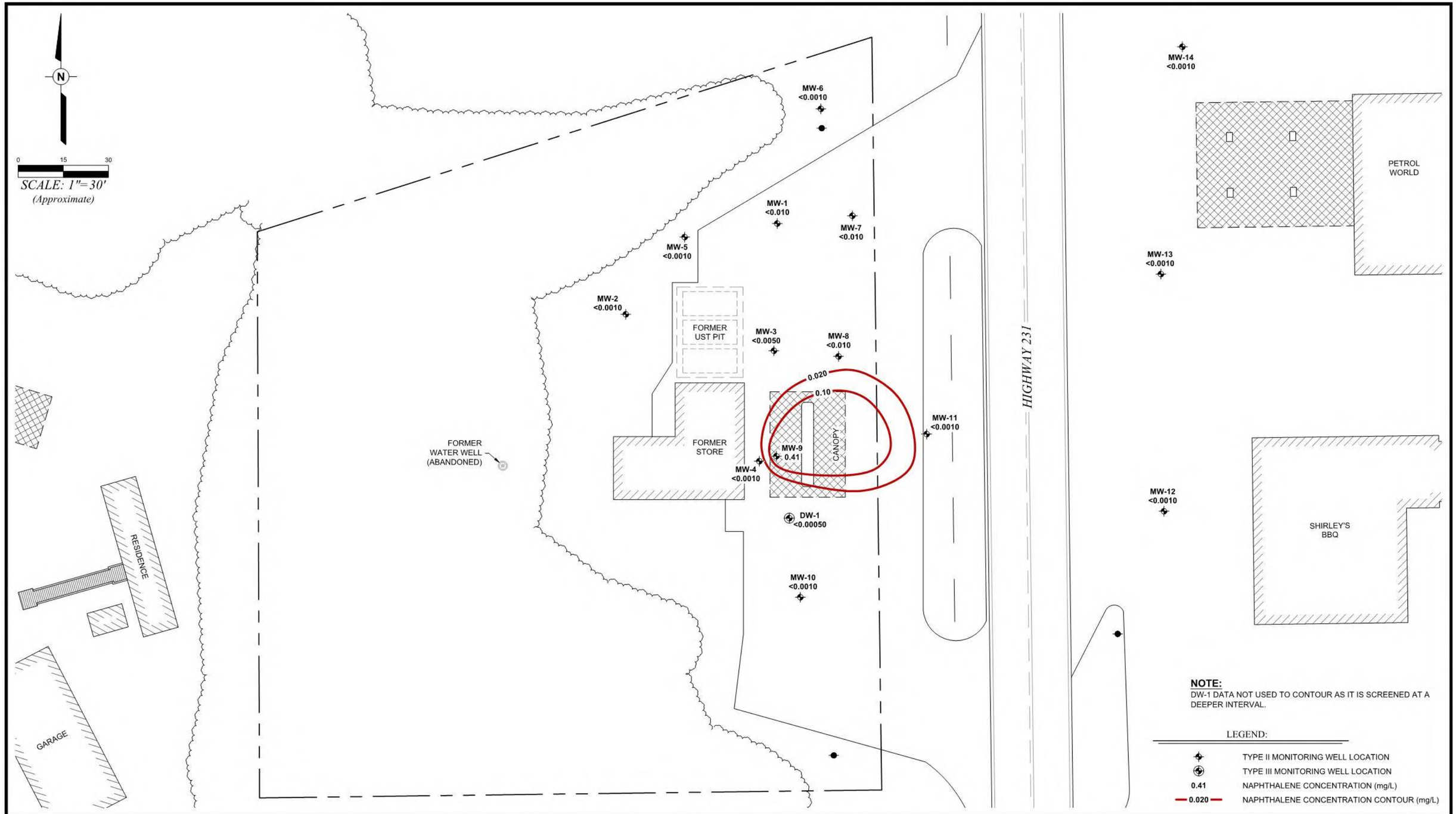
PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	03/24/20
PROJECT NUMBER:	PHASE:
466159	GWM04

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED NAPHTHALENE ISOCONCENTRATION MAP (MARCH 9, 2020)

FIGURE NUMBER
6



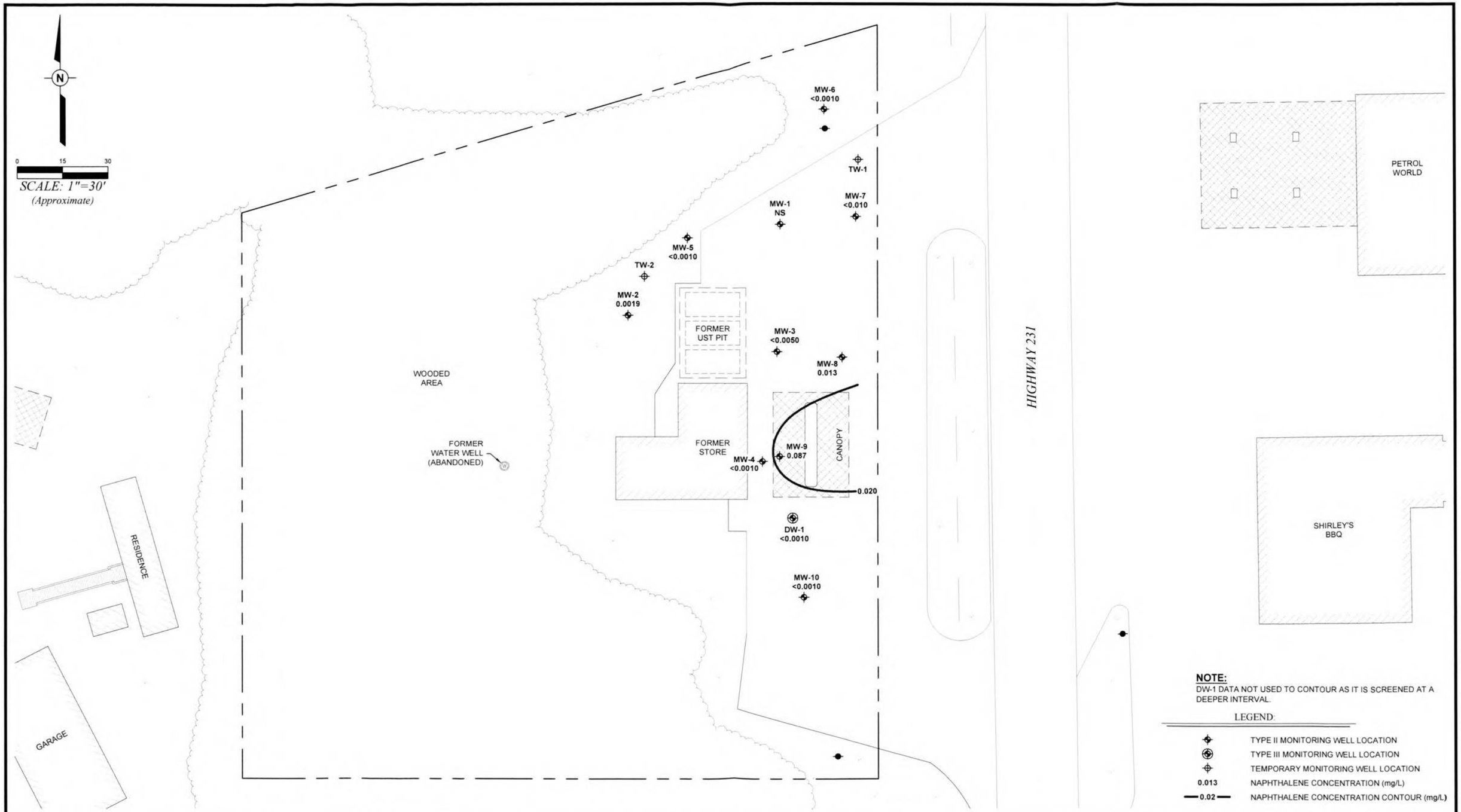
PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
BWH	04/13/19
PROJECT NUMBER:	PHASE:
466159	GWM05

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED NAPHTHALENE ISOCONCENTRATION MAP
(MAY 20, 2020)

FIGURE NUMBER
6



PPM CONSULTANTS, INC. www.ppmco.com	
DRAWN BY: BWH	DRAWN DATE: 11/25/19
PROJECT NUMBER: 466159	PHASE: GWM03

RACETRAC PETROLEUM, INC.
FORMER RACEWAY STORE NO. 808
21403 HIGHWAY 231 NORTH
PELL CITY, ALABAMA

DISSOLVED NAPHTHALENE ISOCONCENTRATION MAP (NOVEMBER 15, 2019)

FIGURE NUMBER
6

APPENDIX C

Health and Safety Plan

HEALTH AND SAFETY PLAN

Prepared By:
ATC
30181 State Highway 59, Ste. 1A
Loxley, Alabama 36551

Prepared For:
RaceTrac Petroleum, Inc.
Former RaceWay Store No. 808
21403 Highway 231 North
Pell City, St. Clair County, Alabama 35131
ATC Project No. RTAL080820

ATC
HEALTH AND SAFETY PLAN (HASP)
REVIEW AND APPROVAL

CLIENT: RaceTrac Petroleum, Inc. PROJECT NUMBER:

SITE NAME: Former RaceWay Store No. 808 SITE LOCATION: Pell City, Alabama

PROJECT DESCRIPTION: Work associated with environmental investigations, including boring and monitoring well installation, soil and ground water sampling, well gauging, free product recovery, and remediation activities.

PREPARED BY: Paul M. Naman TITLE: Project Manager DATE: January 5, 2020

Paul M. Naman		January 5, 2020
Project Manger	Signature	Date
Reviewer's Name	Signature	Date

This Health and Safety Plan (Plan) has been written for the use of ATC and its employees. It may also be used as a guidance document by properly trained and experienced ATC subcontractors. However, ATC does not guarantee the health or safety of any person entering this Site.

Due to the potential hazardous nature of this Site and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards which may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury at this Site. The health and safety guidelines in this Plan were prepared specifically for this Site and should not be used on any other Site without prior research by trained health and safety specialists.

ATC claims no responsibility for use of this Plan by others. The Plan is written for the specific Site conditions, purposes, dates, and personnel specified and must be amended if these conditions change.

TABLE OF CONTENTS

TABLE OF CONTENTS

EMERGENCY INFORMATION

Site Emergencies Call:

Ambulance	**911**
Fire:	**911**
Police:	**911**
Nationwide Call Before You Dig	**811**
CORE Health (24 hour First-Aid)	**(855) 282-6331**
Poison Control Center:	**(800) 222-1222**
National Response Center:	**(800) 424-8802**

Spills:	**Local USEPA Office**	**(800) 241-1754**
	State Health Department	**(800) 252-1818**
	State Environmental Agency	**(334) 271-7700**

Hospital

Fresenius Medical Care at Lanier Memorial Hospital
4800 48th Street
Valley, AL 36854
(334) 756-9180
See map for directions. **Approximate travel time is four minutes.**

EMERGENCY ASSEMBLY LOCATION: Dependent on specific work area, go to designated reporting area.

FIRST-AID MEASURES

In the event that personnel exhibit symptoms of exposure call **CORE Health ((855) 282-6331)** immediately in first-aid assessment process. The following procedures will be used:

Eye Contact: Flush eye immediately with copious amount of water for a minimum of 15 minutes. Repeat until irritation is eliminated and seek medical attention.

Skin Contact: Wash exposed area with soap and water for at least 15 minutes. If dermatitis or severe reddening occurs, seek medical attention.

Inhalation: Move the person into fresh air. If symptoms persist, seek medical attention.
Ingestion: Do not induce vomiting. Seek immediate medical attention.

Important Numbers:

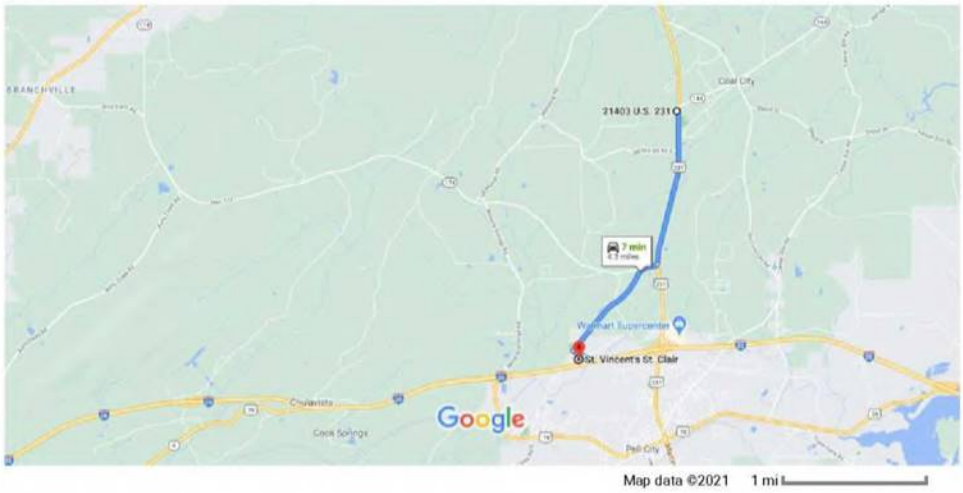
Project Manager: ……..	Paul Naman	(251) 490-0308
Site Safety and Health Officer: ……	ATC Representative	
Site Supervisor: ……...	Paul Naman	(251) 490-0308
Client Contact: ……	Eric Blaylock	(770) 431-7600 ext. 1291
State Utility Locate Service: ……...	Alabama 811	(800) 292-8525

NOTE: For additional emergencies/important contacts, refer to your ATC Lifelines Card.

EMERGENCY MEDICAL ROUTE TO HOSPITAL

21403 Highway 231 North to St. Vincent's St. Clair Hospital

Google Maps 21403 U.S. 231, Ragland, AL to St. Vincent's St. Clair — Drive 4.2 miles, 7 min



21403 US-231
Ragland, AL 35131

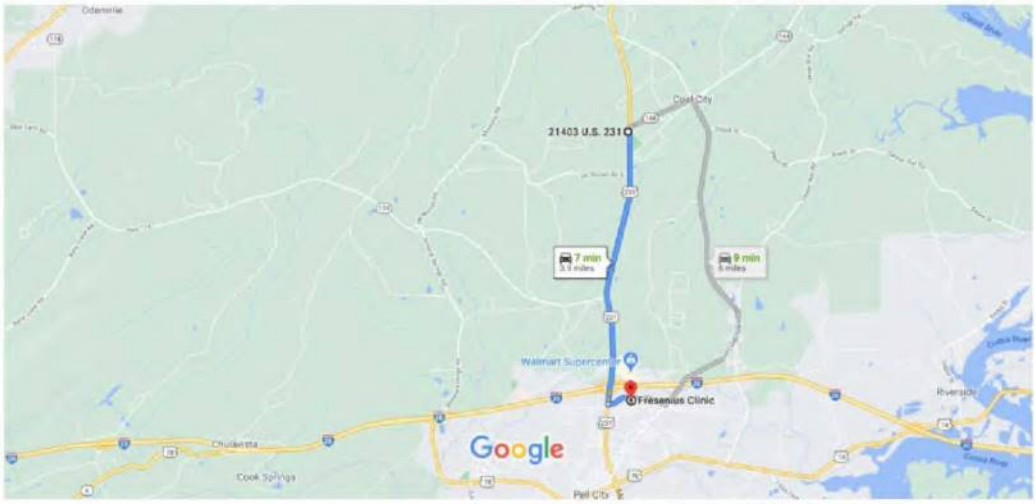
1. Head south on US-231 S toward Oakwood Ln
   Pass by Dollar General (on the right in 0.4 mi)
   2.2 mi
2. Turn right onto Hwy 174 W
   0.2 mi
3. Turn left onto Wolf Creek Rd N
   1.5 mi
4. Turn left onto Veterans Pkwy
   0.2 mi
5. Turn right
   Destination will be on the right
   0.1 mi

St. Vincent's St. Clair
7063 Veterans Pkwy, Pell City, AL 35125

NON-EMERGENCY MEDICAL ROUTE TO CLINIC

21403 Highway 231 North to Fresenius Clinic

Google Maps 21403 U.S. 231, Ragland, AL to Fresenius Clinic — Drive 3.9 miles, 7 min



21403 US-231
Ragland, AL 35131

1. Head south on US-231 S toward Oakwood Ln
   Pass by Dollar General (on the right in 0.4 mi)
   3.6 mi
2. Turn left onto Dr John Haynes Dr
   Destination will be on the right
   0.3 mi

Fresenius Clinic
2804 Dr John Haynes Dr, Pell City, AL 35125

1.0 - INTRODUCTION

1.1 Scope and Applicability of the Site Health and Safety Plan

This Health and Safety Plan (HASP) has been prepared by ATC for the activities associated with the sampling, identification, and possible removal of hazardous materials at the Former RaceWay Store No. 808 in Pell City, St. Clair County, Alabama (Site).

The health and safety protocols established in this Plan are based on the ATC Employee Health and Safety Policy Manual, the Occupational Safety and Health Administration (OSHA) Regulations, past field experiences, specific Site conditions, and chemical hazards known or anticipated to be present from available Site data. The following Site Health and Safety Plan (HASP) is intended solely for use during the proposed activities described in the project documents and technical specifications. Specifications herein are subject to review and revision based on actual conditions encountered in the field during Site characterization activities. Such changes may be instituted by using the HASP List of Approved Amendments and/or Changes (see **Appendix C**).

Before Site operations begin, all employees, including subcontractors for ATC covered by this plan, involved in these operations will have read and understood this HASP and all revisions. All Site personnel have the authority to "Stop Work" if unsafe conditions are present or discovered during Site activities. Before work begins, all affected workers will sign the Heath and Safety Plan Acknowledgment Form (see **Appendix C**). By signing this form, all individuals recognize the requirements of the HASP, known or suspected hazards, and will adhere to the protocols required for the project Site.

1.2 Historical Overview

The Former RaceWay Store No. 808 is currently leased and utilized as a produce stand at 21403 Highway 231 North, Pell City, Alabama. Currently the site building and canopy remain. The site building remains vacant. The UST system, piping and dispensers were removed in 2017. An initial petroleum release was reported at the site in 2017 based on hydrocarbons detected in collected soil samples.

1.3 Visitors

All visitors to the Site must be instructed about the hazards of the activities that ATC or its subcontractors are performing. All visitors must sign the ATC Visitors Log (see **Appendix C**).

1.4 Subcontractor Activities

All subcontractors used at the Site have been Pre-Approved in the ATC Subcontractor Prequalification System.

2.0 - PROJECT ORGANIZATION

All personnel and visitors who may enter work areas on this Site must comply with the requirements of this HASP. All Site personnel have the authority to "Stop Work" if unsafe conditions are present. The specific responsibilities and authority of management, safety and health, and other personnel on this Site are detailed in the following sections.

2.1 Site Safety and Health Officer (SSHO)

The Site Safety and Health Officer (SSHO) has the responsibility and authority to develop and implement this HASP and to verify compliance. The SSHO reports to the Project Manager. The SSHO is on-site during all work operations and has the responsibility to halt Site work if unsafe conditions are detected. The responsibilities of the SSHO at the Site include the following:

- Managing the health and safety functions on the Site;
- Ensuring Site monitoring, worker training, and effective selection and use of PPE;
- Conducting daily Tailgate Safety Meetings for Site personnel and subcontractors and summarize the training on the Tailgate Meeting Form (see **Appendix C**). The following topics should be covered during safety meetings:
  - Hazard Communication (i.e., MSDS location, and container labeling, chemical hazards of non-routine tasks)
  - Determine applicability of Standard Operating Procedures (SOP) in Section 8 and communicate procedures
  - Review Site safety requirements
  - Give refresher training on heat or cold stress (Section 5.2 and 5.3) when appropriate
  - Review Site emergency procedures
  - Discuss location and use of a rig kill switch for drilling/boring operations
- Conducting daily safety inspections of the Site looking for unsafe acts or conditions and providing corrective action as appropriate.

2.2 Site Supervisor

The Site Supervisor is responsible for field operations and reports to the Project Manager. The Site Supervisor is the On-site Coordinator and overseer of operations. It is the Site Supervisor's duty to maintain Site security, supervise the personnel on the Site, coordinate the activities of the subcontractor personnel, and check that the HASP is followed and modified when necessary. The Site Supervisor's specific responsibilities include:

- Executing the work plan and schedule as detailed by the Project Manager
- Coordination with the SSHO on health and safety issues
- Ensuring Site work compliance with the requirements of the HASP
- Before Site activities, contact the hospital emergency room, local fire department, and local police department, as applicable. If outside town, contact county officials and local emergency services.

2.3 Project Manager (PM)

The Project Manager (PM) has the primary responsibility for the fulfillment of the terms of the contract and overseeing operations for the purpose that includes meeting legal and safety requirements. It is the PM's responsibility to keep the project on schedule, within budget, and communicate with the Client regarding the progress toward specified goals.

The PM will inform the Regional Safety Coordinator of all HASP modifications, violations, injuries, exposures, and near-miss situations. The PM responsibilities include:

- Provide personnel time to read and understand the Site Health and Safety Plan (HASP) before fieldwork.
- Conduct project start-up health and safety briefing for: Field personnel, the Site Supervisor, the project team.
- Check that each subcontractor is pre-approved and that each subcontractor's Site workers have appropriate HAZWOPER Training Certificates.
- Check that Site personnel, if required, have received Respiratory Protection Training, Fit testing, and physician's approval to wear a respirator.
- That hazards identified during any Site audits are corrected. If necessary for immediate hazards, shut down field operations if hazards can not be corrected or the hazards present an immediate threat to life and health.

2.4 Regional Safety Coordinator (RSC)

The Regional Safety Coordinator (RSC) is responsible for providing professional health and safety advice and oversight management to the project. The RSC will review and provide support for concerns regarding the health and safety of field personnel assigned to this project, including:

- If requested by the Project Manager, approval of Routine HASP;
- Approval of all Non-Routine HASP;
- Review of incident reports, inspections, and air monitoring results;
- When required, the RSC will conduct a field audit of the Site to evaluate the adequacy of the program and implement the necessary changes through the HASP.

2.5 Project Field Team

The Project Team includes technicians, engineers, scientists, geologists, and possibly subcontractors who perform field activities. Each individual team member will be responsible for understanding and personally complying with the HASP and Site health and safety requirements. Project Team members will report health and safety violations to either the Site Supervisor or the SSHO. Health and safety responsibilities, as discussed in this Plan, which are shared by all Site personnel include:

- Complying with the requirements of the HASP
- Reporting unsafe acts or conditions
- Retain copies at the Site of the following health and safety records:
  - Current HAZWOPER Training Certificate.
  - Respiratory Protection Training Certificate and current fit test record for potential respirator users.
  - Physician's approval for hazardous-waste fieldwork and/or respirator use.
  - First-aid/CPR and bloodborne pathogens training certificate.

3.0 – TASK/OPERATION HEALTH AND SAFETY RISK ANALYSIS SUMMARY

This chapter of the HASP describes the safety and health hazards associated with the Site work and control measures selected to protect workers. The purpose of the Job Safety Analysis (JSA) is to identify the routine safety and health hazards associated with the routine Site tasks and operations. Using this information, appropriate control methods are selected to eliminate the identified risks or effectively control them.

3.1 Job Safety Analysis (JSA)

Each specific JSA appears on a separate copy of the spreadsheets in **Appendix A**. A single JSA may be used for a task/operation performed in multiple locations if the hazards, potential exposures, and controls are the same at each location.

3.2 Health Analysis and Chemical Risk Assessment

Chemicals may be purchased and transported to the Site to support Site characterization and remediation operations. The principal chemical contaminants at the Site are expected to be gasoline (unleaded) and diesel fuel. Appendix B contains information from the National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards about each of these chemicals. Additionally, the Hazard Communication Program (Policy No. 21) requires ATC to provide employees, contractors, subcontractors, and visitors with information on the health effects of these chemicals and necessary actions to protect against exposure. This information is transmitted through Material Safety Data Sheets (MSDS), the NIOSH Pocket Guide, container labels, training, and a written Hazard Communication program.

Site activities will adhere to the ATC Hazard Communication Program as described in the Policy. All Site personnel, including subcontractors, will be briefed on this Program as part of the Site orientation training before starting work. In accordance with this Program, the PM and Site Supervisor will check that each chemical brought to the Site is accompanied by its MSDS. A copy of each MSDS will be made available to each Site employee who may be potentially exposed to the chemical. In addition, the Site Supervisor will check that all subcontractors bring at least one copy of MSDS for each chemical they bring onto the Site. The Site Supervisor will also check that all chemical containers brought to the Site to determine if they are labeled as to its contents and appropriate hazard warnings.

3.3 Risks Associated With Drilling and Subsurface Activities

Drilling operations will conform to the Job Safety Analysis and Subsurface Investigation (ATC Policy No. 33). During drilling operations, the subsurface is penetrated to obtain soil and/or groundwater samples. Contaminated soil cuttings and groundwater may be brought to the surface, creating a potential for exposure through skin contact and inhalation of vapors. The open borehole also creates a conduit for vapors to be released to the atmosphere. However, the amount of vapors released to the atmosphere is relatively small and vapors are usually quickly diluted and dispersed in air. Air monitoring is required to determine if protective equipment is necessary, as described in Section 4.0 of this HASP.

In addition to these chemical risks, the risk of drilling into a buried utility, such as a gas, water, electric line, or underground storage tank or other structures, is always present. Complete the Checklist for Subsurface Clearance prior to any subsurface work (see **Appendix C**) and follow the procedures in Table 3-1 for at least the first 5 feet of penetration:

TABLE 3-1
DRILLING/PROBING PROCEDURES
(First 5 feet below surface)

Step 1 - Site Walk	Conduct Site walk. Verify that the Checklist for Subsurface Clearance has been fully completed.
Step 2 - Locate Markouts	Locate all utility markouts and borehole locations. Start intrusive activities at least five (5) feet away and perpendicular to all marked utility lines.
Step 3 - Break Surface Cover	Use a jackhammer or concrete saw to break through the asphalt or concrete surface cover. The drill bit on the rig may also be used on the asphalt cover. Do **NOT** advance bit or cutting tools beyond the asphalt or concrete cover.
Step 4 - Surface Boring	Use air knife with vacuum extractors, hand auger, or hand shovel to remove soil from the borehole to a depth of at least 5 feet below surface. The soil in the borehole should be excavated to a diameter of at least three inches greater than the diameter of the drill bit on the lead auger or drill stem that is to be used. If it is not possible to perform a surface boring which meets the diameter requirements as stated above, surface borings should be installed to the required depth of 5 feet surrounding the proposed well/boring location in such a manner that any lines/utilities passing through the proposed well/boring location will be encountered while installing the investigation borings/well. If pea gravel, fill material, or refusal is encountered, and was not expected to be encountered, abandon the boring and follow instructions from item #9 of section 5.4.1.
Step 5 - Soil Sampling	If soil samples are required to be collected within the first 5 feet below surface, a hand auger should be utilized to collect native, undisturbed soil samples.
Step 6 - Borehole Protection	If no piping or other structures are encountered within the first 5 feet below surface, normal drill/probe activities may proceed with caution. Containerize drill cuttings as appropriate. If excavation of the borehole is conducted the day before actual drilling is conducted, the borehole should be covered with barricades or cones and with a sheet of material sufficient in strength to support a person's weight until it is ready to be drilled. If the borehole is of sufficient size to potentially cause damage to a vehicle if driven over, the borehole should be covered with a material sufficient in strength to support vehicular weight. In lieu of barricades or cones and a material cover, the boring may be temporarily backfilled to surface. If a backfill material is utilized, it is important for the material to be flush with the surrounding pavement.

Risks of injury associated with the drilling operation itself also exist. The risks of working near overhead electrical lines may also present a safety hazard. The SSHO will check for the presence of overhead lines and other obstructions. No drilling operations will be performed within 10 feet of overhead lines with voltages 0-50 kV. For other voltages refer to ATC Electrical Safety Policy (No. 12) and Equipment (Drill Rigs, Mobile Equipment) Policy (No. 15).

Table 3-2
Minimum Distance from Electrical Lines

Voltage	Required Distance
0-50 KV	10 Feet
50-200 KV	15 Feet
200-350 KV	20 Feet
350-500 KV	25 Feet
500-750 KV	35 Feet
750-1000 KV	45 Feet

Whenever possible, stay at least two feet from turning or rotating machinery. This includes augers, cathead, engine power takeoff, and drill rods. Learn where the rig kill switch is to shut the rig off in case of an emergency. A discussion should be held with the driller on each drill rig at the startup of the field work to discuss the location and use of the kill switch and for documentation of a Safety Inspection such as the Monthly Heavy Equipment Safety Inspection Checklist found in **Appendix C**.

3.4 Noise Hazards and Controls

Exposure to high levels of noise may occur when working near drill rigs or other heavy equipment. Also, depending upon where the work is being performed, local equipment (e.g., airports, factory machines, etc.) may produce high levels of noise. Employees exposed to noise levels in excess of the action level of 85 decibels (A-weighted, Slow Response) will be included into the ATC Policy on Hearing Conservation (Policy No. 34). The SSHO may evaluate employee noise exposures using a Noise Survey Meter or a Noise Dosimeter. The RSC may conduct additional noise monitoring to determine the appropriate response to be taken. Employees will be provided with ear plugs and/or earmuffs when exposed to noise levels in excess of the 8-hour Permissible Exposure Limit (PEL) of 90 decibel (A-weighted, Slow Response). This hearing protection shall have a Noise Reduction Rating (NRR) to protect hearing in accordance with Policy No. 34, including the NRR de-rating factor of [(NRR-7)/2].

3.5 Biological Hazards

Site activities on this Site may expose workers to other hazards such as poisonous plants, insects, animals, and indigenous pathogens. Protective clothing and respiratory protection equipment, and being capable of identifying poisonous plants, animals, and insects, can greatly reduce the chances of exposure. Thoroughly washing any exposed body parts, clothing, and equipment will also protect against infections. If working in wooded/grassy areas, use appropriate insect repellants (containing DEET and/or Permethrin) and apply them per the manufacturers' directions.

4.0 - AIR MONITORING AND PERSONAL PROTECTIVE EQUIPMENT

4.1 Site Air Monitoring Requirements

To prevent exposure to hazardous conditions and aid in the selection of personal protective equipment, monitoring for the presence of airborne contaminants will occur when knowledge of the Site indicates their potential presence. One or more of the following direct-reading instruments may be used to aid in this determination. Photoionization Detectors (PID) and Flame Ionization Detectors (FID) will measure non-specific organic gases and vapors. Combustible Gas Indicators (CGI) will detect explosive atmospheres. Oxygen (O_2) meters will detect fluctuations in oxygen concentrations. These instruments should be calibrated or bump tested daily and whenever the readings may be erratic. All readings should be recorded in the field log books.

Colorimetric detector tubes supplement PID and/or FID readings to measure specific gases and vapors. Other direct-reading instruments are available for use to monitor for the presence of specific airborne Site contaminants.

The breathing zone of the employee(s) anticipated to have the highest potential for exposure for each task will be monitored using an appropriate combination of some or all of these direct-reading instruments. Air monitoring will occur every 15 minutes during non-intrusive activities, or every 5 feet of penetration during intrusive activities. Site tasks and air monitoring requirements are shown in Table 4-1. Additional Site monitoring may occur at the descretion of the SSHO, Site Supervisor, or RSC.

NOTE: All air monitoring equipment must be calibrated as per manufacturer's instructions.

Table 4-1
Site Air Monitoring Requirements

Site Activity	Instrument	Frequency	Location	Caution
Site Excavation or System Construction	PID	Every 30 minutes	In breathing zone of person nearest activity	Communicate with equipment operator before sampling
Drilling and Installing Monitoring Wells	PID	Every 30 minutes	In breathing zone of person nearest activity	Strongest likely concentration when opening cover
Well Sampling—Free Product	PID	Every 30 minutes	In breathing zone of person nearest activity	Strongest likely concentration when opening cover
Well Sampling, System O&M, and Pilot Testing	PID	At least once per site. See air monitoring log for last time sampling was performed. Follow Well Sampling—Free Product Requirements	In breathing zone of person nearest activity	Strongest likely concentration when opening cover

Air monitoring results obtained from the breathing zone during field activities will be recorded in field logbooks and the Air Quality Monitoring Record (see **Appendix C**). All such records will also include the location, date/time, weather conditions, person monitored, background concentration, and identification of specific contaminant whenever possible. Air monitoring information will be utilized to evaluate personnel exposure and assess the appropriateness of PPE for Site conditions. The PPE for the Site are discussed in Section 4.2. Photoionization detector (PID), combustible gas indicator (CGI), and detector tube readings measured in the employees breathing zone will be used to determine the level of protection required. PID readings refer to readings above background, which are sustained for at least 5 minutes and are measured during the performance of field tasks. PID readings are used for general screening.

4.2 Action Levels for Personal Protection Equipment

The first and foremost means of protecting employees from injuries or exposures is to eliminate the exposure. The general hierarchy for controlling potential exposures is: (1) Engineering Controls; (2) Administrative Controls; and (3) the use of PPE. PPE is a means of preventing injury or exposure when exposure elimination and/or other control means are not feasible.

The initial level of protection and the Action Levels at which the PPE will be upgraded are determined based on the identification of specific chemicals expected to be present at a Site and the established OSHA Permissible Exposure Levels (PEL) or ACGIH Threshold Limit Values (TLVs), whichever is lower. In the event more than one chemical is expected or exists at a Site, the most hazardous chemical will dictate the level of personal protection required. Table 4-2 shows the action levels for levels of personal protection equipment.

Table 4-2
Action Levels for Personal Protection Equipment

Monitoring Equipment	Hazard	Action Level Above Background	Action
PID/FID	Organic gas/vapor	< 150 ppm	Level D.
		> 150 ppm	Immediate Withdrawal. Contact the PM and RSC for further instructions to proceed.
Oxygen Concentration Meter	O_2 Concentration	< 19.5 %	Immediate Withdraw. Combustible gas readings are not accurate below this concentration! Notify SSHO.
		19.5 % to 23.5 %	Level D. Check for airborne contaminants. Continue investigation with caution.
		> 23.5 %	Immediate withdrawal. Fire hazard potential. Notify the SSHO and/or the RSC.

Detector tubes to be used are indicated for given ranges based upon the PID readings (Table 4-2). As appropriate, PID readings in conjunction with detector tubes will be utilized during the field activity and location anticipated having the highest level of contamination. This location will be selected by the Site Supervisor. If these measurements indicate exposure levels appropriate for Level D work, the use of detector tubes will be limited to situations where field conditions or activities

have changed. Detector tubes will be available for use at the discretion of the Site Supervisor and the SSHO.

If readings exceed the range for level of protection indicated, personnel should withdraw and not return until an appropriate level of protection has been donned. Upgrading protection shall be communicated to the SSHO, who will in turn convey this information to the RSC. Upon review of PID, CGI, and detector tube measurements, the RSC may further adjust the PPE requirements.

Any upgrading to higher levels of protection may require additional personal sampling using National Institute for Occupational Safety and Health (NIOSH) or Occupational Safety and Health Administration (OSHA) methods for the collection and analysis of airborne contaminants. Air monitoring equipment used on the Site should be calibrated with the following:

Calibration/Response Check

Types	Frequency	Gas Standard
PID	Daily	100 ppm isobutylene in air

Field personnel, in conjunction with the Site Supervisor and SSHO, may choose to allow ventilation of vapors before resuming work (rather than using higher levels of PPE). If ventilation is conducted, additional air monitoring will be performed prior to the resumption of work to determine the level of PPE required.

4.3 Levels of Protection

Levels of protection for Site activities are described on the Site Air Monitoring Summary. The protection levels may include all or some of the following, based on work scope.

Level D:

- Work uniform – Long pants and shirt with sleeves (no tank tops) – refer to Policy No. 25 Personal Protective Equipment (Section 5.5)
- Disposable, inner nitrile gloves
- Chemical-resistant boots with steel toe
- Safety glasses with side shields
- High Visibility Reflective Vest Class 1, Class 2, or Class 3 (select based on Traffic speed)
- Hard hat
- Disposable, chemical-resistant outer boot covers*
- Hearing protection*

LEVEL C:

- Half-face or full-face, air purifying respirator (NIOSH approved)
- Disposable, hooded, chemical-resistant clothing
- Disposable, chemical-resistant outer gloves
- Disposable, inner nitrile gloves
- Chemical-resistant boots with steel toe
- Disposable boot covers
- Hard hat
- Safety Glasses with side shields
- High Visibility Reflective Vest Class 1, Class 2, or Class 3 (select based on Traffic speed)
- Coveralls*

- Hearing protection*

(* Optional Equipment, depending on conditions/exposures)

4.4 Respiratory Protection

Respiratory protection requirements are described in detail in the ATC Respiratory Protection Program. Basic rules of respiratory usage are listed below:

- Facial hair that interferes with a satisfactory fit of the mask-to-face seal is not allowed on personnel required to wear respirators.
- Respirator cartridges should be replaced after approximately 8-hours of continuous or intermittent usage, unless otherwise noted. Cartridges should also be replaced if they become damaged, after the expiration date is exceeded, if vapor smell breakthrough occurs, or if filters become clogged causing resistance to breathing.
- Contact lenses may be worn when respiratory protection is required, in conjunction with additional eye protection to protect against particles or splashes, provided there is no interference with the respirator seal.
- Respirators shall be cleaned and disinfected after each day's use or more often, if necessary.
- Prior to donning, respirators will be inspected for worn or deteriorated parts. Emergency respirators or self-contained devices will be inspected at least once a month and after each use.
- After donning, personnel should perform a positive and negative user fit-check to determine if a good seal has been achieved.
- Each employee shall make sure that they have an annual respirator fit test and respiratory protection training.

5.0 - HEALTH SURVEILLANCE PROGRAM

5.1 Employee Medical Examinations

All employees involved in work at the Site will participate in ATC's Medical Surveillance Program administered by Health Resources. Additionally, when respirators are required (as determined by the SSHO and project manager), each employee will also have current respirator clearance.

A post project, follow-up exam may be required if an exposure incident is reported or an employee shows specific symptoms associated with the known or suspected hazardous chemicals. The RSC and the Project Manager will determine when post project exams are required.

5.2 Heat Stress Program

This procedure applies to all employees when heat stress conditions exist at project sites.

5.2.1 Training

The SSHO will have received acceptable training in first-aid and Cardiopulmonary Resuscitation (CPR), including training in heat-related illnesses. The SSHO shall also be trained on the requirements of the ATC Policy for Industrial Hygiene (Policy No. 23), which contains the requirement for Heat Stress monitoring. All workers should be capable of recognizing and treating the signs and symptoms of heat stress conditions. During potential heat stress conditions, ice should be readily available to rapidly cool victims.

5.2.2 Fluid Replacement

Water will be made available at the Site for employee fluid replacement. When heat stress is determined to be a problem by the SSHO, employees will be provided with balanced, electrolyte solutions to replace fluid and electrolyte loss. Employees will be provided with replacement fluids at a minimum rate of 8 ounces every 15 to 20 minutes per person.

5.2.3 Acclimatization

Acclimatization is a gradual physiological adaptation that improves an individual's ability to tolerate heat stress. Full-heat acclimatization requires up to 3 weeks of continued physical activity under heat-stress conditions similar to those anticipated for the work. Its loss begins when the work activity in the heat stress conditions is discontinued. A noticeable loss usually occurs within 3 – 4 days.

5.2.4 Rest Breaks

When heat stress conditions are applicable, all rest breaks should be taken out of the zone of exclusion into a cooler, shaded, rest area. If these conditions are not available, more frequent rest breaks will be taken.

5.2.5 Heat Stress Monitoring

Heat Stress and heat strain are conditions resulting from environmental factors including temperature, relative humidity, radiant heat transfer, and air movement, as they are affected by clothing. The primary objective of the heat stress management program is to prevent heat stroke which is life threatening and the most serious of the heat-induced disabilities. Extra caution should be taken for workers who are not acclimated to working in the heat.

The following Heat Stress Index (refer to ATC Policy No. 23) should be used as a guide to evaluate heat stress situations. If the Heat Stress exceeds 105° F, contact the RSC prior to work for detailed guidance.

Heat Stress Index

Temp. °F	Relative Humidity								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
105	98	104	110	120	132				
102	97	101	108	117	125				
100	95	99	105	110	120	132			
98	93	97	101	106	110	125			
96	91	95	98	104	108	120	128		
94	89	93	95	100	105	111	122		
92	87	90	92	96	100	106	114	122	
90	85	88	90	92	96	100	106	114	122
88	82	86	87	89	93	95	100	106	115
86	80	84	85	87	90	92	96	100	109
84	78	81	83	85	86	89	91	95	99
82	77	79	80	81	84	86	89	91	95
80	75	77	78	79	81	83	85	86	89
78	72	75	77	78	79	80	81	83	85
76	70	72	75	76	77	77	77	78	79
74	68	70	73	74	75	75	75	76	77

NOTES: Add 10° F when protective clothing is being used; Add 10° F when in direct sunlight

HSI Temp	Category	Injury Threat
Above 130° F	Extreme Danger	No work unless emergency exists. Contact ATC RSC and Corporate Risk Management Department prior to proceeding. Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity.
105° to 130° F	Danger	Contact RSC prior to proceeding. Requires strict adherence to ACGIH Heat Stress Guidelines, including use of on-site WBGT equipment. Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity.
90° to 105° F	Extreme Caution	Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity.
80° to 90° F	Caution	Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity.
Below 80° F	Normal Range	Typical conditions for time of year. Little or no danger under normal circumstances. As always, anticipate problems and work safely.

5.3 Cold Stress Program

This procedure applies to all employees who perform field work in cold environments at risk of cold stress injury and intended to protect workers from the most severe effects of cold stress.

5.3.1 Training

ATC Site employees have been trained in cold stress as part of their HAZWOPER 40-hour initial training. Site workers will receive refresher training by the SSHO in cold stress safety and health procedures. The training program will include, as a minimum, instruction in the following areas:

- Proper first-aid treatment
- Proper clothing practices
- Proper eating and drinking habits
- Recognition of impending frostbite
- Recognition of the signs and symptoms of impending hypothermia or excessive cooling of the body when shivering does not occur
- Safe working practices

The SSHO will be trained in first-aid, CPR, and cold stress conditions.

5.3.2 Environmental Monitoring

Frostbite and hypothermia are two types of cold injury that personnel must be protected against during the performance of field duties. The objective is to prevent the deep body temperature from falling below
96.8° F and to prevent cold injury to body extremities. Two factors influence the development of a cold injury the ambient temperature, and wind velocity.

The SSHO will monitor environmental conditions by recording ambient temperature and estimated wind-speed. Information contained in Tables 5-1 and 5-2 will be used to evaluate the possibility of hypothermia among workers on-site.

5.3.3 Protective Clothing and Rest Breaks

Use appropriate cold weather clothing when temperatures are at or below 40°F as exposed skin surfaces must be protected. These protective items can include facemask, hand wear, and foot wear. Workers handling evaporative solvents during cold stress conditions will take special precautions to avoid soaking gloves and clothing because of the added danger of prolonged skin contact and evaporative cooling. Personnel will wear protective clothing appropriate for the level of cold and planned physical activity. The objective is to protect all parts of the body, with emphasis on the hands and feet. Eye protection against glare and ultraviolet light should be worn in snowy and icy conditions.

The work rate should not be so great as to cause heavy sweating that could result in wet clothing. If heavy work must be done, opportunities for rest breaks will be provided where workers have the opportunity to change into dry clothing. Conversely, plan work activities to minimize time spent sitting or standing still. Rest breaks should be taken in a warm, dry area. Windbreaks can also be used to shield the work area from the cooling effects of wind.

5.3.4 Identification and Treatment of Cold Stress

When frostbite, hypothermia, or other cold stress symptoms are suspected, treat the patient to relieve symptoms or transport them to the medical facility identified on page TC-4.

TABLE 5-1
Threshold Limit Values Work/Warm-up Schedule for Four-Hour Shift*

Air-Temperature--Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F (approx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm. Breaks) 1		(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4	30 min	5
-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease	
-38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	
-43° & below	-45° & below	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	

*1. Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up periods of ten. (10) Minutes in a warm location and with an extended break (e.g., lunch) at the end of the 4-hour work period in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule on step lower. For example, at -35°C (-30°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).

2. The following is suggested as a guide for estimating wind velocity if accurate information is not available: 5 mph: light flag moves; 10 mph: light flag fully extended: 15 mph: raises a newspaper sheet: 20 mph: blowing and drifting snow.

3. If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be 1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 watts per square meter (W/m^2); 2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m^2. In general, the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly overcompensates for the actual temperatures in the cooler ranges because windy conditions rarely prevail at extremely low temperatures.

4. TLVs apply only for workers in dry clothing.

* Adapted from Occupational Health & Safety Division, Saskatchewan Department of Labor.

TABLE 5-2
Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (mph)	Actual Temperature Reading (degrees F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent chill Temperature (degrees F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds > 40 mph have little additional effect)	LITTLE DANGER If < hr with dry skin. Maximum danger of false sense of security				INCREASING DANGER Danger from freezing of exposed flesh within one minute.			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trench foot and immersion foot may occur at any point on this chart.											

* Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA

6.0 - SITE SECURITY AND CONTROL

6.1 Work Zones

Restricted Site areas will include, but not necessarily be limited to, the following zones:

- **Exclusion Zone or Hot Zone** - any area where contamination is either known or likely to be present in concentrations that could pose a threat to human health and safety or that potential for harm to personnel exists because of the type of work activities being conducted. Appropriate PPE and warning signs should be utilized in this area.
- **Contamination Reduction Zone** - any area where workers conduct personal and equipment decontamination.
- **Support Zone** - areas where access is controlled, but the chance to encounter hazardous materials or conditions are minimal.

Access to the work zones will be controlled by work zone delineators (e.g. traffic cones, flags, vehicles, DOT approved devices, temporary or permanent fencing, and/or safety barrier tape). Figure 6-1 is an example of a work zone. Additionally ATC employees should follow the requirements of the Employee Health and Safety Policy Manual, Policy No. 36, Work Zones in Traffic Areas for additional information.

In the event on-site personnel must upgrade their personal protective equipment, the work zones may require substantial modification in order to provide for the safety of nearby personnel not associated with this work. Any upgrade level will be communicated by the Site Supervisor to the PM. The PM will then inform the RSC of this occurrence.

6.2 Buddy System

The Buddy System will be used at all times by field personnel in the Exclusion Zones. The Buddy System means that personnel work in pairs and stay in close visual contact to be able to observe one another and summon rapid assistance in case of emergency. No one is to perform fieldwork alone without the approval of the Branch Safety Officer and/or the Regional Safety Officer.

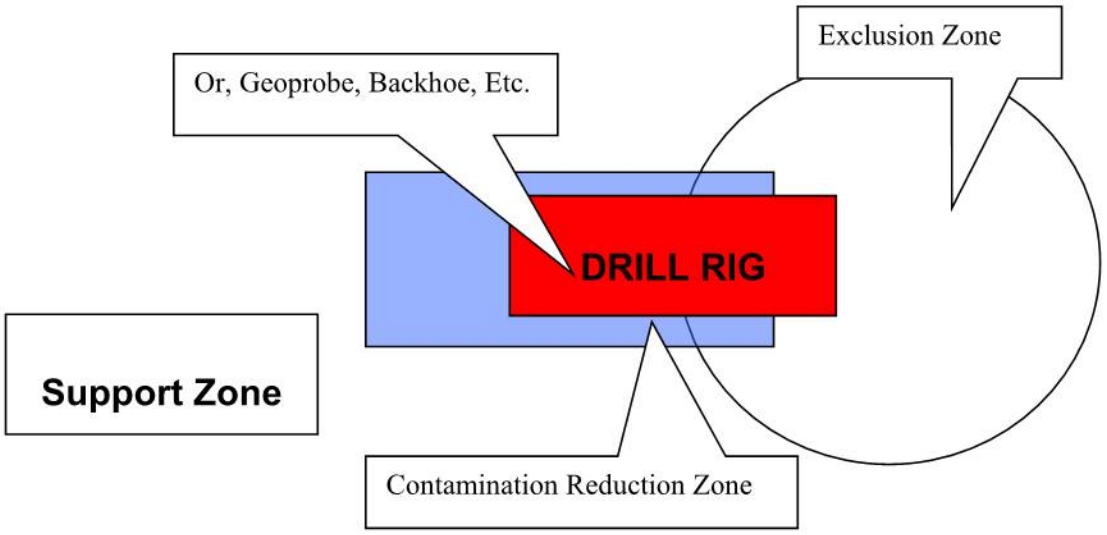
6.3 Site Communication

A loud and clear form of communication should be made available for Site personnel entering the work zones. Site communication may be in the form of hand signals, voice, or other communication devices. All forms of communication should be understood by all workers on the Site prior to starting work.

6.4 Roadway Work Zones

When ATC employee and subcontractors are required to perform Site operation in a city street or public right-of-way, a Traffic Control Plan may be required and included with this HASP. Check with the State or local government Department of Transportation for when a traffic control plan is required. Traffic Control Plans will include Transition Areas, Activity Areas, and Termination Areas.

FIGURE 6-1
TYPICAL EXCLUSION ZONE



7.0 - DECONTAMINATION PROCEDURES

7.1 Personnel Decontamination

All personnel must complete appropriate decontamination procedures in a way that is responsive to actual Site conditions before leaving the Site. The decontamination of personnel and equipment will be performed within the exclusion and contamination reduction zones. Wash tubs containing an appropriate decon solution and soft bristle brushes will be used to decontaminate personal protective clothing and boots. Deionized water will be used for the final rinse. The SSHO will visually inspect all PPE and other equipment once decontamination procedures are completed. In general, the four types of decontamination solutions to be considered for PPE include:

- Water for removal of low-molecular weight hydrocarbons, inorganic compounds, salts, some organic acids, and other polar compounds.
- Dilute acids (vinegar) for removal of basic (caustic) compounds, amines, and hydrazines.
- Dilute bases (soaps and detergents) for removal of acidic compounds, phenols, thiols, and some nitro and sulfonic compounds.
- Organic solvents for removal of nonpolar compounds (organic).

LEVEL D/LEVEL C

- Establish a segregated equipment drop
- Remove disposable, outer boot covers, if applicable
- Remove chemical resistant, outer gloves, if applicable
- Remove hard hat and goggles, safety glasses, or face shield
- Remove disposable, inner gloves
- Remove full-face air purifying respirator (Level C only)

Each individual will be responsible for inspecting and decontaminating their own respirator in accordance with the ATC Respiratory Protection Program (Policy No. 27).

At a minimum the hands and face of each employee must be thoroughly washed upon leaving the work area. Trash receptacles will be provided for all disposable clothing. Commercial laundries or cleaning establishments that decontaminate clothing or equipment will be informed of the potentially harmful effects of exposure.

Decontamination Solution: _____

STATION #1: _____

Equipment Required: _____

_____

STATION #2: _____

Equipment Required: _____

_____

STATION #3: _____

Equipment Required: _____

_____

STATION #4: _____

Equipment Required: _____

7.2 Equipment Decontamination

The subcontractor will decontaminate field equipment according to the work plan. This may include manual removal of gross contamination with shovels or other tools, followed by a high-pressure, hot water sprayer. Because decontamination at the high-pressure, hot water station poses the possibility of a splash and/or mist inhalation hazard, the task should be performed using Level D personal protective equipment at a minimum.

Field tool including split-barrel soil samplers, brass liners, and sample knives and trowels will be decontaminated. The field tools may be scrubbed visually clean using a detergent solution (Alconox/Liquinox) with water and a stiff, long-bristled scrub brush. Following the solution scrubbing, the tools may be rinsed with distilled water or isopropyl alcohol.

Equipment Decontamination

Gross Removal By:

X	Hand Scrubbing
	Cold High Pressure Wash
	Hot High Pressure Wash
X	Steam Cleaning
	Other (specify) _____
X	Clean Rinse
X	Decon solution (specify) Dilute Liquinox

7.3 Disposition of Decontamination Wastes

All materials and equipment used for decontamination should be disposed of in accordance with local, State, and/or Federal Regulations. Clothing, tools, buckets, brushes, and all other equipment that is contaminated must be properly packaged and stored on the Site until disposal arrangements are finalized. Clothing not completely decontaminated on-site should be secured in plastic bags before being removed from the Site.

Decontamination Waste Water

Collection (specify how): Containerize in drum.

Direct Discharge (specify how and where): NA

Pre-Treatment (specify): NA

Disposal (specify how and where): NA

8.0 - STANDARD OPERATING PROCEDURES

The following Standard Operating Procedures (SOPs) will be applied to each location and activity where work is performed on a hazardous chemical site. As hazards increase or decrease on the Site, the applicability of each SOP must be determined by the SSHO with the approval of any changes by the Project Manager or the RSC.

8.1 Personnel Precautions

1. Eating, drinking, chewing gum or tobacco, smoking, and any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the exclusion and contamination reduction zone or in any area known to be contaminated.

2. When decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

3. Contact with contaminated or suspected contaminated surfaces should be avoided. When possible, do not walk through puddles, leachate, or discolored surfaces; kneel on the ground; or lean, sit, or place equipment on drums, containers, or the ground.

4. Medicines and alcohol can increase the effects from exposure to toxic chemicals. Personnel should not take prescribed drugs at hazardous waste operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage intake should be minimized or avoided.

5. All personnel must be familiar with Standard Operating Procedures and any additional instructions and information contained in this HASP. All visitors and subcontractors will read the HASP before entering the Site.

6. All personnel will be aware of symptoms for heat or cold stress.

7. All personnel will be familiar with the chemicals used on-site and the associated hazards as described in each respective MSDS. The MSDS for the chemicals on-site will be available and located in the company vehicle.

8.2 Operations

1. All personnel going to the Site must be adequately trained and thoroughly briefed on anticipated hazards, equipment, safety practices, emergency procedures, and communications.

2. Personnel on the Site must use the Buddy System when engaged in Level C work as specified in ATC Policy No. 35 (Hazwoper). The purpose of the Buddy System is to provide rapid assistance to employees in the event of an emergency.

3. Visual contact must be maintained between pairs of Site and safety personnel. Entry team members should remain close to assist each other during emergencies.

4. Personnel should practice unfamiliar operations before the actual procedure.

5. Entrance and exit locations must be designated, and emergency escape routes delineated. Warning signals for Site evacuation must be established by the SSHO before field activities.

6. Communications using radios, hand signals, or other means, must be maintained between initial entry members at all times. Emergency communications should be prearranged in case of radio failure, the necessity for evacuating the Site, or other reasons.

7. Wind indicators visible to all personnel should be strategically located throughout the Site.

8. Personnel and equipment in the contaminated area should be minimized, consistent with effective Site operations.

9. Work areas for various operational activities will be established.

10. Procedures for leaving a contaminated area will be planned and implemented before going to the Site. Work areas and decontamination procedures will be established based on expected Site conditions.

11. Frequent and regular inspections of Site operations will be conducted by the SSHO to check compliance with this HASP. If changes in operation occur, the HASP must be modified to reflect these changes.

12. All electrical equipment (power tools, extension cords, instruments, radios, etc.) will conform with ATC Policy No. 12 (Electrical) The SSHO will ensure that electrical equipment is free from recognized hazards that may cause physical harm to employees.

13. Fire prevention and protection (appropriate signs for flammable liquids, smoking areas, storage areas of combustible or flammable materials, etc.) will be according to ATC Policy No. 18, Fire Protection.

14. Site Tailgate Safety Meetings will be held daily to discuss anticipated Site conditions and daily activities. This meeting will be summarized in field logbooks and the Tailgate Safety Meeting Form (see **Appendix C**).

9.0 - CONTINGENCY PLAN

This chapter of the HASP describes potential emergencies at this Site and the procedures for responding to those emergencies.

9.1 Medical Emergencies

1. The name, address, telephone number, travel distance, and travel time to the nearest medical treatment facility are found in the Emergency Information section (see Page TC-4) of this HASP. A map and direction for locating the facility is available in the Emergency Information section (see Page TC-6) of this HASP.

2. Emergency routes will be verified and driven before any Site activities. It may be quicker to transport a person with minor injuries than to wait for Emergency Medical Services (EMS) to respond. Check with the local authorities for response times. Life threatening emergency situations will only be handled by emergency medical services.

3. Before mobilization on-site, the Site Supervisor will contact the local hospital emergency room personnel, local fire department, and local police department to brief them regarding the scope and hazards associated with the scheduled fieldwork. If the Site is outside an established town, contact will be made with county officials and local emergency services.

4. An emergency first-aid kit with contents per ATC Policy No. 20 (First-Aid) will be readily available on the Site, and personnel will have first-aid training. The first-aid kit also contains equipment necessary to protect first-aid providers against exposure to bloodborne pathogens. All first-aid providers will have received Bloodborne Pathogens training and can receive Hepatitis B vaccinations according to the ATC Policy No. 09 (Bloodborne Pathogens) if exposed to bodily fluids.

5. Any person who becomes ill or injured in the exclusion zone must be decontaminated as well as possible with consideration to which risk will be greater, the spread of contamination or the health of the individual. If the injury or illness is minor, full decontamination (remove contaminated clothing and wash hands and face with soap and water, See Section 7.0) should be completed and first-aid administered before transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket). First-aid should be administered while awaiting an ambulance or paramedics.

6. The following steps should be followed if an injury or illness case occurs:

    - Check the Scene.
    - If safe to do so, check the condition of the injured.
    - Call 911 if the victim is unconscious or your training dictates to do so.
    - Care for the injured. Always use “Universal Precautions”.
    - Call **CORE Health (855) 282-6331**, if the injury is non-life threatening. CORE Health will assist you with the location of the nearest clinic, if referral is needed.

7. Provisions must be made to identify the substance to which the worker has been exposed. This information must be given to medical personnel.

9.2 Emergency Equipment

1. A personal eyewash unit that meets ANSI Z358.1-1998, Section 6 will be available in each ATC field vehicle at the Site if corrosive chemicals (chemicals with a pH of <3 or >11) will be on-site.

2. An emergency first-aid kit with contents as per ATC Policy No. 20 (First-Aid). The Site Supervisor shall be trained and certified in first-aid and CPR.

3. An emergency spill cleanup kit will be available at the Site at all times. Unplanned releases will be reported to the SSHO and/or Site Supervisor as soon as possible.

4. Sufficient water and/or multipurpose dry chemical (Class A, B, and C) fire extinguishers, rated not less than 2A:10B:C, will be maintained on the Site to cope with any situation until emergency services arrive.

9.3 Flammable Conditions

In the event that combustible vapors exceed 10 percent of the LEL or strong odors are detected in the borehole, the following actions should be taken:

- Continue investigation using extreme caution. Personal protective equipment may need to be upgraded.
- Allow vapors to dissipate or use intrinsically-safe mechanical ventilation.
- If atmospheric conditions do not change, call in the listed sequence:
  - —Project Manager
  - —Regional Safety Coordinator
  - —Fire Department
- Provide answering personnel with the call back numbers, locations, directions, and situation assessment.

9.4 Site Evacuation Conditions

The following conditions will necessitate the cessation of field work in the area of concern, withdrawal from the work area, and revisions to this HASP:

- Fires and/or explosions
- Unexploded ordnance is detected
- A major incident or injury occurs
- Flammable atmosphere readings above 10 percent LEL
- Oxygen readings above 23.5 percent oxygen concentration
- Oxygen readings at or below 19.5 percent oxygen concentration
- PID readings over 50 ppm sustained for more than 5 minutes
- Detector tube readings over the maximum Action Level for the contaminant specified

9.5 Emergency Communication System

Emergency contacts and telephone numbers are provided at the beginning of this HASP. Field crews will have some communication device at each active work location. These may include radios, mobile telephones, or walkie-talkies. Such communication devices will have sufficient range to contact the field office and/or emergency services. If an emergency occurs on-site, the Site Supervisor is responsible for checking that appropriate emergency contact has been notified. At the time of the emergency response, the Site Supervisor or designee will brief the emergency personnel on the status of the emergency, including Site conditions.

Field personnel will use hand signals if there are noisy working conditions on the Site. The hand signals that will be used are shown below and will be reviewed by the SSHO during the on-site safety briefing.

Signal	Meaning
Hands on top of head	Need assistance
Grip partner's wrist or place both hands around partner's arm	Leave area immediately
Thumbs up	OK; I am all right
Thumbs down	No; Negative
Hand gripping throat	Cannot breathe; Out of air

9.6 Emergency Response Follow-Up

If there is an incident, near-miss, or emergency response, the SSHO will notify the Project Manager and Regional Safety Coordinator. The Project Manager or the Branch Safety Officer will complete a Supervisor's Investigation Report (SIR) (Policy No. 51; Appendix 51-1) and submit to the appropriate Regional distribution list. Prior to resuming work, a Site safety meeting should be held to discuss the circumstances surrounding the incident and what should be done to prevent a re-occurrence.

9.7 Non-Emergency Clinic Information

The address and driving directions to the closest non-emergency care facility is included on page 2-4.

9.8 Spill Containment and Response

In order to help prevent spills, hydraulic lines, gas cans, and other potential sources will be inspected prior to commencement of work each day and logged using appropriate heavy equipment inspection log. Any items identified as potentially damaged or worn will be replaced or repaired prior to use.

In the event of a spill or leak from storage containers or from equipment (such as leaking hydraulic lines) during field operations in the work zone, the following actions are to be taken:

- *Identify if spill is manageable (can it be safely stopped/contained, is there a risk of fire/explosion, is there immediate danger to health/safety of personnel*)
- *Shut off all sources of ignition (drill rig, generators, etc.) and position one crew member near fire protection equipment (i.e. fire extinguisher)*
- *Contact Client site manager immediately with type of incident and approximate size/type of spill*

- *Contain and remove affected material IF SAFE TO DO SO (sorbent material and spark-proof shovels)*
- *Determine what (if any) further action is required*
- *Complete incident report within 8 working hours*

In the event of a LARGE spill which endangers personnel or a facility emergency unrelated to ATC project work:

- *Shut off all sources of ignition immediately and evacuate to the designated evacuation zone or safe zone*
- *Contact Client site manager, who will then make appropriate intercompany contacts for emergency response*
- *Follow instructions from Client site manager*
- *Complete incident report within 8 working hours (may require additional follow-up)*

10.0 - EMPLOYEE TRAINING

10.1 Pre-Assignment and Annual Refresher Training

All ATC Employees and Subcontractors will participate in routine health and safety education and training programs. These programs are designed to provide employees with a thorough knowledge of hazardous materials, health and safety hazard potential, and Federal Occupational Safety and Health Administration (OSHA) requirements published in 29 Code of Federal Regulations (CFR) Part 1910. According to 29 CFR 1910.120(e), Site employees will have received 40 hours of initial Hazardous Waste Operations & Emergency Response (HAZWOPER) instruction and 24 hours of supervised field experience. Attending an annual 8-hour HAZWOPER refresher training session maintains this initial training. It is the responsibility of the Project Manager and each subcontractor's supervising manager to determine if the subcontractor staff meets these training requirements.

10.2 Site Supervisor's Training

On-site Managers and Supervisors on hazardous waste sites who are directly responsible for or who supervise workers engaged in hazardous wastes operations receive, in addition to the initial 40 HAZWOPER training, 8 additional hours of specialized supervisory training in compliance with the OSHA regulations. This training includes training on the employer's safety and health program and the associated employee training program, personal protective equipment program, spill containment program, and health hazards monitoring procedure and techniques.

10.3 Site Safety Training and Briefing Topics

The SSHO will conduct Site-specific health and safety briefing for field personnel before the start of all field work. Briefing attendees will include the Site Supervisor, the Project Team, and Subcontractor personnel. At the conclusion of the meeting, personnel are to sign the HASP Agreement and Acknowledgement Form in the Appendices. As additional people are assigned to the Site, it is the responsibility of the SHSO to ensure that new personnel are briefed on health and safety protocols and ensure that they have reviewed and signed the HASP Agreement and Acknowledgement Form. Items to be covered include:

- Site-specific health and safety rules
- Client-specific health and safety rules
- Health effects of various chemicals used on the Site
- Emergency response actions pertaining to operations on-Site

Additionally, daily Site Tailgate Safety Meetings will be conducted to review past activities, plan ahead for new or changed operations, to understand any near-miss and "lessons learned, establish safe working procedures for anticipated hazards, and provide pertinent safety and health training and motivation. The SSHO will complete the Tailgate Safety Meeting Form located in the Appendices.

10.4 Visitors

All visitors entering the designated work zones will be subject to all applicable health and safety requirements during field operations at the Site. All visitors to a work Site will be given the opportunity to review the HASP, will be escorted at all times, and will be required to stay a safe distance from Site activities. The Site Supervisor and/or the SSHO will be responsible for briefing all visitors on the Site hazards, Site safety precautions, and the Site emergency response plan.

APPENDIX A
Job Safety Analysis (JSA)

APPENDIX B
Chemical Hazard Information

APPENDIX C
Site Map
List of Approved Amendments/changes
HASP Acknowledgement/Agreement Form
Visitors Log
Tailgate Safety Meeting Form
Air Quality Monitoring Record
Equipment Calibration Log
Checklist for Subsurface Investigation
Monthly Heavy Equipment Safety Inspection Checklist

HEALTH AND SAFETY PLAN (HASP)
List of Approved Amendments/Changes

Date	Name	Signature	Changes/Comments	Section Added

HEALTH AND SAFETY PLAN (HASP)
Acknowledgement/Agreement Form

(All ATC, Subcontractor & Client Personnel Must Sign)

Client Site Name: _____ Project Site No. _____

ATC Project No. _____ Task No. _____

I acknowledge I have reviewed a copy of the Health and Safety Plan for this project, understand it, and agree to comply with all of its provisions. I also understand I could be prohibited by the Site Health and Safety Coordinator or other ATC personnel from working on this project for not complying with any aspect of this Health and Safety Plan:

PRINT NAME	SIGNATURE	COMPANY	DATE

HEALTH AND SAFETY PLAN (HASP)
Visitors Log

Client Site Name: _____ Project Site No. _____

ATC Project No. _____ Task No. _____

PRINT NAME	SIGNATURE	COMPANY	DATE

HEALTH AND SAFETY PLAN (HASP)
Tailgate Safety Meeting Form

Site Name & Number: _____

ATC Project Number: _____

Work Being Performed: _____

Date & Time of Meeting: _____

Name of Presenter: _____

NOTE: On the initial day of the project, the Project Manager or designee should conduct a visual inspection of the project site (using the Site Safety Checklist) prior to the Tailgate Safety Meeting. This inspection should include a review of project site equipment, hazards, and specific job tasks, activities or operations to be performed for that day. These specific items must be covered during the Tailgate Safety Meeting. For subsequent days, any changes to the site or operations must be covered in the Tailgate Safety Meeting. In addition, "Task-Specific" Job Safety Analysis (JSA) for the tasks/activities at the project site must be integrated into the HASP and Tailgate discussions.

Itemize the Specific Topics Discussed (if more space is needed use the back of this page):

❑ Are all employees okay? ❑ Are all employees physically able to perform their job duties? ❑ "Shared Learning" items?
❑ Has PPE been checked? ❑Emergency evacuation area identified? ❑ Asked for Sub interactions or questions?

❑ **Client Requirements** - By checking the box to the left, the Presenter of the Tailgate Meeting acknowledges that all Client-specific requirements have been completed for both ATC and Subcontractor employees.

Participants (if needed, list additional participants on back of this page):

Print Name	Signature	Company	Date

A Tailgate Safety Meeting must be conducted and documented at the beginning of each workday when two or more ATC employees and/or Subcontractor representatives are present on site. Employees, client representatives and subcontractors who arrive at the site after the Tailgate Safety Meeting has been conducted must be briefed on the topics and acknowledge by signing

this form. The JSA must be completed at the beginning of each day when one or more ATC employees and/or subcontractor representatives are present on a site.

HEALTH AND SAFETY PLAN (HASP)
Air Quality Monitoring Record

DATE	TIME	LOCATION	INSTRUMENT	CONCENTRATION (UNITS)	SAMPLED BY

HEALTH AND SAFETY PLAN (HASP)
Equipment Calibration Log

DATE	INSTRUMENT/ MODEL NO.	ZERO ADJUST OK?	CALIBRATION GAS (PPM)	READING (PPM)	LEAK CHECK	PERFORMED BY	COMMENTS

CHECKLIST FOR SUBSURFACE CLEARANCE

MUST be filled out PRIOR to the Start of Field Activities
NO subsurface work in road Right of Ways or Off-Site (property boundary) without Written Authorization

Site Name: _____

Site Address: _____

Project No.: _____

To understand and use this checklist correctly you must refer to and follow the ATC Subsurface Investigation Procedures.

	Person Verifying Each Item to Place Initials On Lines Below and Sign Bottom of Page	Comments
PRE-DRILLING PREPARATION		
Review definition of "Critical" and "Non-Critical" areas.		
Request as-built drawings, and/or approval to use private utility locator service and/or air knife to locate/protect subsurface utilities.		
Obtain Site access agreement.		
Pre-plan boring locations.		
Establish surface boring method.		If not using Air Knife-type technology, why?
Obtain permits and clearances.		
Do borehole and utility markouts.		
Establish Site-specific Health and Safety Plan		
Notify Client, owner, operator prior to mobilization.		
ON-SITE PROCEDURES		
Conduct tailgate safety meeting with topics as indicated in procedure.		
Read and follow Drilling/Probing procedures		
--1. Do Site walk and verify that utility location checklist is complete.		
--2. Locate all markouts and planned borehole locations. Start intrusive procedures at least 5 feet away from and perpendicular to utility markouts.		
--3. Break surface cover.		
--4. Do surface boring to required depth using hand auger, post-hole digger, shovel or "air knife".		
--5. If necessary, use alternate procedure for surface boring.		
--6. Collect soil samples by hand augering to required depth.		
--7. Protect the borehole from pedestrian and vehicular traffic.		

*Buried utilities can be found at any depth, but are most often found within the first 5 feet below the ground surface. Proceed slowly and with extra caution when working within 5 feet of the ground surface.
NOTES:

_____

SIGNATURE DATE

MUST be filled out PRIOR to the Start of Field Activities

NO subsurface work in road Right of Ways or Off-Site (property boundary) without Written Authorization

Site Address: _____ **If Present --**

_____

Site Safety Documents (on-site during activities)	**"Yes or No" Fill Out, as applicable**	
Utility Staking Request Form (properly completed for current scope of work)?	**Yes** **No**	Ticket # and Expir. Date: # / /
Site Health and Safety Plan?	**Yes** **No**	Hospital Location Map Available **Yes** **No**

Utility Identification "color" Above Ground (AG) / Buried (B)			**Identify on a Site Map the Location of ALL Lines & Meters (or actual utility) and Indicate Nearest Building Quadrant (NE, SE, SW, or NW)**
Natural Gas (Yellow) / Staked?	AG / B	**Yes** **No**	NW NE SE SW
Electrical (Red) / Staked?	AG / B	**Yes** **No**	NW NE SE SW
Telephone/Fiber Optic (Orange) / Staked?	AG / B	**Yes** **No**	NW NE SE SW
Cable TV (Orange) / Staked?	AG / B	**Yes** **No**	NW NE SE SW
Water (Blue) / Staked?	AG / B	**Yes** **No**	NW NE SE SW
Sewer (Green) / Staked?	AG / B	**Yes** **No**	SW

Significant Site Features		**Site Feature Located in Closest Property Quadrant (NE, SE, SW, or NW). Also Identify on Site Map.**
UST system (UST cavity, dispenser islands, piping runs, vent pipes etc.)?	**Yes** **No**	
Above Ground Storage Tanks – ASTs (dispenser islands, piping runs)?	**Yes** **No**	
Electrical Transformers?	**Yes** **No**	
Area Lighting (Pole mounted lighting, etc.)?	**Yes** **No**	
Signage with electrical power (Business/Company signs, etc.)?	**Yes** **No**	
Underground lawn/landscaping sprinkler system?	**Yes** **No**	
Storm drain catch basins / man-ways and potential connecting conduits/lines?	**Yes** **No**	

Other		**"Other" Concerns Located in Closest Property Quadrant (NE, SE, SW, or NW). Identify on Site Map.**
Pavement distress (Cracked pavement, "buckled" asphalt, etc.)?	**Yes** **No**	

*Buried utilities can be found at any depth, but are most often found within the first 5 feet below the ground surface. Proceed slowly and with extra caution when working within 5 feet of the ground surface.

NOTES:

SIGNATURE _____ DATE

Monthly Mobile/Heavy Equipment Safety Inspection Checklist

This form is to be completed by the qualified operator of the equipment

Date:		Project No.:		Site/Location:	
Equipment Type:		Model No.:		Odometer:	
Operator/Inspector Name:				Machine Hours:	

Warning: Do not operate a malfunctioning machine until corrective measures have been taken and all discrepancies have been cleared by a qualified operator/mechanic. In addition to elements on this checklist, the owner's manual for the specific piece of equipment being operated may contain other daily inspection checks and/or preventative maintenance procedures.

General Safety	☐ Operator Qualification	☐ PPE Supplies	☐ Fire Extinguisher (ready-to-use)
	☐ Owner's Manual (present)	☐ DriverCheck (decal in place)	☐ First-Aid Kit (present & stocked)
	☐ Manufacturer Specs Followed	☐ Access Ladder (secure and ok)	☐ Housekeeping (clean)
	☐ Emergency Kit (signs, flares)	☐ Flashlight	☐ Markers (cones, barricades, etc.)
Vehicle, Engine, and Hydraulic Systems (note any added fluid)	☐ Engine Oil (fluid level, condition)	☐ Fuel Level	☐ Other Fluid
	☐ Transmission (fluid level, fluid condition, unit operation)	☐ Brake Fluid	☐ Steering (power steering fluid level, no play in steering)
	☐ Radiator (coolant level, hose condition)	☐ Fan Belts (tension/condition)	☐ Brakes (vehicle, parking)
	☐ Hydraulic System (fluid level, fluid condition, hose condition, cylinders, leakage)	☐ Chassis (proper lubrication)	☐ Tires (condition, inflation)
	☐ Outriggers (operational, if equipped)	☐	☐
Tracked Vehicles	☐ Track Tension (proper tension)	☐ Plates and/or Shoes	☐ Grouser Plates
	☐ Rollers	☐ Drive Sprockets	
Lights and alarms (clean and functional)	☐ Headlights (hi, low, run beams)	☐ Parking Lights	☐ Revolving Flashing Lights (if required)
	☐ Reverse Lights (backup)	☐ Equipment Work Lights	☐ Horn
	☐ Brake/Tail Lights	☐ Turn Signals/Hazard Flashers	☐ Reverse Alarms (backup)
Vehicle cab (clean and functional)	☐ Seatbelts (if required)	☐ Windshield Wipers	☐ Body Damage
	☐ Housekeeping	☐ 2 Way Communication	☐ Speed/Hour Meter
	☐ Fuel Gauge	☐ Horn (operational)	☐ Windshield (glass ok, clean)
	☐ Controls Operational	☐ Mirrors (rear view, side)	

Maintenance/ Equipment Request	Corrected By:	Date:

Inspectors Signature:		
		Date

APPENDIX D
Excavating & Trenching

All ATC employees and subcontractors shall be trained and be familiar with the OSHA Excavation Standard and the ATC Employee Health and Safety Policy Manual, Policy No. 16 (Excavation and Trenching) and Policy No. 33 (Subsurface Investigation).

1.0 UNDERGROUND UTILITIES

Prior to any work beginning, the estimated location of utility installations (such as sewer, telephone, fuel, electric, water lines, or any other underground installation) that reasonably may be expected to be encountered during excavation work must be determined prior to opening an excavation. Utility companies or owners shall be contacted and advised of the proposed work and asked to establish the location of the utility underground installations. When utility companies or owners cannot respond to a request to locate underground utilities within 24-48 hours (unless a longer period is required by State or local law), or cannot establish the exact location of these installations, the work may proceed, provided that the work is conducted with caution, and provided detection equipment or other acceptable means to located utilities are used.

When excavation operations approach the estimated location of underground installations (approximately 18 inches from the installation), the exact location of the installations shall be determined by a safe and acceptable means. While the excavation is open, underground installations shall be protected, supported, or removed to safeguard employees.

2.0 ENTERING EXCAVATIONS OR TRENCHES

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a "*Competent Person"* for evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the Competent Person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. All inspections made by the Competent Person should be recorded in the field log book.

No person(s) shall perform work in a trench or excavation that contains accumulated water.

2.1.1 Access/Egress

A stairway, ladder, ramp, or other safe means of egress shall be located in trench excavations that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel distance in any direction.

2.1.2 Exposure to Falling Loads

No employee or subcontractor is permitted underneath loads handled by lifting or digging equipment. All personnel shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by spilling or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the equipment is provided with a cab shield and/or canopy adequate to protect the operator from falling materials.

2.1.3 Warning Systems

When mobile equipment is operated adjacent to an excavation and the operators/drivers do not have a clear and direct view of the edge of the excavation, a warning system such as barricades, hand or mechanical signals, or stop logs are required.

APPENDIX D
Excavating & Trenching

2.1.4 Protection from Loose Rock or Soil

Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard to personnel in the excavation. All temporary spoil piles shall be kept at least 2 feet away from the edge of the excavation. Spoil piles should be placed to channel rainwater or other run-off water away from the excavation.

2.1.5 Hazardous Atmospheres

All excavations deeper than 4 feet deep and which have the potential to have a hazardous atmosphere or oxygen deficient atmospheres (Less than 19.5% oxygen) must be tested to ensure safe working conditions, prior to entry. Air monitoring shall be conducted in accordance with Section 4.0 of the HASP.

2.1.6 Protective Systems

Each employee in an excavation shall be protected from cave-ins by an adequate protective system except when excavations are made entirely in stable rock or the excavation is less than 5 feet in depth and examination by the Competent Person provides no indication of a potential cave-in. Protective systems consist of sloping or benching, use of trench boxes or other shielding mechanisms, or the use of a shoring system in accordance with the regulations.

APPENDIX E
Lockout/Tagout Requirements & Procedures

1.0 DEFINITIONS

1. Lockout – Involves using a device such as a padlock, blank pipe flange, chain key block, etc. to isolate energy from employee exposure.
2. Tagout – Involves applying a tag to the energy isolating device with written information concerning the date and name of person who applied the lock and tag.

2.0 LOCKOUT/TAGOUT POLICY

This procedure establishes the minimum requirements for lockout/tagout of electrical energy sources, mechanical, hydraulic, pneumatic, thermal or chemical process energy. It is to be used to ensure that conductors and circuit parts are disconnected from sources of electrical energy, locked (tagged), and tested before work begins where employees or subcontractor could be exposed to dangerous conditions. Sources of stored energy, such as capacitors or springs, shall be relieved of their energy, and a mechanism shall be engaged to prevent the re-accumulation of energy.

Lockout/tagout procedures shall be used prior to performing tie-in operations, maintenance, repair or adjustment of any device where exposure to hazardous energy sources may occur.

3.0 RESPONSIBILITY

All effected employees and subcontractors shall be instructed in the safety significance of the lockout/tagout procedure. All new or transferred employees and all other persons whose work operations are or might be in the area shall be instructed in the purpose and use of this procedure. The ATC Project Manager shall ensure that appropriate personnel receive instructions on their roles and responsibilities. All persons installing a lockout/tagout device shall sign their names and the date on the tag and on the Lockout/Tagout Isolation Record (see **Appendix E.1**).

4.0 PREPARATION FOR LOCKOUT/TAGOUT

1. Review current diagrammatic drawings (or other equally effective means), tags, labels, and signs to identify and locate all disconnecting means to determine that the source of energy is interrupted by a physical break and not deenergized by a circuit interlock. Make a list of disconnecting means to be locked/tagged.
2. Review other work activities to identify where and how other personnel might be exposed to sources of energy. Establish energy control methods for control of other hazardous energy sources in the area.
3. Provide an adequately rated voltage detector to test each electrical phase conductor or circuit part to verify that they are deenergized. Test the voltage detector to make sure that it is working properly.

5.0 LOCKOUT PROCEDURE

1. Complete the Lockout/Tagout Isolation Record (see **Appendix E.1**).
2. All affected employees in the area shall be notified that a lockout is being performed.
3. The equipment being locked out shall be shut down using normal shutdown procedures. (i.e. operator's control station, stop button, etc.).
4. Any residual energy shall be identified and dissipated at this time.

5. All equipment energy sources shall be neutralized. (i.e. electrical disconnects shall be opened, valves closed, blanks inserted in piping, springs returned to neutral position, other energy sources as required)

6. The qualified employee performing the lockout shall place his/her personal lock and tag on EACH energy isolation point isolated in Step 4. If more than two (2) isolation points are required to lockout the device, a group lockbox may be used. A tag indicating all persons who applied a lock, date, time, equipment type, and number and duration of lockout shall also be applied at this time. A subcontractor representative and an ATC employee shall also apply a lock at this time.
7. Test the lockout by clearing the area and attempting to operate the machine or attempting to operate disconnecting means to determine that the operation is prohibited. A voltage-detecting instrument should be used for electrical components. Inspect the instrument prior to use for physical damage and operation.

6.0 REMOVAL OF LOCKOUT/TAGOUT

1. Upon completion of the lockout an authorized employee must check the area for completeness of work. If the employee who initiated the lockout is available, he/she should conduct this inspection.
2. Remove all tools and nonessential items from the area.
3. Replace all guards.
4. Ensure all employees are clear of the equipment/process.
5. Notify all affected employees in the area that the lockout device(s) are being removed.
6. Remove lockout device(s).
7. Restart the machine to insure proper operation.

7.0 GROUP LOCKOUT

1. When multiple isolation points, three (3) or more, must be controlled during a lockout, or when multiple persons (craft) are involved, a group lockout shall be used.
2. Follow the steps for a normal lockout as documented in steps 1-6 above.
3. Each key for the locks used shall be placed in a group lockout box. The group lockbox shall be kept in view of the work being performed when practical.
4. A Job Control Lock shall be installed on the group lockbox by a ATC Employee. This lock shall remain in place until the lockout has been completed.
5. Each employee shall remove their own lock when their portion of the work is completed or at the end of each shift.
6. Upon completion of the work, the ATC employee shall inspect the work area for completeness.
7. When all of the conditions of the lockout termination procedures have been satisfied, the Job Control Lock shall be removed from the group lockbox.

8.0 EMERGENCY REMOVAL LOCKOUT/TAGOUT DEVICE

1. If an employee leaves the facility without removing his/her lock and tag, an effort shall be made to notify the employee that the supervisor in charge will authorize the removal of their lock. It must be deemed necessary that removal of the lock is required by at least two supervisory personnel, but only after confirming beyond any doubt it is safe to do so.
2. Verify the employee has left the Site.
3. Check with co-workers.
4. Check the employee's time card.
5. Attempt to reach him/her at home.

APPENDIX E
Lockout/Tagout Requirements & Procedures

6. Verify the employee is not in the equipment.
7. Visually confirm the completeness of work.
8. Contact the Regional Safety Coordinator and the Project Manager.
9. An authorized employee, under the direct supervision of an ATC Supervisor shall remove the lock.
10. Upon return to the Site by the employee involved, he/she shall be informed of the removal.
11. A review of the incident may be conducted by the ATC RSC Coordinator to determine any disciplinary actions necessary.

APPENDIX E-1
Lockout/Tagout Isolation Record

System:		Isolation Record	Status	Tagging Authority
Equipment Tag:		Equipment Description:	☐ Construction	
			☐ Startup	
			☐ Operations	

LOTO No.	DNO Tag No.	Equipment Tag No.	Equipment Description	Pos.	LOTO Placed By:	Date	LOTO Removed BY:	Date

Tagging Authority Approval:		
	Signature	Date

Holder List:

PTW No.	Signed Onto LOTO Name	Date / Time	Signed Off LOTO Name	Date / Time

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Manageme
Secondary Category:
JSA NO. **EM-001a**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Driving	**ATC Drivers**	**9/28/2012**	**01**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1of 1

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☐ REFLECTIVE VEST	☐ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☐ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☐ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☐ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Enter/Exit Vehicle	Hand injuries – cuts and pinches	• Make sure keys are in your pocket before shutting door • Only lock the vehicle once the door is closed. • Do not try to stop the door • Do not place your hand between the door and the frame of the vehicle.
	Crime/Assault	• Beware of surroundings. • Use buddy system if working in high crime areas or at night. ▪ Ask for someone to walk to your vehicle with you.
Driving to and from site	Vehicles	• Use defensive driving techniques.
	Pedestrians	• Yield to all pedestrians. • Use defensive driving techniques.
	Load shifting/moving	• All tools, equipment and supplies must be properly secured in the bed of the truck/vehicle. • Check strapping prior to driving.
	Road Conditions	• Use caution while traveling in construction zones • Follow Cardno ATC's Winter Driving Tips

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: Em-007(b)
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:		REVISION DATE:	JSA CREATED ON:
Unloading of Supplies		**04/19/2011**	**2/10/05**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1 of 1

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Pickup/Set down supplies/tools	Back injuries	• Follow proper lifting procedures – lift with your legs. Do not lift more than 50 pounds without assistance.
	Cuts to the hands	• Wear leather, cotton, or craftsman work gloves. • Watch hand placement. • Check object for sharp edges.
Carry supplies/tools	Back injuries	• If carrying material over a long distance, use a cart or hand dolly to assist.
	Slips, trips and falls	• Use designated paths whenever possible. • Wear safety toed boots with ankle support. • Limit the amount of material you are carrying so that you can see the path while walking. • Do not jump from the back of pickup trucks. • Always step down, facing the truck and maintaining three (3) points of contact. • Set down all supplies and tools while climbing into and out of the back of the pickup.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: Em-007(b)
Primary Job Category: Environmental Management

DESCRIPTION OF JOB: **Unloading of Supplies**		REVISION DATE: **04/19/2011**	JSA CREATED ON: **2/10/05**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 2 of 1

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☐ REFLECTIVE VEST	☐ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☐ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☐ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☐ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

Please explain additional steps, changes or amendments to this JSA in the provided space below. Prior to starting work ensure that all employees understand and agree with the changes in this JSA.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-001b**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Site setup and tear down	**ATC Field Staff**	**10/10/07**	**9/28/2012**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Drive around site	• Traffic	• Use defensive driving techniques
	• Pedestrians	• Yield to all pedestrians. • Use defensive driving techniques
Load/Unload equipment and supplies	• Vehicles	• When backing the drill rig, vehicles with trailers, or other large vehicles a spotter must be used. • Use barrier controls with a height of at least 36 inches. • Wear traffic reflective vest. • Caution tape or snow fence should be used to surround the work site.
	• Pedestrians	• Use barrier controls with a height of at least 36 inches. • Place signs indicating authorized personnel only at entrance to site. • When backing the drill rig, vehicles with trailers, or other large vehicles a spotter must be used. • Caution tape or snow fence should be used to surround the work site.
	• Weather	• Prevent heat and cold illnesses by: drinking water frequently and moderately; rest frequently; wear light colored clothing; eat light meals. • Adjust work schedule to avoid temperature extremes. • Sunscreen • Layer clothing to adjust to changing environmental temperatures • Avoid drinks with caffeine (coffee, tea, or soda) or alcohol. • Use the buddy system (work in pairs).

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-001b**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Site setup and tear down	**ATC Field Staff**	**10/10/07**	**9/28/2012**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
	• Slips, trips and falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. • Setup areas away from snow and ice. • If ice is present wear yak-traks on boots.
	• Insects and animals	• Look around area before setting up for the presence of bee nests and cob webs. • Do not disturb – leave them alone. • If stray dogs are present go indoors or the cab of the truck and wait for it to leave. Call animal control. • If you encounter bees or poisonous spiders leave the area and call the Project Manager. • Keep hands and feet out of areas you can not see.
	• Back Injuries	• Use proper lifting procedures – avoid lifting with the back and twisting. • Do not lift over 50 pounds without assistance.
	• Hand Injuries	• Wear work gloves – leather or craftsman while setting up. • Watch hand placement – always know where your hands are at. • Do not place your hand in direct path of a tool or between two objects.
	• Heavy Equipment	• Spotters must be used at all times when heavy equipment is being operated. • All onsite personnel must wear safety reflective

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-001b**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Site setup and tear down	**ATC Field Staff**	**10/10/07**	**9/28/2012**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		vest. • Operator must follow spotters hand signals and remove hands from controls when not working. • Site personnel should only approach the spotter • Backup alarm is required on heavy equipment.
Underground Utility Locate	• Vehicles	• Wear traffic reflective vest. • A spotter should walk with the utility locator looking for hazards whenever the locator is looking down.
	• Weather	• Prevent heat and cold illnesses by: drinking water frequently and moderately; rest frequently; wear light colored clothing; eat light meals. • Adjust work schedule to avoid temperature extremes. • Sunscreen • Layer clothing to adjust to changing environmental temperatures • Avoid drinks with caffeine (coffee, tea, or soda) or alcohol. • Use the buddy system (work in pairs).
	• Slips, trips and falls	• Wear slip resistant steel toed boots with ankle support. • Keep foot wear clean of mud and other debris. • If ice is present wear yak-traks on boots.
	• Insects and animals	• Look around area before setting up for the presence of bee nests and cob webs. • Do not disturb – leave them alone. • If stray dogs are present go indoors or the cab of the truck and wait for it to leave. Call animal control. • If you encounter bees or poisonous spiders leave

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-001b**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Site setup and tear down	**ATC Field Staff**	**10/10/07**	**9/28/2012**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		the area and call the Project Manager. • Keep hands and feet out of areas you can not see.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-001(c)
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:		REVISION DATE:	JSA CREATED ON:
Opening and closing a well vault		**9/28/2012**	**10/10/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1 of 3

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☒ CHEMICAL RESISTANT GLOVE: **Nitrile**	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☒ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☒ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Obtain supplies and tools from truck	• Hand injuries – cuts and scrapes	• Wear work gloves – leather or craftsman while handling equipment. • Watch hand placement – always know where your hands are at. • Do not place your hand in direct path of a tool or between two objects.
	• Slip, trip and falls	• Do not jump from the back of pickup trucks. • Always step down, facing the truck and maintaining three (3) points of contact.
Walk to and from well	• Slip, trip and falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there is aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. • Be deliberate with footing while walking in fields. • Limit the amount of tools and supplies that you carry so that you can see your path.
	• Weather	• Prevent heat and cold illnesses by: drinking water frequently and moderately; rest frequently; wear light colored clothing; eat light meals. • Adjust work schedule to avoid temperature extremes. • Sunscreen • Layer clothing to adjust to changing environmental temperatures • Avoid drinks with caffeine (coffee, tea, or soda) or alcohol. • Use the buddy system (work in pairs).
Remove locks and bolts	• Hand injuries – cuts and scrapes	• Wear work gloves – leather or craftsman. • Use a ratchet extension while unbolting the well. • Watch hand placement – always know where your hands are at. • Do not place your hand in direct path of a tool or between two objects.
Remove/replace well vault lid	• Hand injuries – cuts, scrapes, pinches.	• Wear work gloves – leather or craftsman while opening wells. • Watch hand placement – always know where your hands are at. • Do not place your hand in direct path of a tool or between two objects. • Lift the well cover with the magnet. When removing the magnet lift with your legs, don't

Cardno ATC Shaping the Future	**JSA**	**JOB SAFETY ANALYSIS**	For RM Department Use JSA NO: EM-001(c) Primary Job Category: Environmental Management

DESCRIPTION OF JOB: **Opening and closing a well vault**		REVISION DATE: **9/28/2012**	JSA CREATED ON: **10/10/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 2 of 3

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☒ CHEMICAL RESISTANT GLOVE: **Nitrile**	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☒ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☒ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		jerk upward.
	• Insect – bees, wasps, hornets or black widow spiders	• If insects are encountered notify the Project Manager so that an exterminator can be called. • Open wells slowing looking under the lid. • Shut down site do not proceed
	• Sharp metal at well opening	• Wear work gloves – leather or craftsman • Watch hand placement – always know where your hands are at.
	• Back injuries	• Use proper lifting procedures – avoid lifting with the back and twisting.
Remove/replace well lid	• Pressure	• Remove cap slowing. • Listen for hissing sound • Do not place face near welling opening
	• Chemical contact – inhalation	• Stand upwind while removing cap. • Do not place face near welling opening • Monitor the area with a PID while performing site operations when the well is known to contain free product. • Respirator use required if 10 ppm is maintained for 5 minutes.
	• Chemical contact – hand	• Wear nitrile gloves

Cardno ATC Shaping the Future	JSA	JOB SAFETY ANALYSIS	For RM Department Use JSA NO: EM-001(c) Primary Job Category: Environmental Management

DESCRIPTION OF JOB: **Opening and closing a well vault**		REVISION DATE: **9/28/2012**	JSA CREATED ON: **10/10/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 3 of 3

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☐ REFLECTIVE VEST	☐ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☐ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☐ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☐ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

Please explain additional steps, changes or amendments to this JSA in the provided space below. Prior to starting work ensure that all employees understand and agree with the changes in this JSA.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-001d**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Guaging of a well	**ATC Field Staff**	**3/30/06**	**9/28/2012**

PREPARED BY:	REVIEWED BY:	APPROVED BY:	PAGE:
Dan Mickelsen	**Dan Mickelsen**	**Dan Mickelsen**	1of 2

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS		☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ CHEMICAL RESISTANT GLOVE: **Nitrile**		☐ OTHER:
☒ FACE SHIELD	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Obtain supplies and tools from truck	• Hand injuries – cuts and scrapes	• Wear work gloves – leather or craftsman while handling equipment. • Watch hand placement – always know where your hands are at. • Do not place your hand in direct path of a tool or between two objects.
	• Slip, trip and falls	• Do not jump from the back of pickup trucks. Always step down. • Maintain three points of contact while climbing and descending. Always face the object you are climbing.
Walk to and from well	• Slip, trip and falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. • Be deliberate with footing while walking in fields. In fields look down while walking. Limit carrying objects that could block or obstruct your view of the pathway.
	• Weather	• Prevent heat and cold illnesses by: drinking water frequently and moderately; rest frequently; wear light colored clothing; eat light meals. • Adjust work schedule to avoid temperature extremes. • Sunscreen • Layer clothing to adjust to changing environmental temperatures • Avoid drinks with caffeine (coffee, tea, or soda) or alcohol. • Use the buddy system (work in pairs).
Lower and raise water level meter into well	• Chemical contact – inhalation	• Stand upwind. • Do not place face near welling opening. Bring the measurement tape to you to read.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-001d**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Guaging of a well	**ATC Field Staff**	**3/30/06**	**9/28/2012**

PREPARED BY:	REVIEWED BY:	APPROVED BY:	PAGE:
Dan Mickelsen	**Dan Mickelsen**	**Dan Mickelsen**	1of 2

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☒ CHEMICAL RESISTANT GLOVE: **Nitrile**	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		Breathing zone should be at least 2 feet away from the well opening. • Monitor the area with a PID while performing site operations if well is known to contain free product • Respirator use required if 10 ppm is maintained for 5 minutes. • Bring tape measure to face to read.
	• Chemical contact – hand	• Wear nitrile gloves
Decon equipment	• Chemical contact – hand	• Wear nitrile gloves
	• Splash Hazards	• Wear safety glasses • Face shield while pouring or cleaning decon buckets.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-001(e)
Primary Job Category: Environmental Management

DESCRIPTION OF JOB: **Water Sampling Of A Well**	REVISION DATE: **09/28/12**	JSA CREATED ON: **12/6/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1 of 4

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☒ CHEMICAL RESISTANT GLOVE: **Nitrile**	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Obtain supplies and tools from truck	Hand injuries – cuts and scrapes	• Wear work gloves – leather or craftsman while handling equipment. • Watch hand placement – always know where your hands are at. • Do not place your hand in direct path of a tool or between two objects.
	Slip, trip and falls	• Do not jump from the back of pickup trucks. Always step down. • Maintain three points of contact while climbing and descending. Always face the object you are climbing.
Walk to and from well	Slip, trip and falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. • Be deliberate with footing while walking in fields. In fields look down while walking. Limit carrying objects that could block or obstruct your view of the pathway.
	Weather	• Prevent heat and cold illnesses by: drinking water frequently and moderately; rest frequently; wear light colored clothing; eat light meals. • Adjust work schedule to avoid temperature extremes. • Sunscreen • Layer clothing to adjust to changing environmental temperatures • Avoid drinks with caffeine (coffee, tea, or soda) or alcohol. • Use the buddy system (work in pairs).
Prepare sampling equipment	Hand cuts	• Do not use a fixed open blade knife to cut the plastic wrap.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-001(e)
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:		REVISION DATE:	JSA CREATED ON:
Water Sampling Of A Well		**09/28/12**	**12/6/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 2 of 4

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☒ CHEMICAL RESISTANT GLOVE: **Nitrile**	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Lower and raise sampling device into well	Chemical contact – inhalation	• Stand upwind. • Do not place face near welling opening. Bring the measurement tape to you to read. Breathing zone should be at least 2 feet away from the well opening. • Monitor the area with a PID while performing site operations if well is known to contain free product • Respirator use required if 10 ppm is maintained for 5 minutes. • Bring tape measure to face to read.
	Shoulder/arm strain or sprain	• For wells deeper then 125 feet use a pump to extract sample from well. • If the well needs to be purged of 5 gallons or more than then a pump should be used.
	Chemical contact – hand	• Wear nitrile gloves
Place sample into sample container	Chemical contact with acid.	• Wear nitrile gloves when handling empty or full sampling containers. Some containers break during shipment and can leak acid onto other sampling containers.
	Breaking the sampling container, broken glass	• Over tightening will cause the glass to break. Once resistance is felt stop. • When tightening, keep hands and fingers away from the neck of the sampling container. • Hold the filled VOA vertically with the fingertips of your thumb, index, and middle fingers; gently twist the cap onto the VOA by pinching it between your index, middle finger, and thumb of your other hand. The hand holding the VOA does not move, while the hand with the cap

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-001(e)
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:		REVISION DATE:	JSA CREATED ON:
Water Sampling Of A Well		**09/28/12**	**12/6/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 3 of 4

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☒ CHEMICAL RESISTANT GLOVE: **Nitrile**	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		rotates slightly to the right. • Breakage typically occurs when tightening cap. Therefore it is important to not apply any compression force to the vial (i.e. pushing the cap down onto the vial and/or pushing the vial up into the cap), as this will force broken glass towards the cap hand if vial failure occurs. • See ATC Steps to Fill a VOA With a Groundwater Sample.
Decon equipment	Chemical contact – hand	• Wear nitrile gloves
	Splash Hazards	• Wear safety glasses • Face shield while pouring or cleaning decon buckets.

Cardno ATC Shaping the Future	JSA	JOB SAFETY ANALYSIS	For RM Department Use JSA NO: EM-001(e) Primary Job Category: Environmental Management

DESCRIPTION OF JOB: **Water Sampling Of A Well**		REVISION DATE: **09/28/12**	JSA CREATED ON: **12/6/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 4 of 4

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☐ REFLECTIVE VEST	☐ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☐ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☐ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☐ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

Please explain additional steps, changes or amendments to this JSA in the provided space below. Prior to starting work ensure that all employees understand and agree with the changes in this JSA.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-002b
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Well Abandonment	**04/19/11**	**04/04/08**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Move equipment into place	Pedestrian	• When backing equipment into place a spotter must be used. • Back-up alarm on equipment.
	Other Vehicles	• When backing equipment into place a spotter must be used. • Spotter must have on traffic safety vest. • Equipment driver should yield to other vehicles.
	Over head obstacles	• Driver and spotter should walk the travel path and discuss the movement of the equipment. • When backing equipment into place a spotter must be used.
	Private property damage	• When backing equipment into place a spotter must be used. • Driver and spotter should walk the travel path and discuss the movement of the equipment.
Setup work zone	See JSA for site setup	• See JSA for site setup
Raising the mast	Slips, Trips and Falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock. • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. • Dry up water as quickly as possible.
	Over Head Obstacles	• A spotter will be used as the driller raises the mast to ensure that overhangs, tree branches or canopies are not in the path of the mast. • Have everyone stand clear of the mast.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-002b
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Well Abandonment	**04/19/11**	**04/04/08**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 2 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
	Over Head Utilities	• A spotter will be used as the driller raises the mast to ensure that the path of the mast does not come in contact with overhead lines. • Setup drill rig at least 10 feet from over head power lines. • Position the rig to avoid overhead power lines as defined by the voltage and local zoning requirements.
	Rig Tipping over	• Do not drive with mast in the raised position. • If the ground appears unstable a qualified individual should determine if it is safe to place the drill rig at that site. • Set all brakes, put gearboxes in neutral, and disengage all hoist levers. • Set riggers/stabilizers prior to raising the mast. • Level and stabilized the drill rig before raising mast.
	Equipment Failure	• Perform and document daily inspection of all cabling, hydraulics, motors, fluid levels and hoses.
Grouting of Well	Pressurized lines	• Reverse pump to remove excess pressure. • Open bleed off value. • Slowly disconnect pipes allowing excess pressure to escape. • Wear face shield. • Stand away from the pipe when not connecting or removing pipe.
	Back injuries	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance.
	Hand cuts and pinches	• Be alert for hand injuries. • Do not use your hand as the tool.

Cardno ATC Shaping the Future	JSA	JOB SAFETY ANALYSIS	For RM Department Use JSA NO: EM-002b Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Well Abandonment	**04/19/11**	**04/04/08**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 3 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		• Use the right tool for the job. • Be aware of hand placement – do not place hands in the path of hammers, knifes or between objects. • Wear leather, craftsman or cotton gloves.
	Slips, Trips and Falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock. • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. • Dry up water as quickly as possible.
	Dust exposure	• Open bags inside the drum. • Pour contents slowly. • Stand upwind. • Do not use a chopping motion to open the bag this will cause dust to contact eyes.
	Dropping grout pipe	• Wear leather, craftsman or cotton gloves and keep dry.
	Valve failing	• Clean valves and pipe after every use. • Verify valves are operational before the start of the work. If the valve is difficult to move, make sure system is off and remove valve to determine if it needs to be replaced or cleaned. • Do not force a valve open. The use of only one hand is needed to open a

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-002b
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:		REVISION DATE:	JSA CREATED ON:
Well Abandonment		**04/19/11**	**04/04/08**
PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 4 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		functional valve.
	Noise	• Wear hearing protection
Over Drilling	See JSA for Auger Drilling	• See JSA for Auger Drilling
Concrete/Asphalt cutting	See JSA for Concrete & Asphalt Cutting	• See JSA for Concrete & Asphalt Cutting
Removal of well vault	Heavy Lifting	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance.
	Dropping of the well vault	• Wear safety toed boots
	Hand cuts and pinches	• Be alert for hand injuries. • Do not use your hand as the tool. Use a pry bar to push or elevate the well vault. • Be aware of hand placement – do not place hands in the path of hammers, knifes or between objects. • Wear leather, craftsman or cotton gloves.
Patch concrete	See JSA for Concrete Work	• See JSA for Concrete Work

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

Cardno ATC Shaping the Future	JSA JOB SAFETY ANALYSIS	For RM Department Use JSA NO: EM-002b Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Well Abandonment	**04/19/11**	**04/04/08**

PREPARED BY: Dan Mickelsen	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 5 of 5

☐ REFLECTIVE VEST	☐ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☐ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☐ SAFETY TOED BOOTS		☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☐ SAFETY GLASSES	☐ CHEMICAL RESISTANT GLOVE:		☐ OTHER:
☐ FACE SHIELD	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

Please explain additional steps, changes or amendments to this JSA in the provided space below. Prior to starting work ensure that all employees understand and agree with the changes in this JSA.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: Em-002d
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Ground Water Sampling Well Installation	**04/19/11**	**04/22/08**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1 of 7

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Develop Sand Pack	Back injuries	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance. • Use cart or wheelbarrow to move the bags of sand close to the well opening.
	Hand pinch/cuts/crushed	• Always watch hand placement – do not place your hand in direct path of a tool. Know where your hand is and hands of your fellow employees. • Make sure other employees are aware of what you are doing and are about to do. • Use craftsman, cotton or leather work gloves.
	Dust	• Pour contents of bag near the well opening. • Stand upwind and allow the wind to take any dust generated away from your breathing zone. • Pour contents slowly. • Do not use a chopping motion with a large tool to open a bag of sand because it will cause unwanted debris and dust to be flown into the air and make contact with the eyes.
Place PVC pipe	Back injuries	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance.
	Falling pipe	• Use proper attachment to lift casing.
	Hand injuries	• Be alert for hand injuries. • Do not use your hand as the tool. Use a hammer to move objects that are stuck. • Use the right tool for the job.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: Em-002d
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Ground Water Sampling Well Installation	**04/19/11**	**04/22/08**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 2 of 7

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS		☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ CHEMICAL RESISTANT GLOVE:		☐ OTHER:
☒ FACE SHIELD	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		• Be aware of hand placement – do not place hands in the path of hammers, knifes or between objects. • Wear cotton, leather or craftsman gloves. • Communicate your intentions to others involved. Make sure they understand where and what you will be doing before you do it.
Remove auger as well is advanced	Back injuries	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance. • Use a winch cable as a mechanical lift for auger pieces. • Tip the auger up on one end and roll the auger into place.
	Hot auger	• Do not touch the auger without gloves • Allow auger to cool down before handling • Use water to assist with cooling process
	Hand pinch/cuts/crushed	• Be alert for hand injuries. • Do not use your hand as the tool. Use a hammer to move objects that are stuck. • Use the right tool for the job. • Be aware of hand placement – do not place hands in the path of hammers, knifes or between objects. • Wear cotton, leather or craftsman gloves. • Communicate your intentions to others involved. Make sure they understand where and what you will be doing before you do it.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: Em-002d
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Ground Water Sampling Well Installation	**04/19/11**	**04/22/08**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 3 of 7

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
	Slips, Trips and Falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock before lifting or moving equipment. • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. Setup a boot cleaning area if needed. • Dry up water as quickly as possible. • Continue to clean and remove cuttings from drilling area. • Pickup tools that are not needed and place out of the way. • Walk your pathway before carrying an item. • Maintain three points of contact when climbing up and down. Always face the climbing surface. • If breaking a bolt on an auger make sure you have clean foot wear and work area, face the wrench and only use one foot on the wrench while holding onto a secure area that will not move.
Mixing water and grout	Back injuries	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance. • Take turns mixing the grout or if possible use an automated mixer. • Do not lean over the drum while mixing. Take breaks when needed and change position.
	Noise	• Wear hearing protection when pump and drill rig are operating

Cardno ATC Shaping the Future	JSA JOB SAFETY ANALYSIS	For RM Department Use JSA NO: Em-002d Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Ground Water Sampling Well Installation	**04/19/11**	**04/22/08**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 4 of 7

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
	Splash with water grout mix	• Wear face shield with safety glasses • Slowly introduce water into the mix and use a long handle shovel to mix.
	Hand pinch/cuts/crushed	• Wear work gloves – cotton, leather or craftsman while working. • Watch hand placement – always know where your hands are at. • Do not place your hand in direct path of a tool or between two objects.
	Dust	• Pour contents of bag near the drum or mixing container opening. • Stand upwind and allow the wind to take any dust generated away from your breathing zone. • Pour contents slowly. • Do not use a chopping motion to open the bag this will cause dust to contact eyes. • Use dust goggles.
	Slips, trips and falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock. • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. • Dry up water as quickly as possible. • Place pallet of material close to work area to minimize walking and carrying items.
	Chemical contact – skin	• Do not contact wet grout without nitrile gloves on. Nitrile gloves can be

Cardno ATC Shaping the Future	JSA	JOB SAFETY ANALYSIS	For RM Department Use JSA NO: Em-002d Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Ground Water Sampling Well Installation	**04/19/11**	**04/22/08**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 5 of 7

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		worn under other gloves. • Wash off with clean water. • Do not use hands to mix.
Place well vault	Back injuries	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance.
	Hand pinch/cuts/crushed	• Be alert for hand injuries. • Do not use your hand as the tool. • Use the right tool for the job. • Be aware of hand placement – do not place your hands between object. • Wear cotton, leather or craftsman work gloves.
	Slips, trips and falls	• Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock. • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris.
Pumping grout around well casing	Pressurized lines	• Reverse pump to remove excess pressure. • Open bleed off valve. • Slowly disconnect pipes allowing excess pressure to escape. • Wear face shield when disconnecting and pumping grout around well vault.
	Back injuries	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance.

Cardno ATC Shaping the Future	JSA	JOB SAFETY ANALYSIS	For RM Department Use JSA NO: Em-002d Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Ground Water Sampling Well Installation	**04/19/11**	**04/22/08**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 6 of 7

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☒ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☒ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
	Slips, Trips and Falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock. • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. • Dry up water as quickly as possible.
	Hand cuts and pinches	• Be alert for hand injuries. • Do not use your hand as the tool. • Use the right tool for the job. • Be aware of hand placement – do not place hands in the path of hammers, knifes or between objects. • Wear cotton, leather or craftsman work gloves.
	Noise	• Wear hearing protection
	Valve failing	• Clean valves and pipe after every use. • Verify valves are operational before the start of the work. If the valve is difficult to move, make sure system is off and remove valve to determine if it needs to be replaced or cleaned. • Do not force a valve open. The use of only one hand is needed to open a functional valve.

Cardno ATC Shaping the Future	JSA	JOB SAFETY ANALYSIS	For RM Department Use JSA NO: Em-002d Primary Job Category: Environmental Management

DESCRIPTION OF JOB: **Ground Water Sampling Well Installation**	REVISION DATE: **04/19/11**	JSA CREATED ON: **04/22/08**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 7 of 7

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☐ REFLECTIVE VEST	☐ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☐ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☐ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☐ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

Please explain additional steps, changes or amendments to this JSA in the provided space below. Prior to starting work ensure that all employees understand and agree with the changes in this JSA.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-002j
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Moving A Drum	**04/19/11**	**06/04/07**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 1 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☒ OTHER: Drum Dolly	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Storage of Drum Dolly	Tripping Hazard, Tip-Over Hazard	• If dolly is to be stored in upright position, and has "Kick Stand", use the kick stand to keep dolly in upright position or keep it attached to a standing drum. • If dolly is to be stored in horizontal position, turn the dolly over so that the forks (drum cleats) are in contact with the ground and not sticking out into a work space. • If temporarily storing dolly in horizontal (on the wheels) position, ensure that the forks are protected against workers hitting them. • Where possible, store the dolly out of the immediate work area to minimize chance for dolly being tipped over or tripped over. • Ensure that all employees are aware of storage considerations.
Drum Handling (Empty Drums)	Overexertion Injuries (lifting or moving drums	• When moving drums, use the drum dolly. • Secure assistance as needed for heavier drums (even if empty).
	Eye Injuries (dust, dirt, or metal particles kicked up as result of moving drums or unfastening lids and sealing rings)	• Use safety eyewear with side shields. • Be observant of materials on top of lids before opening them.
	Hand Injuries (pinch points or cuts due to sharp metal edges or burrs)	• Use leather work gloves when handling drums. • Use safe position with hands (do not place between drums and fixed objects, including other drums). • If others are helping with drums, ensure that their hands are also in safe position before moving drums. • Anticipate possible metal burrs on drum lids or sealing rings, and on metal bolt fasteners.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-002j
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:	REVISION DATE:	JSA CREATED ON:
Moving A Drum	**04/19/11**	**06/04/07**

PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 2 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☒ OTHER: Drum Dolly	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		• Use the proper tool for removing lid rings.
	Tripping Hazards (drum lids, sealing rings)	• When removing drum lids and sealing rings for visual drum inspections, do NOT create tripping hazards by placing lids or rings in walkways.
	Foot/Ankle Injuries (drums or dolly parts striking ankles or feet)	• Use safety footwear (steel-toed shoes or boots) when handling drums and drum dolly • Ensure feet are in safe position when lowering drums to floor or removing dolly from under drums.
Drum Dolly Use	Hand, Eye, or Foot Injuries	• Refer to PPE requirements from above.
	Overexertion Injuries	• When moving drum dolly, roll it on its wheels (rather than attempting to lift and carry it). • Only use a 4 wheeled drum dolly.
	Finger Injuries (cuts or pinches)	• When attempting to attach dolly to the drum, watch placement of fingers to avoid pinch points between dolly and drum and between two drums. • Carefully place forks of dolly under the bottom of the drum – ensure forks are fully inserted under the drum. • Affix the securing hook over the edge of the drum top.
	Bumping Into Other Employees, Trip Hazards	• When drum is secured by forks at the bottom and securing hook at the top, check behind you to ensure you still have adequate room, no pedestrian or other traffic, and no obstructions in your path of travel. • Gently rock the drum back toward you until wheels are fully engaged with travel surface. • Slowly roll the dolly and drum to the desired position. • Tip the drum back into vertical position and reverse steps for temporary

Cardno ATC Shaping the Future	JSA	JOB SAFETY ANALYSIS	For RM Department Use JSA NO: EM-002j Primary Job Category: Environmental Management

DESCRIPTION OF JOB: **Moving A Drum**	REVISION DATE: **04/19/11**	JSA CREATED ON: **06/04/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 3 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☒ OTHER: Drum Dolly	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		storage of dolly.
Moving Drums (Pathways)	Uneven Surfaces (can cause drum and dolly to tip over, or sink into terrain)	• Check entire path that drum and dolly must travel. • If surface is not designed for wheeled traffic, make arrangements for temporary plates (plywood or similar) to allow safe movement of dolly. • If surface is uneven, unpaved, or otherwise challenging, consider other methods of improvement. • Where needed, use a "Spotter" to ensure no pedestrians or motorized vehicles enter pathway.
	Weight of Drums (creating an overexertion hazard)	• For full drums, utilize helper to minimize the chance for sprains or strains. • Do NOT attempt to lift full drums – let the dolly do the work.
Spotting Drum at End Location	Foot, Finger & Overexertion Injuries (pinch points, foot crush potential, sprains and strains)	• Ensure that space where drum will be placed is adequate for drum. • If other objects (or other drums) are in area, keep hands out of pinch points between drums (or other objects). • When righting the drum at its destination, use 2 persons where needed. • Keep feet out from under the drum and dolly at all times. • Unhooks the securing hook from the drum lid area. • Carefully slide the forks out from under the drum. Do not attempt to simply "yank" the forks out from under the drum, as dolly could slip back and strike employee's shins, ankles, or feet. • If drum needs to be moved slowly into final position, watch fingers and pinch points. • Use "Buddy System" to gradually shift drum position and ensure both parties are in communication of what each will do and to keep fingers out

Cardno ATC Shaping the Future	JSA	JOB SAFETY ANALYSIS	For RM Department Use JSA NO: EM-002j Primary Job Category: Environmental Management

DESCRIPTION OF JOB: **Moving A Drum**		REVISION DATE: **04/19/11**	JSA CREATED ON: **06/04/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 4 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☒ OTHER: Drum Dolly	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		of pinch points. • When drum is removed from dolly, use steps outlined for temporary (or longer storage) of dolly.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
JSA NO: EM-002j
Primary Job Category: Environmental Management

DESCRIPTION OF JOB:		REVISION DATE:	JSA CREATED ON:
Moving A Drum		**04/19/11**	**06/04/07**
PREPARED BY: Christine Anderson	REVIEWED BY: Dan Mickelsen	APPROVED BY: Dan Mickelsen	PAGE: 5 of 5

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT			
☐ REFLECTIVE VEST	☐ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☐ HARD HAT	☐ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☐ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☐ SAFETY GLASSES	☐ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☐ FACE SHIELD			☐ OTHER:
REQUIRED TOOLS/EQUIPMENT/SUPPLIES			
☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☐ TRAFFIC CONTROL DEVICES	☐ AIR MONITORING **SELECT FROM LIST**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

STOP WORK

Cardno ATC and Subcontractor employees must stop work and contact off-site senior personnel when a change in condition, process, or job phase develops on the project site that is not addressed by this JSA or within the project specific HASP. The JSA should be modified with new steps, hazards, and safe procedures agreed upon by all Cardno ATC and Subcontractor employees at the project site and approved by off-site senior personnel. Documentation of the modification and review by all affected personnel must take place.

Please explain additional steps, changes or amendments to this JSA in the provided space below. Prior to starting work ensure that all employees understand and agree with the changes in this JSA.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-002e**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Well development	**Field Technician**	**4/22/08**	

PREPARED BY: **Dan Mickelsen**	REVIEWED BY: **Dan Mickelsen**	APPROVED BY: **Dan Mickelsen**	PAGE: of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
Moving equipment into position	Pedestrians	• When backing equipment into place a spotter must be used. • Back-up alarm on equipment.
	Other vehicles	• When backing equipment into place a spotter must be used. • Spotter must have on traffic safety vest. • Equipment driver should yield to other vehicles.
	Overhead obstacles	• Driver and spotter should walk the travel path and discuss the movement of the equipment. • When backing equipment into place a spotter must be used.
	Damage to private property	• When backing equipment into place a spotter must be used. • Driver and spotter should walk the travel path and discuss the movement of the equipment.
Site Setup	See JSA for site setup	• See JSA for site setup
Raising and lowering the mast	Equipment Failure	• Perform and document daily inspection of all cabling, hydraulics, motors, fluid levels and hoses.
	Equipment Tipping over	• Do not drive with mast in the raised position. • If the ground appears unstable a qualified individual should determine if it is safe to place the drill rig at that site. • Set all brakes, put gearboxes in neutral, and disengage all hoist levers.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-002e**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Well development	**Field Technician**	**4/22/08**	

PREPARED BY: **Dan Mickelsen**	REVIEWED BY: **Dan Mickelsen**	APPROVED BY: **Dan Mickelsen**	PAGE: of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		• Set riggers/stabilizers prior to raising the mast. • Level and stabilized the drill rig before raising
	Over Head Utilities	• A spotter will be used as the driller raises the mast to ensure that the path of the mast does not come in contact with overhead lines. • Setup drill rig at least 10 feet from over head power lines. • Position the rig to avoid overhead power lines as defined by the voltage and local zoning requirements.
	Over Head Obstacles	• A spotter will be used as the driller raises the mast to ensure that overhangs, tree branches or canopies are not in the path of the mast. • Have everyone stand clear of the mast.
	Falling objects	• Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • Do not allow employees on the deck when the mast is being raised. • Only the operator should be next to the equipment when raising the mast. • Inform all personnel before raising the mast.
Connect baler	Back Injuries from baler and other heavy objects	• Use proper lifting procedures – avoid lifting with the back and twisting. • If over 50 pounds or awkward ask for assistance. • Attach the baler and use a winch cable as a

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-002e**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Well development	**Field Technician**	**4/22/08**	

PREPARED BY: **Dan Mickelsen**	REVIEWED BY: **Dan Mickelsen**	APPROVED BY: **Dan Mickelsen**	PAGE: of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		mechanical lift.
	Contact with contaminated water	• Wear nitrile gloves under cotton, leather or craftsman gloves.
	Hand Injuries – cuts, pinches, fractures or crushed	• Be alert for hand injuries. • Do not use your hand as the tool. Use hammers to move objects that are stuck. • Use the right tool for the job. • Be aware of hand placement – do not place hands in the path of hammers, knifes or between objects. • Wear cotton, leather or craftsman gloves. • Communicate your intentions to others involved. Make sure they understand where and what you will be doing before you do it.
	Slips, Trips and Falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working. • If on pavement or concrete sweep up loose sand, dirt or rock before lifting or moving equipment. • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris. Setup a boot cleaning area if needed. • Dry up water as quickly as possible. • Pickup tools that are not needed and place out of the way.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-002e**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Well development	**Field Technician**	**4/22/08**	

PREPARED BY: **Dan Mickelsen**	REVIEWED BY: **Dan Mickelsen**	APPROVED BY: **Dan Mickelsen**	PAGE: of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		• Walk your pathway before carrying an item. • Maintain three points of contact when climbing up and down. Always face the climbing surface.
	Equipment Failure	• Perform and document daily inspection of all cabling, hydraulics, motors, fluid levels and hoses. • Keep all unnecessary employees away from the area.
Baling water	Hand pinch/cuts/crushed	• Be alert for hand injuries. • Do not use your hand as the tool. • Use the right tool for the job. • Be aware of hand placement – do not place your hands between object. • Wear cotton, leather or craftsman work gloves with nitrile gloves under them. • Do not hold onto winch cable
	Contact with contaminated water	• Wear nitrile gloves
	Moving baler and winch	• No loose clothing. • Do not approach the moving cable or baler. • Wait for the operator to indicate it is safe to approach. • Wear cotton, leather or craftsman gloves. • Keep all unnecessary employees away from the area.
	Slips, trips and falls	• Maintain housekeeping. • Set up work zone with enough room for staging of equipment and supplies such that there are aisle ways for walking and working.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-002e**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Well development	**Field Technician**	**4/22/08**	

PREPARED BY: **Dan Mickelsen**	REVIEWED BY: **Dan Mickelsen**	APPROVED BY: **Dan Mickelsen**	PAGE: of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		• If on pavement or concrete sweep up loose sand, dirt or rock. • Wear slip resistant steel toed boots. • Keep foot wear clean of mud and other debris.
	Equipment Failure	• Perform and document daily inspection of all cabling, hydraulics, motors, fluid levels and hoses. • Keep all unnecessary employees away from the area.
	Noise	• Wear hearing protection
	Hazardous Atmosphere	• Monitor the environment using a PID. • Use a respirator if levels of contaminates exceed the action level. • Prior to work starting identify potential hazardous air contaminates
	Hydraulic Hose Breaking	• Check all lines and connections for cracks, tears or weakness prior to start of operations. • Maintain lines in a manner that would prevent deterioration. • Remove and replace all lines that show wear and tear.
Emptying baler	Contact with contaminated water	• Wear nitrile gloves • Wear face shield and safety glasses. • Use a hook to open the baler and allow the water to escape.
	Equipment Failure	• Perform and document daily inspection of all cabling, hydraulics, motors, fluid levels and hoses.

Cardno ATC
Shaping the Future

JSA JOB SAFETY ANALYSIS

For RM Department Use
Primary Category:
EM - Environmental Management
Secondary Category:
JSA NO. **EM-002e**

DESCRIPTION OF JOB:	OPERATOR JOB CLASSIFICATION:	DATE:	REVISION:
Well development	**Field Technician**	**4/22/08**	

PREPARED BY: **Dan Mickelsen**	REVIEWED BY: **Dan Mickelsen**	APPROVED BY: **Dan Mickelsen**	PAGE: of

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT

☒ REFLECTIVE VEST	☒ LONG PANTS	☐ AIR PURIFYING RESPIRATOR	☐ OTHER:
☒ HARD HAT	☒ COTTON, LEATHER, OR CRAFTSMAN GLOVES	☐ SUPPLIED AIR RESPIRATOR	☐ OTHER:
☒ SAFETY TOED BOOTS	☐ CHEMICAL RESISTANT GLOVE:	☐ CHEMICAL RESISTANT CLOTHING:	☐ OTHER:
☒ SAFETY GLASSES	☒ HEARING PROTECTION	☐ GOGGLES	☐ OTHER:
☒ FACE SHIELD			☐ OTHER:

REQUIRED TOOLS/EQUIPMENT/SUPPLIES

☐ DRINKING WATER	☐ RATCHET WITH EXTENSION	☐ OTHER:	☐ OTHER:
☐ BUG REPELLENT	☐ WELL MAGNET	☐ OTHER:	☐ OTHER:
☒ TRAFFIC CONTROL DEVICES	☒ AIR MONITORING **PID**	☐ OTHER:	☐ OTHER:
☐ LADDER	☐ LOCKOUT/TAGOUT EQUIPMENT	☐ OTHER:	☐ OTHER:

1 JOB STEPS	2 POTENTIAL HAZARDOUS CONDITIONS or UNSAFE PRACTICES	3 SAFE PROCEDURES and PREVENTATIVE MEASURES
		• Keep all unnecessary employees away from the area.
	Hand injuries	• Be alert for hand injuries. • Do not use your hand as the tool. • Use the right tool for the job. • Be aware of hand placement – do not place your hands between object. • Wear leather or craftsman work gloves with nitrile gloves under them.
Drum moving	See JSA drum handling	• See JSA drum handling

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C6-H6

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. The substance is toxic to blood, bone marrow, central nervous system (CNS). The substance may be toxic to liver, Urinary System. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Material Safety Data Sheet
Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgClO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas. Dioxygenyl tetrafluoroborate is as very powerful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition. Contact with sodium peroxide with benzene causes ignition. Benzene ignites in contact with powdered chromic anhydride. Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:
Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction

of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States] TWA: 1.6 STEL: 8 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.1 STEL: 1 from NIOSH TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States] TWA: 10 (ppm) from OSHA (PEL) [United States] TWA: 3 (ppm) [United Kingdom (UK)] TWA: 1.6 (mg/m3) [United Kingdom (UK)] TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m3) [Canada] TWA: 0.5 (ppm) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:
Aromatic. Gasoline-like, rather pleasant. (Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 930 mg/kg [Rat]. Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. Causes damage to the following organs: blood, bone marrow, central nervous system (CNS). May cause damage to the following organs: liver, Urinary System.

Other Toxic Effects on Humans:
Very hazardous in case of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects. May affect genetic material (mutagenic). May cause cancer (tumorigenic, leukemia)) Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism,and urinary system. Eyes: Causes eye irritation. Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value) California prop. 65: This product contains the following ingredients

for which the State of California has found to cause cancer which would require a warning under the statute: Benzene Connecticut carcinogen reporting list.: Benzene Connecticut hazardous material survey.: Benzene Illinois toxic substances disclosure to employee act: Benzene Illinois chemical safety act: Benzene New York release reporting list: Benzene Rhode Island RTK hazardous substances: Benzene Pennsylvania RTK: Benzene Minnesota: Benzene Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene New Jersey: Benzene New Jersey spill list: Benzene Louisiana spill reporting: Benzene California Director's list of Hazardous Substances: Benzene TSCA 8(b) inventory: Benzene SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer. R62- Possible risk of impaired fertility. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S46- If swallowed, seek medical advice immediately and show this container or label. S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Material Safety Data Sheet
Xylenes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Xylenes

Catalog Codes: SLX1075, SLX1129, SLX1042, SLX1096

CAS#: 1330-20-7

RTECS: ZE2100000

TSCA: TSCA 8(b) inventory: Xylenes

CI#: Not available.

Synonym: Xylenes; Dimethylbenzene; xylol; methyltoluene

Chemical Name: Xylenes (o-, m-, p- isomers)

Chemical Formula: C6H4(CH3)2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Xylenes	1330-20-7	100

Toxicological Data on Ingredients: Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

Flammable Limits: LOWER: 1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Vapors may travel to source of ignition and flash back.

Special Remarks on Explosion Hazards:
Vapors may form explosive mixtures with air. Containers may explode when heated. May polymerize explosively when heated. An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined

areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 (ppm) [Canada] TWA: 435 (mg/m3) [Canada] TWA: 434 STEL: 651 (mg/m3) from ACGIH (TLV) [United States] TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Miscible with absolute alcohol, ether, and many other organic liquids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2119 mg/kg [Mouse]. Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals:
Lowest Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects (male and femael fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. Can be absorbed through skin. Eyes: Causes eye irritation. Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves. Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/ kidneys. May cause effects similar to those of acute inhalation. Chronic Potential Health Effects: Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may alsocause mucosal bleeding. Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Xylenes UNNA: 1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Xylenes Illinois chemical safety act: Xylenes New York acutely hazardous substances: Xylenes Rhode Island RTK hazardous substances: Xylenes Pennsylvania RTK: Xylenes Minnesota: Xylenes Michigan critical material: Xylenes Massachusetts RTK: Xylenes Massachusetts spill list: Xylenes New Jersey: Xylenes New Jersey spill list: Xylenes Louisiana spill reporting: Xylenes California Director's List of Hazardous Substances: Xylenes TSCA 8(b) inventory: Xylenes SARA 302/304/311/312 hazardous chemicals: Xylenes SARA 313 toxic chemical notification and release reporting: Xylenes CERCLA: Hazardous substances.: Xylenes: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R10- Flammable. R21- Harmful in contact with skin. R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S36/37- Wear suitable protective clothing and gloves. S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 12:54 PM

Last Updated: 05/21/2013 12:00 PM

Material Safety Data Sheet
Methyl tert-butyl ether MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl tert-butyl ether

Catalog Codes: SLM2152

CAS#: 1634-04-4

RTECS: KN5250000

TSCA: TSCA 8(b) inventory: Methyl tert-butyl ether

CI#: Not available.

Synonym:

Chemical Name: Methyl tert-Butyl Ether

Chemical Formula: C5-H12-O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl {tert-}butyl ether	1634-04-4	100

Toxicological Data on Ingredients: Methyl tert-butyl ether: ORAL (LD50): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC50): Acute: 23576 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 224°C (435.2°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 2.5% UPPER: 15.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Characteristic. (Strong.)

Taste: Not available.

Molecular Weight: 88.15 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 55.2°C (131.4°F)

Melting Point: -109°C (-164.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.7405 (Water = 1)

Vapor Pressure: 245 mm of Hg (@ 20°C)

Vapor Density: 3.1 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:

Soluble in methanol, diethyl ether. Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 4000 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 23576 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Extremely hazardous in case of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Methyl tert-butyl ether : UN2398 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Methyl tert-butyl ether Massachusetts RTK: Methyl tert-butyl ether TSCA 8(b) inventory: Methyl tert-butyl ether SARA 313 toxic chemical notification and release reporting: Methyl tert-butyl ether CERCLA: Hazardous substances.: Methyl tert-butyl ether

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:23 PM

Last Updated: 05/21/2013 12:00 PM

Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C10H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
Israel: TWA: 10 (ppm) TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m3) from ACGIH [1995] Australia: STEL: 15 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:
Partially dispersed in hot water, methanol, n-octanol. Very slightly dispersed in cold water. See solubility in methanol, n-octanol.

Solubility:
Partially soluble in methanol, n-octanol. Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 490 mg/kg [Rat]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: Naphthalene Pennsylvania RTK: Naphthalene Florida: Naphthalene Minnesota: Naphthalene Massachusetts RTK: Naphthalene TSCA 8(b) inventory: Naphthalene TSCA 8(a) PAIR: Naphthalene TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87 SARA 313 toxic chemical notification and release reporting: Naphthalene: 1% CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-4: Flammable solid. CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36- Irritating to eyes. R40- Possible risks of irreversible effects. R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed. R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation. R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:30 PM

Last Updated: 05/21/2013 12:00 PM