MODIFIED CORRECTIVE ACTION PLAN II (COST PROPOSAL NO. 32)

CIRCLE K STORES, INC.
FORMER CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA

FACILITY I.D. NO. 23413-097-000304
UST INCIDENT NO. UST14-09-03

PPM PROJECT NO. 234949-MCAP2

JUNE 30, 2020

PPM CONSULTANTS

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(COST PROPOSAL NO. 32)

FOR

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928 TELEGRAPH ROAD
PRICHARD, ALABAMA

FACILITY I.D. NO. 23413-097-000304
UST INCIDENT NO. UST14-09-03

PREPARED FOR:

CIRCLE K STORES, INC.
25 WEST CEDAR STREET, SUITE 100
PENSACOLA, FLORIDA 32502

PPM PROJECT NO. 234949.MCAP2

JUNE 30, 2020

PREPARED BY:

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TABLE OF CONTENTS

PAGE

CERTIFICATION PAGE IV

UST RELEASE FACT SHEET V

UST SITE CLASSIFICATION SYSTEM VI

1.0 INTRODUCTION 1

2.0 BACKGROUND 1

2.1 Site Location 1
2.2 Site Description 1
2.3 Surrounding Area 2
2.4 Site History 2
2.5 Site Conditions 7
2.5.1 Site Lithology 7
2.5.2 Groundwater 8
2.5.3 COCs in Soil 8
2.5.4 Free Product 8
2.5.5 COCs in Groundwater 8

3.0 REMEDIAL OBJECTIVES 9

4.0 PROPOSED MODIFIED CORRECTIVE ACTION 9

4.1 Corrective Action Overview 9
4.2 Chemical Oxidation 10
4.2.1 Overview of Ozone Sparge 10
4.2.2 Design Considerations 11
4.2.3 Ozone Unit 11
4.2.4 Electrical Components 12
4.2.5 Fail-safe Components 12
4.2.6 Monitoring Components 13
4.3 Sparge Points 13
4.4 Remediation by Natural Attenuation 13
4.4.1 Overview of RNA Approach 14
4.5 Anticipated Site Response 15
4.5.1 Oxidation of COC 15
4.5.2 Remediation by Natural Attenuation 15
4.6 Permits 15
4.7 Installation 16
4.7.1 General 16
4.7.2 Soil Borings 16
4.7.3 Ozone Sparge Point Installation 17
4.7.4 Electrical Hookup 17

TABLE OF CONTENTS (Continued)

PAGE

4.7.5 Sparge Point Configuration 17
4.7.6 Protective Piping 18
4.8 Baseline Groundwater Monitoring 18
4.8.1 Fieldwork Methodology 18

5.0 OZONE SYSTEM STARTUP/INITIAL OPTIMIZATION 19

5.1 System Operations and Maintenance 20
5.1.1 Effectiveness Monitoring 21
5.1.2 Ozone Sparge System Monitoring 21
5.1.3 Groundwater Sampling 21

6.0 REPORTING 22

7.0 CLOSURE EVALUATION 22

8.0 SITE HEALTH AND SAFETY 23

9.0 PROJECT SCHEDULE 23

9.1 Estimated Schedule for System Installation 23
9.2 Estimated Cleanup Time 24

10.0 COST ESTIMATE 24

FIGURES (Appendix A)

Figure 1 – Site Location Map
Figure 2 – Site Map
Figure 3 – Area Map
Figure 4 – Groundwater Elevation Map (March 23, 2020)
Figure 5 – Benzene Concentrations in Groundwater (March 23, 2020)
Figure 6 – MTBE Concentrations in Groundwater (March 23, 2020)
Figure 7 –Napthalene Concentrations in Groundwater (March 23, 2020)
Figure 8 – Proposed Ozone System Layout
Figure 9 – Typical Sparge Point Construction Details

TABLE OF CONTENTS (Continued)

TABLES (Appendix B)

Table 1 – Summary of Groundwater Elevation Survey Data
Table 2 – Summary of Groundwater Analytical Data
Table 3 – Summary of Private Well Analytical Data

APPENDICES

Appendix A – Figures
Appendix B – Tables
Appendix C – Design Calculations
Appendix D – Equipment Manufacturer's Quotation/Specifications
Appendix E – Subcontractor Specifications and Quotation
Appendix F – Technical Sampling and QA/QC Plan
Appendix G – Ozone Unit Monitoring Forms
Appendix H – Site Health and Safety Plan
Appendix I – Cost Proposal No. 32 – MCAP2 / UIC Permit
Appendix J – Cost Proposal No. 33 – Equipment Purchase
Appendix K – Cost Proposal No. 34 – Ozone System Installation and Startup
Appendix L – Cost Proposal No. 35 – First Quarter O&M
Appendix M – Cost Proposal No. 36 – Second Quarter O&M
Appendix N – Cost Proposal No. 37 – Third Quarter O&M

CERTIFICATION PAGE

I certify under penalty of law that this Modified Corrective Action Plan (CAP) for the Circle K Store No. 8261 located at 928 Telegraph Road in Prichard, Alabama, and the plans, specifications, and technical data submitted within were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiring of the person or persons who directly gathered the enclosed information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information.

Rodney M. Kilgore, P.G.
AL No. 1147

July 1, 2020
Date

UST RELEASE FACT SHEET

GENERAL INFORMATION:

SITE NAME: Former Circle K Store No. 8261

ADDRESS: 928 Telegraph Road, Prichard, Alabama

FACILITY I.D. NO.: 23413-097-000304

UST INCIDENT NO.: UST14-09-03

RESULTS OF EXPOSURE ASSESSMENT:

How many private drinking water wells are located within 1,000 ft. of site?	2
How many public water supply wells are located within 1 mile of the site?	0
Have any drinking water supply wells been impacted by contamination from this release?	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, Industrial & Residential

CONTAMINATION DESCRIPTION:

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

Free product present in wells? { } Yes { X } No

Maximum BTEX concentrations measured in soil: All BTEX Concentrations were below detection limits (BDL).

Maximum BTEX or PAH concentrations measured in groundwater: Total BTEX 6.00 mg/L @ MW-9 (June 2018).

ADEM UST Form - 001 (04/22/93)

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 Circle K Store No. 8261
SITE ADDRESS:	928 Telegraph Road
	Prichard, AL
FACILITY I.D. NO.:	23413-097-000304
UST INCIDENT NO.:	UST14-09-03
OWNER NAME:	Circle K Stores, Inc.
OWNER ADDRESS:	25 W. Cedar Street
	Pensacola, FL 32502
NAME & ADDRESS OF PERSON COMPLETING THIS FORM:	Rodney M. Kilgore, P.G. PPM Consultants, Inc.
	30704 Sgt. E.I. "Boots" Thomas Drive
	Spanish Fort, Alabama 36527

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.	☐	☒

CLASSIFICATION	*DESCRIPTION*	*YES*	*NO*
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:

Two private industrial wells are located on the Metals USA property located southeast of the subject property. PW-1 is located approximately 20 feet southeast and PW-2 is located approximately 195 feet southeast of the subject property.

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:	F.2

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

1.0 INTRODUCTION

PPM Consultants, Inc. (PPM) was retained by Circle K Stores, Inc. to prepare a second Modified Corrective Action Plan (MCAP2) for the former Circle K Store No. 8261 facility located at 928 Telegraph Road in Prichard, Mobile County, Alabama. The preparation of the MCAP2 (under Cost Proposal No. 32) was requested by the Alabama Department of Environmental Management (ADEM) in a letter dated February 27, 2020.

The purpose of this MCAP is to provide a plan for facilitating the remediation of soil and groundwater impacted by petroleum hydrocarbons which were released to the subsurface from the former underground storage tank (UST) system. This MCAP provides a summary of environmental activities conducted to date at the facility and a detailed description of the proposed methods of site cleanup.

2.0 BACKGROUND

2.1 SITE LOCATION

The former Circle K Store No. 8261 is located at the southeast corner of the intersection of Telegraph Road and Woodland Avenue in Prichard, Mobile County, Alabama. Geographically, the site is located in Section 44, Township 3 South, Range 1 West at Latitude 30° 44' 38" North and Longitude 88° 4' 7" West on the Mobile, Alabama 7.5 Minute Quadrangle. The site is at an approximate elevation of 33 feet above mean sea level (AMSL), based on nearby elevation contours from the USGS topographic map. The site location is shown in **Figure 1, Site Location Map, Appendix A**.

2.2 SITE DESCRIPTION

The site property occupies an area of approximately 0.40 acres, is somewhat rectangular shaped, and is relatively flat with a gentle slope to the north and west. Currently the site is an active convenience store (A-1 Stop) that is improved with a square shaped 2,750 square foot store building located at the southeast corner of the property. The parking area is paved predominately with concrete and asphalt. The site was formerly a self-serve gas station prior to the UST system being removed in 2014.

The former UST system consisted of three 10,000 gallon USTs containing regular and premium unleaded gasoline (two of the three tanks were manifolded together and considered one 20,000 gallon tank containing regular unleaded gasoline). The USTs were of steel construction with galvanic protection, overfill protection, and leak detection. The product piping was constructed of fiberglass reinforced plastic (FRP). The system was equipped with automatic tank gauging and Statistical Inventory Reconciliation (SIR).

2.3 SURROUNDING AREA

The site is located in a combination commercial, industrial, and residential area of Prichard, Alabama. A vacant lot (north) and Ladd Supply Company (northeast) are located across Woodland Avenue from the site. A metal fabrication facility (Metals, USA) adjoins the site to the east, southeast, and south. Vacant lots are located across Telegraph Road and Woodland Avenue west and northwest of the site. The location of the site improvements and the UST system are shown in **Figure 2, Site Map, Appendix A**. The site and surrounding properties are shown in **Figure 3, Area Map, Appendix A**.

2.4 SITE HISTORY

The Circle K Store No. 8261 is believed to have operated as a gasoline station since 1977 (under various names) when three 10,000 gallon USTs were installed.

In April 1979, Circle K leased the store from the estate of Augustine Meaher, Jr., Augustine Meaher III, and Joseph L. Meaher. Circle K operated the gas station and convenience store from 1979 until September 2011, when the lease was assigned to Rajendra Patel, who has operated the store ever since.

UST Closure Assessment

In June 2014, the UST system was closed by removal by Superior Petroleum Services of Mobile, Alabama. Soil samples were collected by PPM personnel from the perimeter of the UST pit, beneath each UST, and near the former dispensers and analyzed for Total Petroleum Hydrocarbons (TPH). Samples from beneath the western UST and adjacent to the former dispenser island had reported concentrations of TPH that exceeded the 100 part per million (ppm) threshold.

A UST Closure Assessment Report was submitted by PPM to ADEM on July 7, 2014. On October 15, 2014, ADEM issued a Notice of Requirement (NOR) to conduct a Preliminary Investigation.

Preliminary Investigation

Drilling activities for the Preliminary Investigation were conducted in November 2014. Four permanent, groundwater monitoring wells (MW-1 through MW-4) were constructed within soil borings SB-1 through SB-4, respectively.

Concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and naphthalene were below detection limits (BDL) in all soil samples. Soil methyl tertiary butyl ether (MTBE) concentrations exceeded the ADEM Initial Screening Level (ISL) of 0.00862 milligrams per kilogram (mg/kg) in samples SB-1/S-5 (0.038 mg/kg) and SB-4/S-5 (0.051 mg/kg). Both samples were collected from the 24 to 26 foot interval in each respective boring.

Benzene concentrations in groundwater exceeded the ADEM ISL of 0.005 milligrams per liter (mg/L) at MW-1 (0.0082 mg/L) and MW-2 (0.013 mg/L).

MTBE concentrations exceeded the ADEM ISL of 0.02 mg/L in samples collected from monitoring wells MW-1 (0.16 mg/L) and MW-2 (0.0126 mg/L). Groundwater flow direction was to the northeast.

In the review letter for the Preliminary Investigation, dated March 19, 2015, ADEM requested a workplan and cost proposals to conduct two quarterly groundwater monitoring events, which were submitted on April 21, 2015. The workplan and Cost Proposals No. 3 and 4 were approved on June 5, 2015.

Groundwater Monitoring

PPM conducted the first approved Groundwater Monitoring Event on August 27, 2015. Benzene concentrations in groundwater exceeded the ADEM ISL of 0.005 mg/L in samples collected from MW-1 (0.17 mg/L) and MW-2 (0.16 mg/L). Groundwater MTBE concentrations exceeded the ADEM ISL of 0.02 mg/L at MW-1 (4.90 mg/L) and MW-2 (0.026 mg/L). Naphthalene concentrations were below the ADEM ISL of 0.02 mg/L in all samples except MW-1 (0.21 mg/L). Groundwater flow was toward the northeast.

PPM conducted the second approved groundwater monitoring event on November 24, 2015. Benzene concentrations in groundwater exceeded the ADEM ISL of 0.005 mg/L in samples from MW-1 (0.076 mg/L) and MW-2 (0.081 mg/L). MTBE concentrations in groundwater exceeded the ADEM ISL of 0.02 mg/L in samples MW-1 (2.80 mg/L), MW-2 (0.022 mg/L), and MW-4 (0.025 mg/L). Naphthalene concentrations in groundwater exceeded ADEM ISL of 0.02 mg/L in MW-1 (0.17 mg/L). Groundwater flow was towards the northeast.

Secondary Investigation

In February 2016, PPM conducted a Secondary Investigation at the site to delineate the horizontal extent of the release of petroleum products. Soil borings SB-5 through SB-10 were advanced for the purpose of collecting soil and geotechnical samples and for the installation of shallow monitoring wells MW-5 through MW-9, with the exception of SB-10 which was converted to a Type III monitoring well (DW-1).

Concentrations of BTEX, MTBE, and naphthalene in soil were BDL in all samples collected.

Groundwater samples for the Secondary Investigation were collected on March 10, 2016. Benzene concentrations in groundwater exceeded the ADEM ISL of 0.005 mg/L in samples collected from monitoring wells MW-1 (0.025 mg/L), MW-2 (0.078 mg/L), MW-4 (0.0061 mg/L), MW-8 (0.056 mg/L), and MW-9 (0.31 mg/L).

Concentrations of toluene, ethylbenzene, and total xylenes in groundwater samples collected were either BDL or below the respective ADEM ISL.

Concentrations of MTBE in groundwater exceeded the ADEM ISL of 0.02 mg/L in samples collected from monitoring wells MW-1 (1.2 mg/L), MW-2 (0.037 mg/L), MW-4 (0.052 mg/L), and MW-8 (4.5 mg/L).

Concentrations of naphthalene in groundwater exceeded the ADEM ISL of 0.02 mg/L in samples collected from monitoring wells MW-1 (0.037 mg/L) and MW-8 (0.055 mg/L).

PPM recommended an Additional Secondary Investigation in order to horizontally delineate the petroleum hydrocarbon plume. The workplan and Cost Proposal No. 5 were submitted to ADEM on August 29, 2016 and approved on September 14, 2016.

Additional Secondary Investigation

PPM conducted an Additional Secondary Investigation in November 2016. Four Soil borings (SB-11 through SB-14) were advanced on the adjacent Metals USA property for the purpose of installing four groundwater monitoring wells (MW-10 through MW-13). Soil and groundwater samples, along with samples from two private water wells located on the Metals USA property were collected for analysis.

BTEX, MTBE, and naphthalene concentrations were BDL in all soil and groundwater sampled from the newly installed wells. Groundwater benzene concentration exceeding Site Specific Corrective Action Limits (SSCAL) were reported in samples collected from MW-1, MW-2, MW-8, and MW-9. MTBE concentrations exceeding SSCALs were reported in MW-1, MW-2, MW-4, and MW-8 and naphthalene concentrations exceeded SSCALs in MW-1, MW-2, MW-8, and MW-9. COC concentrations in the two samples collected from the private wells were all BDL except for minor detections of chloroform.

Risk Assessment

As approved by ADEM in a letter dated September 14, 2016, an Alabama Risk Based Corrective Action (ARBCA) Evaluation to establish SSCALs for the site were performed by PPM in February 2017. The proposed SSCALs for the site were approved by ADEM in a letter dated February 15, 2017.

SSCALS				
CHEMICALS OF CONCERN	**SOURCE WELL MW-1**	**COMPLIANCE WELL MW-2**	**COMPLIANCE WELL MW-3**	**COMPLIANCE WELL MW-4**
Benzene	0.153	0.153	0.153	0.153
Toluene	3.07	3.07	3.07	3.07
Ethyl-benzene	2.15	2.15	2.15	2.15
Xylenes	30.7	30.7	30.7	30.7
MTBE	0.0613	0.0613	0.0613	0.0613
Naphthalene	0.0613	0.0613	0.0613	0.0613
CHEMICALS OF CONCERN	**COMPLIANCE WELL MW-5**	**COMPLIANCE WELL MW-6**	**COMPLIANCE WELL MW-7**	**COMPLIANCE WELL MW-8**
Benzene	0.00761	0.00745	*0.00435*	0.00702
Toluene	1.52	1.49	*0.87*	1.40
Ethyl-benzene	1.06	1.04	*0.609*	0.983
Xylenes	15.2	14.9	*8.70*	14
MTBE	0.0304	0.0298	*0.0174*	0.0281
Naphthalene	0.0304	0.0298	*0.0174*	0.0281

CHEMICALS OF CONCERN	COMPLIANCE WELL MW-9	COMPLIANCE WELL MW-10	COMPLIANCE WELL MW-11	COMPLIANCE WELL MW-12
Benzene	0.00808	*0.0021*	*0.00248*	*0.00352*
Toluene	1.62	*0.419*	*0.496*	*0.703*
Ethyl-benzene	1.13	*0.294*	*0.347*	*0.492*
Xylenes	16.2	*4.19*	*4.96*	*7.03*
MTBE	0.0323	*0.00839*	*0.00993*	*0.0141*
Naphthalene	0.0323	*0.00839*	*0.00993*	*0.0141*
CHEMICALS OF CONCERN	**COMPLIANCE WELL MW-13**	**COMPLIANCE WELL DW-1**	**ADEM Initial Screening Levels (ISL)**	
Benzene	0.0059	0.005	0.005	
Toluene	1.18	1.0	1.0	
Ethyl-benzene	0.826	0.70	0.70	
Xylenes	11.8	10	10	
MTBE	0.0236	0.02	0.02	
Naphthalene	0.0236	0.02	0.02	

Calculated SSCALs in Italics are lower than ADEM ISLs and therefore will default to ISLs

Corrective Action Plan Evaluation and Development

In February 2017, PPM submitted a Corrective Action Plan (CAP) Evaluation Report to ADEM recommending the installation of an ozone sparge system at the site.

Additional Groundwater Monitoring

PPM conducted four quarterly groundwater monitoring events during 2017 (March 28, June 22, September 22, and December 12, 2017). Chemicals of concern (COC) exceeding SSCALs were reported in samples collected from monitoring wells MW-1, MW-2, MW-8, and MW-9.

Sentry Well Installation

In August 2017 per ADEM's request, PPM oversaw the installation of "sentry" monitoring well MW-14 to be located halfway between MW-9 and the offsite private well PW-1. Initial soil and groundwater samples collected during the installation were either BDL or below SSCALs.

Corrective Action Plan Evaluation and Development

Based on ADEM review of a CAP Evaluation Report submitted by PPM on February 24, 2017, ADEM requested in a letter dated March 3, 2017, a CAP to install an ozone unit. PPM submitted the CAP on July 28, 2017. In a letter dated August 29, 2017, ADEM denied the ozone CAP and groundwater monitoring continued under approved Cost Proposal numbers 8 and 9.

In a letter dated November 17, 2017, ADEM requested cost proposals to conduct monthly 8-hour mobile enhanced multi-phase extraction (MEME) events followed by quarterly groundwater monitoring.

MEME and Groundwater Monitoring

In January 2018, PPM initiated monthly 8-hour MEME events with quarterly groundwater monitoring based on COCs exceeded SSCALs at MW-1, MW-8, and MW-9.

Modified Corrective Action Plan and Extraction Well Installation

In their review of the October 25, 2018 MEME/Groundwater Monitoring report, ADEM requested that a Modified CAP (MCAP) be submitted to continue monthly MEME with quarterly groundwater monitoring, along with the installation of two 4-inch diameter groundwater extraction wells, along the south and east walls of the store building. The MCAP was submitted on December 5, 2018 and approved on December 17, 2018. The extraction wells (EW-1 and EW-2) were installed in January 2019.

In their February 27, 2020 review of the January 2020 MEME/Groundwater Monitoring Report, ADEM requested a second MCAP utilizing ozone as a remedial method.

2.5 SITE CONDITIONS

2.5.1 Site Lithology

Subsurface lithology was identified from visual inspection of soils encountered during the advancement of soil borings at the site. Sand (SP), Clayey Sand (SC), Sandy Clay (CL), and Clay (CH) were predominant at the site.

2.5.2 Groundwater

Saturated soils have ranged from 24 to 30 feet below ground surface (BGS) during five subsurface investigations (monitoring/extraction well installations) that have been conducted at the site. During the most recent groundwater sampling event on March 23, 2020, the depth to groundwater ranged from 24.15 feet below top of casing (BTOC) in MW-5 to 26.12 feet BTOC in MW-14. Groundwater elevations measured during the groundwater sampling event ranged from 9.68 feet AMSL at MW-2 to 12.02 feet AMSL at MW-6. Groundwater flow direction was toward a hydrologic low area at MW-2, with a hydraulic gradient of approximately 0.03 between MW-6 and MW-2. Groundwater flow direction is shown in **Figure 4, Groundwater Elevation Map (March 23, 2020), Appendix A**. Groundwater elevation survey data from this and previous sampling events are included in **Table 1, Summary of Groundwater Elevation Survey Data, Appendix B**.

2.5.3 COCs in Soil

A total of 30 soil samples have been submitted for laboratory analysis of BTEX, MTBE, and naphthalene per Environmental Protection Agency (EPA) Test Method 8260B. Analytical results of 30 soil samples for BTEX, MTBE, and naphthalene indicated that two soil samples (SB-1/S-5 and SB-4/S-5) exceeded the ADEM ISL for MTBE. None of the soils samples had reported COCs exceeding the SSCALs for Source Soils.

2.5.4 Free Product

Free product has not been encountered in any of the monitoring wells associated with the site.

2.5.5 COCs in Groundwater

Analytical results of the most recent sampling event conducted on March 23, 2020 indicated the benzene concentration at Point of Compliance (POC) well MW-9 (0.097 mg/L) exceeded its SSCAL of 0.00808 mg/L. Benzene concentrations in groundwater samples collected from the remaining wells were below their respective SSCALs. Historically, benzene concentrations have exceeded SSCALs at Source Wells MW-1 and MW-2, and at POC wells MW-8, EW-1, and EW-2. Benzene concentrations are shown in **Figure 5, Benzene Concentrations in Groundwater (March 23, 2020), Appendix A**.

Toluene, ethylbenzene and total xylene concentrations in groundwater were either BDL or below the respective SSCALs in all samples collected.

Groundwater MTBE concentrations at Source Well MW-1 (0.71 mg/L) and POC wells MW-8 (0.74 mg/L), and EW-1 (0.23 mg/L) exceeded their respective SSCALs of 0.0613 mg/L, 0.028 mg/L, and 0.0323 mg/L. MTBE concentrations are shown in **Figure 6, MTBE Concentrations in Groundwater (March 23, 2020), Appendix A**.

Concentrations of naphthalene in groundwater were either BDL or below their respective SSCALs in all groundwater samples. Naphthalene concentrations are shown in **Figure 7, Naphthalene Concentrations in Groundwater (March 23, 2020), Appendix A**.

A detectible concentration of chloroform (0.0008 mg/L) was reported in the analytical result from the sample collected from private well PW-1 but was below the EPA Regional Screening Level (RSL) of 0.08 mg/L.

Groundwater analytical results from the groundwater monitoring on March 23, 2020 are summarized in **Table 2, Summary of Groundwater Analytical Data, Appendix B**. Analytical results from the private wells are summarized in **Table 3, Summary of Private Well Analytical Data, Appendix B**.

3.0 REMEDIAL OBJECTIVES

This MCAP2 has been prepared to achieve the following objectives:

- Reduce the concentrations of COCs in the groundwater to below SSCALs; and
- Accomplish site objectives in a safe, timely, and cost-effective manner.

4.0 PROPOSED MODIFIED CORRECTIVE ACTION

4.1 CORRECTIVE ACTION OVERVIEW

Ozone sparging combined with enhanced bioremediation, is proposed as the most viable approach for obtaining site objectives. This approach should be effective in reducing COC concentrations on site and thus mitigating the potential for further off-site impact.

The first phase of corrective action should consist of ozone sparge techniques to provide COC mass reduction. The second phase of corrective action should consist of Remediation by Natural Attenuation (RNA). This second phase is intended to address dissolved COC concentrations that may be at or near the SSCALs but do not warrant further ozone sparge efforts.

The most recent groundwater monitoring event can serve as a baseline event to provide site conditions prior to initiating ozone sparging at the site. Subsequent groundwater monitoring events can be used to assess the overall effectiveness of the remedial approach and to aid in selecting the future course of actions at the site. The following provides a description of the proposed corrective actions and associated effectiveness monitoring.

4.2 CHEMICAL OXIDATION

In-situ chemical oxidation can be used to reduce contaminant mass present in the subsurface by altering the contaminant's chemical structure into either readily degradable substances or less harmful, inert substances. PPM recommends that ozone sparging be used at on-site locations to decrease COC concentrations in soil and groundwater to below SSCALs.

4.2.1 Overview of Ozone Sparge

Ozone (O_3) is an allotrope of oxygen, consisting of three oxygen atoms that are less stable than diatomic oxygen (O_2). Ozone is more soluble than oxygen in water and is commonly used in municipal water treatment applications for disinfectant purposes. However, the use of ozone for soil and groundwater remediation projects has increased over the last several years as alternative remedial methods have been pursued and the technology has subsequently evolved.

In general, ozone based processes for site remediation are similar to other chemical oxidation techniques in which the oxidant of choice is injected into the desired treatment area. However, the use of ozone is different from most oxidation processes as the ozone can be injected as a gas or liquid (as ozonated water). This approach provides the opportunity to deliver more continuous oxidation as opposed to batch applications typically associated with other techniques.

An ozone generator uses electrical current to convert O_2 (readily available in atmospheric air) to O_3. A compressor is then used to sparge the ozone into the subsurface using one or more sparge points. Although ozone gas is typically sparged into the water table for

groundwater remediation, it can be sparged into the vadose zone for soil treatment. Once delivered to the subsurface, the ozone facilitates deconstruction of COC molecules and other oxidizable substances. As an added benefit, the reaction results in the release of oxygen that is beneficial in producing conditions that are conducive to aerobic degradation of select contaminants.

4.2.2 Design Considerations

A remedial approach that should achieve site objectives in a cost effective and timely manner has been selected. The area chosen for treatment extends east from monitoring well MW-1 to MW-8 and south from the north side of the store building to the south property line (MW-9 and EW-1), which comprises an area where groundwater samples have exhibited concentrations of COCs exceeding SSCALs.

One of the most important aspects of any chemical oxidation program is providing adequate contact with the substance to be oxidized. Typically, most applications deliver the oxidant throughout the area of impact in an effort to provide a greater amount of destruction. Sparge points are strategically placed across the area of impact to provide overlap of the oxidant injections.

PPM used existing COC concentration data to estimate the volume of contaminants requiring treatment. In addition, consideration was also given to other oxidizable materials known or suspected to be present in the subsurface. A site oxidant demand was then estimated using this information. Based on the estimated oxidant demand, an ozone sparge system was selected that should be capable of producing a sufficient mass of ozone per day such that site objectives could be achieved within a reasonable time frame. A summary of these calculations is provided in **Appendix C, Design Calculations**.

PPM proposes to conduct groundwater sampling events prior to and on a quarterly basis after system start up. Groundwater sampling methodology and recommended sampling frequency are discussed further in **Section 4.8**. Based on the results of these events, the decision will be made to continue with ozone sparge or proceed with a RNA approach.

4.2.3 Ozone Unit

Based on availability, PPM recommends that an H2O Model No. MOSU20-104 trailer mounted ozone unit be used at the site. The unit is capable of producing up to 5.5 pounds per day (ppd) of ozone for remedial efforts. The ozone delivery pump can sparge ozone at

a rate of 3.5 standard cubic feet per minute (scfm) at 90 pounds per square inch (psi) for up to 20 ozone sparge points simultaneously. Maximum delivery capacity is rated at approximately 3.8 cfm at 20 psi.

The unit has a field programmable controller with an interface panel viewer. Independent time duration control for each sparge point is available ranging from 1 to 99 minutes per location. A programmable cycle lag time is used to control the time duration between each sparge cycle.

A copy of the equipment manufacturer's quotes and specifications are attached in **Appendix D, Equipment Manufacturer's Quotation/Specifications**. The quote for installation services is included in **Appendix E, Subcontractor Specifications and Quotation**.

System components that are in contact with ozone are manufactured of ozone resistant material to maintain acceptable runtime during the project. Components can be easily replaced during maintenance intervals recommended by the equipment manufacturer. More detailed information regarding the unit is provided in **Appendix D**.

4.2.4 Electrical Components

External and internal electrical equipment will meet or exceed local, state, and federal code pertaining to design and installation requirements. The unit utilizes single-phase, 240-volt power.

4.2.5 Fail-safe Components

The unit is provided with a fail-safe automatic shutdown device to stop ozone production/sparging in the event that an ozone leak is detected within the unit. The built in ambient ozone sensor can be set for system shutdown if ozone is detected at concentrations from 0.1 parts per million (ppm) to 1.0 ppm. In addition, a built in high limit pressure switch and pressure relief valve is provided to protect against equipment damage.

Although it is anticipated that ozone sparged into the subsurface will be depleted during the oxidation process, it is possible that some residual ozone may remain after the oxidant demand has been met. If this should occur, ozone escape is not anticipated to be an issue for outdoor inhalation or indoor inhalation within surface structures, primarily due to dilution effects with ambient air. Furthermore, no basements or crawl spaces are located within close proximity of the proposed treatment area.

4.2.6 Monitoring Components

Individual and total sparge time accumulators will monitor the duration of ozone sparge. A pressure gauge will be located at the unit such that the discharge pressure can be monitored visually and by the data logger. Pressure gauges will be installed at the well heads for each sparge point that will enable site personnel to evaluate if an acceptable pressure distribution is present across the treatment area.

4.3 SPARGE POINTS

PPM recommends that ozone be applied to the subsurface by means of ten sparge points strategically placed on the property. Each sparge point will be installed during system installation activities. Ozone sparge at these locations should achieve an overall decrease of COC concentrations within the vicinity of each sparge point. An ozone sparge pilot test study was not conducted. However, based on experience on sites with similar lithologies, a conservative estimation of 12.5 feet was chosen as the design radius of influence. The placement of the proposed sparge points is provided in **Figure 8, Proposed Ozone System Layout, Appendix A**.

Existing monitoring wells will be used to monitor site response and to serve as locations for measuring pressure gradients once the system is operational. Should the radius of influence from these sparge points be deemed insufficient to contact the majority of COC impact over time, additional sparge points may be added as needed.

For costing purposes, it is assumed that ten proposed sparge points will be constructed to a depth of approximately 30 feet BGS. The intent of these completion depths is to sparge ozone into the upper extent of the saturated zone. Actual depths may vary slightly during system installation depending on site conditions encountered.

4.4 REMEDIATION BY NATURAL ATTENUATION

Natural attenuation is a term applied to the natural processes that help reduce contaminant concentrations and, in some cases, reduce the potential for contaminant migration. There are multiple components that comprise natural attenuation including: biodegradation; sorption; dispersion and dilution; and volatilization. Biodegradation is often considered the most important component of RNA as it results in chemical changes to the contaminant often rendering it less harmful to the environment.

RNA is typically not considered for sites with elevated contaminant concentrations or free product, as it typically does not achieve site objectives within a reasonable time frame. However, RNA is often selected for sites with low to moderate impact that show indications that it may be effective. In addition, RNA may be used in conjunction with other remedial methods that address contaminant source control.

4.4.1 Overview of RNA Approach

If dissolved COC concentrations appear to be stable and are at or just below SSCALs, a RNA monitoring program may be implemented at the site. It is anticipated that ozone sparge will not only reduce the overall contaminant mass, but will also create conditions conducive to increased microbial activity. If so, a RNA monitoring program may be necessary to ensure that active remediation is no longer warranted at the site.

There are multiple secondary approaches for monitoring RNA effectiveness including estimating a first order rate of attenuation and measuring select water quality parameters. PPM will use both methods to evaluate the overall effectiveness of RNA. However, the stable and/or decreasing trends of dissolved COC concentrations will be the primary gauge of RNA effectiveness.

A first order rate of attenuation constant will be estimated for select wells in general accordance with the U.S. EPA publication entitled "Calculation and Use of First-Order Rate Constants for Monitored Natural Attenuation Studies" (November 2002). The following formula will be used to estimate the approximate time frame required to achieve SSCALs through use of natural attenuation:

$$t = \frac{-Ln\left[\frac{C_{goal}}{C_{start}}\right]}{K_{pont}}$$

Where:

t	=	time, yrs
C_{-goal}	=	desired COC concentration, ppm
C_{-start}	=	initial COC concentration, ppm
k_{point}	=	time rate constant

The initial C-start concentration will be the COC concentrations observed shortly after the ozone sparge has been discontinued at the site.

Select water quality parameters [pH, temperature, specific conductance, oxidation reduction potential (ORP), and dissolved oxygen etc.] will also be monitored during the RNA groundwater monitoring events. In addition, select wells may be sampled for nitrate, manganese, iron, and sulfate to further assess the aerobic condition of the aquifer.

4.5 ANTICIPATED SITE RESPONSE

The following provides information regarding the anticipated site response to treatment based on actual and assumed site conditions.

4.5.1 Oxidation of COC

Ozone sparged into the subsurface should rapidly react with oxidizable substances that it contacts with, essentially deconstructing the molecules in a short time period. An important factor in this process is providing an adequate mass of ozone based on the oxidant demand. The actual oxidant demand for the site is unknown, but has been estimated using the assumptions outlined in **Appendix C**. Multiple sparge points are proposed to provide sufficient contact in the treatment area.

4.5.2 Remediation by Natural Attenuation

The final phase of effectiveness monitoring will be initiated once active remediation efforts have ceased at the site. Anticipated site response to RNA cannot be adequately predicted at this time, as it is unknown what site conditions will be upon completion of the active remediation efforts. However, efforts will be made to obtain site remedial objectives within approximately ten months of implementing corrective action activities outlined in this MCAP2.

4.6 PERMITS

An underground injection control (UIC) permit application and applicable fee will be submitted to ADEM. The installation of the ozone system will begin after the UIC permit has been obtained.

4.7 INSTALLATION

4.7.1 General

The ozone unit is proposed to be located within a fence enclosure generally east of the store building. The primary reasons for selecting this area are surface area usage, locations of utilities, security, and minimal pedestrian and vehicular traffic. The proposed location of the unit is shown in **Figure 8, Appendix A**.

Installation dates will be based on the approval date of this MCAP2 by ADEM, the approval of the UIC permit, equipment availability, and subcontractor scheduling. Initial installation activities will consist of the following:

- Installation of ten borings using hollow stem augers (HSA)
- Construction of ten ozone sparge points (SP-1 through SP-10)
- Installation of protective piping and ozone delivery tubing from sparge points SP-1 through SP-10 to the ozone system location
- Mobilization of the ozone unit to the site
- Installation of required electrical power supply equipment and lines
- Preliminary testing of the ozone system.

4.7.2 Soil Borings

The first 4 feet of each boring will be advanced with hand-held equipment to check for the presence of unmarked utilities. The hand-held equipment will be cleaned prior to use at each boring location by means of a phosphate free soap rinse, an isopropyl alcohol rinse, and a rinse of distilled water. Rinse fluids will not be contained but will be allowed to fall to the land surface in an area that provides drainage away from the respective boring location.

The borings for the proposed sparge points will be advanced with HSA equipment using a minimum of 2.25 inside diameter (I.D.) rods. Borings will be advanced to depths of approximately 30 feet BGS. Down-hole equipment will be cleaned prior to use at each location with a high-pressure steam rinse. Soil cuttings generated during boring advancement will be transported to a local landfill.

4.7.3 Ozone Sparge Point Installation

Ozone sparge points will be constructed of 1-inch I.D. Schedule (SCH) 80 polyvinyl chloride (PVC) risers extending from just below the land surface to approximately 18 inches above the bottom of the boring. A 1.5-inch outside diameter (O.D.) oxidation point approximately 18 inches long will be connected to the bottom of the solid riser. The risers and oxidation points will be joined using threaded, flush joint connections complete with ozone-resistant fittings.

Well-graded sand will be placed in the boring annulus for each proposed sparge point from the bottom of the boring to at least 2 feet above the top of the oxidation point. A bentonite seal approximately 1 to 2 feet thick will be constructed at the top of the sand pack. A cement/bentonite grout will be placed above the bentonite seal to within approximately 1 foot BGS. The bentonite seal and grout are intended to reduce the potential for ozone escaping up the boring and to the land surface.

Each proposed sparge point will be set within a 12-inch diameter steel manhole cover and surrounded by a concrete pad. The larger diameter manhole cover is necessary to facilitate easy access to the well head connections. The manhole covers will extend slightly above the existing land surface in an effort to reduce the potential for inflow from the land surface. Each sparge point will be completed with a well head connection that will facilitate ozone delivery and measurement of sparge pressures.

A quote from Walker Hill Environmental, Inc. to install of the system are provided in **Appendix E**.

4.7.4 Electrical Hookup

A certified electrical subcontractor will provide the connection from the service provider to the system. Electrical work will be performed in accordance with applicable federal, state, and local codes.

4.7.5 Sparge Point Configuration

Ten sparge points will be utilized for soil and groundwater remediation efforts. Each location has been strategically placed such that remedial objectives can be obtained within a reasonable time period.

The areas selected for treatment at the site are focused in and around the source of COC impact and in the downgradient portion of impact. Placement of sparge points is intended to reduce existing COC impact in these areas and reduce the potential for further COC migration.

Sparge point specifications will consist of the following:

- Installation of a 12-inch diameter x 12-inch deep manhole cover at each proposed sparge point
- Installation of a well head connection including a SCH 80 flush threaded cap, a type 316 stainless steel tee, and a compression fitting.
- Connection of the delivery tubing to the well head via the compression fitting
- Installation of 1-inch I.D., SCH 40 PVC piping to serve as conduit for the ozone tubing to extend from the manhole to the ozone unit.

Typical construction details of sparge points are presented in **Figure 9, Typical Sparge Point Construction Details, Appendix A**.

4.7.6 Protective Piping

Ozone resistant tubing (1/2-inch O.D. by 3/8-inch I.D.) will be used to convey the ozone from the system to each sparge point. The tubing for each sparge point will be placed inside 1-inch I.D. SCH 40 PVC for protection. The piping will be installed to a depth of approximately 12 inches BGS. Efforts will be made to ensure that the piping does not interfere with existing underground utilities.

4.8 BASELINE GROUNDWATER MONITORING

Currently, PPM is conducting quarterly groundwater sampling at the site. Analytical results of the most recent sampling event to date prior to startup of the ozone system will be used to establish baseline conditions prior to initiating corrective actions. The following provides a detailed description of the fieldwork methodology and groundwater sampling events for this MCAP.

4.8.1 Fieldwork Methodology

A groundwater elevation survey will be performed prior to sampling the wells. Depth to groundwater measurements will be accomplished at each well location to be sampled with

an oil/water interface probe capable of measuring the water depth to within +/- 0.01 feet. The interface probe will be cleaned prior to use at each well location by means of a phosphate free soap rinse, an isopropyl rinse, and a rinse of distilled water. Rinse fluids will be discharged to the land surface in areas that do not drain back to the respective well locations.

Each selected monitoring well (along with the two offsite private wells) will then be sampled in general accordance with PPM's internal Quality Assurance/Quality Control (QA/QC) plan. Prior to sampling, each well will be purged of approximately three well-casing volumes (or to near dryness) utilizing single use, disposable PVC bailers and nylon rope. Purge water from the monitoring wells will be placed in a 55-gallon drum then transported to PPMs office in Spanish Fort, Alabama. The contents of the drum will then be disposed of by Erwin Remediation Inc.

Each sample for COC analysis will be transferred from the bailer into 40-milliliter (ml) glass vials containing HCl as a preservative. Each container will be filled with the sample, promptly capped, and appropriately labeled to indicate the sample origin. A duplicate sample from one well will be collected for QA/QC protocol. Containers will then be placed in an iced cooler for preservation during shipment to the laboratory.

PPM personnel will wear disposable nitrile gloves during well purge and sample collection activities in an effort to reduce the potential for cross-contamination and as part of personal protective equipment (PPE) for the project. Gloves will be changed and discarded between each sample acquisition.

Select water quality parameters (pH, temperature, specific conductance, ORP, and dissolved oxygen) will be measured during sample collection. Measurements will be performed for each well sampled and will be representative of the water collected from the well. Instrument readings will be documented in the project field book.

Upon completion of sampling activities, sample coolers will be transported or shipped under standard chain-of-custody protocol to an independent testing laboratory for analyses. A copy of PPM's **Technical Sampling and QA/QC Plan** is provided in **Appendix F**.

5.0 OZONE SYSTEM STARTUP/INITIAL OPTIMIZATION

PPM personnel will be on site during system startup and initial operation. System components will be monitored to ensure that the system is operating properly prior to their departure from the site. During the first day of operation, air will gradually be applied to the

various sparge points. Connections, piping, and well heads will be checked for the presence of leaks and modifications/repairs will be made upon discovery. Data will be collected to evaluate the initial pressure gradient generated throughout the sparge areas and fluctuations in groundwater elevations (if any). The initial startup period is anticipated to be completed in approximately two days. Once it appears the system is operating as intended, ozone will then be sparged into the subsurface.

This information will be collected and recorded, on a daily basis during the first two days of the optimization study and twice during the following four weeks. These measurements will be used to perform modifications and adjustments to the system as needed to enhance the remedial efforts.

5.1 SYSTEM OPERATIONS AND MAINTENANCE

Following completion of the optimization study, PPM will periodically visit the site to conduct Operations and Maintenance (O&M) and monitoring activities. These activities will be conducted by a PPM engineer, geologist, or technician experienced in subsurface investigations and remediation.

PPM anticipates visiting the site approximately two times per month during normal system operation. Additional visits may be required based on site-specific conditions encountered. O&M and monitoring activities to be conducted during these routine visits are discussed in the following sections.

Normal operations will include O&M of the system and continuing optimization of system performance as needed. Scheduled visits will be made to maintain the system components and ensure the system is operating as intended. Minor system components will be regularly inspected and replaced or repaired as required. If a shutdown of the system occurs, PPM will attempt to provide personnel to restart/repair the system within 72 hours of receiving notification of shutdown.

Typical O&M activities will include the following:

- Visual inspection of system components and their condition (including pipe connections for potential leaks)
- Monitoring of pressure levels at the unit and each sparge point
- Monitoring of sparge times
- Inspection of ambient ozone monitor to ensure proper working condition.

5.1.1 Effectiveness Monitoring

The progress of corrective action activities will be monitored to evaluate if the remedial objectives are being met. Results from baseline groundwater sampling will be used to gauge the progress of groundwater remediation efforts.

5.1.2 Ozone Sparge System Monitoring

System monitoring will include routine measurement of parameters discussed in **Section 5.1** and will coincide with O&M activities. Additional parameters to be measured, recorded, or calculated during the routine activities are as follows:

- Date of each site visit
- Measuring groundwater elevations in select monitoring wells (minimum of once per month)
- Total system runtime and explanations of unscheduled shutdowns
- O&M activities and system condition
- Progress of the remedial system toward achieving site cleanup objectives.

An example of a monitoring form to be used is included in **Appendix G, Ozone Unit Monitoring Forms**.

5.1.3 Groundwater Sampling

PPM recommends groundwater samples be collected from all monitoring wells on a quarterly basis thereafter while the system is in operation. Groundwater samples will be analyzed for COCs per EPA Method 8260, while samples collected from the two offsite private wells will be sampled for volatile organic compounds (VOC) per EPA Method 524.2. Analytical data obtained during these events will be evaluated to ascertain if modifications to the ozone sparge program are warranted. This may include adjusting the ozone sparge cycle time or modifying the number of sparge points used.

The system will be shut down approximately 24 to 48 hours in advance of each scheduled monitoring event. Sampling activities will be conducted in accordance with the methodology outlined in **Section 4.8.1**.

6.0 REPORTING

PPM will submit reports in accordance with ADEM requirements. These reports will include:

1. System Delivery

   A system delivery letter will be submitted to ADEM within ten days of system delivery to the site.

2. Start-up Notification

   This letter report will provide start-up notification within 15 days of system start-up.

3. Report of Corrective Action Implementation

   This report will be submitted within 60 days of system startup. This report will include as-built drawings of the system and analytical results of the baseline sampling event.

4. Reporting of Corrective Action Effectiveness

   PPM proposes to submit quarterly progress reports, which summarize field activities and progress of the system toward reducing COC concentrations to below SSCALs. These reports will include an evaluation of the system effectiveness, and recommendations concerning any additional modifications or change in remedial approaches that may be necessary. ADEM Corrective Action System Effectiveness Monitoring Report (CASEMR) forms will be included with each report.

5. Request for Cessation of Corrective Action (Closure Evaluation)

   This report will include data that shows that remediation goals or asymptotic levels have been achieved. A separate cost proposal will be submitted for this work.

6. Site Closure Report

   This report will describe in detail the closure of the site and removal of all remediation equipment. A separate cost proposal will be submitted for this work.

7.0 CLOSURE EVALUATION

The data collected during site monitoring activities will be evaluated on a quarterly basis or more frequently if needed. Criteria for considering termination of remedial activities will include reduction of COC concentrations to at or below SSCALs or a determination that asymptotic levels have been reached.

Remedial measures will be terminated following approval from ADEM. The site will be monitored for potential increases in COC concentrations (rebound) once corrective actions have ceased. Recommendations will be made concerning further remedial action should COC concentrations rebound.

8.0 SITE HEALTH AND SAFETY

A site-specific Health and Safety Plan (HASP) for proposed corrective action activities at the facility is included in **Appendix H, Site Health and Safety Plan**. The HASP was specifically designed to address the proposed corrective actions and monitoring activities at the site. Project personnel will be familiar with the HASP prior to performing any work at the site. The HASP will be kept on site throughout the duration of the project.

9.0 PROJECT SCHEDULE

PPM will notify ADEM five days in advance of any planned drilling, trenching, system installation, or startup activities to allow department personnel the opportunity to visit the site during work activities if possible. If rescheduling is necessary, PPM will notify ADEM by telephone of the new date and reason for rescheduling.

9.1 ESTIMATED SCHEDULE FOR SYSTEM INSTALLATION

PPM estimates that site preparation/system installation activities will require approximately three weeks to complete pending site and weather conditions encountered. System offloading and connection activities will likely require two days to complete pending adequate response time from local utility personnel.

System start-up activities will require approximately two days for adequate system monitoring prior to departing from the site. A site visit will be conducted approximately one week following start-up activities to further optimize system operation. Based on this anticipated schedule, PPM estimates that system installation, start up, and initial optimization efforts can be completed within 35 days of initiating site activities.

9.2 ESTIMATED CLEANUP TIME

Although the length of time required to obtain cleanup objectives cannot be accurately predicted, it is anticipated that the ozone system will be operated for approximately twelve months. This time frame is based on several factors including, but not limited to: estimated mass of COC in soil and groundwater; estimated mass of oxidizable substances in the subsurface (non COC material); estimated radii of influence for sparge points; estimated ozone delivery rate from the system; and estimated system runtime. A summary of design calculations, including estimated cleanup time, is provided in **Appendix D**. It is noted that this is a theoretical estimate only and the actual cleanup time can be expected to vary from that predicted.

A more accurate prediction of cleanup time will be provided once the system has been in operation long enough to establish trends for dissolved COC concentrations during system operation.

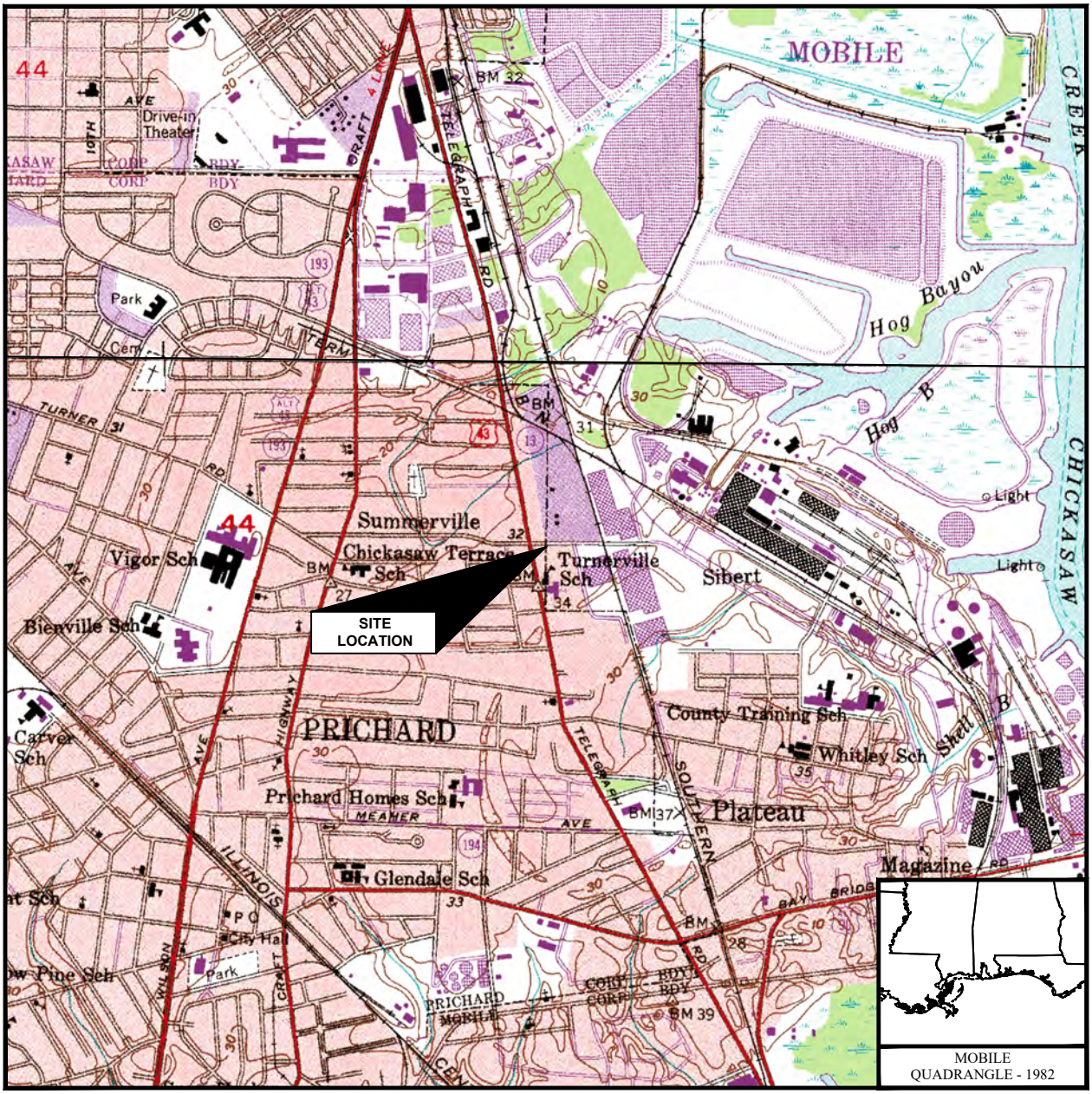
10.0 COST ESTIMATE

Cost proposals for completion of the activities associated with implementation of the MCAP are included as follows:

- **Appendix I – Cost Proposal No. 32 – MCAP2 / UIC Permit**
- **Appendix J – Cost Proposal No. 33 – Equipment Purchase**
- **Appendix K – Cost Proposal No. 34 – Ozone System Installation and Startup**
- **Appendix L – Cost Proposal No. 35 – First Quarter O&M**
- **Appendix M – Cost Proposal No. 36 – Second Quarter O&M**
- **Appendix N – Cost Proposal No. 37 – Third Quarter O&M**

APPENDICES

APPENDIX A – FIGURES



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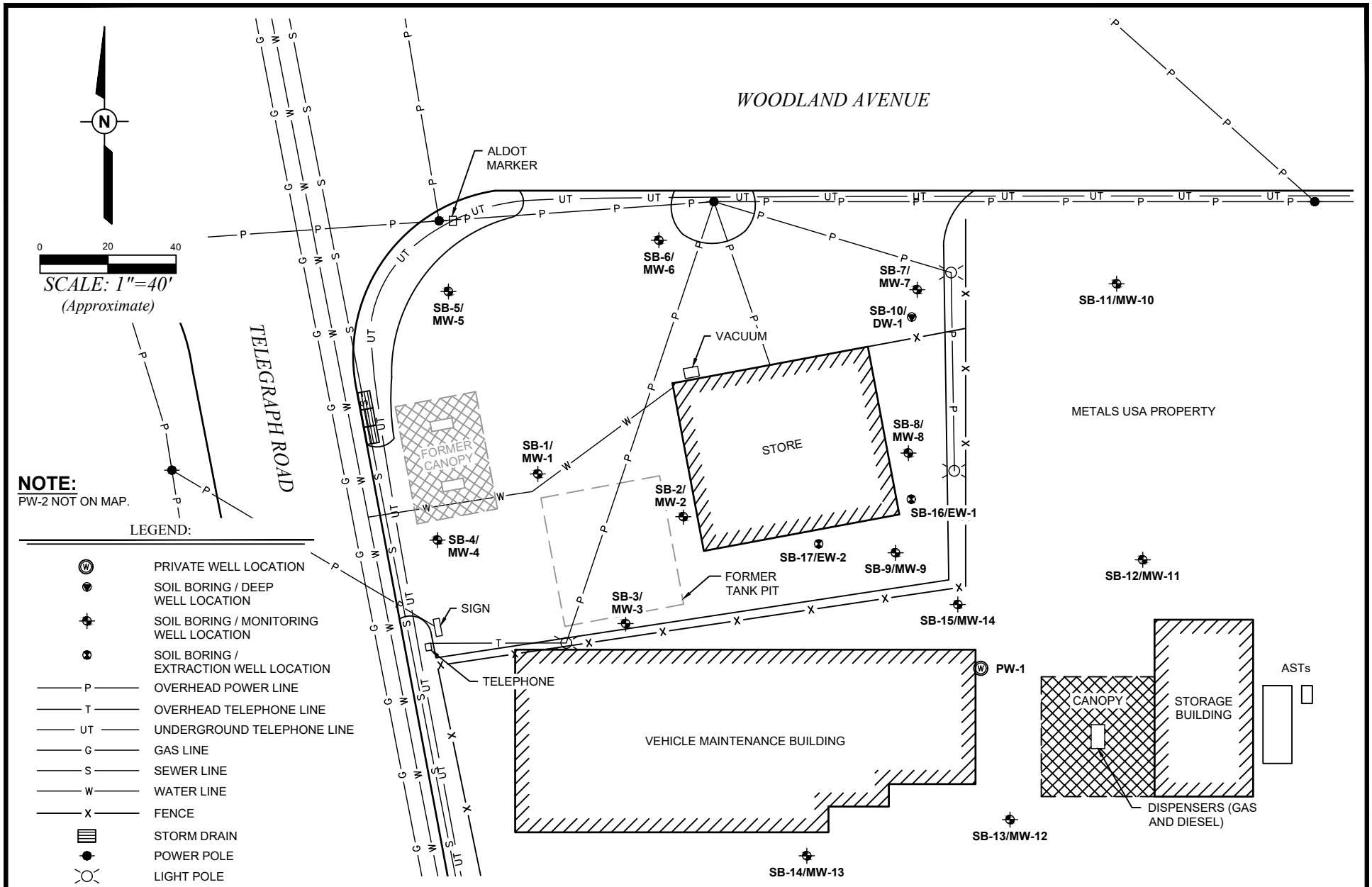
1 .5 0 1
MILES

1000 0 1000 5000 10,000
FEET

1 0 KILOMETER 1 2
1000 0 METER 1000 2000

PPM CONSULTANTS, INC. www.ppmco.com		CIRCLE K STORES, INC. **CIRCLE K STORE NO. 8261** 928 TELEGRAPH ROAD PRICHARD, ALABAMA	SITE LOCATION MAP
DRAWN BY: JCP	DRAWN DATE: 06/05/20		FIGURE NUMBER 1
PROJECT NUMBER: 234949	PHASE: MCAP2		



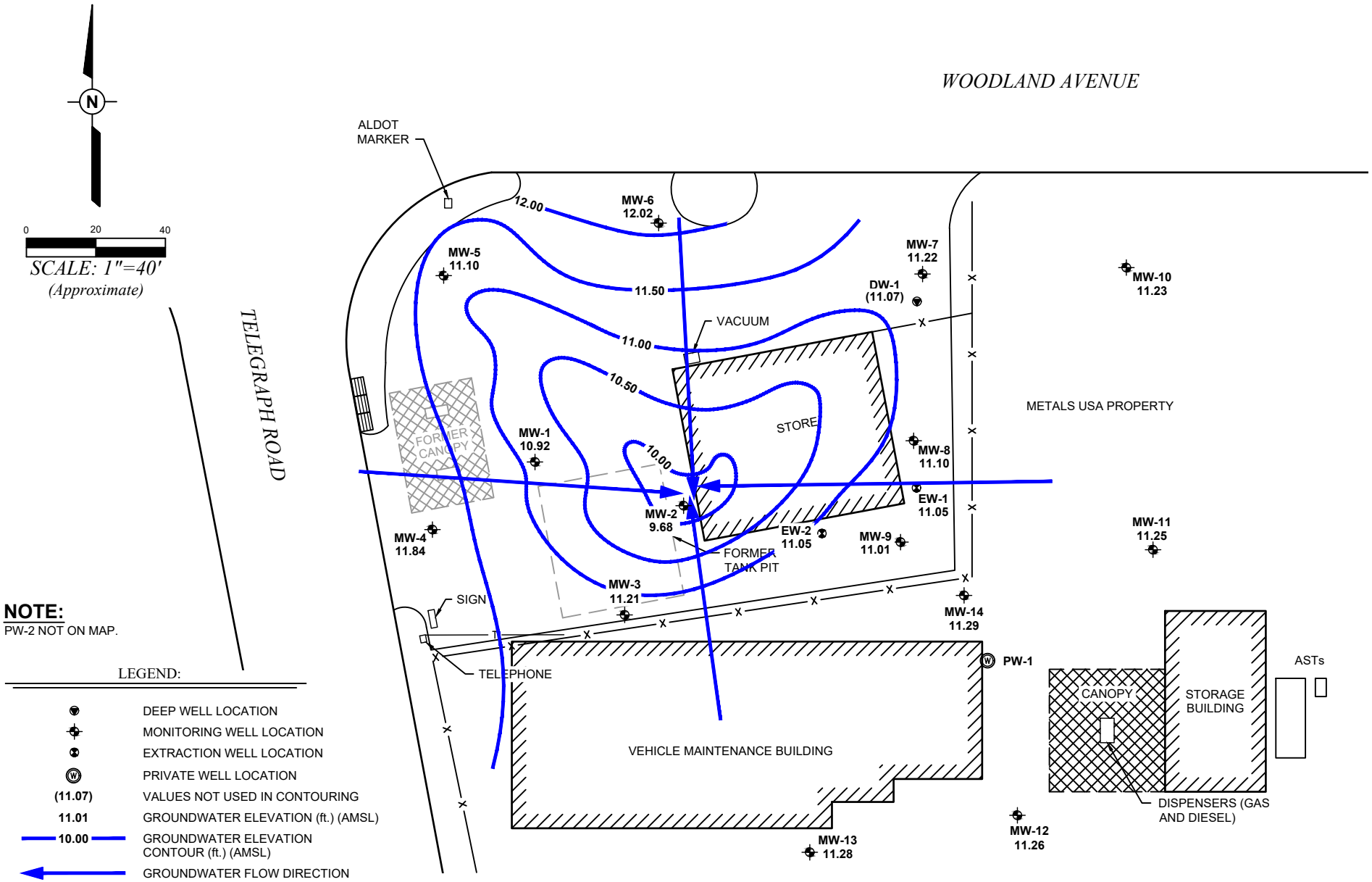
PPM CONSULTANTS, INC. www.ppmco.com	
DRAWN BY: JCP	DRAWN DATE: 06/05/20
PROJECT NUMBER: 234949	PHASE: MCAP2

CIRCLE K STORES, INC.
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA

SITE MAP

FIGURE NUMBER
2

PPM CONSULTANTS, INC. www.ppmco.com		CIRCLE K STORES, INC. **CIRCLE K STORE NO. 8261** 928 TELEGRAPH ROAD PRICHARD, ALABAMA	AREA MAP
DRAWN BY: JCP	DRAWN DATE: 06/05/20		FIGURE NUMBER 3
PROJECT NUMBER: 234949	PHASE: MCAP2		

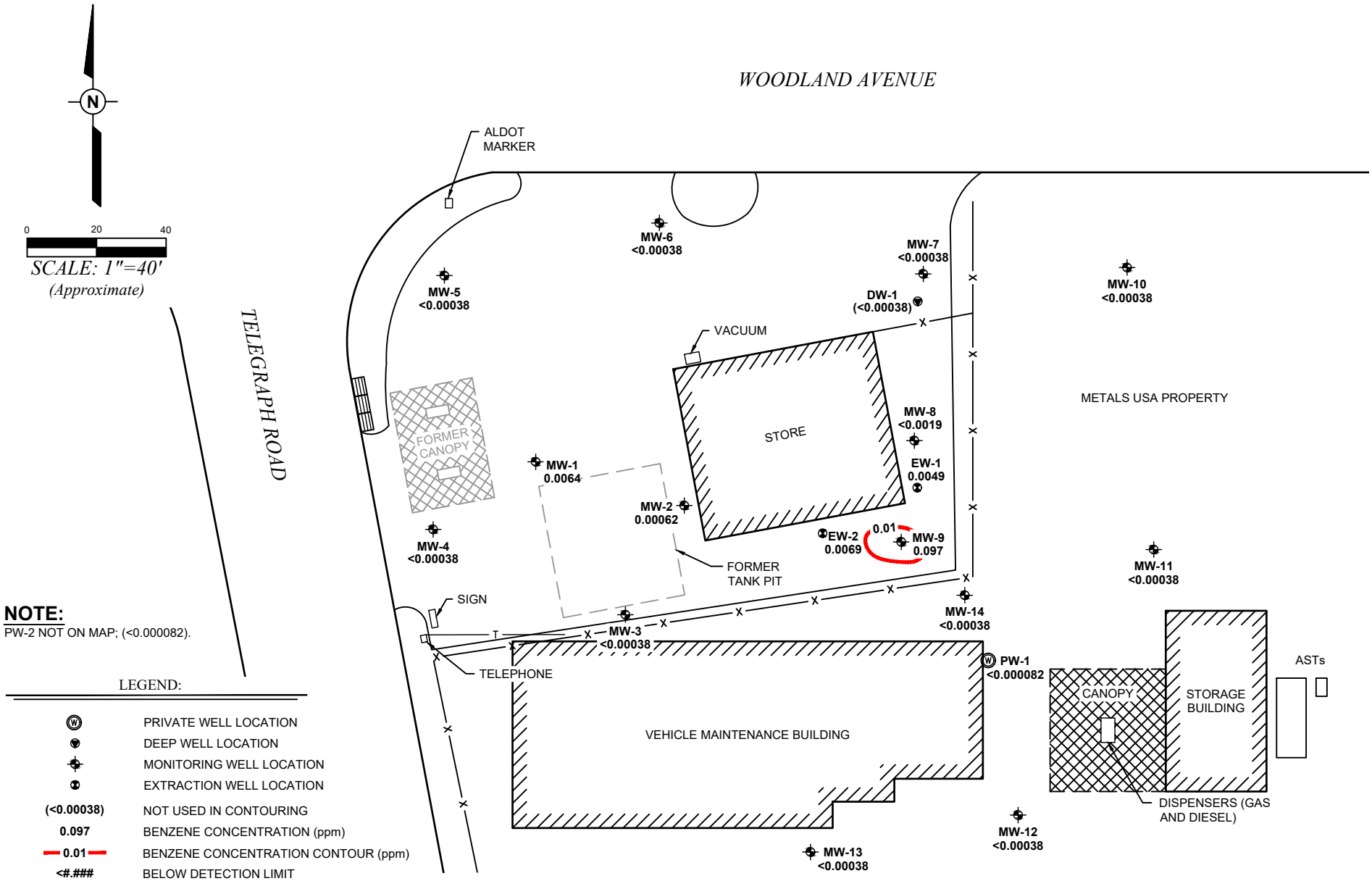


PPM CONSULTANTS, INC. www.ppmco.com	
DRAWN BY: JCP	DRAWN DATE: 06/05/20
PROJECT NUMBER: 234949	PHASE: MCAP2

CIRCLE K STORES, INC.
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA

GROUNDWATER ELEVATION MAP (MARCH 23, 2020)

FIGURE NUMBER
4



NOTE:
PW-2 NOT ON MAP; (<0.000082).

LEGEND:

Ⓦ	PRIVATE WELL LOCATION
▼	DEEP WELL LOCATION
⊕	MONITORING WELL LOCATION
⊗	EXTRACTION WELL LOCATION
(<0.00038)	NOT USED IN CONTOURING
0.097	BENZENE CONCENTRATION (ppm)
0.01	BENZENE CONCENTRATION CONTOUR (ppm)
<#.###	BELOW DETECTION LIMIT

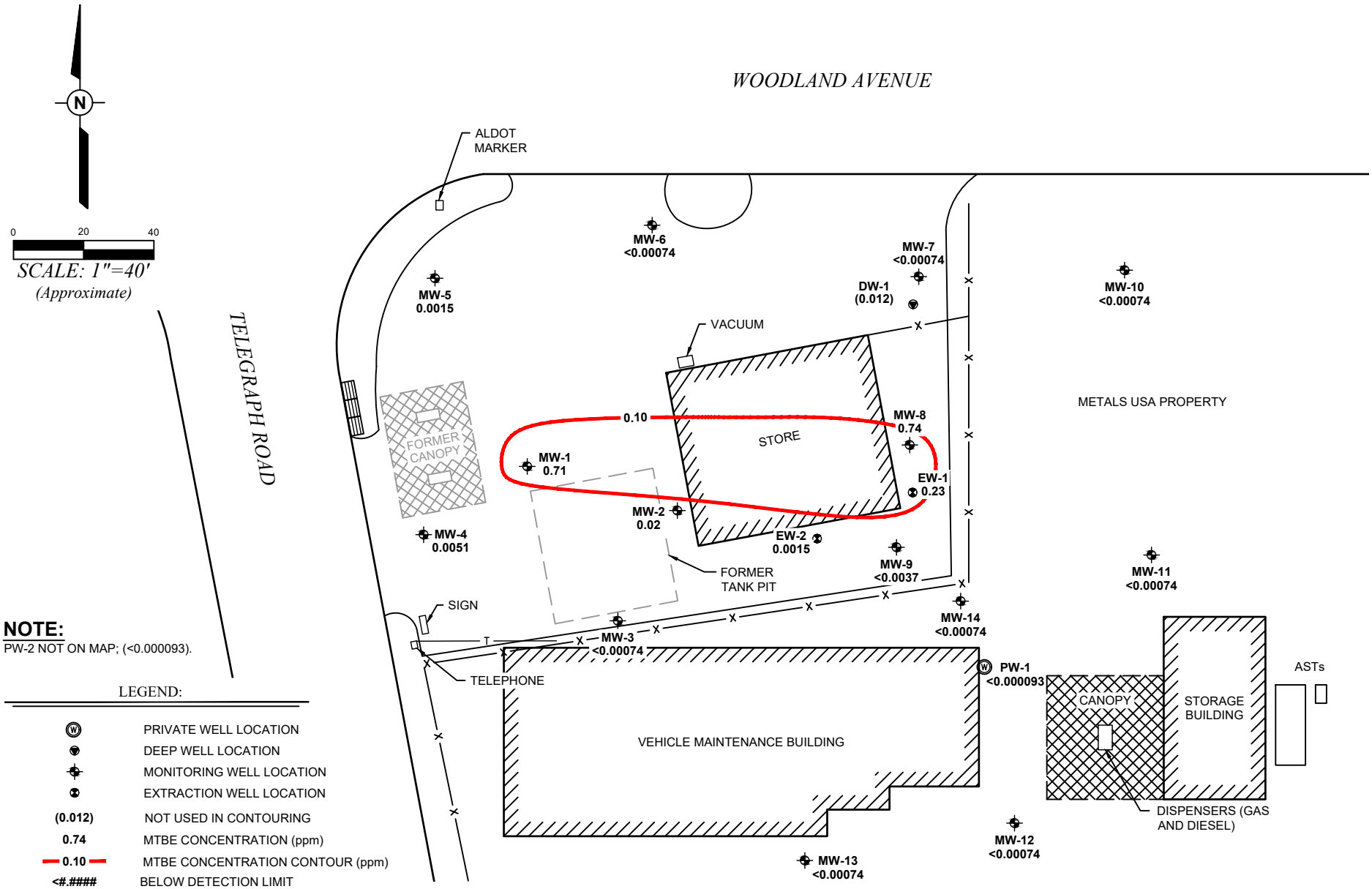
PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY:	DRAWN DATE:
JCP	06/05/20
PROJECT NUMBER:	PHASE:
234949	MCAP2

CIRCLE K STORES, INC.
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA

BENZENE CONCENTRATIONS IN GROUNDWATER (MARCH 23, 2020)

FIGURE NUMBER
5



NOTE:
PW-2 NOT ON MAP; (<0.000093).

LEGEND:

Ⓦ	PRIVATE WELL LOCATION
▼	DEEP WELL LOCATION
⊕	MONITORING WELL LOCATION
⊗	EXTRACTION WELL LOCATION
(0.012)	NOT USED IN CONTOURING
0.74	MTBE CONCENTRATION (ppm)
0.10	MTBE CONCENTRATION CONTOUR (ppm)
<#.####	BELOW DETECTION LIMIT

PPM CONSULTANTS, INC.
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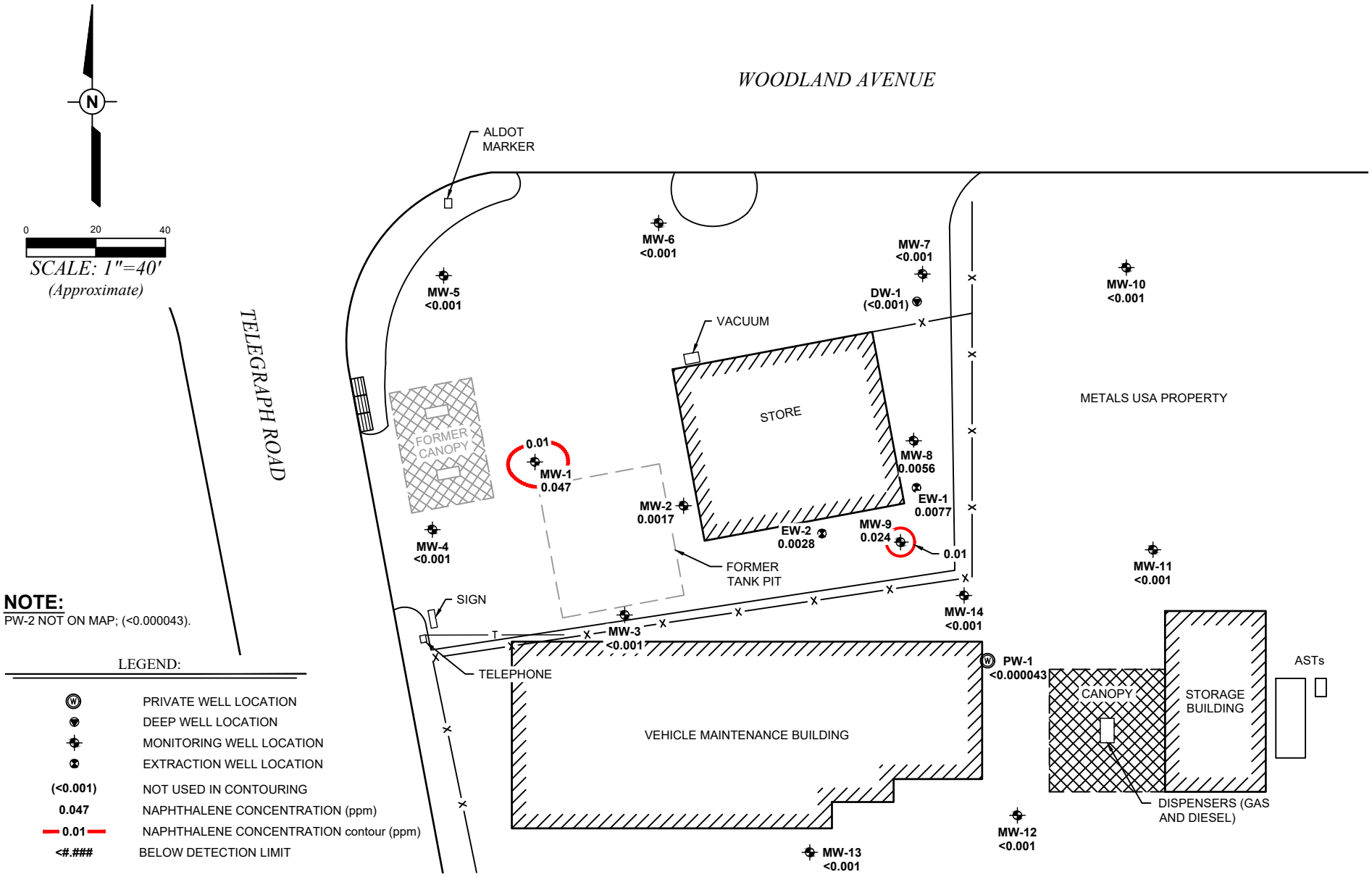
DRAWN BY:	DRAWN DATE:
JCP	06/05/20
PROJECT NUMBER:	PHASE:
234949	MCAP2

CIRCLE K STORES, INC.
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA

MTBE CONCENTRATIONS IN GROUNDWATER (MARCH 23, 2020)

FIGURE NUMBER
6



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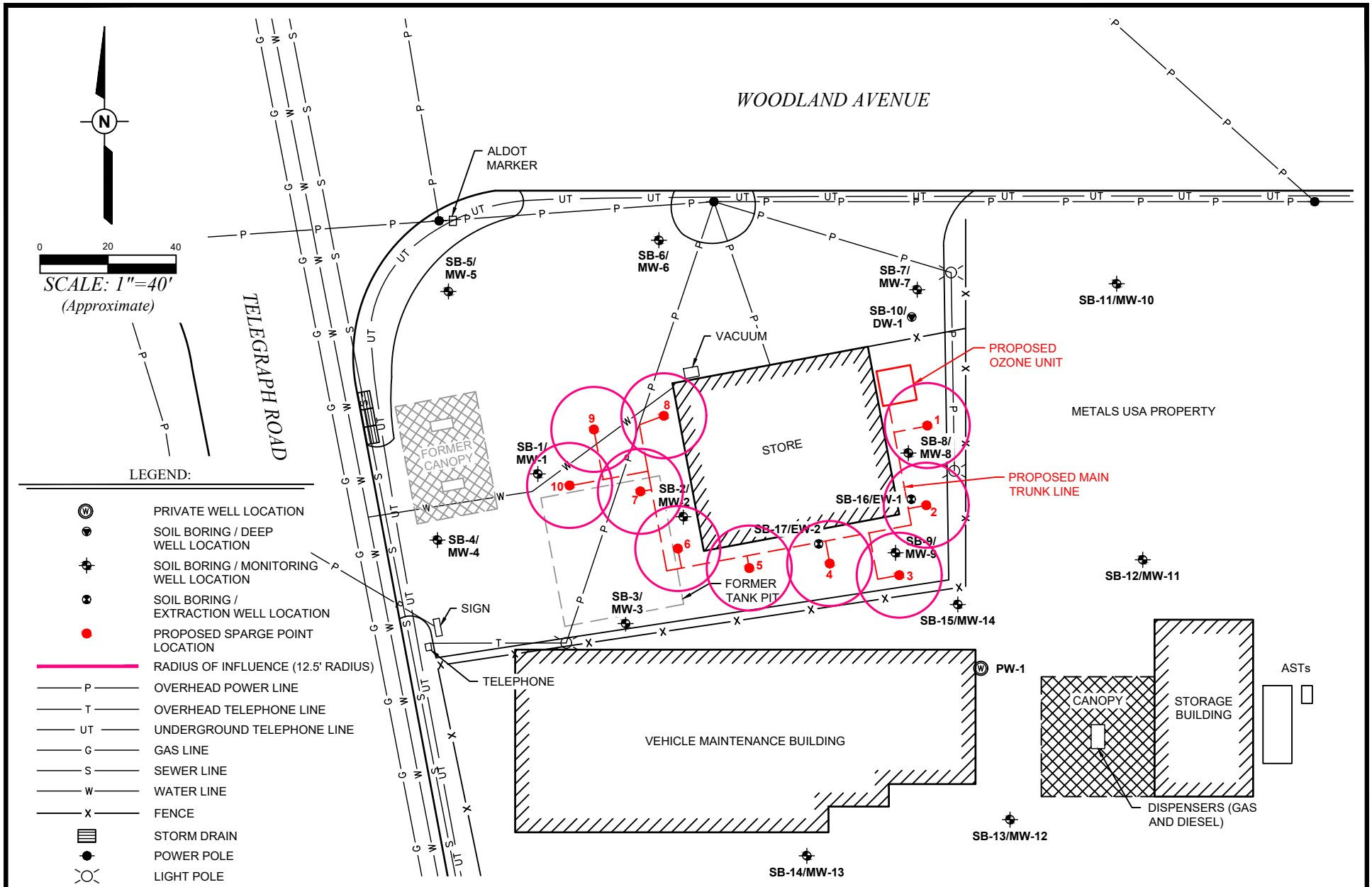
DRAWN BY:	DRAWN DATE:
JCP	06/05/20
PROJECT NUMBER:	PHASE:
234949	MCAP2

CIRCLE K STORES, INC.
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA

NAPHTHALENE CONCENTRATIONS IN GROUNDWATER (MARCH 23, 2020)

FIGURE NUMBER
7



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PROJECT NUMBER: 234949	PHASE: MCAP2

CIRCLE K STORES, INC.
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA

PROPOSED OZONE SYSTEM LAYOUT

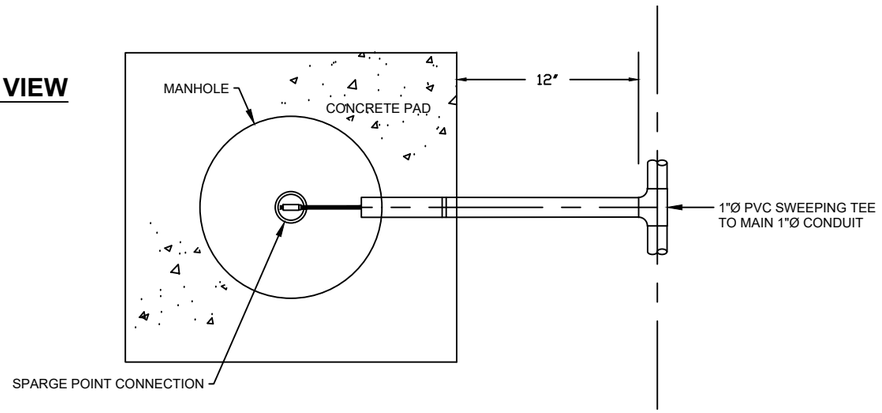
FIGURE NUMBER
8

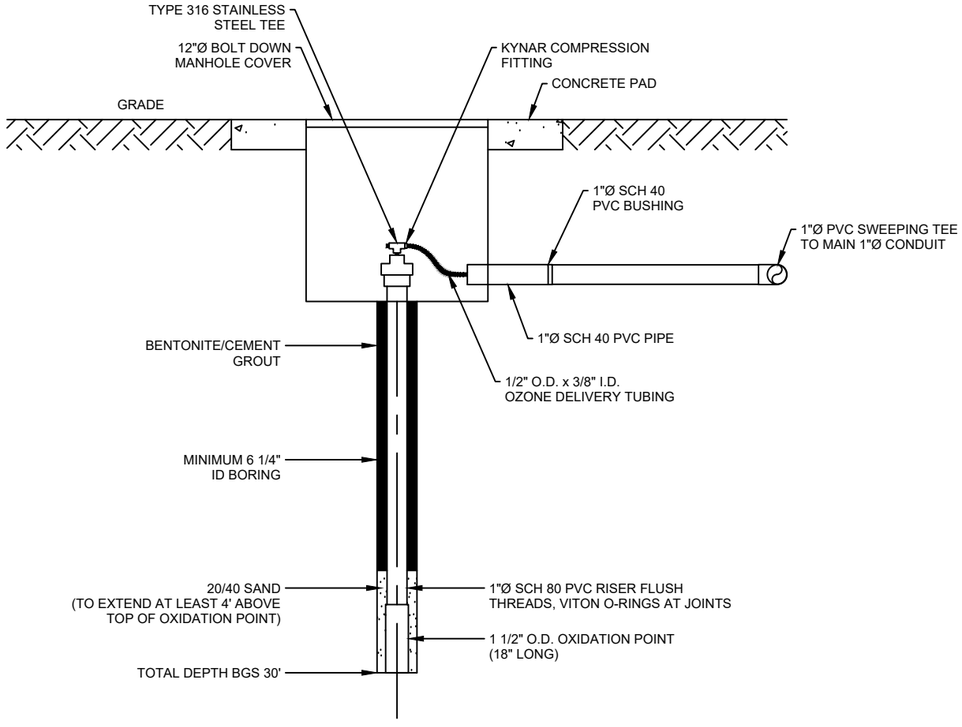
NOTES:

1. WELLHEAD CONNECTIONS, RISER AND OXIDATION POINTS TO BE PROVIDED BY EQUIPMENT MANUFACTURER.
2. OZONE DELIVERY TUBING TO BE PROVIDED BY EQUIPMENT MANUFACTURER.
3. OZONE DELIVERY TUBING TO BE INSTALLED DURING PLACEMENT OF 1"Ø SCHEDULE 40 PVC CONDUIT.

TYPICAL PLAN VIEW

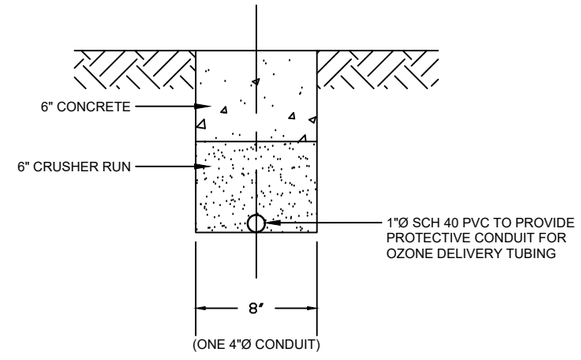
NOT TO SCALE





TYPICAL SPARGE POINT DETAIL

NOT TO SCALE



TYPICAL TRENCH DETAIL

NOT TO SCALE

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CIRCLE K STORES, INC.
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA

TYPICAL SPARGE POINT CONSTRUCTION DETAILS

FIGURE NUMBER
9

APPENDIX B – TABLES

TABLE 1
SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft. BGS)	Depth to Product (ft. BTOC)	Depth to Water (ft. BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-1	Preliminary	11/21/14	35.00	35.59	20.00-35.00	NE	26.00	--	9.59
	GWM1	8/27/15				NE	26.01	--	9.58
	GWM2	11/24/15				NE	26.27	--	9.32
	SI	3/10/16				NE	25.19	--	10.40
	SI2	12/8/16				NE	26.08	--	9.51
	GWM3	3/28/17				NE	26.08	--	9.51
	GWM4	6/22/17				NE	25.19	--	10.40
	GWM5	9/22/17				NE	24.37	--	11.22
	GWM6	12/12/17				NE	24.47	--	11.12
	GWM7	3/27/18				NE	24.75	--	10.84
	GWM8	6/26/18				NE	25.08	--	10.51
	GWM9	9/25/18				NE	25.31	--	10.28
	GWM10	12/31/18				NE	24.89	--	10.70
	RNA1	3/18/19				NE	24.54	--	11.05
	RNA2	6/28/19				NE	25.00	--	10.59
	RNA3	9/24/19				NE	25.36	--	10.23
	RNA4	12/16/19				NE	25.49	--	10.10
	RNA5	3/23/20				NE	24.67	--	10.92
MW-2	Preliminary	11/21/14	35.00	35.21	20.00-35.00	NE	26.84	--	8.37
	GWM1	8/27/15				NE	26.85	--	8.36
	GWM2	11/24/15				NE	27.14	--	8.07
	SI	3/10/16				NE	26.05	--	9.16
	SI2	12/8/16				NE	26.97	--	8.24
	GWM3	3/28/17				NE	26.93	--	8.28
	GWM4	6/22/17				NE	26.06	--	9.15
	GWM5	9/22/17				NE	25.23	--	9.98
	GWM6	12/12/17				NE	25.33	--	9.88
	GWM7	3/27/18				NE	25.50	--	9.71
	GWM8	6/26/18				NE	25.94	--	9.27
	GWM9	9/25/18				NE	26.18	--	9.03
	GWM10	12/31/18				NE	25.76	--	9.45
	RNA1	3/18/19				NE	25.43	--	9.78
	RNA2	6/28/19				NE	25.84	--	9.37
	RNA3	9/24/19				NE	26.22	--	8.99
	RNA4	12/16/19				NE	26.37	--	8.84
	RNA5	3/23/20				NE	25.53	--	9.68

TABLE 1
SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft. BGS)	Depth to Product (ft. BTOC)	Depth to Water (ft. BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-3	Preliminary	11/21/14	35.00	36.44	20.00-35.00	NE	26.56	--	9.88
	GWM1	8/27/15				NE	26.56	--	9.88
	GWM2	11/24/15				NE	26.86	--	9.58
	SI	3/10/16				NE	25.77	--	10.67
	SI2	12/8/16				NE	26.64	--	9.80
	GWM3	3/28/17				NE	26.66	--	9.78
	GWM4	6/22/17				NE	25.78	--	10.66
	GWM5	9/22/17				NE	24.95	--	11.49
	GWM6	12/12/17				NE	25.03	--	11.41
	GWM7	3/27/18				NE	25.35	--	11.09
	GWM8	6/26/18				NE	25.65	--	10.79
	GWM9	9/25/18				NE	25.90	--	10.54
	GWM10	12/31/18				NE	25.47	--	10.97
	RNA1	3/18/19				NE	25.12	--	11.32
	RNA2	6/28/19				NE	25.55	--	10.89
	RNA3	9/24/19				NE	25.95	--	10.49
	RNA4	12/16/19				NE	26.06	--	10.38
	RNA5	3/23/20				NE	25.23	--	11.21
MW-4	Preliminary	11/21/14	35.00	36.14	20.00-35.00	NE	25.62	--	10.52
	GWM1	8/27/15				NE	25.62	--	10.52
	GWM2	11/24/15				NE	25.90	--	10.24
	SI	3/10/16				NE	24.80	--	11.34
	SI2	12/8/16				NE	25.70	--	10.44
	GWM3	3/28/17				NE	25.69	--	10.45
	GWM4	6/22/17				NE	24.79	--	11.35
	GWM5	9/22/17				NE	23.99	--	12.15
	GWM6	12/12/17				NE	24.07	--	12.07
	GWM7	3/27/18				NE	24.38	--	11.76
	GWM8	6/26/18				NE	24.70	--	11.44
	GWM9	9/25/18				NE	24.94	--	11.20
	GWM10	12/31/18				NE	24.50	--	11.64
	RNA1	3/18/19				NE	24.15	--	11.99
	RNA2	6/28/19				NE	24.60	--	11.54
	RNA3	9/24/19				NE	24.98	--	11.16
	RNA4	12/16/19				NE	25.11	--	11.03
	RNA5	3/23/20				NE	24.30	--	11.84

TABLE 1
SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft. BGS)	Depth to Product (ft. BTOC)	Depth to Water (ft. BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-5	SI	3/10/16	35.00	35.25	20.00-35.00	NE	24.67	--	10.58
	SI2	12/8/16				NE	25.60	--	9.65
	GWM3	3/28/17				NE	25.61	--	9.64
	GWM4	6/22/17				NE	25.69	--	9.56
	GWM5	9/22/17				NE	23.84	--	11.41
	GWM6	12/12/17				NE	23.98	--	11.27
	GWM7	3/27/18				NE	24.25	--	11.00
	GWM8	6/26/18				NE	24.59	--	10.66
	GWM9	9/25/18				NE	24.40	--	10.85
	GWM10	12/31/18				NE	24.40	--	10.85
	RNA1	3/18/19				NE	24.06	--	11.19
	RNA2	6/28/19				NE	24.50	--	10.75
	RNA3	9/24/19				NE	24.87	--	10.38
	RNA4	12/16/19				NE	25.02	--	10.23
	RNA5	3/23/20				NE	24.15	--	11.10
MW-6	SI	3/10/16	35.00	36.52	20.00-35.00	NE	25.00	--	11.52
	SI2	12/8/16				NE	25.90	--	10.62
	GWM3	3/28/17				NE	25.87	--	10.65
	GWM4	6/22/17				NE	25.02	--	11.50
	GWM5	9/22/17				NE	24.20	--	12.32
	GWM6	12/12/17				NE	24.30	--	12.22
	GWM7	3/27/18				NE	24.55	--	11.97
	GWM8	6/26/18				NE	24.88	--	11.64
	GWM9	9/25/18				NE	25.12	--	11.40
	GWM10	12/31/18				NE	24.70	--	11.82
	RNA1	3/18/19				NE	24.37	--	12.15
	RNA2	6/28/19				NE	24.79	--	11.73
	RNA3	9/24/19				NE	25.18	--	11.34
	RNA4	12/16/19				NE	25.19	--	11.33
	RNA5	3/23/20				NE	24.50	--	12.02

TABLE 1
SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft. BGS)	Depth to Product (ft. BTOC)	Depth to Water (ft. BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-7	SI	3/10/16	35.00	36.54	20.00-35.00	NE	25.90	--	10.64
	SI2	12/8/16				NE	26.80	--	9.74
	GWM3	3/28/17				NE	26.77	--	9.77
	GWM4	6/22/17				NE	25.91	--	10.63
	GWM5	9/22/17				NE	25.10	--	11.44
	GWM6	12/12/17				NE	25.17	--	11.37
	GWM7	3/27/18				NE	25.48	--	11.06
	GWM8	6/26/18				NE	25.78	--	10.76
	GWM9	9/25/18				NE	26.01	--	10.53
	GWM10	12/31/18				NE	25.59	--	10.95
	RNA1	3/18/19				NE	25.28	--	11.26
	RNA2	6/28/19				NE	25.68	--	10.86
	RNA3	9/24/19				NE	26.06	--	10.48
	RNA4	12/16/19				NE	26.20	--	10.34
	RNA5	3/23/20				NE	25.32	--	11.22
MW-8	SI	3/10/16	35.00	37.02	20.00-35.00	NE	26.44	--	10.58
	SI2	12/8/16				NE	27.33	--	9.69
	GWM3	3/28/17				NE	27.33	--	9.69
	GWM4	6/22/17				NE	26.45	--	10.57
	GWM5	9/22/17				NE	25.62	--	11.40
	GWM6	12/12/17				NE	25.74	--	11.28
	GWM7	3/27/18				NE	26.00	--	11.02
	GWM8	6/26/18				NE	26.32	--	10.70
	GWM9	9/25/18				NE	26.55	--	10.47
	GWM10	12/31/18				NE	26.17	--	10.85
	RNA1	3/18/19				NE	25.82	--	11.20
	RNA2	6/28/19				NE	26.20	--	10.82
	RNA3	9/24/19				NE	26.58	--	10.44
	RNA4	12/16/19				NE	26.73	--	10.29
	RNA5	3/23/20				NE	25.92	--	11.10

TABLE 1
SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft. BGS)	Depth to Product (ft. BTOC)	Depth to Water (ft. BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-9	SI	3/10/16	35.00	37.01	20.00-35.00	NE	26.47	--	10.54
	SI2	12/8/16				NE	27.38	--	9.63
	GWM3	3/28/17				NE	27.39	--	9.62
	GWM4	6/22/17				NE	26.52	--	10.49
	GWM5	9/22/17				NE	25.64	--	11.37
	GWM6	12/12/17				NE	25.80	--	11.21
	GWM7	3/27/18				NE	26.10	--	10.91
	GWM8	6/26/18				NE	26.40	--	10.61
	GWM9	9/25/18				NE	26.62	--	10.39
	GWM10	12/31/18				NE	26.18	--	10.83
	RNA1	3/18/19				NE	25.88	--	11.13
	RNA2	6/28/19				NE	26.29	--	10.72
	RNA3	9/24/19				NE	26.65	--	10.36
	RNA4	12/16/19				NE	26.76	--	10.25
	RNA5	3/23/20				NE	26.00	--	11.01
MW-10	SI2	12/8/16	35.00	37.18	25.00-35.00	NE	27.34	--	9.84
	GWM3	3/28/17				NE	27.35	--	9.83
	GWM4	6/22/17				NE	26.50	--	10.68
	GWM5	9/22/17				NE	25.67	--	11.51
	GWM6	12/12/17				NE	25.82	--	11.36
	GWM7	3/27/18				NE	26.16	--	11.02
	GWM8	6/26/18				NE	26.35	--	10.83
	GWM9	9/25/18				NE	26.78	--	10.40
	GWM10	12/31/18				NE	26.20	--	10.98
	RNA1	3/18/19				NE	25.77	--	11.41
	RNA2	6/28/19				NE	26.22	--	10.96
	RNA3	9/24/19				NE	26.59	--	10.59
	RNA4	12/16/19				NE	26.76	--	10.42
	RNA5	3/23/20				NE	25.95	--	11.23
MW-11	SI2	12/8/16	35.00	37.31	25.00-35.00	NE	27.45	--	9.86
	GWM3	3/28/17				NE	27.46	--	9.85
	GWM4	6/22/17				NE	26.62	--	10.69
	GWM5	9/22/17				NE	25.77	--	11.54
	GWM6	12/12/17				NE	25.91	--	11.40
	GWM7	3/27/18				NE	26.15	--	11.16
	GWM8	6/26/18				NE	26.45	--	10.86
	GWM9	9/25/18				NE	26.70	--	10.61
	GWM10	12/31/18				NE	26.30	--	11.01
	RNA1	3/18/19				NE	25.89	--	11.42
	RNA2	6/28/19				NE	26.34	--	10.97
	RNA3	9/24/19				NE	26.68	--	10.63
	RNA4	12/16/19				NE	26.86	--	10.45
	RNA5	3/23/20				NE	26.06	--	11.25

TABLE 1
SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft. BGS)	Depth to Product (ft. BTOC)	Depth to Water (ft. BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-12	SI2	12/8/16	35.00	37.19	25.00-35.00	NE	27.31	--	9.88
	GWM3	3/28/17				NE	27.31	--	9.88
	GWM4	6/22/17				NE	26.48	--	10.71
	GWM5	9/22/17				NE	25.65	--	11.54
	GWM6	12/12/17				NE	25.77	--	11.42
	GWM7	3/27/18				NE	26.00	--	11.19
	GWM8	6/26/18				NE	25.95	--	11.24
	GWM9	9/25/18				NE	26.54	--	10.65
	GWM10	12/31/18				NE	26.16	--	11.03
	RNA1	3/18/19				NE	25.74	--	11.45
	RNA2	6/28/19				NE	26.18	--	11.01
	RNA3	9/24/19				NE	26.55	--	10.64
	RNA4	12/16/19				NE	26.71	--	10.48
	RNA5	3/23/20				NE	25.93	--	11.26
MW-13	SI2	12/8/16	35.00	37.08	25.00-35.00	NE	27.16	--	9.92
	GWM3	3/28/17				NE	27.18	--	9.90
	GWM4	6/22/17				NE	26.34	--	10.74
	GWM5	9/22/17				NE	25.48	--	11.60
	GWM6	12/12/17				NE	25.63	--	11.45
	GWM7	3/27/18				NE	25.90	--	11.18
	GWM8	6/26/18				NE	26.20	--	10.88
	GWM9	9/25/18				NE	26.43	--	10.65
	GWM10	12/31/18				NE	26.04	--	11.04
	RNA1	3/18/19				NE	25.61	--	11.47
	RNA2	6/28/19				NE	26.05	--	11.03
	RNA3	9/24/19				NE	26.44	--	10.64
	RNA4	12/16/19				NE	26.62	--	10.46
	RNA5	3/23/20				NE	25.80	--	11.28
MW-14	GWM5	9/22/17	30.00	37.41	20.00-30.00	NE	25.83	--	11.58
	GWM6	12/12/17				NE	25.97	--	11.44
	GWM7	3/27/18				NE	26.22	--	11.19
	GWM8	6/26/18				NE	26.51	--	10.90
	GWM9	9/25/18				NE	26.75	--	10.66
	GWM10	12/31/18				NE	26.38	--	11.03
	RNA1	3/18/19				NE	25.96	--	11.45
	RNA2	6/28/19				NE	26.40	--	11.01
	RNA3	9/24/19				NE	26.77	--	10.64
	RNA4	12/16/19				NE	26.95	--	10.46
	RNA5	3/23/20				NE	26.12	--	11.29

TABLE 1
SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft. BGS)	Depth to Product (ft. BTOC)	Depth to Water (ft. BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
DW-1	SI	3/10/16	55.00	36.47	50.00-55.00	NE	25.81	--	10.66
	SI2	12/8/16				NE	26.68	--	9.79
	GWM3	3/28/17				NE	26.68	--	9.79
	GWM4	6/22/17				NE	25.80	--	10.67
	GWM5	9/22/17				NE	25.00	--	11.47
	GWM6	12/12/17				NE	25.06	--	11.41
	GWM7	3/27/18				NE	25.38	--	11.09
	GWM8	6/26/18				NE	25.69	--	10.78
	GWM9	9/25/18				NE	25.92	--	10.55
	GWM10	12/31/18				NE	25.51	--	10.96
	RNA1	3/18/19				NE	25.17	--	11.30
	RNA2	6/28/19				NE	25.57	--	10.90
	RNA3	9/24/19				NE	25.98	--	10.49
	RNA4	12/16/19				NE	26.11	--	10.36
	RNA5	3/23/20				NE	25.40	--	11.07
EW-1	RNA1	3/18/19	35.00	36.95	20.00-35.00	NE	25.80	--	11.15
	RNA2	6/28/19				NE	26.20	--	10.75
	RNA3	9/24/19				NE	26.60	--	10.35
	RNA4	12/16/19				NE	26.71	--	10.24
	RNA5	3/23/20				NE	25.90	--	11.05
EW-2	RNA1	3/18/19	35.00	36.67	20.00-35.00	NE	25.50	--	11.17
	RNA2	6/28/19				NE	25.89	--	10.78
	RNA3	9/24/19				NE	26.29	--	10.38
	RNA4	12/16/19				NE	26.43	--	10.24
	RNA5	3/23/20				NE	25.62	--	11.05

Notes: *Top of casing elevation is based on assigned benchmark (BM) elevation of 36 feet AMSL for landsurface at MW-1*
ft. BGS: Feet Below Ground Surface
ft. AMSL: Feet Above Mean Sea Level.
ft. BTOC: Feet Below Top of Casing
NA; Not Applicable
NE: Not Encountered

Source: *PPM Consultants, Inc.*
PPM Project No. 234949-MCAP2

TABLE 2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-1	Preliminary	11/21/14	0.0082	<0.0007	0.008	0.01	0.0262	**0.16**	0.0046
	GWM1	8/27/15	**0.17**	<0.018	0.29	0.072 J	0.532	**4.90**	**0.21**
	GWM2	11/24/15	**0.076**	<0.007	0.16	0.024 J	0.26	**2.80**	**0.17**
	SI	3/10/16	**0.025**	<0.007	0.029	0.026 J	0.08	**1.20**	0.037
	SI2	12/8/16	**0.065**	<0.014	0.057	0.054 J	0.176	**2.40**	**0.14**
	GWM3	3/28/17	**0.026**	<0.0035	0.033	0.011 J	0.07	**2.0**	**0.11**
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.02	<0.001
	GWM5	9/22/17	0.0045 J	<0.0035	0.0037 J	<0.008	0.0082	**0.40**	0.019
	GWM6	12/12/17	**0.019**	<0.007	0.016	<0.016	0.035	**1.20**	0.052
	GWM7	3/27/18	**0.020**	<0.0035	0.025	0.013 J	0.058	**1.10**	**0.065**
	GWM8	6/26/18	**0.038**	<0.0035	0.06	0.033 J	0.131	**1.30**	**0.12**
	GWM9	9/25/18	**0.02**	<0.0035	0.023	0.010 J	0.053	**1.10**	**0.08**
	GWM10	12/31/18	0.0043	<0.00082	0.0025	<0.0032	0.0068	**0.38**	0.021
	RNA1	3/18/19	0.0093	<0.00082	0.006	<0.0032	0.0153	**0.59**	0.027
	RNA2	6/28/2019	0.0037	<0.00082	0.0019 J	<0.0032	0.0056	**0.35**	0.018
	RNA3	9/24/2019	0.0079	<0.0021	0.0044 J	<0.008	0.0123	**0.71**	0.032
	RNA4	12/16/2019	**0.016**	<0.00041	0.021	0.0074 J	0.0444	**1.70**	**0.14**
	RNA5	3/23/2020	0.0064	<0.0021	0.0089	<0.008	0.0153	**0.71**	0.047
	RNA5 dup	3/23/2020	0.0068	0.0034 J	0.011	<0.008	0.0212	**0.70**	0.05
SSCAL Source Well			**0.0153**	**3.07**	**2.15**	**30.7**	**--**	**0.0613**	**0.0613**
MW-2	Preliminary	11/21/14	0.013	0.0027	0.0066	0.024	0.0463	0.026	<0.001
	GWM1	8/27/15	**0.16**	0.0067	0.054	0.043	0.2637	0.026	0.0021
	GWM2	11/24/15	**0.081**	0.021	0.015	0.065	0.182	0.022	0.0031
	SI	3/10/16	**0.078**	0.0065	0.012	0.048	0.145	0.037	0.0090
	SI2	12/8/16	**0.044**	<0.0007	0.00085 J	0.0033 J	0.048	0.055	0.022
	GWM3	3/28/17	0.0092	<0.0007	<0.0005	0.0017 J	0.011	0.061	0.011
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.016	<0.001
	GWM5	9/22/17	**0.026**	<0.0007	0.0035	<0.0016	0.0295	0.02	0.017
	GWM6	12/12/17	**0.016**	<0.0007	0.00073 J	<0.0016	0.01673	0.01	0.016
	GWM7	3/27/18	0.0026	<0.0007	0.0017	<0.0016	0.0043	0.012	0.0084
	GWM8	6/26/18	0.0028	<0.0007	<0.0005	<0.0016	0.0028	0.013	0.011
	GWM9	9/25/18	0.0013	<0.0007	<0.0005	<0.0016	0.0013	0.015	0.0072
	GWM10	12/31/18	0.00064 J	<0.00041	<0.0005	<0.0016	0.00064	0.0081	0.002
	RNA1	3/18/19	0.0011	<0.00041	<0.0005	<0.0016	0.0011	0.0094	0.0028
	RNA2	6/28/2019	0.00090 J	<0.00041	<0.0005	<0.0016	0.0009	0.024	0.0017
	RNA3	9/24/2019	0.00042 J	<0.00041	<0.0005	<0.0016	0.00042	0.023	0.0013
	RNA4	12/16/2019	0.00075 J	<0.00041	<0.0005	<0.0016	0.00075	0.032	0.0018
	RNA5	3/23/2020	0.00062 J	<0.00041	<0.0005	<0.0016	0.00062	0.020	0.0017
SSCAL Source Well			**0.0153**	**3.07**	**2.15**	**30.7**	**--**	**0.0613**	**0.0613**

TABLE 2
SUMMARY OF GROUNDWATER ANALYTICAL DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-3	Preliminary	11/21/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	0.0014	<0.001
	GWM1	8/27/15	0.0021	<0.0007	<0.0005	<0.0006	0.0021	<0.00074	<0.001
	GWM2	11/24/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001
	SI	3/10/16	0.0011	<0.0007	<0.0005	<0.0006	0.0011	<0.00074	<0.001
	SI2	12/8/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
SSCAL Source Well			**0.0153**	**3.07**	**2.15**	**30.7**	**--**	**0.0613**	**0.0613**
MW-4	Preliminary	11/21/14	0.0007 J	<0.0007	<0.0005	0.00064 J	0.00134	0.013	<0.001
	GWM1	8/27/15	0.0011	<0.0007	<0.0005	0.0016 J	0.0027	0.013	<0.001
	GWM2	11/24/15	0.0024	<0.0007	0.0031	0.0077	0.0132	0.025	<0.001
	SI	3/10/16	0.0061	<0.0007	0.011	0.017	0.0341	0.052	0.0019
	SI2	12/8/16	0.0016	<0.0007	0.0013	0.0022 J	0.0051	0.023	<0.001
	GWM3	3/28/17	0.00038 J	<0.0007	<0.0005	<0.0016	0.00038	0.012	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM5	9/22/17	0.0016	<0.0007	0.0024	0.0029 J	0.0068	0.012	<0.001
	GWM6	12/12/17	0.0013	<0.0007	0.0026	0.0028 J	0.0067	0.01	<0.001
	GWM7	3/27/18	0.00053 J	<0.0007	<0.0005	<0.0016	0.00053	0.016	<0.001
	GWM8	6/26/18	0.00041 J	<0.0007	<0.0005	<0.0016	0.00041	0.0078	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0049	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.018	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.013	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.015	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0054	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.011	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0051	<0.001
SSCAL Source Well			**0.0153**	**3.07**	**2.15**	**30.7**	**--**	**0.0613**	**0.0613**

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL DATA

CIRCLE K STORE NO. 8261

928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-5	SI	3/10/16	0.0005 J	<0.0007	<0.0005	<0.0006	0.0005	0.0077	<0.001
	SI2	12/8/16	0.00046 J	<0.0007	<0.0005	<0.0016	0.00046	0.016	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0047	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0011	<0.001
	GWM5	9/22/17	0.00044 J	<0.0007	<0.0005	<0.0016	0.00044	0.0074	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0021	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.002	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0025	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0029	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.00093 J	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0013	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0021	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.003	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0056	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0015	<0.001
SSCAL POC Well			**0.00761**	**1.52**	**1.06**	**15.2**	**--**	**0.0304**	**0.0304**
MW-6	SI	3/10/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001
	SI2	12/8/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0015	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0023	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0019	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.00095 J	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0019	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0026	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0028	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0019	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0012	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0015	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.00090 J	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.00087 J	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
SSCAL POC Well			**0.00745**	**1.49**	**1.04**	**14.9**	**--**	**0.0298**	**0.0298**

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL DATA

CIRCLE K STORE NO. 8261

928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-7	SI	3/10/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	0.0013	<0.001
	SI2	12/8/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0014	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0089	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0092	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0025	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0012	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0044	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	0.0026	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	**0.022**	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0077	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0058	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0065	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.0026	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
SSCAL POC Well			**0.005**	**1.0**	**0.70**	**10.0**	**--**	**0.02**	**0.02**
MW-8	SI	3/10/16	**0.056**	<0.018	0.031	<0.015	0.087	**4.50**	**0.055**
	SI2	12/8/16	**0.074**	<0.014	<0.010	<0.032	0.074	**4.50**	**0.063**
	GWM3	3/28/17	**0.033**	<0.014	<0.01	<0.032	0.033	**3.40**	**0.051**
	GWM4	6/22/17	**0.033**	<0.0014	0.018	0.0039 J	0.0549	**3.50**	**0.06**
	GWM5	9/22/17	**0.022**	<0.014	<0.01	<0.032	0.022	**2.50**	**0.04**
	GWM6	12/12/17	**0.02**	<0.007	<0.005	<0.016	0.02	**1.50**	0.025
	GWM7	3/27/18	**0.013**	<0.0035	<0.0025	<0.008	0.013	**1.20**	0.014
	GWM8	6/26/18	**0.017**	<0.0035	<0.0025	<0.008	0.017	**1.30**	0.022
	GWM9	9/25/18	**0.018**	<0.0035	<0.0025	<0.008	0.018	**1.40**	0.02
	GWM10	12/31/18	**0.019**	<0.0041	<0.005	<0.016	0.019	**1.60**	0.015
	RNA1	3/18/19	**0.012**	0.0054	<0.0025	0.016 J	0.0334	**1.50**	0.0096
	RNA2	6/28/2019	**0.013**	<0.0041	<0.005	<0.016	0.013	**1.50**	0.019
	RNA3	9/24/2019	0.0064	0.0048 J	<0.0025	<0.008	0.0112	**0.70**	0.015
	RNA4	12/16/2019	0.0047 J	<0.0021	<0.0025	<0.008	0.0047	**1.10**	0.009
	RNA5	3/23/2020	<0.0019	<0.0021	<0.0025	<0.008	BDL	**0.74**	0.0056
SSCAL POC Well			**0.00702**	**1.4**	**0.983**	**14**	**--**	**0.0281**	**0.0281**

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL DATA

CIRCLE K STORE NO. 8261

928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-9	SI	3/10/16	**0.31**	0.039	0.18	0.56	1.09	0.0075	0.014
	SI2	12/8/16	**0.33**	0.0069	0.21	0.20	0.747	<0.0015	**0.044**
	GWM3	3/28/17	**0.22**	0.0025	0.11	0.04	0.3705	<0.0015	0.015
	GWM4	6/22/17	**0.27**	0.0015 J	0.15	0.013 J	0.4345	<0.0015	**0.045**
	GWM5	9/22/17	**0.12**	0.0035	0.11	0.01	0.4345	0.00075 J	0.016
	GWM6	12/12/17	**0.09**	0.0012	0.038	<0.0016	0.1292	0.00098 J	0.005
	GWM7	3/27/18	**0.24**	0.53	0.16	0.40	1.33	0.0048 J	**0.035**
	GWM8	6/26/18	**0.57**	**3.10**	0.53	1.80	6.00	<0.015	**0.081**
	GWM9	9/25/18	**0.47**	**2.20**	0.47	1.30	4.44	<0.0074	**0.084**
	GWM10	12/31/18	**0.41**	1.20	0.38	0.87	2.86	0.009 J	**0.078**
	RNA1	3/18/19	**0.27**	1.10	0.25	0.75	2.37	<0.0074	**0.039**
	RNA2	6/28/2019	**0.35**	**2.70**	0.42	1.80	5.27	<0.0074	**0.058**
	RNA3	9/24/2019	**0.18**	1.50	0.21	0.82	2.71	<0.0074	**0.036**
	RNA4	12/16/2019	**0.22**	1.80	0.26	1.00	3.28	<0.015	**0.043**
	RNA5	3/23/2020	**0.097**	0.81	0.15	0.49	1.547	<0.0037	0.024
SSCAL POC Well			**0.00808**	**1.62**	**1.13**	**16.2**	**--**	**0.0323**	**0.0323**
MW-10	SI2	12/8/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM6	12/12/17	0.0013	<0.0007	0.00055 J	<0.0016	0.00185	<0.00074	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.005	<0.0016	BDL	<0.00074	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.005	<0.0016	BDL	<0.00074	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
SSCAL POC Well			**0.005**	**1.0**	**0.70**	**10.0**	**--**	**0.02**	**0.02**

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL DATA

CIRCLE K STORE NO. 8261

928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-11	SI2	12/8/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
SSCAL POC Well			**0.005**	**1.0**	**0.70**	**10.0**	**--**	**0.02**	**0.02**
MW-12	SI2	12/8/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
SSCAL POC Well			**0.005**	**1.0**	**0.70**	**10.0**	**--**	**0.02**	**0.02**

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL DATA

CIRCLE K STORE NO. 8261

928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
MW-13	SI2	12/8/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA4	12/16/2019	<0.00038	<0.0041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
SSCAL POC Well			**0.0059**	**1.18**	**0.826**	**11.8**	**--**	**0.0236**	**0.0236**
MW-14	GWM5	8/25/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
SSCAL POC Well			**0.00518**	**1.04**	**0.726**	**10.4**	**--**	**0.0207**	**0.0207**
DW-1	SI	3/10/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001
	SI2	12/8/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM3	3/28/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM4	6/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM5	9/22/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM6	12/12/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM7	3/27/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM8	6/26/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM9	9/25/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001
	GWM10	12/31/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA1	3/18/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA2	6/28/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA3	9/24/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA4	12/16/2019	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001
	RNA5	3/23/2020	<0.00038	<0.00041	<0.0005	<0.0016	BDL	0.012	<0.001
SSCAL POC Well			**0.005**	**1.0**	**0.70**	**10.0**	**--**	**0.02**	**0.02**

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL DATA

CIRCLE K STORE NO. 8261

928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Event	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)	Total BTEX (mg/L)	MTBE (mg/L)	Naphthalene (mg/L)
EW-1	RNA1	3/18/2019	0.0055	<0.00041	<0.0005	<0.0016	0.0055	**0.23**	0.0035
	RNA2	6/28/2019	0.0049	<0.00082	<0.001	<0.0032	0.0049	**0.21**	0.0075
	RNA3	9/24/2019	0.0055	0.0048	0.00056 J	0.005 J	0.01586	**0.24**	0.011
	RNA4	12/16/2019	0.0057	<0.00082	<0.001	<0.0032	0.0057	**0.42**	0.011
	RNA5	3/23/2020	0.0049	<0.00082	<0.001	<0.0032	0.0049	**0.23**	0.0077
SSCAL for POC Well			**0.00808**	**1.62**	**1.13**	**16.2**	**--**	**0.0323**	**0.0323**
EW-2	RNA1	3/18/2019	**0.11**	0.22	0.077	0.20	0.607	0.0035	0.019
	RNA2	6/28/2019	**0.14**	0.56	0.17	0.46	1.33	0.0037	**0.041**
	RNA3	9/24/2019	**0.048**	0.16	0.044	0.12	0.372	0.0027	0.019
	RNA4	12/16/2019	**0.042**	0.16	0.039	0.12	0.361	0.0036	0.015
	RNA5	3/23/2020	0.0069	0.0013	0.0017	<0.0016	0.0099	0.0015	0.0028
SSCAL for POC Well			**0.00808**	**1.62**	**1.13**	**16.2**	**--**	**0.0323**	**0.0323**

Notes: *All Readings are in mg/L (milligrams per Liter), equivalent to parts per million (ppm)*
BTEX: Benzene, toluene, ethyl benzene, xylenes
MTBE: Methyl tertiary butyl ether
BTEX, MTBE, and naphthalene analysis on the monitoring well samples was conducted per EPA Test Method 8260B
POC: Point of compliance
DUP: Duplicate sample collected from well MW-9
SSCAL: Site Specific Corrective Action Level established by Tier I/Tier II Risk Assessment (February 2017)
ISL: Initial Screening Levels established by ADEM for groundwater at commercial sites (November 2001)
***Bold** type: Concentration exceeds ADEM SSCAL or ISL*
J: Indicates the result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value
--: No ISL or SSCAL established

Source: *PPM Consultants, Inc.*
PPM Project No. 234949.MCAP2

TABLE 3

SUMMARY OF PRIVATE WELL ANALYTICAL DATA

CIRCLE K STORE NO. 8261

928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Sample Date	Benzene (mg/L)	Chloroethane (mg/L)	Chloroform (mg/L)	Chloromethane (mg/L)	1,1-Dichloropropene (mg/L)	MTBE (mg/L)	Tetrachloroethene (mg/L)
PW-1	12/8/16	<0.000082	<0.00022	0.00069	<0.00015	<0.000095	<0.000093	<0.00018
	2/13/17	<0.0005	<0.001	0.00045 J	<0.0005	0.00012 J	<0.0005	0.00046 J
	3/2/2017 TestAmerica	<0.000082	<0.00022	0.00055	0.00015 J	<0.000095	0.00022 J	<0.00018
	3/2/2017 Pace	<0.00025	<0.00028	0.00066 I	<0.00046	<0.00025	<0.00025	<0.00025
	3/28/17	<0.000082	<0.00022	0.00065	<0.00015	<0.000095	0.00021 J	<0.00018
	6/22/17	<0.000082	<0.00022	0.00044 J	<0.00015	<0.000095	0.00016 J	0.00046 J
	9/22/17	<0.000082	<0.00022	0.00071	<0.00015	<0.000095	0.00019 J	<0.00018
	12/12/17	<0.000082	<0.00022	0.00075	<0.00015	<0.000095	0.00022 J	<0.00018
	3/27/18	<0.000082	<0.00022	0.00046 J	<0.00015	<0.000095	0.00011 J	0.0027
	6/26/18	<0.000082	<0.00022	0.00072	0.00093	<0.000095	0.00013 J	<0.00018
	9/25/18	<0.000082	<0.00022	0.00062	<0.00015	<0.000095	0.00014 J*	0.00039 J
	12/31/18	<0.000082	<0.00022	0.00072	<0.00015	<0.000095	<0.000093	0.00031 J
	3/18/19	<0.000082	<0.00022	0.00073	<0.00015	<0.000095	0.00011 J	<0.00018
	6/28/19	<0.0005	<0.0005	0.0007	<0.0005	<0.0005	<0.0005	<0.0005
	9/24/19	<0.000082	<0.00022	0.00083	<0.00015	<0.000095	<0.000093	<0.00018
	12/16/19	<0.000082	<0.00022	0.00073	<0.00015	<0.000095	<0.000093	<0.00018
	3/23/20	<0.000082	<0.00022	0.00080	<0.00015	<0.000095	<0.000093	<0.00018

TABLE 3
SUMMARY OF PRIVATE WELL ANALYTICAL DATA
CIRCLE K STORE NO. 8261
928 TELEGRAPH ROAD, PRICHARD, ALABAMA

Well I.D.	Sample Date	Benzene (mg/L)	Chloroethane (mg/L)	Chloroform (mg/L)	Chloromethane (mg/L)	1,1-Dichloropropene (mg/L)	MTBE (mg/L)	Tetrachloroethene (mg/L)
PW-2	12/8/16	<0.000082	<0.00022	0.00035 J	<0.00015	<0.000095	<0.000093	<0.00018
	2/13/17	0.000096 J	<0.001	0.00043 J	0.00018 J	<0.0005	<0.0005	<0.0005
	3/2/2017 TestAmerica	<0.000082	<0.00022	0.00044 J	<0.00015	<0.000095	<0.000093	<0.00018
	3/2/2017 Pace	<0.00025	<0.00028	0.00042 I	<0.00046	<0.00025	<0.00025	<0.00025
	3/28/17	<0.000082	<0.00022	0.00038 J	<0.00015	<0.000095	<0.000093	<0.00018
	6/22/17	<0.000082	<0.00022	<0.0002	<0.00015	<0.000095	<0.000093	<0.00018
	9/22/17	<0.000082	<0.00022	0.00023 J	<0.00015	<0.000095	<0.000093	<0.00018
	12/12/17	<0.000082	<0.00022	0.00025 J	<0.00015	<0.000095	<0.000093	<0.00018
	3/27/18	<0.000082	<0.00022	0.00023 J	<0.00015	<0.000095	<0.000093	<0.00018
	6/26/18	<0.000082	<0.00022	<0.0002	<0.00015	<0.000095	<0.000093	<0.00018
	9/25/18	<0.000082	<0.00022	<0.0002	<0.00015	<0.000095	<0.000093*	<0.00018
	12/31/18	<0.000082	<0.00022	0.00021 J	<0.00015	<0.000095	<0.000093	<0.00018
	3/18/19	<0.000082	<0.00022	<0.0002	<0.00015	<0.000095	<0.000093	<0.00018
	6/28/19	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	9/24/19	<0.000082	<0.00022	<0.0002	<0.00015	<0.000095	<0.000093	<0.00018
	12/16/19	<0.000082	<0.00022	<0.0002	<0.00015	<0.000095	<0.000093	<0.00018
	3/23/20	<0.000082	<0.00022	<0.0002	<0.00015	<0.000095	<0.000093	<0.00018
EPA RSL or MCL for Tapwater		**0.005**	**21**	**0.08**	**0.19**	**--**	**0.014**	**--**

Notes: *All Readings are in mg/L (milligrams per Liter), equivalent to parts per million (ppm)*
MTBE: Methyl tertiary butyl ether
VOC analysis on the monitoring well samples was conducted per EPA Test Method 524.2
RSL: Regional Screening Levels established by EPA, June 2017
MCL: Maximum Contaminant Level established by EPA
I, J: Indicates the result is less than the Reporting Limit but greater than or equal to the Method Detection Limit and the concentration is an approximate value
<X.XXX: Below Method Detection Limit
--: No RSL or MCL established
** : Relative Percent Difference of the laboratory control sample and/or laboratory control sample duplicate exceeds the control limits.*
PW: Private Well

Source: *PPM Consultants, Inc.*
PPM Project No. 234949.MCAP2

APPENDIX C – DESIGN CALCULATIONS

PPM Consultants, Inc.

MASS REDUCTION ESTIMATE

Project Mgr: Rodney Kilgore
Site Name: Circle K Store 8261

1) Dissolved COC Reduction Required in Groundwater:

Data from the last five groundwater monitoring events were averaged to represent COC concentrations in groundwater.

Sample ID	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Total Xylenes (ppm)	MTBE (ppm)
MW-1	0.0087	0.0006	0.0084	0.006	0.812
MW-2	0.00076	0.0002	0.00025	0.0008	0.022
MW-8	0.0083	0.0024	0.00125	0.0112	1.11
MW-9	0.223	1.582	0.258	0.972	0.004
EW-1	0.005	0.0004	0.0005	0.003	0.266
EW-2	0.069	0.016	0.663	0.180	0.003
Average	**0.053**	**0.2669**	**0.1553**	**0.1955**	**0.37**
Lowest SSCAL	**0.00702**	**1.40**	**0.983**	**14**	**0.0281**
Reduction Goal	**0.0456**	**0.2135**	**0.1242**	**0.156**	**0.341**

Note: where average COC concentration is below SSCAL, an 80% reduction target is utilized for the reduction goal.

2) Adsorbed COC Reduction Required in Soil: All Soil COCs are below SSCAL for Source Soils.

COC concentrations in soil are based on the average soil concentrations from borings within the area of proposed ozone treatment.

Sample ID	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Total Xylenes (ppm)	MTBE (ppm)
SB-1/MW-1	0.001	0.001	0.0004	0.001	0.021
SB-2/MW-2	0.0007	0.001	0.0004	0.001	0.001
SB-8/MW-8	0.0006	0.0006	0.0003	0.001	0.0006
SB-9/MW-9	0.0006	0.001	0.0003	0.001	0.001
Average	**0.0007**	**0.0009**	**0.0004**	**0.001**	**0.0059**
Lowest SSCAL	**0.303**	**71.8**	**44.1**	**48.3**	**0.987**
Reduction Goal	**0.00058**	**0.00072**	**0.00028**	**0.0008**	**0.00472**

Note: where average COC concentration is below SSCAL, an 80% reduction target is utilized for the reduction goal.

3) Groundwater Treatment Volume:

The areal extent of hydrocarbon-impacts will be estimated using the equation for an ellipsoid:

$$V = (4/3) \times \pi \times L \times W \times D \times P$$

Where:

L = Length (feet)
W = Width (feet)
D = Depth/Thickness (feet)
P = Porosity

Length (ft) =	120	
Width (ft) =	50	
Thickness (ft) =	10	
Porosity =	0.374	March 2016 - Secondary Investigation Data

Total Treatment Volume, GW =	93,871	ft^3
Total Treatment Volume, GW =	2,657,942	L

Notes:
1. COC impacts are estimated to be present within a water-bearing zone with a thickness of up to 10 feet.
2. Areal extent of the groundwater treatment area is estimated based upon an elliptical area of the benzene/MTBE plume exceeding the SSCALs.

PPM **PPM Consultants, Inc.**

MASS REDUCTION ESTIMATE

Project Mgr: Rodney Kilgore
Site Name: Circle K Store 8261

4) Soil Treatment Volume:

The areal extent of hydrocarbon-impacts will be estimated using the equation for an ellipsoid:

$$V = (4/3) \times \pi \times L \times W \times D$$

Where:

L= Length (feet)
W= Width (feet)
D= Depth/Thickness (feet)
P= Porosity

Length (ft) =	120	
Width (ft) =	50	
Thickness (ft) =	10	
Soil Density (lb/ft^3) =	103	February 2017 ARBCA Data Acquisition Report

Total Treatment Volume, Soil =	251,327	ft^3
Soil Weight =	25,886,723	lb
Soil Mass =	11,739,629	kg

Notes:
1. Areal extent of the soil treatment area is estimated based upon an elliptical area of the benzene/MTBE plume exceeding the SSCALs.

5) Dissolved COC Mass to be Removed

	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Conc., mg/L	0.046	0.2135	0.1242	0.156	0.341
mass, mg	1.21E+05	5.68E+05	3.30E+05	4.16E+05	9.07E+05
Weight, lb	0	1.3	0.7	0.9	2.0
Total lbs.	5				

6) Adsorbed Hydrocarbon Mass to be Removed

	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE
Conc., mg/kg	0.0006	0.001	0.000	0.001	0.005
mass, mg	6.81E+03	8.45E+03	3.29E+03	9.39E+03	5.54E+04
Weight, lb	0.0	0	0	0	0.12
Total lbs.	0				

Total Mass of COCs to be Removed = 5 lbs

7) Ozone Required for Treatment

Number of COCs	5	
Gram Equivalent to Oxidize COC (13.6 g/g for BTEX, 3.0 g/g for MTBE, 3.0 g/g for Naph)	19.6	g/g
Total Mass of Ozone Required for COCs	21	lbs
Assume COCs Comprise 35% of Hydrocarbons Released	35%	
Total Mass of Ozone Required for all Hydrocarbons	60	lbs
Pounds of Ozone Per Day System Can Generate	2.7	lbs/day
No. of Days Required for all Hydrocarbons	22	days
Safety Factor for Naturally Occurring Oxidant Demand	10%	
No. Days Required for Hydrocarbons and Nat. Occurring Oxidant Demand	24	days
General Safety Factor	15%	
No. Days Required for Hydrocarbons, Nat. Oxidant Demand, and Safety Factor	28	
No. of Years Required for Hydrocarbons, Nat. Oxidant Demand, and Safety Factor	0.1	years
No. of Years Required assuming 85% Runtime	0.1	years

It is noted that the estimated cleanup time does not take into account the affects of natural attenuation.

APPENDIX D – EQUIPMENT MANUFACTURER'S QUOTATION/SPECIFICATIONS

Proposal for

PPM Consultants
Circle K No. 8261
MOSU20-104 - Rental

6/4/2020

Prepared for
Rodney Kilgore
Rodney.kilgore@ppmco.com | 251.266.7915

Prepared by
Jeff Martens | jmartens@h2oengineering.com | 805.548.2303

1 Executive Summary

H2O Engineering is pleased to provide PPM Consultants with the following rental proposal for Circle K No. 8261 in Spanish Fort, AL.

This proposal is designed to meet your needs based on discussions with Rodney Kilgore. Please let us know if these requirements have changed or are inaccurate in any way.

- MOSU20-104 Ozone Sparge Mobile System rental for 12 months
- An integrated, enclosed, pre-piped, pre-wired, fully equipped mobile remediation system capable of producing up to 5.5 lbs/day of ozone for remedial efforts
- Field programmable controller with an interface panel viewer
- Sparge point materials including oxidation points, wellhead connection and riser pipe

As a benefit to you, all H2O Engineering projects include:

- Professional start-up assistance, commissioning, training and service (if required)
- Deep remediation experience with engineering, PLC programming and fabrication capabilities in-house
- Experience manufacturing remediation systems of this scale and complexity with strict performance and safety requirements
- Optimum equipment arrangement with an objective to minimize footprint and operating costs

The monthly rental price for this proposal is $5,000.00 per month. Please see Section 5 on page 15 to see the pricing breakdown and options.

A detailed scope of supply for the equipment and services proposed are provided in the following sections.

If you have any questions regarding our proposal, please do not hesitate to contact me.

Sincerely,

Jeff Martens
VP, Sales and Market Development
H2O Engineering Inc.

Email: jmartens@h2oengineering.com
T: 805.548.2303
M: 630.441.6281

Table of Contents

1 Executive Summary 2

2 H2O Engineering Scope of Supply 6

2.1 Base System Specifications 6

2.1.1 Ozone Sparge System Design basis 6

2.1.2 Feed Gas Air Compressor 6

2.1.3 Oxygen Concentrators 6

2.1.4 Oxygen Purity Monitor 6

2.1.5 Ozone Generators 6

2.1.6 Ozone Delivery Pump 6

2.1.7 Ozone Delivery Manifold 7

2.1.8 Ozone Sparge System Enclosure 7

2.1.9 Control System 7

2.1.10 Electrical Requirements 8

2.2 All control panel components to be UL 508A listedAncillary Materials and Specifications 8

2.2.1 In-situ Oxidation Point: IOP100-12-P 8

2.2.2 Riser Pipe: RP100 8

2.2.3 Riser Pipe: RP100-5 8

2.2.4 Well Head Connection: WHC10 8

2.2.5 Ozone Delivery Tubing: TUB-PFA-8 9

2.2.6 Ozone Resistant Monitoring Well Plugs 9

2.3 Service Kits and Other Equipment Options 9

2.3.1 Service & Maintenance Kit Specifications 9

2.3.2 Portable Oxygen Purity Analyzer: ACC-112 10

2.3.3 Hand-held Passive Ambient Ozone Monitor: ACC-105 10

2.3.4 Portable Gas Leak Detector: ACC-175 + ACC-175a 10

3 Engineering Submittals 12

3.1 Base Package 12

3.2 Optional Engineering Documentation 12

4 Startup Services 13

4.1 Startup Services Scope of Work 13

4.1.1 Startup Services Assumptions and Clarifications 14
5 Commercial Offer 15
5.1 Base System 15
5.2 Ancillary Materials 15
5.3 Service Kits 15
5.4 Startup Services - Optional 15
5.5 Freight 16
5.6 Invoicing and Payment Terms 16
5.6.1 Equipment 16
5.6.2 Rental Equipment 16
5.6.3 Parts and Consumables 16
5.6.4 Labor Services 16
5.7 Project Schedule 16
5.8 Equipment Shipment and Delivery 16
5.9 Pricing Notes 17
5.10 Conditional Offering 17
5.11 After Sales Service 17
5.12 Limited Warranty and Disclaimers 17
5.12.1 Limited Express Warranty. 17
5.12.2 Repairs and replacement parts. 18
5.12.3 How to Obtain Service under H2O Engineering's Limited Warranty. 18
5.12.4 Items Excluded from the Warranty. 19
5.12.5 Claims and Returns. 19
5.12.6 Exclusive Warranty; Miscellaneous Provisions. 20
6 Acceptance of Proposal 20
7 H2O Engineering Project Team Member 22
7.1 Robert Moncrief – President and CEO 22
7.2 Ben Corcoran – VP of Operations 22
7.3 Chris Nosti, P.E. – VP of Engineering and Service 22
7.4 Jeffery Martens – VP of Sales and Market Development 23
7.5 Hannah Platt – Mechanical Engineer 23
7.6 Trevor Weiss – Water Process Engineer 23
7.7 Mark Scott – Account Manager 24
7.8 Jeff Cedillos – Sales Coordinator 24

7.9 Erik Barker – Field Operations Supervisor 24
7.10 Caitlin McLaughlin – Customer Service Coordinator 24

2 H2O Engineering Scope of Supply

2.1 Base System Specifications

All ozone wetted parts to be of ozone compatible materials (i.e., stainless steel, glass, PVDF, PTFE, and Viton). Ozone output verification will be performed upon completion of fabricating the ozone sparge system. This system is an air-cooled piece of equipment. Adequate ventilation is required to ensure reliable operation.

2.1.1 Ozone Sparge System Design basis

- The sparge system is rated to produce 104 g/h (5.5 lb/day) of ozone at up to 6% by weight at the end of 500-ft of Teflon™ tubing. Ozone pressure will be boosted through a diaphragm pump to a maximum 50 psi.
- Oxygen will be created by two oxygen concentrators, each providing 90-95% pure oxygen at 30 SCFH at 10 psi
- Blend air will be supplied from a compressor, providing 3.5 SCFM at up to 90 PSI
- Generated ozone will be routed through a 20-point manifold.
- Manifold will connect to up to 20 sparge points using ½-inch OD PFA tubing
- Built-in high limit pressure transducer and pressure relief valves on manifold.
- Sparge flow rate for each sparge point is up to 4 SCFM
- Maximum sparge pressure is 50 PSIG, breakthrough sparge pressure is 90 PSIG

2.1.2 Feed Gas Air Compressor

- Built in tank and refrigerated dryer.
- Maximum air / breakthrough sparge pressure of 90 PSI
- Rotary screw design

2.1.3 Oxygen Concentrators

- Each calibrated to deliver 30 SCFH of 90 to 95% purity oxygen at a maximum delivery pressure of 10 PSIG, 2 each.

2.1.4 Oxygen Purity Monitor

- Oxygen purity monitor located upstream of ozone generators to alarm if purity falls below 85%

2.1.5 Ozone Generators

- 104 g/h total (5.5 lb/day) at up to 5% by weight ozone from oxygen at 60 SCFH, 10 PSIG
- Integrated alarms with dry contact to PLC
- Backpressure regulators downstream of generators to control feed gas pressure, provide optimum ozone output, and isolate ozone generators from variable manifold pressure, 2 each

2.1.6 Ozone Delivery Pump

- Inlet pressure at 10 PSIG

- Outlet pressure at up to 50 PSIG

2.1.7 Ozone Delivery Manifold

- Delivery flow and pressure displayed and logged via PLC, viewable from HMI and telemetry
- Maximum air / breakthrough sparge pressure of 90 PSI
- 20 solenoid valves
- 1/2" OD Kynar compression fittings

2.1.8 Ozone Sparge System Enclosure

- Trailer Mounted, Overall Dimensions: 11'9"L x 6'9"Wx 6'8"H
- Single axle, spare tire, stabilizer jacks, 2" ball hitch, hitch lock, 4 way flat trailer plug
- Access ports in walls/floors, as appropriate, for ventilation, air supply lines and ozone discharge lines
- Exterior painted white
- Exterior service disconnect/emergency switch located on side wall of trailer
- Interior painted white
- Interior lighting and 10A convenience outlet
- Interior ozone monitor
    - Connected to system PLC. Range 0 – 2ppm
    - Alarm set point: 1.0 ppmv
- Temperature Control
    - Wall mount electric heater
    - Interior foam-board and plywood insulation of walls and roof
    - PLC controlled fan ventilation
    - One 12" exhaust fan in side wall

2.1.9 Control System

- Control Panel is UL508a Listed and ships with all UL drawings
- NEMA 3R enclosure utilized for the main control panel and MSP style breakers.
- Indicators for alarm conditions for each individual alarm on HMI screen
- All indicator lights LED type.
- Power contacts to have one N.O. auxiliary contact each
- (1) 15-amp GFCI convenience outlet, with its own circuit breaker.
- Motor circuit wiring conforms to NEC Table 310-16, with a 0.87 wire size correction factor.
- A system schematic to be laminated and permanently affixed inside the electrical panel door.
- The control panel HMI screen equipped with an hour meter to track operation of the ozone sparging compressor. Automatic regression from ozone to air / breakthrough mode upon high pressure detection.
- User selectable delivery gas for each sequence step (ozone or oxygen, either with or without air flow boost, or air flow boost only)
- Independent time duration control for each sequence step (programmable from 1 to 120 minutes)
- User configurable valve sparge sequence ordering, allows user to repeat valves within the sequence or change sparge sequence order without plumbing changes
- Variable ozone output can be individually configured for each valve (10-100%)

- Automated maintenance notifications
- Automated email alarm notifications, up to 2 email addresses
- PLC based system located on interior wall of trailer
- Total system power consumption monitored by PLC
- Allen Bradley PanelView Plus 400 4" Human Machine Interface (HMI) with touch pad to allow modification to programming while operating
- Individual and total sparge time cycle accumulator. Accumulator shall be protected or reset by a programmed password.
- Cell-phone based telemetry system included (Verizon Wireless service contract required)
- Onboard VNC Server to allow control and monitoring of system from multiple computers, tablets, smartphones (free apps available)

2.1.10 Electrical Requirements

- Final electric service connection (240V/60 Hz, 60A) by others

2.2 All control panel components to be UL 508A listedAncillary Materials and Specifications

2.2.1 In-situ Oxidation Point: IOP100-12-P

- Stainless Steel Body
- (16) 3/8" x 1-1/2" Outlets
- 50 mesh internal stainless screen
- 1" x 8 T.P.I. F-480 Male Flush Thread w/ Viton® O-ring

2.2.2 Riser Pipe: RP100

- 1"ID x 10'L with Viton® O-ring
- Sch. 80
- 1" x 8 T.P.I. F-480 Male Flush Thread

2.2.3 Riser Pipe: RP100-5

- 1"ID x 5'L with Viton® O-ring
- Sch. 80
- 1" x 8 T.P.I. F-480 Male Flush Thread

2.2.4 Well Head Connection: WHC10

- ¼" Stainless Steel Tee
- ¼" Stainless Steel Plug

- ¼" Stainless Steel Nipple
- 1/2" Compression fitting for ozone delivery tubing
- 1" Slip Sch. 80 Union with insert

2.2.5 Ozone Delivery Tubing: TUB-PFA-8

- PFA
- 1/2" OD x 3/8" ID

2.2.6 Ozone Resistant Monitoring Well Plugs

- Available in 2" and 4" sizes
- Standard monitoring well plugs cannot withstand ozone gas and will leak over a short period of time
- Ozone resistant sealing gasket prevents ozone from short circuiting from an active sparge well to a nearby monitoring well

2.3 Service Kits and Other Equipment Options

2.3.1 Service & Maintenance Kit Specifications

2.3.1.1 MOSUXX-104 Six Month Service Kit, Series D.4, includes

(Parts are subject to change based on final design specifications.)

- (4) V-C-104 - 1/4" MPT 316SS Check Valve
- (1) S-IF-11-8.75 - Intake Filter
- (1) S-OF-SX - Oil Filter
- (1) S-AFC-4.7-2.0 - Air Filter
- (1) S-FB-OR-F9KE-F - Oil Filter Element
- (1) S-FB-PF-F9KB-F - Particulate Filter Element
- (1) S-OWS-25-F - Oil/Water Separator Element
- (4) S-OIL-FSYN-QT - Synthetic Oil, quart
- (2) F-OR-100 - Filter, Oil Removal, Inline, 1/4"

2.3.1.2 MOSUXX-104 Twelve Month Service Kit, Series D.4, includes

(Parts are subject to change based on final design specifications.)

- (4) V-C-104 - 1/4" MPT 316SS Check Valve
- (1) S-ECH-O3-200-A - O3 Sensor, 0-2ppm Replacement Ozone Sensor
- (1) V-PR-101 - Manifold Pressure Relief Valve, 100psi
- (2) V-PR-207 - Oxygen Pressure Relief Valve, 45psi
- (3) S-V-S-102-SK Solenoid Valve Rebuild Kit for Viton Valves Only
- (2) S-CMP-O3-100-SK ODP Compressor Rebuild Kit

- (2) F-OR-100 Inline Oil/Particulate Filter
- (1) S-IF-11-8.75 - Intake Filter
- (1) S-OF-SX - Oil Filter
- (1) S-AFC-4.7-2.0 - Air Filter
- (1) S-OSC-SX - Oil Separator Cartridge
- (4) S-OIL-SYN-QT - Synthetic Oil, quart
- (1) S-DB-4307 - Drive Belt
- (1) S-FB-OR-F9KE-F - Oil Filter Element
- (1) S-FB-PF-F9KB-F - Particulate Filter Element
- (1) S-OWS-25-F - Oil/Water Separator Element Disclosures

2.3.2 Portable Oxygen Purity Analyzer: ACC-112

- Range: 0-100 % O2
- Display: digital readout in .01 % increments
- Includes flow cell and 10 ft. cable
- Size: 4.62 x 2.5 x 1.5 in.
- Weight: 1.37 lb
- Power requirements: 9V battery
- Battery Lifetime: 1400 hours approx.

2.3.3 Hand-held Passive Ambient Ozone Monitor: ACC-105

- Range: 0-10 ppm; sensitivity as low as .02 ppm
- Display: digital readout in .01 ppm increments
- Measurement principle: HMOS (heated metal oxide semiconductor) sensor
- Size: 50 × 100 × 25 mm (2 × 4 × 1 in)
- Weight: 170 grams (6 oz)
- Power requirements: 12 VDC unregulated; AC adapters available worldwide
- Battery: Rechargeable batteries last more than 8 hours

2.3.4 Portable Gas Leak Detector: ACC-175 + ACC-175a

- Range: Ozone, 0-5/200 PPM (20 PPM Std.)
- Display: Back-lit graphics liquid crystal display
- Accuracy: ± 5% of value
- Sensitivity: 1% of sensor module range
- Outputs: RS-232 output of stored gas values
- Memory: 12,000 data points
- Storage Interval: Programmable from 1 minute to 60 minutes
- Typical Capacity: 8 days at 1-minute storage interval
- Alarms: Three concentration alarms (caution, warning, and alarm with adjustable setpoints)
- Low flow and low battery alarms
- Alarms displayed on LCD & Indicated by audible beeper
- Power: D cell battery, alkaline recommended, 75 hours operation
- Internal rechargeable Nicad for backup power, 6 hours operation
- 120 or 220 VAC chargers available
- Operating Temp.: -25º to +55ºC

- Humidity: 0-95% Non-condensing
- Detector Material: Glass Filled Polycarbonate
- Includes Carrying Case
- Size: 3.5″(W) x 9″(H) x 5.5″(D)
- Shipping Weight: 7 lbs. (3.2 Kg.)

3 Engineering Submittals

3.1 Base Package

Deliverable	Description
P&ID – Process & Instrumentation Diagram	Diagram of all process components, sensors, instrumentation, pipe sizes and materials, main equipment specifications and control signals/alarms/interlocks.
System Overview Narrative	Document describing system operation to delineate primary functions of all major equipment and how each component is controlled.
Spare Parts List	Recommended critical spare parts list for the system.
Major Equipment Cut Sheets and Vendor Manuals	All cut sheets or user manuals for all major equipment on the skid. Includes items like pumps, controls, sensors, control valves, tanks etc.
1 Hour Webinar Design Review	1 Hour webinar reviewing total project scope and presented submittals.
Shipping Pack List	List of items shipping to customer including loose-packed items like filters or spare parts

3.2 Optional Engineering Documentation

The following is a list which can be provided to the client upon request. H2O Engineering to provide estimate based on scope of project.

Deliverable	Description
GA - Skid General Arrangement	Drawing of 3D skid with plan/elevation/side views to denote skid dimensions, plumbing inlet/outlet connections, electrical connections, lifting/loading points and includes main equipment bill of materials.
Seismic Anchorage Structural Engineering Package	Complete structural drawings for skid anchoring signed/stamped by PE Engineer.
Electrical Schematics	Drawing of main skid power connections, disconnect, equipment schedule and component layout of panel. Electrical schematic drawing showing all wire connections within the control panel and component layout of the panel.
Control Narrative	Document describing the overall control scheme for the skid, HMI menu overview and alarm scheme.
I/O Table and SOO	Spreadsheet and documentation of all skid control set points, PLC I/O, alarms, Sequence of Operation and PID control loops
PLC / HMI Code	PLC and HMI specific code the skid. These are the actual program files uploaded to the device. ***Requires executed limited use and license agreement***

User Manual	PDF document describing operation of skid. Includes information about safety, installation, operation, control, maintenance, troubleshooting, alarms, spare parts, drawings & warranty
In Person Design Review	An in-person design review can be conducted with the customer's design and operations team.

4 Startup Services

4.1 Startup Services Scope of Work

Item	Description	Scope of Supply	
		H2O Engineering	**PPM Consultants or Subcontractor**
Equipment Installation and Technical Advisory Services	Unloading the equipment, rigging the equipment into place, connecting existing power wiring to control panel, verifying adequate drainage, testing for adequate water pressure, and testing power supply.		X
	Remote technical support of Equipment Installation	X	
Plumbing, Electrical and Pre-Startup Inspection	Plumbing and electrical connections to be finalized before H2O Engineering installation visit. All plumbing and electrical utilities need to be brought to within 5 feet of treatment equipment location (Treatment pad area).		X
	Includes time to inspect installation work, address questions, develop punch list of completion items necessary prior to startup.	X	
Commissioning Checklist	H2O Engineering to provide pre-commissioning checklist to client.	X	
	Complete pre-commissioning checklist and send completed form to H2O Engineering prior to site mobilization for startup services.		X
Equipment Startup	Includes operating the equipment manually, operating the equipment automatically, setting and testing control system, and putting system into automatic operation. Also includes informal, hands-on training conducted by the service technician in front of the equipment.	X	

4.1.1 Startup Services Assumptions and Clarifications

- This total assumes no weekends, or a holiday are required and is based on an eight-hour workday.
- Travel time to and from the job site for H2O Engineering Field Service personnel is included in this estimate.
- To ensure personnel availability, H2O Engineering requires a minimum of four weeks' advance notice to schedule equipment start-ups. Any startup with less than 4 weeks lead time may require additional travel or manpower expense.
- The commissioning plan does not include site specific safety training. We would be happy to provide site-specific safety training at our Field Service Labor rate.
- On-time completion of H2O Engineering's startup and commissioning services requires satisfactory installation of all equipment by Customer (where not included above). Please complete the commissioning checklist and return a signed copy to H2O Engineering prior to the commissioning date.
- If additional service time is required for H2O Engineering's commissioning scope due to Customer's changes in scope or delays in completion of installation, additional charges will apply, billed at H2O Engineering's Field Service Labor Rates. H2O Engineering will provide a revised scope of work and cost estimate.

5 Commercial Offer

5.1 Base System

Description	Qty	Price Each	Total Price
MOSU20-104 Rental - $5,000/month for 12 months	12	$5,000.00	$60,000.00
Security Deposit	1	$3,000.00	$3,000.00
Freight Estimate – to site	1	$5,500.00	$5,500.00
Freight Estimate - from site	1	$5,500.00	$5,500.00
Total			**$74,000.00**

5.2 Ancillary Materials

Description	Qty	Price Each	Price
IOP (In-situ Oxidation Points)	10	$319.04	$3,190.40
Riser Pipe (10ft)	30	$36.82	$1,104.60
Riser Pipe (5ft)	10	$26.85	$268.50
Well Head Connections	10	$143.85	$1,438.50
Ozone Delivery Tubing (per foot)	1,300	$4.33	$1,304.33
Monitoring Well Plugs	-	$40.00	-
Total			**$7,306.33**

5.3 Service Kits

Description	Qty	Price Each	Price
6-month Service and Maintenance Kit – SKM104-06-D.4	1	$1,468.00	$1,468.00
12-month Service and Maintenance Kit – SKM104-12-D.4	1	$3,081.50	$3,081.50
Total			**$4,549.50**

5.4 Startup Services - Optional

Description	Price
Up to 2 hours of remote communication (phone, teleconference, emails, or other as appropriate) is included at no additional charge to provide support for startup and commissioning of a single system.	Included (no additional charge)
Additional time beyond 2 hours of remote communication to be billed at H2O Engineering Field Service Technician rate. (Optional – Actual time used will be invoiced)	Bill Actual: Hours x Field Service Technician rate
Price indicates cost for (1) H2O Engineering personnel to be on-site for (1) day. Additional days to be billed at H2O Engineering field service rate.	$5,800.00

5.5 Freight

A shipping estimate will be supplied upon contract award. All pricing is FOB/FCA (INCOTERMS 2010) from designated factory.

5.6 Invoicing and Payment Terms

Terms are as follows with credit approval.

5.6.1 Equipment

Equipment shipment is contingent on receipt of initial milestone payment.

- 50% invoiced with order due upon receipt of invoice
- 25% invoiced with engineering submittal due upon receipt of invoice
- 15% invoiced 2 weeks prior to shipment due NET 30
- 10% invoiced at shipment due NET 30

5.6.2 Rental Equipment

- Invoiced monthly upon credit approval due NET 30

5.6.3 Parts and Consumables

- Invoiced upon shipment due NET 30

5.6.4 Labor Services

- Invoiced upon completion of work or at the end of the month; whichever occurs first, due NET 30.

5.7 Project Schedule

The Buyer and Seller will arrange a kick-off meeting after contract acceptance to develop firm deliverable and shipment schedule. Title and risk of loss will transfer upon delivery in accordance with FCA (INCOTERMS 2010) designated factory.

5.8 Equipment Shipment and Delivery

Firm shipment estimate to be determined upon award of contract. The Buyer and Seller will arrange a kick-off meeting after contract acceptance to develop firm shipment schedule. Title and risk of loss will transfer upon delivery in accordance with FCA (INCOTERMS 2010) designated factory.

Project cost is based on standardized shipping lead times (does not include expedited shipping)

5.9 Pricing Notes

- All prices quoted are in USD. Quote is good for 30 days from date of quotation.
- Any sales or value added tax is not included.
- The customer will pay all applicable local, state, provincial, or federal taxes and duties.
- The equipment delivery date, start date, and date of commencement of operations are to be negotiated.
- Commercial terms and conditions shall be in accordance with H2O Engineering's Standard Terms and Conditions of Sale.
- This proposal and the rates provided herein are subject to final site, environmental, H2O Engineering compliance check, and financial due diligence by H2O Engineering.
- This proposal supersedes all previous proposals and correspondence.
- Seller's price and delivery schedule are based on the assumption that Buyer will take delivery as and when foreseen by the schedule. Where this is not the case, the Parties must agree in advance an alternative place of delivery, failing which the Seller will be entitled to ship the equipment to storage. Buyer shall issue a Change Order to take into account any additional cost or delay incurred by H2O Engineering in implementing this change.
- Seller may manufacture and source the Equipment and any part thereof globally in the country or countries of its choosing, provided that the Equipment complies with all of the requirements specified in this Agreement.

5.10 Conditional Offering

Customer understands that this proposal has been issued based upon the information provided by customer, and currently available to, H2O Engineering at the time of proposal issuance. Any changes or discrepancies in site conditions (including but not limited to system influent water characteristics, changes in environmental, health, and safety (EH&S) conditions, and/or newly discovered EH&S concerns), Customer financial standing, Customer requirements, or any other relevant change, or discrepancy in, the factual basis upon which this proposal was created, may lead to changes in the offering, including but not limited to changes in pricing, warranties, quoted specifications, or terms and conditions. H2O Engineering's offering in the proposal is conditioned upon a full H2O Engineering EH&S and Customer financial review.

5.11 After Sales Service

Should you want to learn more about H2O Engineering's expert service offerings on your equipment, please contact your local H2O Engineering Account Manager or visit our website http://www.h2oengineering.com to get connected with a Customer Service Coordinator in your region. In North America, please dial 1-866-987-0303 to contact a customer service representative.

5.12 Limited Warranty and Disclaimers

5.12.1 Limited Express Warranty.

As to parts and/or equipment supplied by H2O Engineering, Inc. ("H2O Engineering"), H2O Engineering warrants these parts to be free from material defects in material or workmanship for

a period of 12 months commencing on the date of original shipment from H2O Engineering; provided, however, the one (1) year warranty period shall begin on the earlier to occur of: (i) installation date, if the installation is performed by H2O Engineering; or (ii) on the sixtieth (60th) day following the date of the original shipment from H2O Engineering to Customer. This warranty shall be limited to the repair or replacement of parts and the labor and services required to repair the equipment. Notwithstanding anything to the contrary, any materials used in connection with such equipment that are not manufactured by H2O Engineering shall carry no warranty from H2O Engineering.

To assist us in providing you with services under this warranty, kindly return to H2O Engineering a copy of the invoice along with the following information:

- End user name;
- Complete address, including telephone number;
- Date installed;
- Complete model and serial number information; and
- Name of company from which the unit was purchased.

5.12.2 Repairs and replacement parts.

Repairs and Replacement parts provided under this warranty shall carry only the unexpired portion of this warranty or 90 days, whichever is longer. Implied warranties, including but not limited to warranties of fitness for particular purpose, merchantability, use or application, and all other obligations or liabilities on the part of H2O Engineering are null and void, unless such warranties, obligations or liabilities are expressly agreed to in a writing signed by H2O Engineering.

5.12.3 How to Obtain Service under H2O Engineering's Limited Warranty.

5.12.3.1 For Purchased Equipment.

If any parts appear defective, Customer immediately shall notify H2O Engineering in writing via email at warranty@h2oengineering.com and provide H2O Engineering with reasonable opportunity to make inspections and tests. H2O Engineering's obligations under this warranty are limited to the repair or replacement at its facility in San Luis Obispo, California of any part which proves to be defective. If Customer asks H2O Engineering to inspect, test and/or replace defective parts at Customer's premises, Customer agrees to pay for all reasonable traveling time, accommodations and associated expenses incurred by H2O Engineering's representative. Notwithstanding the foregoing, H2O Engineering's labor costs to complete the repair/replacement will be covered by H2O Engineering in accordance with the terms and conditions hereof. Equipment shall not be returned to H2O Engineering for inspection and testing without H2O Engineering's prior written authorization. H2O Engineering will provide Customer with a return goods authorization number ("RGA") to use for returned goods to be shipped to H2O Engineering, FOB San Luis Obispo, CA. The RGA number must appear prominently on the exterior of the shipped box(es). The product and/or part must be packaged either in its original packing material or in comparable and suitable packing material, if the

original is not available. Customer is solely responsible for paying shipping charges to H2O Engineering and for any damage to the product and/or part that may occur during shipment. It is recommended that Customer insure the shipment for the amount originally paid for the product and/or part. Repaired or replaced items will be shipped back to Customer at Customer's sole cost by H2O Engineering, FOB San Luis Obispo, California. If upon inspection at H2O Engineering's facility, H2O Engineering determines that there is no defect or that the damage to the product and/or part resulted from causes not within the scope of this limited warranty, then the Customer shall bear the cost of H2O Engineering's labor in connection with inspecting and testing the product and/or part and all return freight charges. Any unauthorized attempt by Customer or any of its agents or employees to repair H2O Engineering manufactured products without prior permission shall void this express warranty. For service, contact H2O Engineering Service directly at (805) 547-0303 or via email at service@h2oengineering.com.

5.12.3.2 For Leased Equipment. Please refer to the warranty terms contained in the Equipment Lease between Customer and H2O Engineering.

5.12.4 Items Excluded from the Warranty.

This warranty does not apply to normally consumable parts or components, which shall include but not be limited to, filter cartridges, pump seals and/or fan filters. This warranty does not apply to any labor charges or property damage for physical removal or replacement of the equipment. This warranty does not extend to any product and/or part from which the assigned serial number has been removed or which has been damaged or rendered non-functioning as a result of any one or more of the following:

- an accident, misuse, alteration or abuse;
- an act of God such as flood, earthquake, hurricane, lightning or other disaster resulting only from the forces of nature;
- normal wear and tear;
- operation outside the usage parameters stated in the product user's manual;
- use of parts not sold by H2O Engineering;
- damage which may occur during shipping;
- service or unit modification not authorized by H2O Engineering;
- failure to meet service requirements as outlined in the Product Manual/User Guide;
- improper installation or application; and/or

5.12.5 Claims and Returns.

Customer must inspect shipment for damage in the presence of the carrier at the time of delivery. Failure to bring any damages (obvious or concealed) to the attention of the carrier and noting such damages on the bill of lading will void any claim made against the carrier. Customer should save all packaging materials and immediately notify H2O Engineering of the damages. On all products shipped FOB shipping point, it is the responsibility of H2O Engineering to file a damage claim with the carrier. Therefore, Customer must furnish H2O Engineering with complete damage information immediately via email to warranty@h2oengineering.com. Customer should verify contents of all shipments against the packing slip and carefully check all packaging materials for

merchandise before discarding. Claims for shortages or inaccurate filling of orders must be made to H2O Engineering within ten (10) days of the shipment's delivery by the carrier. If any goods were shipped in error, H2O Engineering shall provide Customer with an RGA number. If H2O Engineering, in good faith, determines that any error was not H2O Engineering's, Customer shall be charged a 20% restocking fee for any products or parts returned for credit or exchange.

5.12.6 Exclusive Warranty; Miscellaneous Provisions.

Except for the express warranty provided herein, there is no other warranty (expressed or implied) on H2O products and/or parts; provided, however, that neither this warranty nor any other warranty, expressed or implied, including any implied warranties or merchantability of fitness, shall extend beyond the warranty period. Some states do not allow limitations on how long an implied warranty lasts, so that the above limitations or exclusions may not apply to all Customers.

No course of prior dealings between the parties and no usage of the trade shall be relevant to supplement or explain any term used in this warranty. Acceptance or acquiescence in a course of performance rendered under these terms shall not be relevant to determine the meaning of this warranty even though the accepting or acquiescing party has knowledge of the nature of the performance and opportunity for objection. Whenever a term defined by the California Uniform Commercial Code (the "Code") is used herein, the definition contained in the Code shall control.

It is stipulated by the parties that these terms shall be interpreted and construed according to the laws of the State of California and specifically the Uniform Commercial Code as adopted in the State of California as effective and in force on the effective date of this warranty (as provided below). Venue for any dispute arising under this Agreement shall be in the courts in and for San Luis Obispo County, California.

If any provision of this warranty or the application thereof is held to be unenforceable or invalid by any court of competent jurisdiction, the remainder of this warranty shall not be affected thereby and to this end only those provisions of this warranty are declared severable. If any provision of this warranty is determined by any court of competent jurisdiction to be invalid, illegal, or unenforceable to any extent, that provision shall, if possible, be construed as though more narrowly drawn, if a narrower construction would avoid such invalidity, illegality, or unenforceability or, if that is not possible, such provision shall, to the extent of such invalidity, illegality, or unenforceability, be severed, and the remaining provisions of this warranty shall remain in effect.

6 Acceptance of Proposal

The commercial offer, specifications, terms and conditions are satisfactory and are hereby accepted. You are authorized to do the work as specified in this proposal. Payment will be made as outlined under the commercial offer.

Name and Title: _____

Signature: _____

Date of acceptance: _____

7 H2O Engineering Project Team Member

7.1 Robert Moncrief – President and CEO

Founded in 2000, H2O Engineering is recognized industry wide as a leader in water treatment system manufacturing and integration. As Founder, President and CEO of H2O Engineering, Robert's team has deployed over 400 sparge systems internationally and nationally, received two process patents utilized in many of their water treatment systems, and has manufactured Title 22 validated ozone equipment for tertiary water treatment in the State of California. Robert has fostered a sense of sustainable growth by developing long term relationships with many of the nation's leading water treatment and environmental engineering firms and partnering with key industry leaders who manufacture cutting edge, robust and reputable products.

7.2 Ben Corcoran – VP of Operations

As Vice President of Operations, Benjamin Corcoran directs all project processes and logistics, including materials procurement, resource planning, parts fabrication, product assembly, procedural implementation, and delivery logistics. Benjamin is responsible for H2O Engineering's facility requirements, manufacturing safety programs, final product inspection and prove-out and the company's UL 508A certification. Benjamin has been a part of the H2O Engineering team for the last 10 years.

7.3 Chris Nosti, P.E. – VP of Engineering and Service

Chris Nosti is a Mechanical Engineering M.S. graduate from California Polytechnic State University, San Luis Obispo and is a Registered Professional Electrical Engineer in the State of California. As VP of Engineering, Chris is directly responsible for planning, organizing and directing all engineering efforts to ensure H2O Engineering's products and services meet the highest standards in quality and reliability. Chris directs the creation of Process & Instrumentation Diagrams, mechanical and electrical drawings, project Bill of Materials and the internal manufacturing reference materials so projects are built on time and to specification. Chris has over 10 years of experience designing mechanical and electrical systems and he specializes in managing complex engineering projects to ensure all customer requirements are met.

7.4 Jeffery Martens – VP of Sales and Market Development

Jeff has 25 years of water treatment experience as a global business development and marketing executive. He has a history of delivering some of the most innovative and successful water treatment solutions in the industry. He is responsible for managing all aspects sales and marketing function, setting strategy, building partnerships and delivering the right technology solutions for our customers. Jeff graduated from the University of Michigan with a Chemical Engineering degree and went on to get his MBA from Northwestern's Kellogg School of Management.

7.5 Hannah Platt – Mechanical Engineer

Hannah Platt graduated from California Polytechnic State University with a B.S. in BioResource and Agricultural Engineering. As a Mechanical Engineer, Hannah develops 3D models of mechanical and electrical systems, creates Process and Instrumentation Diagrams, mechanical and electrical layout drawings, and complete project bill of materials. She has experience in developing mechanical, electrical, and plumbing designs for large scale commercial building layouts and complex process equipment/skids. Hannah has the skill set to complete fine detail designs while making sure they harmoniously sync with the overall system design to ensure customer specifications and expectations are met.

7.6 Trevor Weiss – Water Process Engineer

Trevor Weiss is a Water Engineering M.S. graduate from California Polytechnic State University, San Luis Obispo. As Water Process Engineer, Trevor is responsible for presales system design including technology selection, water treatment modelling, system specifications, and project costing. Trevor is a bridge between sales and engineering and works with customers to better understand their technical needs to ensure projects are delivered on time and meet customer expectations. Trevor has hands-on experience in the manufacturing industry supporting production and research & development of new technologies related to water treatment.

7.7 Mark Scott – Account Manager

Experienced Sales, Marketing, and Engineering professional with a demonstrated history of working in the medical devices, oxygen, and ozone industries. Skilled in Engineering, Manufacturing, International Business, Business Development, and Marketing Strategy. Graduated from The University of Chicago Booth School of Business and Cal Poly San Luis Obispo School of Engineering.

7.8 Jeff Cedillos – Sales Coordinator

Jeff Cedillos is the Sales Coordinator for H2O Engineering, Inc. and supports Sales, Market Development, Service DI Business and Customer Management, Business Development, Operations and Purchasing. Jeff is your go-to guy if you need to get anything done in short order. Jeff has more than 15 years of operations, sales and marketing experience and provides world-class customer support.

7.9 Erik Barker – Field Operations Supervisor

Erik Barker is the Field Operations Supervisor for H2O Engineering, Inc. Erik has close to 20 years of experience in the ozone and water purification industry. He currently oversees all service operations, in-house and in-field duties for both the Clean World and Pure Water divisions of H2O Engineering. In addition, Erik also oversees and maintains H2O Engineering's ozone remediation system rental fleet. Erik's experience provides a wide range of capabilities from system deployment and installation, to preventative maintenance and service, to system troubleshooting, prove-out and repairs.

7.10 Caitlin McLaughlin – Customer Service Coordinator

As the Customer Service Coordinator, Caitlin assists with planning and organizing the Service Department to meet H2O Engineering's objectives for customer support. Caitlin graduated from San Francisco State University with a B.S. in Environmental Studies: Earth System Science and has experience in biofuel, pollution prevention, and water conservation programs. Her background in product research and development, production management, software troubleshooting and customer support makes her an excellent asset to the team. Caitlin is responsible for resource allocation of the Service Department and serves as the primary point of contact for all service-related activities and projects.

APPENDIX E – SUBCONTRACTOR SPECIFICATIONS AND QUOTATION

Cost Proposal

Date	Proposal #
6/15/2020	12054

PO Box 1147
Foxworth, MS 39483

Name / Address	Re:
PPM CONSULTANTS, INC. 5555 BANKHEAD HIGHWAY BIRMINGHAM, AL 35210	Environmental Services Circle K 8261 Prichard, AL PPM Project No. 234949 MCAP2

Description	Unit	Qty	Rate	Total
Mobilize/Demobilize Drill Rig	lump sum	1	200.00	200.00T
Mileage	per mile	300	2.30	690.00T
Drill, sample & install (10) 30'- Ozone sparge points	per ft.	300	30.00	9,000.00T
Per-Diem	per day	3	300.00	900.00T
Flush Mount Covers	per each	10	200.00	2,000.00T
Mobilize/Demobilize System Crew	lump sum	1	2,500.00	2,500.00T
Trench & Backfill - Concrete/Asphalt	per ft.	250	25.00	6,250.00T
Saw Cutting up to 6" Concrete/Asphalt	per ft.	550	7.50	4,125.00T
1" Sch 40 PVC Piping	per ft.	1,200	2.00	2,400.00T
Up to 45 LF of 6' Wooden Privace Fence with metal roof	lump sum	1	2,050.00	2,050.00T
Well Head Hook-up	per each	10	95.00	950.00T
Electricity Hook-up	lump sum	1	2,500.00	2,500.00T

Customer Acceptance of Cost Proposal

_____
Authorized Signature Date

*Payment Terms NTE 30 days upon project completion.
*1.5% Interest will be charged monthly to all overdue invoices.

Subtotal	$33,565.00
Tax (0.0%)	$0.00
Total	$33,565.00

Walker-Hill Environmental, Inc
Foxworth, MS Office
Phone: (601) 736-3500
Email: eric@whenv.com

May 11, 2020

TO: **Rodney Kilgore**
PPM Consultants

FROM: **Wendy Powell**
EcoSouth Services

RE: **928 Telegraph Road, Prichard**
Transportation and Disposal

Thank you for allowing us the opportunity to offer a proposal for your waste disposal needs. I look forward to following up with you at your earliest convenience.

TRANSPORTATION

Transportation (per load)	=	$195
Delivery	=	$75

DISPOSAL

Industrial solid waste (per ton)	=	$28*

ADEM PROFILE FEE = $250

** The Alabama Department of Environmental Management (ADEM) mandates that all disposal sites collect and remit a fee to the State. This fee is currently **$1.00 per ton**. The ADEM fee will be added to all levels of disposal pricing quoted above.*

Cell: (228) 297-0483
Email: Wendy.powell@ecosouthservices.net

APPENDIX F – TECHNICAL SAMPLING AND QA/QC PLAN

PPM CONSULTANTS, INC.

1.0 TECHNICAL SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER MONITORING

1.1 PURPOSE

This Technical Sampling and Analysis (TS&A) Plan describes the methods and procedures to be followed during groundwater monitoring activities at leaking underground storage tank sites. Any modification to the sampling process will be addressed and described within in the monitoring reports.

1.2 LIQUID GAUGING PROCEDURES

Prior to groundwater sampling, liquid levels are measured in each well to determine the groundwater elevation and flow direction. Liquid levels inside the wells are measured with a Solinst, ORS, or Keck interface probe from the top of the well casing using the same reference point from which the survey elevations determined during the assessment were recorded, Groundwater elevations at the site are calculated to a common datum. Calculations for determining the water table elevations are as follows:

GE = ETC - DTW

Where:
GE = Groundwater elevation
ETC = Elevation of top of casing
DTW = Depth to water

For wells containing measurable quantities of free product, groundwater elevations were calculated using the following equation:

WTE = ETC – [DTW – SG product (PT)]

Where:
WTE = Adjusted water table elevation (ft)
ETC = Elevation of top of casing
DTW = Depth to water
PT = Product Thickness (ft)
SG = Specific Gravity
SG gasoline = 0.755
SG diesel = 0.844

Groundwater flow direction at the site is determined through groundwater contouring based on water table elevations calculated from the monitoring wells installed at the site.

1.3 GROUNDWATER SAMPLING PROCEDURES

After the depth to water is measured, each well is purged of at least three well volumes of liquid prior to sampling using a submersible pump or bailer. Purged water is contained in sealed 55- gallon drums and disposed of at an approved disposal facility. Groundwater samples are collected using disposable bailers and immediately transferred into 40 ml glass VOA vials. The vials are immediately sealed and placed on ice inside coolers. The samples are shipped with chain-of custody forms via common courier to an independent testing laboratory for analysis. One trip blank and one duplicate sample are submitted per event for QA/QC purposes.

1.4 LABORATORY ANALYSES

Laboratory analyses are performed by an independent testing laboratory. The laboratory used will maintain a Quality Assurance/Quality Control (QA/QC) program which utilizes spike and duplicate analysis. Groundwater samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTBX), methyl tertiary butyl ether (MTBE), and naphthalene per EPA SW-846, Test Method 8260B (or other approved method), and other parameters that may be applicable to the constituents of concern. Results of the internal QA/QC program used by the laboratory are included in each report.

2.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

2.1 PURPOSE

This QA/QC Plan describes the procedures followed by personnel during the project to ensure that all data generated is accurate and representative of conditions encountered.

2.2 GROUNDWATER SAMPLING

2.2.1 Well Purging

Groundwater is purged from monitoring wells prior to sampling to ensure each sample is representative of existing subsurface conditions. At a minimum, three well volumes of standing water are purged using a submersible pump or bailer. Only water inside the upper column of the well is purged. Each well is purged at a minimal rate to avoid aeration through cascading action of groundwater in the screened interval. When the bailing method is employed, the bailer is slowly lowered and retrieved from the groundwater to minimize aeration inside the well. Groundwater in wells is allowed to recover to near static water level before sampling.

2.2.2 Sample Collection

Groundwater samples are collected using disposable bailers. Procedures for sampling groundwater are described below:

1) The bailer is lowered into the well slowly to avoid aeration of the sample;

2) The bailer is filled from the top of the water column and retrieved; and

3) The first bailer of water is transferred from the bottom of the bailer into 40 ML, prepared VOA vials or applicable containers specific to the analyte. The sample container is filled completely to the top and tightly sealed. Samples are placed on ice immediately following collection.

2.2.3 Decontamination

Disposable vinyl gloves are worn during well purging and sample collection. During well purging, the gloves are changed between each well. Gloves are also changed between each sample acquisition during the sampling process. When a pump is used, all downhole equipment is decontaminated between each use by circulating clean water and phosphate-free detergent. Disposable bailers are used for collecting samples; therefore, no additional decontamination procedures are employed.

2.2.4 Sample Dispatch

Groundwater samples are packed in individual plastic protective envelopes (bubble pack) inside a cooler to avoid breakage during shipment. The coolers used are insulated to maintain sample temperature near 4 C. Each cooler is sealed with tape to discourage tampering. The samples are shipped to the laboratory via common courier.

2.3 SAMPLE CUSTODY

A traceable link is established from the time samples are obtained until submission of analytical results. The following section describes chain-of-custody (COC) procedures which are adhered to during the project to establish that traceable link.

2.3.1 Documentation

Protocols for documentation are used to ensure appropriate sample identification and transfer. This documentation includes sample labels, seals, and COC forms. Labels and seals will be filled out using water-proof ink. Information to be supplied on COC forms consists of the following:

- Project number and location of the site.
- Sample identification/location.
- Sample point (depth).
- Signature of collector.
- Date and time of sample collection,
- Sample matrix (water).
- Method of preservation (HC1),
- Number of containers per sample location.
- Analytical method requested.
- Name of person(s) in possession of the COC and samples.
- Applicable remarks.

Custody seals are placed on coolers in such a manner that the container cannot be opened without breaking the seal. At least two seals are used, (one on either side of the cooler).

2.3.2 Custody Procedures

COC procedures implemented during the project are as follows:

- Each sample collected for the project is entered on the COC record.
- The original COC record accompanies the sample containers during transport to document their custody.
- The shipping` package is sealed with strapping tape and a custody seal affixed. The seal is placed on the package in such a manner that the package cannot be opened without breaking the seal. The seal documents that the samples remained unaltered during shipment through the common parcel carrier.
- The laboratory assumes custody of the sample upon receipt and a designated sample custodian is charged with sample care and receipt.
- The laboratory retains custody of the sample

2.4 QUALITY CONTROL CHECKS

The following quality control checks are implemented during the project to verify the adherence to the QA/QC plan, and to provide measurement for method and samplers performance.

2.4.1 Trip Blanks

Trip blanks are used to determine the QA/QC of sample handling procedures. The trip blanks are filled with distilled water in the laboratory and will accompany the cooler to and from the project site. One trip blank is sent per cooler.

2.4.2 Duplicate Samples

Duplicate groundwater samples are collected to provide a check on sampling techniques as well as laboratory equipment. Duplicate samples are collected simultaneously from the same well and labeled with a different well designation number. Duplicate samples are collected at a frequency of one per 10 samples submitted for laboratory analysts.
s in a secure area for a minimum of one month following the date of receipt. At that time, the samples are disposed of in accordance with appropriate disposal procedures.

- The sampler maintains the final copy of the COC to verify that the samples were collected and sent to the laboratory.

APPENDIX G – OZONE UNIT MONITORING FORMS

OZONE SYSTEM FIELD MONITORING FORM

Site ID: Circle K Store No. 8261	**Client:** Circle K	**Project Number:** 234949	
Site Location: 928 Telegraph Rd., Prichard, AL		**System Configuration:**	
Date:		**Time of Arrival/Departure:**	
Personnel:		**Status of System:**	

SPARGE POINT DATA

Valve No.	Sparge Point	Online (Y/N)	O_2 or O_3	Cycle Time	Pressure @ Manifold (psi)	Airflow @ Manifold (cfm)	Operational Time			
							Total	O_3	O_2	Air
	SP-1									
	SP-2									
	SP-3									
	SP-4									
	SP-5									
	SP-6									
	SP-7									
	SP-8									
	SP-9									
	SP-10									

Work Performed This Visit

OZONE SYSTEM FIELD MONITORING FORM

MISCELLANEOUS *Date* *Initials*

Ambient Temp. (°F)	Time Readings Were Initiated	Total Runtime (hrs)	Cycle Lag Time (minutes)	A - Side				B - Side			
				O_2 Airflow-Flowmeter (scfh)	O_3 Reactor Pressure (psi)	ATF Inlet Pressure (psi)	ATF O_2%	O_2 Airflow-Flowmeter (scfh)	O_3 Reactor Pressure (psi)	ATF Inlet Pressure (psi)	ATF O_2%

System Comps. Checked for Leaks (Y / N)	SP Connections Checked for Leaks (Y / N)	Cabinet Temp. (°F)	Ozone Reading in Enclosure (ppm)	Suspend Mode On (Y / N)	Suspend Mode Times	Manifold Air Regulator Pressure (psi)	Compressor Pressure (psi)	Compressor Temp. (°F)	Compressor Runtime (hrs)

MONITORING WELL DATA

Well ID	Depth to Water (ft BTOC)	Induced Pressure	Sparge Point(s) Online?	Other Info

Site Notes:

APPENDIX H – SITE HEALTH AND SAFETY PLAN

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

HEALTH AND SAFETY PLAN

CIRCLE K STORES, INC.
CIRCLE K STORE #8261
928 TELEGRAPH ROAD
PRICHARD, ALABAMA
MOBILE COUNTY

PPM PROJECT NO. 234949

JUNE 2020

PPM CONSULTANTS

PREPARED UNDER THE DIRECTION OF:
JERI F. THRASHER, CSP | MBA / HEALTH AND SAFETY DIRECTOR
1600 LAMY LANE, MONROE, LOUISIANA 71201
(P) 318.812.3454 / (C) 318.884.8188

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

TABLE OF CONTENTS

PROJECT CHECKLIST – HASP AND JSA v

EMERGENCY SUMMARY INFORMATION vi

1.0 INTRODUCTION 1
- 1.1 COMPANY COMMITMENT 1
- 1.2 HASP PURPOSE 1
- 1.3 APPLICABILITY 1
- 1.4 EXCEPTIONS 1
- 1.5 MANAGEMENT OF CHANGE 1

2.0 ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES 2
- 2.1 CHAIN-OF-COMMAND 2
- 2.2 PERSONNEL ROLES AND RESPONSIBILITIES 2
- 2.3 SHORT SERVICE EMPLOYEES 4
- 2.4 TRAINING AND MEDICAL MONITORING 4

3.0 HAZARD ASSESSMENT AND CONTROL MEASURES 4
- 3.1 CHEMICAL HAZARDS AND CONTROLS 4
  - 3.1.1 Gases and Fumes 4
    - 3.1.1.1 Acids 4
    - 3.1.1.2 Bases/Alkali 5
    - 3.1.1.3 Calibration and Fuel Gases 5
    - 3.1.1.4 Carbon Dioxide (Dry Ice) 5
    - 3.1.1.5 Hydrogen Sulfide 6
  - 3.1.2 Oxidizers 6
    - 3.1.2.1 Nano Xothermal Technology (NXT) 6
    - 3.1.2.2 Oxygen Release Compound® (ORC) and ORC Advanced® 6
    - 3.1.2.3 Ozone 7
    - 3.1.2.4 RegenOx A and B™ 7
    - 3.1.2.5 Hydrogen Peroxide (30-50%) 7
  - 3.1.3 Particulates and Fibers 8
    - 3.1.3.1 Aluminum Oxide 8
    - 3.1.3.2 Asbestos 8
    - 3.1.3.3 Heavy Metals 9
    - 3.1.3.4 Nuisance and Concrete Dust 12
  - 3.1.4 Volatile and Semi-Volatile Organic Compounds 12
    - 3.1.4.1 Chlorinated Compounds 12
    - 3.1.4.2 Isopropyl Alcohol 13
    - 3.1.4.3 Methyl-Tertiary Butyl Ether (MTBE) 14
    - 3.1.4.4 Organic Hydrocarbons 14
    - 3.1.4.5 Pesticides 17
    - 3.1.4.6 Polychlorinated Biphenyls (PCB) 18

3.1.5 Other/Unknown Chemicals....18
3.1.5.1 Activated Carbon....18
3.1.5.2 Alconox®/Liquinox®....19
3.1.5.3 Descaling Agents (Analytix AN-754GH)....19
3.1.5.4 Unknown Chemicals and/or Concentrations....19
3.1.6 Chemical/Physical Properties....19

3.2 PHYSICAL HAZARDS AND CONTROLS....20
3.2.1 Combustion/Flammability....20
3.2.2 Contaminated Water/Splash Hazards....20
3.2.3 Compressed Gas....20
3.2.4 Concrete Coring and Cutting....21
3.2.5 Cuts and Lacerations....21
3.2.6 Driving Safety....21
3.2.7 Drowning....22
3.2.8 Electrical....22
3.2.8.1 Subsurface and Overhead Utilities....22
3.2.8.2 Electrical Tools and Power Cords....23
3.2.8.3 Lockout/Tagout....24
3.2.9 Hand and Power Tools....24
3.2.10 Illumination....24
3.2.11 Ladder Safety....25
3.2.11.1 Portable Ladder Safety....25
3.2.11.2 Fixed Ladder Safety....26
3.2.12 Material Handling and Back Safety....26
3.2.13 Mobile Equipment....26
3.2.13.1 Heavy Equipment and Machinery....26
3.2.13.2 Aerial and Scissor Lifts....27
3.2.14 Noise....27
3.2.15 Repetitive Motion....28
3.2.16 Scaffolding....28
3.2.17 Slips, Trips, and Falls....28
3.2.18 Traffic and Secluded Areas....29
3.2.19 Walking/Working Surfaces....30
3.2.19.1 Elevated Walking/Working Surfaces....30
3.2.19.2 Uneven Walking/Working Surfaces....30
3.2.19.3 Unstable Soils and Cave-Ins....31
3.2.20 Weather....31
3.2.20.1 Heat Stress....31
3.2.20.2 Cold Stress....32
3.2.20.3 Adverse Weather Conditions....33

3.3 BIOLOGICAL HAZARDS AND CONTROLS....33
3.3.1 Insects and Mosquitoes....33
3.3.2 Ticks and Spiders....34
3.3.3 Rodents, Reptiles and Roaming Animals....34
3.3.4 Poison Plants....35
3.3.5 Bloodborne Pathogens....35

4.0 EXPOSURE MONITORING....36
4.1 TERMINOLOGY/DEFINITIONS....36
4.2 ESTABLISHING EXPOSURE AND FLAMMABILITY LIMITS....36
4.2.1 Exposure Limits....36
4.2.2 Flammability Limits....37
4.3 REGULATORY EXPOSURE LIMITS....37
4.4 MONITORING EQUIPMENT AND CALIBRATION....39
4.5 SAMPLE COLLECTION....41
4.6 MONITORING FREQUENCY AND DOCUMENTATION....41

5.0 PERSONAL PROTECTIVE EQUIPMENT....41
5.1 PROTECTIVE CLOTHING AND EQUIPMENT....41
5.1.1 Head Protection....41
5.1.2 Eye and Face Protection....42
5.1.3 Hand Protection....42
5.1.4 Foot Protection....43
5.1.5 Full Body Protection....43
5.1.6 Hearing Protection....43
5.1.7 Respiratory Protection....44
5.1.8 Electrical Protective Equipment....44
5.1.9 Life Saving Equipment....44
5.2 OTHER PROTECTIVE AIDS....44
5.3 PROJECT-SPECIFIC PPE REQUIREMENTS....45
5.4 REDUCTION OF PROTECTIVE CLOTHING AND EQUIPMENT....46

6.0 SITE ACCESS, CONTROL, AND DECONTAMINATION....46
6.1 SITE ACCESS....46
6.2 DESIGNATED WORK ZONES....46
6.3 AUTHORIZED PERSONNEL....46
6.4 STOP-WORK AUTHORITY....47
6.5 GENERAL SITE CONTROL AND SAFETY PRECAUTIONS....47
6.6 DECONTAMINATION PROCEDURES....47

7.0 EMERGENCY RESPONSE 48
7.1 ALARMS AND ONSITE NOTIFICATIONS 48
7.2 PERSONNEL ASSESSMENT AND EVACUATION 48
7.3 INCIDENT, NEAR-MISS, AND HAZARD RECOGNITION REPORTING 48
7.4 INJURY REPORTING AND CASE MANAGEMENT 49
7.5 GENERAL MEDICAL CARE AND FIRST AID 49
7.6 HAZARDOUS SUBSTANCE RELEASE 50
7.7 REGULATORY, CLIENT, OR OTHER AGENCY NOTIFICATIONS 50

8.0 WASTE MANAGEMENT 51
8.1 CONTAINER LABELING 51
8.1.1 Hazardous Material/Waste Labeling 51
8.1.2 Nonhazardous Material Waste Labeling 52
8.2 CONTAINER STORAGE AND DISPOSAL 52
8.3 CONTAINER INSPECTIONS 52

9.0 PERSONNEL/CONTRACTOR SAFETY REVIEW 53

10.0 CONTRACTOR RESPONSIBILITY AND SUPERVISION 53

11.0 CONFINED SPACE 53

12.0 LIST OF ABBREVIATIONS 54

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

PROJECT CHECKLIST – HASP AND JSA

Project/Task and Corresponding Job Safety Analysis:

- ☐ Asbestos Inspection
- ☐ Carbon Change-Out
- ☐ Chemical Injection
- ☐ DPVE/SVE/Air Sparge Installation
- ☐ DPVE/SVE/Air Sparge Demobilization
- ☐ Drilling/Probing [Hand Auger]
- ☐ Drilling/Probing [Heavy Equipment]
- ☐ Mobile Vacuum Event [Emergency Response]
- ☐ Ozone System Installation
- ☐ Ozone System Demobilization
- ☐ Remediation System Modification* [specify below]
- ☐ Spill Bucket Replacement/Closure
- ☐ Trenching/Excavation
- ☐ UST Pull/Closure
- ☐ Well Plugging and Abandonment [Grout In Place]
- ☐ Well Plugging and Abandonment [Overdrilling]
- ☐ Other* [specify below and contact HSD with details]

Hazard Assessment:

Chemical Hazards

- ☐ Acids [HCl, HNO_3, H_3PO_4, H_2SO_4]
- ☐ Activated Carbon
- ☐ Alconox®/Liquinox®/Isopropanol
- ☐ Asbestos
- ☐ Bases [NaOH/KOH/$CaOH_2$/NH_3/Na_2CO_3]
- ☐ Calibration Gas [Meth/Hex/Isobutyl]
- ☐ Carbon Dioxide [Dry Ice]
- ☐ Chlorinated Solvents [Dry Cleaners]
- ☐ Descaling Agents [Analytix AN-754GH]
- ☐ Diesel/PAHs
- ☐ Dust [Nuisance/Concrete]
- ☐ Dust [Granular Carbon/Aluminum Oxide]
- ☐ Fuel Gases [Meth/Hex/Butane/Prop]
- ☐ Gasoline [BTEX]
- ☐ Hydrogen Sulfide[H_2S]
- ☐ Kerosene
- ☐ Metals [As/Cd/Cr/Cu/Pb/Hg/Zn]
- ☐ Methyl-Tertiary Butyl Ether [MTBE]
- ☐ Oil/Lubricating Oils
- ☐ Oxidizer [NXT/ORC®/ORC Advanced®]
- ☐ Oxidizer [RegenOx A/B™]
- ☐ Ozone
- ☐ Ozone/Hydrogen Peroxide
- ☐ Pesticides [Industrial/Agricultural]
- ☐ Polychlorinated Biphenyls [PCB]

- ☐ Other C/P/B Hazard* [contact HSD]
- ☐ Unknown C/P/B Hazard* [contact HSD]

Physical/Biological Hazards

- ☐ Aerial Lifts
- ☐ Biological
- ☐ Combustion/Flammability
- ☐ Compressed Gas [cylinders]
- ☐ Concrete [coring/cutting]
- ☐ Cuts/Lacerations
- ☐ Driving
- ☐ Drowning
- ☐ Electrical
- ☐ Elevated Working Surfaces
- ☐ Forklift/Crane [truck-mount]
- ☐ Hand/Power Tools
- ☐ Heat/Cold Stress
- ☐ Heavy Equipment
- ☐ Illumination
- ☐ Ladder Safety
- ☐ Material Handling [back safety]
- ☐ Noise
- ☐ Repetitive Motion
- ☐ Scaffolding/Scissor Lifts
- ☐ Slips/Trips/Falls
- ☐ Traffic or Secluded Sites
- ☐ Uneven Working Surfaces
- ☐ Unstable Soils/Cave-Ins

Protective Equipment:

- ☐ Apron and Goggles
- ☐ Booties/Foot Covers
- ☐ Ear Plugs/Canal Caps
- ☐ Face Shield
- ☐ Flame-Retardant Clothing
- ☐ Hand – Cotton Gloves
- ☐ Hand – Kevlar Gloves
- ☐ Hand – Leather Gloves
- ☐ Hand – Nitrile Gloves
- ☐ Hand – Other*
- ☐ Hard Hat [Class E]
- ☐ Harness and Lanyard
- ☐ High Visibility Shirt/Vest
- ☐ Protective Suits [tyvek]*
- ☐ Reflective Shirt/Vest
- ☐ Respirator [air-purifying]*
- ☐ Respirator [supplied air]*
- ☐ Safety Glasses
- ☐ Steel-Toed Boots
- ☐ Other PPE* [contact HSD]

Documentation Required:

- ☐ Ambient Air Monitoring
- ☐ Crane Operator Inspection
- ☐ Forklift Safety Inspection
- ☐ HASP Acknowledgement Form
- ☐ Incident Report/Log [as applicable]
- ☐ Subsurface Clearance Checklist
- ☐ Tailgate Safety Meeting Log
- ☐ Trench/Excavation Inspection

Return Pages in the Following Order:

§ HASP Coverpage
§ Project Checklist
§ Emergency Summary Information and Maps
§ Personnel Roles and Responsibilities, p.3
§ One Call (if electronic copy)
§ Subsurface Clearance Checklist
§ Ambient Air
§ Trench/Excavation Checklist
§ HASP Acknowledgment
§ Tailgate Logs

HASP Generated By [Print Name]: _____ Date Generated: _____

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

EMERGENCY SUMMARY INFORMATION

Medical Facility:

In cases of incidents or near-misses, the Health and Safety Director (HSD) must be verbally contacted immediately once any spills/releases have been contained and appropriately isolated. Incidents resulting in injury or illness must be reported immediately to the HSD for further instruction and injury case management. 911 should be called for life-threatening cases or cases requiring immediate attention. Be prepared to administer CPR and first aid care only if you have been trained to do so, acquire consent from injured worker (unless unconscious in which consent is implied), and training is up-to-date.

Name of Hospital: Mobile Infirmary Phone: 251-435-2400

Address: 5 Mobile Infirmary Circle City, State: Mobile, AL Zip: 36607

Directions and Map: See attached (next page) Distance: 4.1 miles Time: 10 mins

Company and Emergency Contact Information:

Agency/Emergency Responder	Telephone	Website
Fire Department / Police Department / Ambulance	911	--
Center for Disease Control and Prevention	800-232-4636	www.cdc.gov
CDC – Public Health Preparedness and Response	404-639-7405	cdcinfo@cdc.gov
CDC – Bioterrorism Preparedness and Response	404-639-0385	cdcinfo@cdc.gov
CDC – Toxic Substances and Disease Registry	770-488-7100	cdcinfo@cdc.gov
Chemtrec [24-Hour Emergency Chemical Spill]	800-262-8200	chemtrec@chemtrec.com
EPA RCRA Superfund Hotline	800-424-9346	--
Poison Control Center	800-222-1222	www.aapcc.org

PPM Contact Information	Representative	Office	Cell
Principal [Primary Regional Safety PIC]	Shawn Ivey	318-323-7270	318-237-0677
Principal [Alternate Regional Safety PIC]	Zane Hood	205-836-5650	205-240-9883
Health and Safety Director	Jeri Thrasher	318-812-3454	318-884-8188
Safety Supervisor [Baton Rouge]	David Durbin	225-293-7270	225-603-8050
Safety Supervisor [Birmingham]	Brandy Hall	205-836-5650	205-913-5471
Safety Supervisor [Jackson]	Regan Byrd	601-956-8233	601-862-8693
Safety Supervisor [Mobile/Pensacola]	Kay Williams	251-990-9000	251-753-4455
Safety Supervisor [Monroe]	Matt Colvin	318-812-3467	318-355-6415
Safety Supervisor [Orlando]	Amy Guilfoyle	407-240-1127	941-730-5600

Note: District and Project Managers can be contacted by using the office phone numbers provided for each location.

Designated Break and Evacuation Locations:

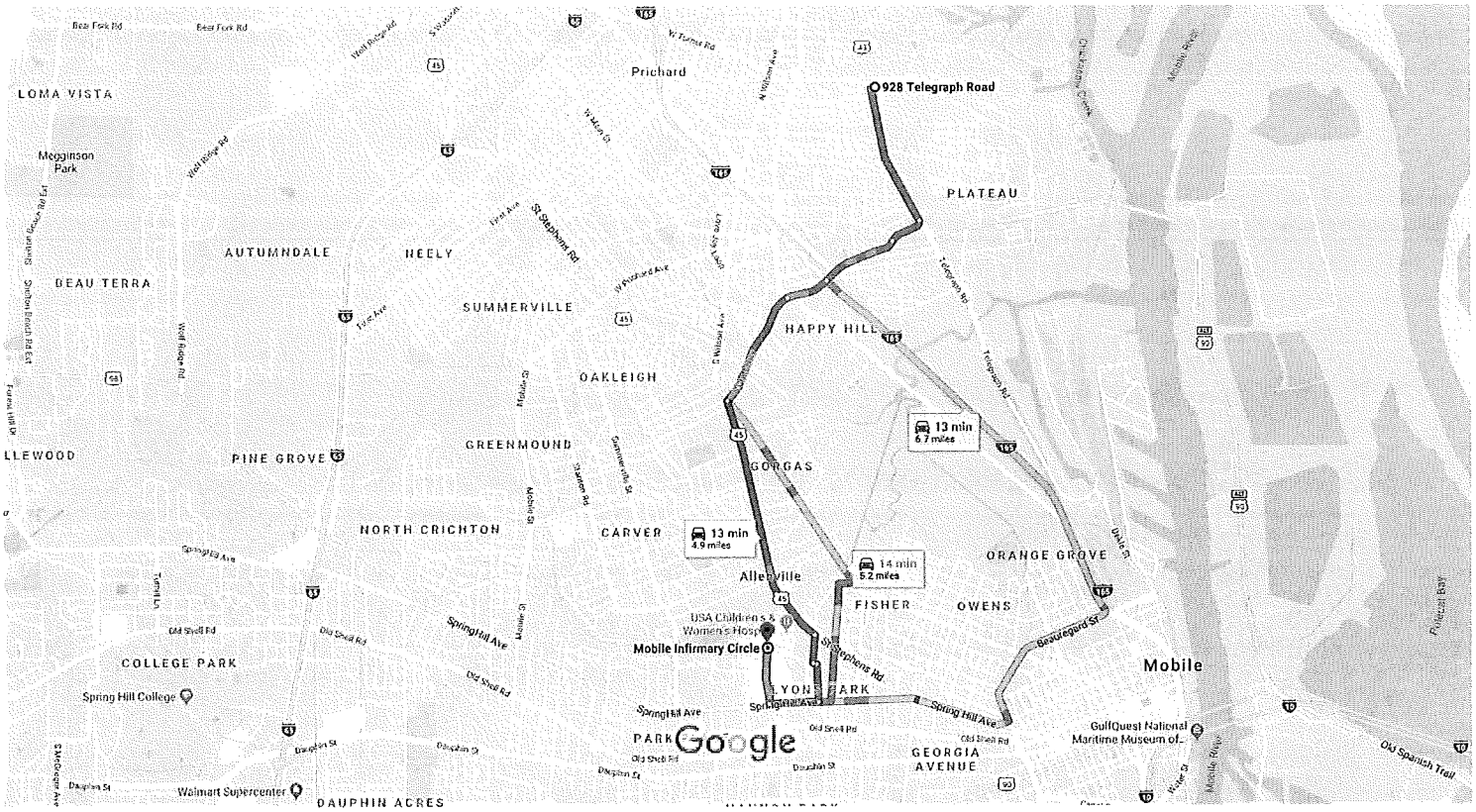
Personal protective equipment is required at all times within the work zone and can only be doffed when in the site's designated break area. Smoking will be permitted within the break area pending the site's ambient contaminant concentrations. In the event of an emergency, workers must report to the designated evacuation area for a headcount. This site's designated break and evacuations areas are outlined as follows:

Break Area: _____ Evacuation Area: _____

Google Maps

928 Telegraph Road, Mobile, AL to Mobile Infirmary Cir, Mobile, AL 36607

Drive 4.9 miles, 13 min



928 Telegraph Rd

Mobile, AL 36610

Take Telegraph Rd to New Bay Bridge Rd

3 min (1.5 mi)

1. Head south on Telegraph Rd toward E Turner Rd

0.8 mi

2. Turn right onto Conception Street Rd

0.2 mi

3. Turn right onto US-90 ALT W/New Bay Bridge Rd

0.5 mi

Take S Craft Hwy to St Stephens Rd in Mobile

2 min (1.0 mi)

4. Continue straight onto New Bay Bridge Rd

0.3 mi

5. Continue onto S Craft Hwy

0.7 mi

6. Slight left onto St Stephens Rd

4 min (1.5 mi)

Follow Lambert St and Lyons Park Ave to SpringHill Ave

2 min (0.4 mi)

7. Turn right onto Lambert St

0.2 mi

8. Turn left onto Center St

128 ft

9. Turn right onto Lyons Park Ave

0.2 mi

10. Turn right onto SpringHill Ave

41 s (0.3 mi)

Follow Infirmary Dr to Mobile Infirmary Cir

2 min (0.3 mi)

11. Turn right onto Infirmary Dr

0.3 mi

12. Continue onto Mobile Infirmary Cir

141 ft

Mobile Infirmary Cir

Mobile, AL 36607

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

1.0 INTRODUCTION

1.1 COMPANY COMMITMENT

PPM is committed to the safety and wellbeing of its employees and subcontractors. Our mission to exceed client expectations is done under the provision that worker health, safety and security is not compromised in the process. In addition, the company strives to ensure that the environment and its natural resources are preserved and not otherwise negatively impacted as the result of company-related processes. This commitment to our workers and our environment is outlined within our written health, safety, security and environmental (HSSE) program, which establishes the company's expectations through its policies and procedures.

1.2 HASP PURPOSE

The purpose of this health and safety plan (HASP) is to mitigate those hazards associated with routine company-related tasks that could not otherwise be substituted or eliminated. This document outlines the control measures, protective equipment and emergency response procedures necessary to ensure worker safety and wellbeing are maintained. This HASP has been prepared in accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 standard for typical conditions encountered during routine field activities.

1.3 APPLICABILITY

All field-related projects and/or tasks require a HASP, unless otherwise exempted by the safety department. The provisions outlined within this plan are applicable to all personnel assigned to the project and subcontracted workers hired by the company to complete the project. PPM will not be responsible for the safety of contracted workers hired directly by the client or partnering companies unless otherwise specified by these entities to do so. Accountability for the health, safety and security of contractors under these circumstances must be pre-established and explicitly outlined within the proposed scope of work and must additionally be approved by a Principal of the company.

1.4 EXCEPTIONS

This general report template has been prepared specifically for common chemicals and tasks associated with routine company-related field processes as outlined within the Project Checklist – HASP and Job Safety Analysis (JSA) form. Any project involving a chemical or field-related task not otherwise specified within this form is considered non-routine and is not covered by the provisions of this written plan. HASP requests and proposed scope-of-work for non-routine chemicals and/or job-related tasks must be sent directly to the Health and Safety Director (HSD) so that a site-specific HASP can be prepared. When possible, please allow five days for preparation.

Common, repetitive field tasks such as groundwater monitoring, operation and maintenance of remediation systems, environmental site assessments, mobile vacuum events and other similar tasks that do not require exposure monitoring will be addressed within a separate HASP prepared specifically for these activities.

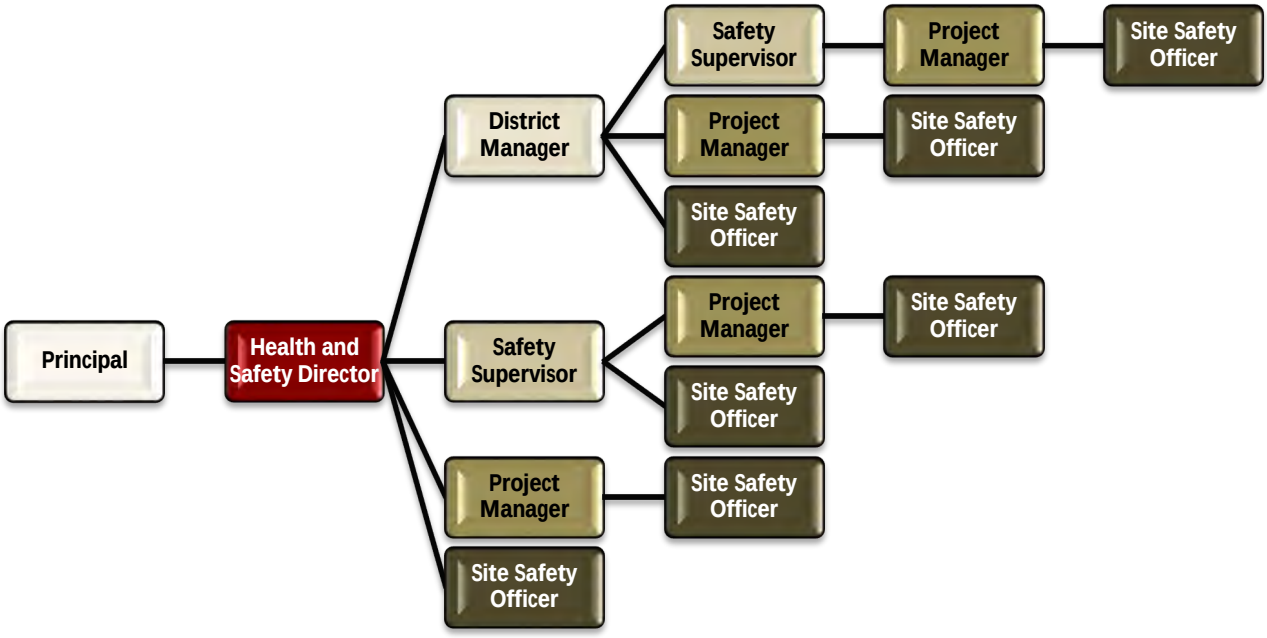
1.5 MANAGEMENT OF CHANGE

Should any unexpected conditions arise that introduces new hazards or eliminates existing hazards, work will cease immediately and this HASP will be amended to accommodate changes in site conditions. Additions or changes to this HASP will be communicated to all affected personnel and subcontractors.

2.0 ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES

2.1 CHAIN-OF-COMMAND

The hierarchy of command creates a system for accountability and is extremely beneficial to the reporting process. As indicated by the graphic below, PPM has built-in redundancies within its command chain to ensure that all affected parties are notified and accountable as well as to compensate for designated personnel when they are inaccessible. There are various ways in which to notify management; however, when it involves worker safety and health, the HSD and Principal must be notified and cannot be by-passed.



2.2 PERSONNEL ROLES AND RESPONSIBILITIES

Safety is the responsibility of every worker within the company, regardless of position. Workers are accountable for their own personal safety as well as the safety of the co-workers around them. Also, key personnel within the company have additional safety obligations due to their designated leadership roles within the organization. PPM expects its managers to set the tone for safety through their exemplary leadership thereby creating the foundation for a strong safety culture. Positions requiring additional safety responsibilities include the following:

- **Principal**. Principals are assigned responsibility for different departments within the company. The primary Safety Principal-in-Charge (PIC) is Shawn Ivey [Monroe], and the alternate Safety PIC is Zane Hood [Birmingham]. Each is responsible for authorizing HSSE policies and procedures set forth by the safety department and establishing the final provisions when discrepancies are noted.
- **Health and Safety Director**. The HSD is responsible for proposing and generating HSSE policy/procedures under the advisement of the Safety PIC, communicating these provisions to all affected workers within the organization, and ensuring uniform implementation of these provisions throughout all branch offices.

- **District Manager**. Each branch office has a designated District Manager who is responsible for ensuring that HSSE policies and procedures are implemented by the workers assigned to his or her office. The District Manager is directly accountable to the Principals for the safety performance of his/her office.
- **Safety Supervisor**. Each branch office has a designated Safety Supervisor (SS) assigned by the District Manager. The SS is responsible for ensuring HSSE compliance by all within his/her office through consistent toolbox training, unscheduled site safety inspections and any other task delegated by the HSD. The SS is directly accountable to the HSD for his/her supervisory role and is also accountable to his/her District Manager regarding the office's safety performance.
- **Project Manager**. Project Managers are responsible for all aspects of their assigned projects, including the safety and wellbeing of the workers assigned to their jobsite. Project Managers establish the overall scope-of-work for the project and must consider the appropriate safety provisions (i.e., engineering design, protective equipment, etc.) during the planning phase. Project Managers are directly accountable to their District Managers for the job-related safety aspects.
- **Site Safety Officer**. A site safety officer (SSO) is assigned to each field project. An alternate SSO is assigned to any field project with more than one PPM employee onsite. The SSO is responsible for jobsite safety, which includes, but is not limited to, the following:
  - → Designate break and evacuation areas based on current site conditions
  - → Review the provisions outlined within the HASP and JSA with all affected personnel, subcontractors, client, and regulatory officials
  - → Ensure site security and preventing unauthorized entry to the work zone
  - → Ensure subsurface utilities have been marked and appropriate Principal approval has been obtained for exclusion zone disturbances
  - → Locate emergency shut-off devices to pumps and heavy equipment
  - → Establish communication system with equipment operators
  - → Ensure all workers and contractors wear required protective equipment
  - → Prohibit onsite smoking, except when permitted within designated areas
  - → Complete required field documentation outlined within the HASP for worker exposure monitoring and other site safety inspections
  - → Report to management any incident or near-miss involving worker injury/illness, property damage, contact with overhead or subsurface utilities, chemical/product releases or auto accident

  The alternate SSO is responsible for jobsite safety in the absence of the SSO or when under the direction of the SSO.

The following personnel are assigned to this project:

NAME	TITLE/POSITION
Isaac Smith	District Manager
Rodney Kilgore	Project Manager
Jeri F. Thrasher, CSP	Health and Safety Director
Kay Williams	Safety Supervisor (SS)
	Site Safety Officer (SSO)
	Alternate SSO
	Subcontractor

2.3 SHORT SERVICE EMPLOYEES

Short service employees are defined as any worker employed by PPM for less than six months or workers who have not yet completed required training and certification. Short service employees are assigned a mentor and supervised at all times when in the field - (exception: establishing offices that do not have a mentor may require that short service employees perform field duties unsupervised; however, Principal exemption is required).

2.4 TRAINING AND MEDICAL MONITORING

PPM field personnel associated with this project have received company HSSE policy and procedural training as part of their safety orientation. Personnel have additionally received initial 40-Hour HAZWOPER certification, which is updated annually through an 8-Hour refresher. This training course meets the requirements of the OSHA 29 CFR 1910.120 standard. Short-service employees not otherwise HAZWOPER-certified will be provided training after 90-day probationary period.

In accordance with the medical monitoring requirements outlined within 29 CFR 1910.120, workers who are or may potentially be exposed to hazardous materials are provided a medical evaluation paid for by the company. Only those employees who have been medically cleared for duty by a physician are permitted to perform field duties.

3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

A hazard is defined as a "situation that poses a level of threat to life, health, property or environment." For purposes of this written plan, hazards have been categorized in four ways – chemical, physical, biological and environmental. Hazards further outlined within the following sections are those that could not otherwise be eliminated or substituted as part of the risk assessment process. The control measures discussed throughout the following sections are required to mitigate the hazards posed to workers in order to ensure that worker safety and health is maintained.

3.1 CHEMICAL HAZARDS AND CONTROLS

PPM is an environmental consulting firm that specializes in environmental spill response, remediation and general regulatory compliance. As part of these functions, workers will likely be exposed to chemical hazards through the following routes: site contamination, chemicals used as part of the remediation process, chemicals used for equipment maintenance and calibrations, and chemicals used/stored at client facilities.

3.1.1 Gases and Fumes

3.1.1.1 Acids

Acids have a pH <7, change litmus paper to red, taste sour (most citrus fruits are acidic), are corrosive to metals, and are commonly found in car/forklift batteries, used as sample preservatives and used to prevent algae, calcium and other similar buildups in piping systems. Common acids encountered through company-related processes include but are not limited to: hydrochloric (muriatic), nitric, phosphoric and sulfuric acid. Acids can cause moderate to severe skin and eye burns, and breathing the fumes created by these materials can cause extreme burning of the respiratory system. Materials with a pH <2 must be disposed as a hazardous waste; however, acids can be neutralized with a bases/alkali.

Control Measures: Never pour water into acid! Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures

(i.e., stand upwind of concentrations) or upgrade protective equipment. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations, itching and burning and prevent accidental ingestion. Prevent contact with metals.

3.1.1.2 Bases/Alkali

Commonly referred to as caustics, bases have a pH >7, change litmus paper to blue, have a bitter taste, feel slippery and are commonly used to make soap and textiles, found in common household detergents, cleaners (i.e., Drano, oven cleaners and ammonia products), milk of magnesia and antacids. Common bases encountered through company-related processes include but are not limited to: sodium hydroxide, potassium hydroxide, calcium hydroxide, ammonia, and sodium carbonate. Bases can cause moderate to severe skin and eye burns, and breathing the fumes created by these materials can cause extreme burning of the respiratory system and pulmonary edema. Materials with a pH >12.5 must be disposed as a hazardous waste. While bases react violently with acids, they can also be neutralized by acids.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations, itching and burning and prevent accidental ingestion.

3.1.1.3 Calibration and Fuel Gases

Calibration gases are used to calibrate air monitoring equipment. Common calibration gases used for equipment calibration include: hexane, isobutylene and methane. Calibration gases are used in small quantities, are highly flammable, and must be stored and handled safely. Gases such as hexane, methane, butane, and propane are used as fuel sources and may be encountered in larger quantities at oil and gas facilities. Workers may also come across methane gas through work in landfills, swamps, and agricultural land associated with raising livestock.

Control Measures: Keep containers upright, lids secured and store in climate-controlled environment away from heat sources. Calibration gases are asphyxiants (displace oxygen) so calibrate equipment in well-ventilated areas. When these gases are anticipated in larger quantities, workers must air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment.

3.1.1.4 Carbon Dioxide (Dry Ice)

Dry ice is carbon dioxide in a solid form. It may be used as a refrigerant and/or to displace vapors and has been used on some PPM jobsites for such purposes. Some hazards associated with the use of dry ice include, but are not limited to: frostbite through direct skin contact, asphyxiation due to displacement of oxygen in the atmosphere, and explosion from release of pressure exerted by the conversion of carbon dioxide solid to gas which could produce projectiles of the dry ice.

Control Measures: Avoid direct contact with solid dry ice to prevent frostbite. Avoid storing in areas with limited air flow (ventilation) such as buildings, vehicles, or other confined areas where gases can accumulate and be inhaled. Store inside a paper bag within a refrigerator, freezer, or cooler with a tight seal.

3.1.1.5 Hydrogen Sulfide

Hydrogen sulfide (H_2S) is a colorless gas known for its pungent odor (often referred to as a "rotten egg" odor) at low concentrations. It is a highly flammable and toxic substance associated with oil and gas refining, mining, tanning, pulp and paper processing, and rayon manufacturing. It can also occur naturally in sewers, well water, oil and gas wells, manure pits, and volcanoes. Hydrogen sulfide is heavier than air so it settles in low-lying enclosed areas such as manholes, sewers, and underground telephone vaults. Another characteristic of hydrogen sulfide is that it fatigues a worker's sense of smell so it cannot be relied upon in determining the continuous presence of H_2S gas. Health effects depend upon the exposure concentration and include, but are not limited to: irritation of eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (tears), photophobia (intolerance to light), corneal vesiculation; dizziness, headache, weakness, exhaustion, irritability, insomnia; gastrointestinal disturbance; as a liquid: frostbite.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Wear personal monitoring badges for H_2S within the breathing zone. Where applicable, rely upon stationary monitoring devices and when alarms are triggered, evacuate the area upwind immediately. Use escape only respiratory protection when issued by PPM and/or the client facility.

3.1.2 Oxidizers

3.1.2.1 Nano Xothermal Technology (NXT)

NXT is process used to treat chemical contamination. It is a system comprised of two compounds: Klozur® (sodium persulfate) and dry caustic potash (potassium hydroxide). This material can either be injected into the subsurface or can be placed inside open excavations as part of in-situ remediation. This material is a white solid with a pH range that is undetermined but anticipated to be on the caustic side. Symptoms of exposure include: skin, eye and respiratory irritation, itching, redness and burning; can cause permanent eye damage.

Control Measures: When in powder form, this material is to be treated as a nuisance dust. Avoid creating dusty environments during the mixing process. When dealing with unknown dust concentrations, wear air-purifying respirator with P-100 HEPA filter until product becomes slurry mixture. Wear nitrile, neoprene or rubber gloves for hand protection and safety glasses or goggles for eye protection. Avoid storing oxidizers near combustible materials, other strong oxidizers (including ozone), acids, heavy metals, etc. (see safety data sheet for complete list of incompatibles).

3.1.2.2 Oxygen Release Compound® (ORC) and ORC Advanced®

ORC® and ORC Advanced® are forms of enhanced aerobic bioremediation which supplies oxygen to accelerate the biodegradation of soil and groundwater contaminants. Both materials are a white powder that gets mixed with water and injected in subsurface soils. Once mixed, these materials have a pH of 10 [ORC] and 11-13 [ORC Advanced], making them a significant skin and eye irritant. Symptoms of exposure include: cough, sore throat, nose bleeds (extended exposures), eye watering and redness, eye lesions (extended exposures), nausea and vomiting if ingested and skin irritation.

Control Measures: When in powder form, this material is to be treated as a nuisance dust. Avoid creating dusty environments during the mixing process. When dealing with unknown dust concentrations, wear air-purifying respirator with P-100 HEPA filter until product becomes slurry mixture. Wear nitrile, neoprene or rubber gloves for hand protection and safety glasses or goggles for eye protection. Avoid storing oxidizers near combustible materials, other strong oxidizers, strong acids or other strong chemical agents. etc. (see safety data sheet for complete list of incompatibles).

3.1.2.3 Ozone

Ozone is a pale, blue gas with a distinctive odor similar to that of chlorine bleach and can be smelled at relatively low concentrations. It is a powerful oxidizer injected into subsurface soils for the treatment of contaminants such as MTBE, BTEX, hydrocarbons – aliphatic and polyaromatic, diesel fuel, chlorinated solvents, VOCs, and pesticides. Symptoms of exposure include: dryness of mouth, coughing, irritation to nose, throat and chest; difficult breathing, headache, and fatigue; eye irritation causing pain, lacrimation (tears) and inflammation.

Control Measures: Because ozone is injected into subsurface soils, worker exposures will likely result from a release at the monitoring wellhead, sparge point or other similar avenues that will lead the substance to ground surface. Workers must consistently air monitor sparge points and monitoring wells for evidence of ozone leakage. Collections must occur at the wellhead (source) as well as within the breathing zone of the worker. Ozone rapidly coverts into O_2, CO_2 and other less toxic molecules but exposure limits can be triggered at the wellhead so workers must keep face away from the source while collecting the sample until it can be confirmed that the sample is acceptable for worker exposure.

Although this system has built-in safety features which shut down the system if a leak is detected, sometimes ozone concentrations can build up inside the mobile ozone trailer. Workers should use caution when opening door and should keep door open while in use to allow for ventilation.

3.1.2.4 RegenOx A and B™

RegenOx™ is an oxidizing compound comprised of two parts (A and B) that is injected into subsurface soils as part of in-situ remediation. Part A is a white, odorless powder with a pH of 10.5 and is the oxidizer/catalyst component of this mixture. Part B is a blue/green, odorless liquid with a pH of 11 and is the activator complex. Both parts are mixed together prior to subsurface injection. The mixing of these materials is a relatively safe process but exposures can result in skin, eye, respiratory and gastrointestinal irritations. Symptoms include: coughing, shortness of breath, irritation to mucous membranes, nose and throat; skin and eye itching/redness; vomiting and diarrhea associated with ingestion [Part A] and irritation to mouth, esophagus and stomach [Part B].

Control Measures: When mixing materials, wear protective clothing such as neoprene, rubber or PVC gloves for hand protection and goggles or face-shield for eye protection. Avoid storing oxidizers near combustible materials, other strong oxidizers, acids, bases, salts of heavy metals, reducing agents, etc. (see safety data sheet for complete list of incompatibles).

3.1.2.5 Hydrogen Peroxide (30-50%)

Hydrogen peroxide is a colorless liquid with a slightly sharp odor. It is a powerful oxidizer injected into subsurface soils, in conjunction with ozone, for the treatment of contaminants such as MTBE, BTEX, hydrocarbons – aliphatic and polyaromatic, diesel fuel, chlorinated solvents, VOCs, and pesticides. It is generally noncombustible, but upon contact with a combustible material, may result in spontaneous combustion. Direct contact may result in severe skin and eye damage. Symptoms of exposure include: irritation of eyes, nose, and throat; corneal ulcer; burning and redness of skin; and bleaching of hair.

Control Measures: Because hydrogen peroxide is injected into subsurface soils, worker exposures will likely result from a release at the monitoring wellhead, sparge point or other similar avenues that will lead the substance to ground surface. Therefore, workers must routinely air monitor around sparge points and monitoring wells for evidence of leakage. Collections must occur at the wellhead (source) as well as within the breathing zone of the worker. Hydrogen peroxide is injected into the subsurface via tubing from storage containers of liquid hydrogen peroxide so workers may have direct contact with these storage containers during initial setup and when replacing empty containers with new containers. Wear face shields, elbow-length gloves, and aprons as necessary to prevent direct contact with substance, and workers must keep face away from the source while collecting ambient air samples to avoid potential inhalation exposures and splash hazards.

3.1.3 Particulates and Fibers

Particulates are commonly referred as particulate matter and consist of pieces of solid matter suspended in a gas or liquid. Particulate matter can occur naturally or be man-made. Fibers consist of continuous filaments or elongated pieces like those similar to thread. Fibers are used to produce various materials such as paper, rope, and clothing. The common types of particulates and fibers encountered by personnel are outlined in the following sections.

3.1.3.1 Aluminum Oxide

Aluminum oxide is a byproduct generated by ozone remediation systems. Condensation forms on aluminum metal parts which when combined with oxygen creates a white, odorless, crystalline powder scale which can build up on metal parts of the system and presents a potential contact, inhalation, and/or ingestion exposure to workers. Aluminum oxide is a noncombustible solid, is not considered carcinogenic, and may include symptoms such as irritation of eyes, skin, and respiratory system.

Control Measures: To eliminate contact exposures, workers must wear chemical-resistant gloves and aprons to remove powder scale buildup from aluminum piping during routine system maintenance. Workers should avoid creating dust buildup of this substance, and when this cannot otherwise be avoided, workers must upgrade to respiratory equipment with P-100 filter to prevent inhalation of this material.

3.1.3.2 Asbestos

Asbestos is a naturally-occurring fibrous material used in many products due to its attractive features. Asbestos has tensile strength, can easily be woven, and is heat and chemical resistant. It is most commonly found in roofing shingles, floor and ceiling tiles, textiles, coatings, paper and cement products, piping insulation and friction products such as automobile clutch, brake and transmission parts. The three most common forms of asbestos include:

- **Amosite**. Also called brown asbestos. Amphibole fiber formation (straight, needle-like fibers). Originated in Africa and used industrially as a fire retardant in thermal insulation, used in cement sheeting and is also found in ceiling tiles.

- **Chrysotile**. Also called white asbestos. Serpentine fiber formation (curled fibers). Is less friable (less-likely to be inhaled) than other types of asbestos and therefore viewed by many to be the safest type of the asbestos, which is why it is the most common form of asbestos used in the U.S. mostly in the form of building materials.

- **Crocidolite**. Also called blue asbestos. Amphibole fiber formation (straight, needle-like fibers). Originated in South Africa and Australia and used for thermal and chemical insulation as well as construction piping and water casings. Is considered to be the most dangerous type of asbestos.

When asbestos is disturbed through repairs, remodeling or demolition, airborne fibers can be inhaled by workers causing respiratory diseases such as lung cancer, asbestosis and mesothelioma – all of which have a latency period between exposure and onset of symptoms. These respiratory diseases are chronic in nature and generally irreversible. Smokers are more susceptible to the damaging health effects of asbestos exposures. Symptoms of asbestos exposure include: shortness of breath, difficult breathing or swallowing, persistent coughing that progressively worsens, wheezing and hoarseness, coughing up blood, pain or tightening in the chest, swelling of face or neck, loss of appetite, weight loss, fatigue or anemia.

Control Measures: Asbestos-containing areas must be identified by signs, which will likely be found when working at larger industrial and commercial facilities. In these cases, workers must avoid these areas and take all necessary precautions to prevent disturbing any materials within these areas. In most cases, potential asbestos exposures will be in the form of sample collection as part of environmental site assessments performed on commercial properties. Personnel must be certified asbestos inspectors to perform these collections. In some cases, demolition of structures potentially containing asbestos materials may be supervised. At a minimum, the designated PPM-representative must be asbestos certified; however, the demolition and air monitoring requirements will be subcontracted to an appropriately state-certified contractor.

Because the sample collection process disturbs asbestos-containing materials (ACM) or potential asbestos-containing materials (PACM), workers must wear air-purifying respiratory protection in the form of half-mask respirator with P-100 high efficiency particulate air (HEPA) filters and must also wet the sample area with a soap-water mixture to reduce the dispersion of fibers. *Note: asbestos-containing materials will be presumed until otherwise verified through laboratory analysis. Buildings constructed prior to the 1980s have a greater likelihood of containing asbestos. PACMs must be treated as if they contain asbestos, and the greatest level of control should be used when collecting samples*.

3.1.3.3 Heavy Metals

Numerous heavy metals bind naturally to soils; therefore, dusty environments can introduce these hazards to workers. Heavy metals are poisonous to humans and can cause severe health effects due to their proven or suspected carcinogenic characteristics. Common heavy metals encountered through company-related processes include:

- **Aluminum**. A silvery-white, malleable, ductile, and odorless solid (metal); combustible as a solid (although takes effort), but easily ignitable when in fine dust form which can cause explosions; can cause damage to the eyes, skin and respiratory system; symptoms include: skin, eye and respiratory irritation.
- **Arsenic**. A silver-gray or tin-white metal commonly associated with under-ground storage tanks; noncombustible in solid form but presents slight explosion hazard in dust form when exposed to flame; is considered potential lung and lymphatic system carcinogen and can also affect liver, kidneys and skin through inhalation, skin absorption, skin/eye contact and ingestion exposures; symptoms include: respiratory irritations such as ulceration of nasal septum, dermatitis, gastrointestinal disturbances, hyperpigmentation (darkening) of the skin, and peripheral neuropathy (problem with nerves that carry information to and from the brain and spinal cord which can result in pain, loss of sensation and inability to control muscles).
- **Barium**. A silvery-white metal that exists naturally in the environment; because it is very reactive in its natural state, it is often combined with other elements such as oxygen, carbon and sulfur; it has many uses, but one likely exposure source is that it is used by the oil and gas industry to make drilling mud, which lubricates the drill and simplifies the process when drilling through rock; barium in its natural state is highly flammable and reacts violently with water; may cause irritation of skin, eye, nose, throat and upper respiratory tract, allergic reactions, and central nervous system damage; symptoms include: corneal damage including blindness, poisoning, dermatitis, and skin, eye and throat burns.
- **Cadmium**. A soft, bluish-white metal commonly associated with underground storage tanks; noncombustible in solid form but will burn in powder form; is considered potential prostate and lung carcinogen and can also affect respiratory system, kidneys and blood through inhalation and ingestion exposures; symptoms include: pulmonary edema (fluid in air sacs of lungs) which causes difficult breathing, cough, chest tightness, substernal pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, loss of smell, emphysema, proteinuria (protein in urine), and mild anemia.
- **Chromium**. A hard, steel-gray metal commonly associated with underground storage tanks; noncombustible in solid form but finely dispersed dust particles will rapidly burn when exposed to a flame; chromium is not considered a likely carcinogen, but does affect skin, eyes and respiratory system through inhalation, ingestion and contact exposures; symptoms include: skin and eye irritation and lung fibrosis (scarring of the lungs).
- **Copper**. A soft, malleable reddish-orange metal commonly associated with underground storage tanks; noncombustible in solid form but may ignite when in powder form; copper is not considered a likely carcinogen, but does affect skin, eyes, respiratory system, liver and kidneys through inhalation, ingestion and contact exposures; symptoms include: skin, eye and pharynx irritation, nasal septum perforation, metallic taste, and dermatitis.
- **Iron**. A lustrous metal with a grayish tinge commonly used in industry in the construction of machinery, tools, automobiles, ships and building components; it is the most commonly used of all metals and can also be found in numerous dietary sources; elevated iron in the blood can react with peroxides to produce free radicals that can damage DNA, proteins, lipids and other cellular components; upon exposure, iron can cause skin, eye, mucous and respiratory irritations; it is also flammable as a fine dust.

- **Lead**. A soft, gray metal commonly associated with underground storage tanks, paints and coatings; noncombustible in solid form; lead is not considered a likely carcinogen, but does affect eyes, gastrointestinal tract, central nervous system, kidneys, blood and gingival tissue (soft tissue of the mouth surrounding the teeth) through inhalation, ingestion and contact exposures; symptoms include: eye irritation, weakness, exhaustion, insomnia, facial pallor (paleness), weight loss/anorexia, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis of wrist and ankles, encephalopathy (various brain disorders), kidney disease, and hypertension.
- **Magnesium**. A strong, silvery-white, light-weight metal that exists naturally in the environment; because it is very reactive in its natural state, it is often combined with other elements to form magnesium oxide, various salts, and other industrially-important compounds; magnesium is the third most commonly used metal; because it is light-weight, it is widely used in manufacturing numerous electronics; upon exposure, magnesium can cause skin and eye irritations; it is also flammable as a fine dust.
- **Mercury**. A silver-white, liquid metal associated with underground storage tanks, batteries, fluorescent bulbs, thermometers and thermostats; noncombustible liquid; mercury is not considered a likely carcinogen but does affect skin, eyes, respiratory system, central nervous system and kidneys through inhalation, skin absorption, ingestion and contact exposures; symptoms include: skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pnuemonitis (lung inflammation), tremor, insomnia, irritability, indecision, headache, weakness, exhaustion, stomatitis (inflammation of lining within the mouth), salivation, gastrointestinal disturbance, weight loss/anorexia, and proteinuria (protein in urine).
- **Selenium**. Crystalline, red to gray solid that is considered to be combustible when in fine dust form; elemental selenium is rare – it is most commonly produced as a byproduct of refining copper or producing sulfuric acid; selenium can cause damage to the skin, eyes, respiratory system, liver, kidneys, blood and spleen; symptoms include: skin, eye, nose, and throat irritations, visual disturbance, headache, chills, fever, difficulty breathing, bronchitis, metallic taste, garlic breath, gastrointestinal disturbance, dermatitis, and skin and eye burns.
- **Silver**. A white, lustrous metal that is noncombustible in solid form but can become flammable when in dust form. Silver can cause damage to the nasal septum, skin and eyes. Symptoms include: blue-gray eyes, nasal septum, throat and skin, ulceration of skin, and gastrointestinal disturbance.
- **Zinc**. A bluish-white metal commonly associated with underground storage tanks and used as an anti-corrosion agent; zinc is commonly found in common cold lozenges and over-the-counter cold remedies, as a dietary supplement and also within common foods such as beans, nuts, whole grains and pumpkin/sunflower seeds; zinc is commonly considered non-toxic but in abundance can result in gastrointestinal irritation through ingestion exposures; symptoms include: loss of appetite, nausea, vomiting, stomach cramps, diarrhea and headaches.

Control Measures: Soils should be wet and kept moist to reduce the amount of airborne dust concentrations generated. Providing sufficient ventilation, wearing safety glasses with side-shield protection and wearing dust masks or respiratory equipment with P100 filter are other alternatives for working in dusty environments. Most PPM jobsites can be mitigated using wet methods only. Workers should use additional precautions when using both wet methods and power tools or corded equipment to avoid electrical shock.

3.1.3.4 Nuisance and Concrete Dust

Dust generation is a common occurrence when working with contaminated soils and when mixing or dismantling concrete. In most cases, activities that result in dust accumulation are subcontracted making them more susceptible to these respiratory hazards than PPM personnel. Generally, dust accumulation is minimal, but the SSO must ensure that subcontractors are using effective controls to minimize dust accumulation, and that they are also equipped and wearing the appropriate protective equipment when performing these tasks. Contaminants associated with common job-related dusty environments include:

- **Total and respirable dust**. Dust found in the air that can cause breathing difficulties if inhaled. OSHA has established permissible exposure limits (PELs) for both total and respirable dusts to regulate worker exposures. Respirable dust is defined as dust particles less than 10 micrometers in diameter, which is too small to be visible. Symptoms of exposure can include coughing, wheezing and breathing difficulties.
- **Concrete dust**. Commonly generated through core drilling and jack-hammering through concrete. Also, small areas of concrete can be replaced by workers who may generate dusts from bags of cement as part of the mixing process. Trace amounts of crystalline silica, alkaline compounds and hexavalent chromium are found within cement. OSHA has established PELs for Portland cement to regulate worker exposures. Symptoms of exposure can include coughing, wheezing, eye irritations and in severe cases silicosis. Wet cement can also cause skin burns so workers should wear goggles and aprons or long-sleeved clothing when mixing cement.

Control Measures: Soils should be wet and kept moist to reduce the amount of airborne dust concentrations generated. Providing sufficient ventilation, wearing safety glasses with side-shield protection and wearing dust masks or respiratory equipment with P100 filter are other alternatives for working in dusty environments. Most PPM jobsites can be mitigated using wet methods only. Workers should use additional precautions when using both wet methods and power tools or corded equipment to avoid electrical shock.

3.1.4 Volatile and Semi-Volatile Organic Compounds

Volatile organic compounds (VOCs) are a broad group of materials that have the ability to vaporize (change from a solid or liquid into a gas) with an increase in ambient temperature. Some example VOCs include: paints and lacquers, paint thinners, pesticides, solvents and degreasers, glues/adhesives and petroleum fuels. Semi-volatile organic compounds (SVOCs) include phenols and polycyclic aromatic hydrocarbons (PAHs), which have a higher boiling point than water and may vaporize with an increase in ambient temperature. VOC/SVOCs are not known for acute toxicity but have significant chronic health effects because concentrations are often low and symptoms are slow to develop, which is why several VOC/SVOCs are suspected or known carcinogens. Common VOC/SVOCs are outlined in the following sections.

3.1.4.1 Chlorinated Compounds

A chlorinated solvent is a type of organochlorine, which is an organic compound (contains carbon) that also contains chlorine. They are found in a variety of products and used as part of the dry cleaning process due to its ability to dissolve materials such as fats and greases. Workers are most likely to be exposed to these chemicals as part of soil and groundwater assessment and remediation associated with dry cleaning contaminants. Chlorinated solvents can be environmentally persistent and tend to evaporate easily making inhalation the primary route of worker exposure. However, workers may additionally be exposed to chlorinated solvents through ingestion, absorption and skin/eye contact. Common chlorinated solvents encountered through company-related processes include:

- **Carbon tetrachloride**. A noncombustible, colorless liquid with ether-like odor; considered a potential carcinogen with damaging effects to the central nervous system, eyes, lungs, liver, kidneys, and skin; symptoms include: skin and eye irritation, central nervous system depression, nausea, vomiting, drowsiness, dizziness, and incoordination.
- **Chloroform**. A noncombustible, colorless liquid with pleasant odor; considered a potential carcinogen with damaging effects to the liver, kidneys, heart, eyes, skin, and central nervous system; symptoms include: skin and eye irritation, dizziness, mental dullness, nausea, confusion, headache, weakness, exhaustion, anesthesia, and enlarged liver.
- **Methylene chloride**. A combustible, colorless liquid with chloroform-like odor; considered a potential carcinogen with damaging effects to the eyes, skin, cardiovascular system, and central nervous system; symptoms include: skin and eye irritation, weakness, exhaustion, drowsiness, dizziness, numb and tingling limbs, and nausea.
- **Perchloroethylene (Tetrachloroethylene)**. A noncombustible, colorless liquid with mild chloroform-like odor; when in a fire, it decomposes to hydrogen chloride and phosgene; considered a potential carcinogen with damaging effects to the eyes, skin, respiratory system, liver, kidneys and central nervous system; symptoms include: skin, eye, nose, throat and respiratory irritation, nausea, flushed face and neck, dizziness, incoordination, headache, drowsiness, skin redness, and liver damage.
- **Trichloroethylene**. A combustible, colorless liquid with chloroform-like odor; will burn when exposed to flame, but is difficult to burn; considered a potential carcinogen with damaging effects to the eyes, skin, respiratory system, heart, liver, kidneys, and central nervous system; symptoms include: skin and eye irritation, headache, visual disturbance, weakness, exhaustion, dizziness, tremor, drowsiness, nausea, vomiting, dermatitis, cardiac arrhythmias, parasthesia (tingling or numbness of the skin), and liver injury.
- **Vinyl chloride**. A combustible, colorless gas or liquid (below 7º F) with pleasant odor at high concentrations; considered a potential carcinogen with damaging effects to the liver, central nervous system, blood, respiratory system, and lymphatic system; symptoms include: weakness, exhaustion, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or cyanosis of extremities, and frostbite (as a liquid).

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment.

3.1.4.2 Isopropyl Alcohol

After bailers and reusable sampling equipment is decontaminated with alconox® solution, it is then sprayed with isopropyl alcohol. Also referred to as isopropanol, isopropyl alcohol is a colorless, flammable liquid commonly known as rubbing alcohol. It is considered a skin, eye and respiratory system irritant that causes damage through inhalation, ingestion and skin/eye contact exposures. Symptoms of overexposure include: irritation of eyes, nose and throat, drowsiness, dizziness, headache and dry, cracking skin.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of

concentrations) or upgrade protective equipment. Increase frequency of air monitoring if action limits are triggered and remove or isolate all ignition sources if flammability limits are triggered. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations.

3.1.4.3 Methyl-Tertiary Butyl Ether (MTBE)

MTBE is a colorless, flammable liquid with an ether-like odor used as a fuel additive to reduce emission gases such as ozone and carbon monoxide. At one point gasoline could consist of as much as 10-15% MTBE but has since been replaced with ethanol and other additions less harmful to humans and the environment. MTBE poses a concern because it is considered a potential human carcinogen, can easily travel through soils, and is very soluble in water creating larger contaminant plumes than other gasoline constituents. It is also more resistant to biodegradation making it more environmentally persistent. MTBE is considered a skin, eye, respiratory and central nervous system irritant with symptoms that include: skin, eye and mucous membrane irritation, dizziness, nausea, headache, intoxication, loss of balance and coordination, unconsciousness, coma, respiratory failure and death.

Control Measures: Avoid prolonged exposures to oil mist, liquid or vapor. Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations.

3.1.4.4 Organic Hydrocarbons

Total petroleum hydrocarbon (TPH) is a broadly used term referring to a large family of compounds that originate from crude oil. Crude oil is a naturally-occurring, flammable liquid comprised of a complex mixture of various hydrocarbons. It is recovered through oil drilling, but can be refined and separated into other substances such as gasoline, kerosene, diesel and lubricating oils. TPH is generally comprised of hydrogen and carbon; hence the term "hydrocarbon". Because there are so many different mixtures, TPH is divided into groups or fractions, and each fraction consists of hydrocarbons that exhibit similar soil and groundwater traits. Fractioning TPH is beneficial in the risk assessment process because certain fractions may be eliminated as contaminants of concern. Common petroleum-based chemicals encountered through company-related processes include:

- **Gasoline**. Gasoline is extracted from crude oil through a distillation process. It is comprised primarily of aliphatic hydrocarbons, but also includes some aromatic hydrocarbons such as benzene and toluene to increase octane ratings. Additional additives such as tetraethyl lead and methyl-tertiary butyl ether (MTBE) were added to gasoline to enhance performance and reduce harmful carbon monoxide exhaust emissions and reduce smog. Due its harmful effects to human health and the environment, neither additive is currently used and has been replaced instead with alcohols such as ethanol or methanol.

  Gasoline is used primarily as a fuel source but can also be used as a solvent. Components of gasoline are considered to be carcinogenic, and because gasoline is highly volatile, inhalation of vapors is always a concern for workers. Gasoline is also a skin and eye irritant, its vapors are highly flammable, and it is a major source of pollution gas (i.e., 1 U.S. gallon of gasoline produces 19.4 pounds of carbon dioxide, a greenhouse gas). Gasoline is comprised of the following four constituents:

→ Benzene – a colorless, flammable liquid with a sweet odor; makes up on average 0.62% to 1% of gasoline; is considered a known carcinogen with damaging effects to skin, eyes, respiratory system, blood, central nervous system and bone marrow, which can result in anemia (decreased red blood cell count making one weak and tired), decreased white blood cell count (difficult to fight off infections), and low blood platelet count (excessive bleeding); benzene causes damage through inhalation, skin absorption, ingestion and contact exposures; symptoms include: drowsiness, dizziness, headaches, confusion, tremors, skin/eye irritations, redness and blistering of the skin, vomiting, stomach irritation, convulsions, rapid heart rate, unconsciousness, leukemia (long-term) and death (large doses).

→ Toluene – a colorless, flammable liquid with benzene-like odor (smells like paint thinner); can produce damaging effects to skin, eyes, respiratory and central nervous systems, liver and kidneys; toluene causes damage through inhalation, skin absorption, ingestion, and contact exposures; symptoms include: eye and nose irritation, weakness, exhaustion, confusion, euphoria, dizziness, headaches, dilated pupils, lacrimation (tears), anxiety, muscle fatigue, insomnia, parathesia (tingling or numbness of the skin), dermatitis, and liver/kidney damage.

→ Ethylbenzene – a colorless, flammable liquid with aromatic odor (smells like gasoline); is considered a potential human carcinogen that can produce damaging effects to skin, eyes, respiratory and central nervous systems; ethylbenzene causes damage through inhalation, skin/eye contact and ingestion exposures; symptoms include: irritation of the eyes, skin and mucuous membranes, headaches, dizziness, dermatitis, narcosis (unconsciousness) and coma.

→ Xylene – colorless, flammable liquid with sweet, balsam-like odor; is a mixture of ortho-, meta- and para-xylene isomers that releases carbon monoxide gas when burned; can produce damaging effects to skin, eyes, respiratory and central nervous systems, gastrointestinal tract, blood, liver and kidneys; xylene causes damage through inhalation, skin absorption, ingestion and skin/eye contact exposures; symptoms include: irritation of skin, eyes, nose and throat, dizziness, excitement, drowsiness, incoord-ination, staggering gait, corneal vacuolization, anorexia, nausea, vomiting, abdominal pain and dermatitis.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Increase frequency of air monitoring once action limits are triggered to ensure that all ignition sources are removed or isolated when flammability limits are triggered.

§ **Kerosene**. Kerosene is a source of fuel refined from crude oil that is heavier than gasoline but lighter than diesel. It is a colorless to yellowish oily liquid used in households as a lamp oil and used industrially as jet fuel for aircraft and rocket engines. Kerosene has a strong odor, is highly flammable, and causes damage to the eyes, skin, respiratory system, and central nervous system. Workers may be exposed to liquid kerosene and its vapors through inhalation, ingestion, skin and/or eye contact. Symptoms include: irritation of eyes, skin, nose and throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination,

confusion, drowsiness; vomiting, diarrhea; dermatitis; and chemical pneumonitis (aspiration liquid). Kerosene is commonly referred to as paraffin in other countries.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Increase frequency of air monitoring once action limits are triggered to ensure that all ignition sources are removed or isolated when flammability limits are triggered.

§ **Diesel/polycyclic aromatic hydrocarbons (PAHs)**. Diesel is a source of fuel refined from crude oil and used in diesel trucks, boats, school and city buses, trains, cranes, farming equipment, emergency response vehicles and power generators. Diesel is an attractive fuel source because it is less volatile and emits smaller amounts of greenhouse gases (CO and CO_2); however, during combustion it does release large amounts of soot which can lead to acid rain, smog and poor health conditions. PAHs are found in crude oil and soot and are also a by-product of petroleum processing or combustion, specifically the incomplete burning of oil and gas. Common PAH constituents include: acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h) anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene. The regulated PAH constituents are outlined below:

→ Coal tar pitch volatiles - PAH components anthracene, benzo(a)pyrene, chrysene, phenanthrene, and pyrene, all of which have the same chemical description, target organs, and regulatory threshold limits are not addressed by NIOSH as individual components. Instead, they are classified and regulated as coal tar pitch volatiles. Coal tar pitch volatiles may vary slightly but are described as combustible, black or brown amorphous residues and are considered a potential human carcinogen with damaging effects to respiratory system, skin, bladder, and kidneys. Symptoms include: dermatitis and bronchitis.

→ Naphthalene – Naphthalene is a combustible, colorless to brown solid with an odor or mothballs that causes damaging effects to eyes, skin, blood, liver, kidneys, and central nervous system. Symptoms include: eye irritation, headache, confusion, excitement, discomfort, nausea, vomiting, abdominal pain, bladder irritation, profuse sweating, jaundice, blood in urine, renal failure, dermatitis, optic and cornea damage.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Increase frequency of air monitoring once action limits are triggered to ensure that all ignition sources are removed or isolated when flammability limits are triggered.

§ **Hydraulic and lubrication oils**. Oils used for internal combustion engines to lubricate moving parts, prevent corrosion and to cool the engine. Lubricating oils are made from crude oil but also include additives to improve certain properties. Lubricating oils can be highly flammable and can cause irritation of nose, throat and lungs, headaches, dizziness, nausea, vomiting and diarrhea.

Control Measures: Avoid prolonged exposures to oil mist, liquid or vapor. Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report

any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations.

3.1.4.5 Pesticides

A pesticide is another type of organochlorine commonly used for crop dusting agricultural farmland not only to kill insects, rodents and germs, but is also used for weed and mildew control. The term "pesticide" includes a broad category of chemicals that can be further broken down into insecticides, rodenticides and fungicides. Some older and more recently banned pesticides (such as DDT) tend to be environmentally persistent. Workers are potentially exposed to pesticides as part of the assessment or remediation of impacted farmland as well as commercial pesticide manufacturing and/or storage facilities. Similarly to chlorinated solvents, pesticides can be volatile making inhalation the primary route of worker exposures. However, workers may additionally be exposed to pesticides through ingestion, absorption and skin/eye contact. There are numerous pesticides tested as part of assessment and remediation of impacted sites; however, the following pesticides are OSHA-regulated materials that pose a potential health risk to workers:

- **Aldrin**. A noncombustible, colorless to dark-brown crystalline solid with mild chemical odor; may dissolve in flammable liquids; formerly used as an insecticide and is considered a potential carcinogen with damaging effects to the central nervous system, kidneys, liver, and skin; symptoms include: headache, dizziness, nausea, vomiting, vague feeling of discomfort, jerking of limbs, convulsions, coma, hematuria (blood in urine), and azotemia (blood containing high levels of urea, creatinine and other nitrogen-rich compounds).
- **Dichlorodiphenyltrichloroethane (DDT)**. A combustible, colorless crystals or off-white powder with a slight aromatic odor; considered a potential carcinogen with damaging effects to the eyes, skin, central nervous system, liver, kidneys, and peripheral nervous system; symptoms include: skin and eye irritation, tingling and numbness of tongue, lips and face, tremor, anxiety, dizziness, confusion, vague feeling of discomfort, headache, weakness, exhaustion, convulsions, partial loss or impaired movement of hands, and vomiting.
- **Dieldrin**. A noncombustible, colorless to light-tan crystals with a mild chemical odor; used as an insecticide and is considered a potential carcinogen with damaging effects to the central nervous system, liver, kidneys, and skin; symptoms include: headache, dizziness, nausea, vomiting, vague feeling of discomfort, sweating, jerking of limbs, convulsions, and coma.
- **Endrin**. A noncombustible, colorless to tan, crystalline solid with a mild chemical odor; may dissolve in flammable liquids; used as an insecticide with damaging effects to the central nervous system and liver; symptoms include: epileptic-like convulsions, stupor, headache, dizziness, abdominal discomfort, nausea, vomiting, anorexia, insomnia, aggressiveness, confusion, drowsiness, weakness, and exhaustion.
- **Heptachlor**. A noncombustible, white to light-tan crystals with a camphor-like odor; may dissolve in flammable liquids; used as an insecticide and is considered a potential carcinogen with damaging effects to the central nervous system and liver; symptoms provided for animals only and include: tremor, convulsions, and liver damage.
- **Lindane**. A noncombustible, white to yellow crystalline powder with slight, musty odor; may dissolve in flammable liquids; causes damaging effects to skin, eyes, respiratory system, central nervous system, blood, liver, and kidneys; symptoms include: skin, eye,

nose and throat irritation, headache, nausea, convulsions, respiratory difficulty, cyanosis, aplastic anemia, and muscle spasm.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment.

3.1.4.6 Polychlorinated Biphenyls (PCB)

Polychlorinated biphenyls (PCBs) are a mixture of numerous chlorinated compounds and are commercially sold under the trade name Aroclor® 1242 (contains 42% Cl^-) and Aroclor® 1254 (contains 54% Cl^-). It is a colorless to light-yellow, oily solid or liquid with no known taste or smell and can volatilize to a vapor with a slight increase in temperature. PCBs were used as coolants and lubricants in transformers, capacitors and electrical equipment because they do not burn easily and are good insulators. Production in the U.S. was discontinued in 1977 due to its environmental persistence and damaging health effects. PCBs do not easily break down, bind strongly to soil, accumulate in fish and marine life, and can travel far distances in air.

Workers are likely to be exposed to PCBs through damaged or burning transformers, known/suspected site contamination, or ingestion of contaminated fish. PCBs can also be found in pre-1977 fluorescent light fixtures, electrical devices (TVs and appliances), and hydraulic oils. Worker exposures are likely to occur through inhalation, absorption, ingestion and contact causing damaging effects to the skin, eyes, liver and reproductive system. Symptoms include: eye irritation, chloracne (acne-like skin condition in adults), liver damage, and reproductive effects.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment.

3.1.5 Other/Unknown Chemicals

3.1.5.1 Activated Carbon

Also referred to as activated charcoal, this material comes in various forms but is most often purchased by PPM in granular form (occasionally purchased in pellet form). Activated carbon is a porous material that is effective in the adsorption of gases/vapors and is commonly used as part of the groundwater treatment process. This material is non-toxic but can be irritating to the skin and eyes. Loose granules can also present a slip hazard and dusts can accumulate when replacing spent carbon with unspent carbon.

Control Measures: Keep granules inside storage bag or carbon vessel and immediately remove spilled granules from the work area to prevent slipping. Wear appropriate protective clothing such as gloves and safety glasses when working with/near this material to prevent skin and eye contact. Keep dust generation to a minimum using a porta vac and be prepared to wear a dust mask or half mask with P-100 HEPA cartridge when dusts cannot otherwise be mitigated.

3.1.5.2 Alconox®/Liquinox®

Alconox® (powder) and Liquinox® (liquid) are detergents used to decontaminate bailers and equipment to prevent cross-contamination of samples. Detergents generally can be skin or eye irritants that can cause itching, pain, redness or burning.

Control Measures: Keep face away from solution when mixing and wear safety glasses with side-shield protection or goggles depending upon the degree of splashing.

3.1.5.3 Descaling Agents (Analytix AN-754GH)

Various chemicals may be used to prevent the accumulations of scaling along monitoring well walls. These descalers may vary by office location; however, most of these chemicals exhibit similar characteristics. They are typically acidic in nature and may be extremely corrosive to skin, eyes, and respiratory system.

Control Measures: Keep face away from solution when handling and wear safety glasses with side-shield protection or goggles depending upon the degree of splashing. Use safe precautions when handling material and make every effort to avoid direct contact with this material through the use of protective clothing and equipment such as chemical-resistant gloves, goggles and aprons. Avoid inhaling any fumes that may arise from these chemicals.

3.1.5.4 Unknown Chemicals and/or Concentrations

Workers do not often come into contact with unknown chemicals and/or chemical concentrations. Although rare, workers may potentially encounter unknowns during drum characterizations as requested by a particular client. When the client cannot identify the material(s) inside a drum or other container, this material(s) is to be treated as an extremely hazardous substance using the highest level of safety precautions including, but not limited to, personal protective clothing/equipment. When working with known chemicals at unknown concentrations, the same level of safety precautions must be implemented to preserve worker safety and wellbeing. These situations are considered an immediately dangerous to life and/or health (IDLH) environment.

Control Measures: When this type of work is proposed by a client, it must be presented and approved by Shawn Ivey or Zane Hood, Regional Principals. Due to the increase in safety precautions, a site-specific HASP must be generated by the Health and Safety Director, which may require additional time to prepare. Never open a site drum/container that does not belong to PPM if the contents or concentrations are unknown.

3.1.6 Chemical/Physical Properties

The following table outlines the chemical and physical properties associated with the most common volatile or semi-volatile constituents encountered by PPM.

Chemical Name	VP[1]	VD[2]	SG[3]	Sol[4]	FP[5]	LEL[6]	UEL[7]
Diesel	0.009 psia	>1	0.83-0.88	Negligible	125	0.6	7.5
Gasoline	38-300	3-4	0.72-0.76	Insoluble	45	1.4	7.6
Benzene	75	2.8	0.88	<1	12	1.2	7.8
Toluene	21	4	0.87	<1	40	1.1	7.1
Ethylbenzene	7	4	0.87	<1	55	0.8	6.7
Xylene	9	4	0.86	<1	81	1.1	7.0
MTBE	245-256	3.1	0.74	4.8	-17	1.6	8.4
Ozone	>1 atm	1.7	2.14	<1	N/A	N/A	N/A

1 – Vapor Pressure (mmHg) – the higher the VP, the more likely it is to change from a liquid to a vapor with an increase in temperature.
2 – Vapor Density – how heavy the material is in air; anything >1 will sink into worker breathing zone; anything <1 will rise.
3 – Specific Gravity – how heavy the material is in water; anything >1 will sink in water; anything <1 will float on water.
4 – Solubility (%) – how likely the material is to be dissolved in water.
5 – Flash Point (°F) – lowest temp that material vapors will ignite/burn.
6 – Lower Explosive Limit (%) – lowest concentration in which vapors will ignite.
7 – Upper Explosive Limit (%) – highest concentration in which vapors will ignite.

3.2 PHYSICAL HAZARDS AND CONTROLS

3.2.1 Combustion/Flammability

The three elements needed to produce a fire are: combustible material, oxygen, and ignition source (heat). As part of most projects, the presence of gasoline (flammable contaminant) within an outdoor environment (sufficient oxygen content) when combined with the use of heavy equipment (electrical source) provides all three elements necessary to produce a flammable setting. Fires can also be the result of overloading circuitry and improper chemical storage.

Control Measures: Monitor ambient site concentrations to ensure flammable action limits are not triggered. Oxidizers are capable of releasing oxygen and generating heat so store them away from combustible materials. Do not overload power outlets. Remove foot heaters or other electrical devices if they trip ground fault circuit interrupters (GFCI) or produce burnt smell and/or smoke. Use ABC-rated fire extinguisher to extinguish fire or follow company evacuation procedures when warranted.

3.2.2 Contaminated Water/Splash Hazards

Beware of splash hazards posed by purging and/or development of groundwater monitoring wells. Chemical splash hazards may also be encountered during drum sampling of known contaminants. Contaminants are likely to vary; therefore, the chemical hazards section of this plan should be referenced to address the hazards posed by the contaminant.

Control Measures: Workers must wear safety glasses with side-shield protection. Goggles may be necessary depending upon the degree of splashing. Goggles are required when moving containers of or working with severe eye irritants, acids or caustics.

3.2.3 Compressed Gas

Compressed gases such as acetylene and oxygen may be used to operate cutting torches. Cylinders can become projectiles if they are not secured and/or stored properly. Improper handling of cylinders can also result in muscular sprains/strains, falls, bruising, or broken bones. Other hazards may include chemical burns, explosion fire, poisoning, and cold burns due to container mishandling. In addition, utility gas lines are often buried onsite nearby areas where drilling, trenching or other similar surface disturbances are likely to occur. Contact with a subsurface gas line could result in an explosion, fire, and other significant physical bodily injury.

Control Measures: Only qualified workers appropriately trained in compressed gas safety are permitted to work with compressed gases. Keep compressed gas cylinders upright and secured when in storage, transit or use. The valve protection cap must remain in place when not in use and during storage and should only be removed when the cylinder is secured and/or ready for use. Never drag or slide a compressed gas cylinder, drop a cylinder, or subject cylinders to strikes from other objects as this may cause damage to the valves. Store in a climate-controlled environment away from heat sources, heavily traveled paths, and emergency exits and store other combustible materials in a separate location away from compressed gas cylinders. Smoking is prohibited near compressed gases. Keep empty and full cylinders segregated and replace empty cylinders promptly. Restrict unauthorized access to compressed gases and visually inspect containers weekly.

3.2.4 Concrete Coring and Cutting

The use of jackhammers and coring equipment is necessary to cut through concrete when conducting subsurface work. The use of this equipment is extremely loud, creates dusty environments and can create projectiles out of broken pieces of concrete.

Control Measures: Wet affected areas of concrete to reduce amount of dust generated; however, avoid creating large puddles of water as some equipment being used is corded and can create electrical hazards. If dust continues to be a problem, workers must wear air-purifying respirator with P-100 HEPA filter. Use vacuum-based core drills or secure the base of the core drill to concrete when working on uneven surfaces. Know where the manual shut-off switch is located and if not within reaching distance of worker, someone must be present at electrical outlet to unplug equipment should it be necessary. Operator and any worker required to be within 10 feet of coring/cutting process must wear face shield over safety glasses with side-shield protection to protect against flying particles.

3.2.5 Cuts and Lacerations

Acetate liners used for soil collections must be cut to collect the sample. Also, tubing materials used when groundwater sampling or used for air monitoring must be cut in various lengths. Shears or tube cutters are alternatives to using knives or other blades; however, there may be instances in which the use of knives or blades cannot be avoided.

Control Measures: Always use sharpened blades as dull blades can require more applied force. Wear leather or Kevlar® gloves to protect hands. Secure the object being cut keeping free hand out of the way and always cut away from the body. If cut must be made towards the body, cut the object at an angle away from the body. Utility knives must have a self-retracting blade and should not be stored in pockets of clothing.

When collecting soil samples, workers should rely upon the subcontractor to cut the sample liners whenever possible. When workers must cut the liners, the following specific instructions are required:

- Secure the liner to a stable structure (i.e., the truck tailgate or portable table).
- Use the proper cutting tool for the job (see photo); subcontractors often have this tool.
- Cut the liner perpendicular to the body – avoid cutting towards the body.

3.2.6 Driving Safety

Most company-related field activities occur offsite and require personnel to drive from the office to the jobsite. Collision with another vehicle or into a structure can result in property damage, worker injury or even a fatality.

Control Measures: Drivers must have valid state license to drive and must be classified appropriate to the type of vehicle he/she will be required to operate (i.e., vehicles with gross vehicle weight rating [GVWR] >10,000 lbs or any vehicle/trailer combination GVWR >10,000 lbs requires a commercial drivers license). Additional safety precautions for driver safety include, but are not limited to, the following:

- § Obey all federal and state traffic laws (i.e., speed limits, yielding, etc.)
- § Plan route to site in advance to avoid traffic congestion, construction, road closures, inclement weather or other similar forms of delay
- § Perform pre-use inspection to ensure vehicle is fueled and in good working order
- § Ensure all materials are secured
- § Avoid distractions such as changing radio stations, reading texts or emails, eating, drinking, or other similar functions
- § Pull over to take or make a phone call even when using hands-free devices
- § Texting while driving is strictly prohibited by PPM and is a law in several states
- § Drive defensively - yield to aggressive drivers, slow down when driving through adverse weather conditions or when driving through school zones

3.2.7 Drowning

Water bodies where the potential for drowning exists includes: oceans, rivers, lakes, seas, gulfs, bays, ponds, wetlands, bayous, streams or other similar water sources. Work over or near these types of water bodies is rarely encountered, and routine company job tasks do not usually result in the use of a boat. However, when they arise, jobs of this nature do pose a risk of drowning. When sample collections are anticipated to occur from within a boat, this will likely take place in various locations of the water body with varying or unknown depths, currents, floating and subsurface debris, and/or other similar hazards.

Control Measures: Tasks requiring work over or near water where the potential for drowning could occur requires a minimum of two workers. Use a boat with a flat, stable surface to reduce the potential for rollover. In addition, workers must wear a U.S. Coast Guard-approved life preserver at all times when inside the boat or when otherwise performing a task where the potential for drowning still exists. Once over water, movement within the boat should be minimized, and workers must use caution when collecting the sample. Workers must be equipped with buoys or other similar means to extract any individual that should fall into the water.

3.2.8 Electrical

3.2.8.1 Subsurface and Overhead Utilities

Typical jobsites will pose both subsurface and overhead utility hazards. Also, remediation systems are electrically operated and pose similar electrical hazards. Contact with power lines or exposed electrical wires can result in electric shock, severe skin burns and electrocution. Electrical wires are generally insulated as a first line of defense; however, tears or damage to the insulated material can directly expose workers to the wire. Other utility lines may be present at common jobsites and include water, sewer, natural gas, telephone and fiber optic. A punctured natural gas line can spontaneously combust and cause a massive explosion. In addition, active retail gas stations contain subsurface product lines running from the tank pit to the dispenser islands and the layout of these lines can often be difficult to determine. Damage to some utilities may not necessarily pose a safety risk but damage to these structures can disrupt normal business functions and be very costly.

Control Measures: Treat all electrical lines and wires as active and avoid contact. Keep all equipment at least 10 feet away from all overhead power lines unless they have been isolated or shielded by the local energy company. Add an additional 0.4 inches to this distance for every 1 kV in excess of 50 kV. Follow all clearance procedures outlined within the company's written Subsurface Clearance program, which includes but is not limited to the following measures:

Pre-Work Clearance (Offsite and Onsite Preparations)

- § Request as-built drawings and/or obtain specialized knowledge of subsurface utility/structural locations from the client or property owner
- § Pre-plan borehole locations and visually review with client or property owner
- § Contact state one-call 48-72 hours (state-specific time requirements vary) to mark utility locations prior to field work; make secondary notices if site not marked
- § Contact additional local utility providers that do not subscribe to one-call to mark utility locations prior to field work; make secondary notices if site not marked
- § Hire private utility locators to identify presence of subsurface structures in addition to or in the absence of other clearance methods
- § Perform visual site observations for indicators of subsurface utilities/structures
- § Locate all emergency shut-off devices and isolate the work area
- § Identify and avoid exclusion zones (*any area within 10-foot circumference of UST pit)* or obtain principal approval when there are no other alternatives to avoidance
- § Follow clearance procedures for exclusion zones, critical zones (*any area within 10 feet of furthest edge of any fuel dispenser, product distribution lines, or aboveground electrical utility; entire area between UST pit and dispenser islands; and/or any area within 10 feet of suspected subsurface utilities/structures*), and non-exclusion zones (*any area not otherwise defined as exclusion or critical*).

Subsurface Clearance Procedures

- § Clear all boreholes horizontally to 110% of the diameter of the widest digging instrument intended for use starting in all four cardinal directions (NSEW) then fully covering the entire circumference of the area
- § Clear all boreholes vertically to minimum 4-foot depth BGS unless greater depths are specified by the Office Manager/Principal
- § Use company-approved clearance methods (for drilling/probing) in order of preference outlined as follows:
  1) Blunt-tip push probe
  2) Tiered approach – use push probe for vertical clearance, then use digging tools (i.e., hand auger or post-hole diggers) to clear horizontally to same depth previously cleared vertically; then use push probe to further advance vertically; continue until depth-requirement is achieved
  3) Hand auger and/or post-hole digger – used only when push probe cannot otherwise be advanced vertically due to soil type(s)
- § Use flat-edge shovel to clear for trenches/excavations when in areas of marked or suspected subsurface utilities/structures; clear area until utility/structure is located; if not located within depth-requirement, proceed with trenching/excavating

3.2.8.2 Electrical Tools and Power Cords

Assorted power tools may be required for certain tasks. Power tools can be battery operated or otherwise have an electrical power cord, which can be plugged into an electrical outlet. Due to this factor, energy can be controlled by plugging or unplugging the cord and does not require energy isolation. The electrical wires are typically insulated; however, kinks or cuts made to the power cord jacket can expose workers to these electrical wires resulting in electric shock or electrocution.

Control Measures: Perform an initial inspection to ensure tools and cords are in good working order and immediately discard or label damaged tools/cords to prevent use until repairs or replacements can be made. Additional safety precautions for electrical protection include, but are not limited to, the following:

- § Only use electrical outlets and matching cords with grounding wire (3-prong)
- § Never remove grounding prong to accommodate a 2-prong electrical outlet
- § Electrical cords should be rated for hard or extra hard use
- § Insulated jackets should show no evidence of kinks, cuts or tears; any sign of wear (frayed insulation or exposed wires) requires immediate labeling of the cord as "damaged" and must be immediately removed from the work area
- § Avoid placing electrical cords or tools in pools of water or other wet areas
- § All portable or temporary wiring must be protected by GFCI
- § Avoid using tools or cords that trip the GFCI
- § Do not run over cords or place them through doors, windows or other pinch points

3.2.8.3 Lockout/Tagout

Remediation systems are electrically-operated systems that may require energy isolation as part of operation, maintenance or repairs. According to 29 CFR 1910.147(a)(2)(ii), energy must be isolated when 1) a worker must remove or by-pass safety guards or devices; or 2) a worker must place a body part at the point of operation or where a danger zone exists in the operating cycle. These requirements do not apply to corded equipment as this power source can be isolated by unplugging the equipment. It also does not apply to other pressurized systems for gas or steam if it can be proven that continuity of service is essential or that shut down of the system is impractical.

Routine operations and maintenance procedures typically do not trigger the requirements for energy isolation. However, it should be noted that during certain system or component repairs, these criteria may be triggered and the locking and tagging of the system and/or its components is necessary to prevent the unintentional startup of the system.

Control Measures: Locking and tagging of the system must be conducted in accordance with company requirements outlined within its written Lockout/Tagout program. An itemized procedure list for system deactivation and reactivation are posted at all remediation systems.

3.2.9 Hand and Power Tools

The electrical hazards posed by the use of power tools have previously been addressed. However, other hazards are posed by the use of hand or power tools. Removing or by-passing safety guards can expose a worker to the piercing, cutting, crushing or rotating hazards of mechanical equipment. Improper posture or repetition of hand tools can lead to musculoskeletal disorders as outlined within the previous section.

Control Measures: Use equipment in accordance with manufacturer guidelines and according to its intended purpose. Always select the appropriate tool for the job and refrain from making adjustments. Never remove or bypass safety guards. Perform an initial inspection to ensure tools are in good working order and immediately discard or label damaged tools to prevent use until repairs or replacements can be made. Keep tools stored appropriately to prevent rust or other signs of weathering. Wear appropriate head, eye, hand, and foot protection at all times. Avoid wearing jewelry or loose-fitting protective gloves/clothing that could become entangled in moving parts of the tool.

3.2.10 Illumination

Most company-related tasks will be conducted during normal, daylight hours; however, some tasks may be required to be conducted at night. When these instances occur, visibility will be decreased making the jobsite and the task more dangerous. In addition, the overall visibility of workers to drivers, equipment operators, etc. may be decreased.

Control Measures: The National Cooperative Highway Research Program (NCHRP) Report 498: Illumination Guidelines for Nighttime Highway Work outlines a set of guidelines for adequate lighting when working at night. Workers should adhere to these requirements to ensure appropriate visibility during all phases of the project. The three categories outlined by the NCHRP include the following:

- Level I illuminance is necessary in areas where the work crew is in motion, moving from spot to spot. Required for low accuracy tasks that may involve the use of slow-moving equipment, and where large objects must be visible.
- Level II illuminance is necessary in areas on or around construction equipment. A higher degree of lighting in this area will provide a safer environment for equipment operators allowing them to perform tasks that require a moderate level of accuracy.
- Level III illuminance is necessary for tasks that require a higher level of visual acuity or difficulty.

Sample tasks and the illumination requirements for those tasks are outlined below:

SAMPLE TASKS (NOT ALL-INCLUSIVE)	ILLUMINATION LEVELS	AVERAGE MINIMUM MAINTAINED ILLUMINANCE
All work operation areas; setup of lane or road closures, lane closure tapes, and flagging stations	Level I	54 lux (5 foot-candles)
Areas on or around construction equipment; asphalt paving, milling and concrete placement and/or removal	Level II	108 lux (10 foot-candles)
Pavement or structural crack/ pothole filling; joint repair, pavement patching/repairs; installation of signal/electrical/ mechanical equipment	Level III	215 lux (20 foot-candles)

Note: A foot-candle (fc) is defined as a unit of illumination that is equal to one lumen per square foot, or 10.764 lux.

Increased lighting can be provided using portable light plant towers, balloon lighting, roadway luminaires mounted on temporary poles, and factory-installed lights on equipment. Workers should select a light source and position it in a manner that reduces the amount of glare. When conducting night tasks on or near road system right-of-ways, workers must additionally adhere to appropriate state DOT roadway and traffic control requirements. Reflective clothing/vests are required when working at night or decreased illumination.

3.2.11 Ladder Safety

3.2.11.1 Portable Ladder Safety

Portable ladders are commonly used when replacing spent carbon with inactivated granular carbon or to access stationary aboveground storage tanks for inspections and/or maintenance. Carbon vessels consist of 55-gallon drums or other vessels that commonly range from 8-30 feet in height. It should be noted that carbon vessels can exceed 30 feet but these vessels are not common to current company processes. As part of this change-out process, workers must climb portable ladders at heights greater than 4 feet and they must do so carrying 50-lb sacks of granular carbon or other materials.

Control Measures: Falls from ladder use are exempted from the fall protection standards (29 CFR 1926 Subpart M). Instead falls from ladders are outlined within Subpart X of 29 CFR 1926.1053, which does not require the use of personal fall arrest system when working at elevations in excess of 4 feet. Use buddy system when able or check in periodically with the office to relay status. Use a portable A-frame ladder and ensure that it is locked in place. Place ladder on level, compact

ground surfaces and avoid wet areas. Never place ladder near entrance/exit or other pathway that could interfere with ladder usage. Use ladder for its intended purpose and in accordance with manufacturer's guidelines. Use two hands when ascending or descending. **Note: PPM purposely chooses to reference the most stringent safety measures under construction industry standards, while additionally enforcing the more stringent general industry height requirement of 4 feet. This is an overlap of standards but provides the greatest level of worker protection.*

3.2.11.2 Fixed Ladder Safety

Fixed ladders may be used at client facilities to access rooftops or other similar elevated walking/working surface. This is often necessary with asbestos and/or lead sample collections, vacuum events, and industrial compliance; specifically air compliance.

Control Measures: Falls from ladder use are exempted from the fall protection standards (29 CFR 1926 Subpart M). Instead falls from ladders are outlined within Subpart X of 29 CFR 1926.1053, which does not require the use of personal fall arrest system when working at elevations in excess of 4 feet (general industry). According to OSHA requirements, fixed ladders must have cages, wells, ladder safety devices, or self-retracting lifelines when the climb is less than 24 feet but the top of the ladder is greater than 24 feet above lower levels. When a fixed ladder is greater than 24 feet, it must be equipped with one of the following: ladder safety devices or self-retracting lifelines with rest platforms at intervals not to exceed 150 feet. When able and it does not otherwise introduce additional safety hazards, personnel may be required to use personal fall arrest system. This will be determined on a case-by-case basis. **Note: PPM purposely chooses to reference the most stringent safety measures under construction industry standards, while additionally enforcing the more stringent general industry height requirement of 4 feet. This is an overlap of standards but provides the greatest level of worker protection.*

3.2.12 Material Handling and Back Safety

It is common for workers to transport materials such as hand or power tools, bailers, sampling containers and monitoring equipment from the office to various site locations. Workers are also likely to relocate drums or other chemical storage containers. Materials may be heavy putting strain on the back, or they may be large or bulky and obstruct vision during transport.

Control Measures: When lifting or relocating heavy or large items, mechanical devices should be used as a first line of defense. When mechanical means are not available, workers should use the buddy system to lift and transport loads in excess of 50 lbs or load that obstruct view of travel. When lifting an object, workers should bend at the knees and lift with the legs – avoid applied pressure to the back as muscle strain will likely occur. Keep loads close to the body and avoid twisting while carrying loads. Ensure travel paths are free of obstructions prior to lift and relocating materials.

3.2.13 Mobile Equipment

3.2.13.1 Heavy Equipment and Machinery

Various types of heavy equipment are necessary to perform routine tasks such as drilling, geoprobing (direct push), mobile vacuum, trenching, excavating, remediation system installations and removals, underground storage tank removals, and other similar tasks. The use of this type of equipment is mostly subcontracted, and PPM requires its subcontractors be adequately trained to safely operate these types of heavy machinery. Other forms of heavy equipment such as forklifts, knuckle-boom truck-mounted crane, skid steers, and core drills can be operated by company personnel. PPM requires that operators of these types of equipment be deemed competent by the company through safety, instructional and observational training and/or operator experience. Also, equipment must be inspected by a competent prior to use,

documented and returned to the safety department for recordkeeping. Hazards associated with the use of heavy equipment include, but are not limited to, the following:

- § Pinching, rolling, crushing, rotating hazards
- § Contact with overhead or underground utilities gas lines, power lines, etc.)
- § Falling loads
- § Hydraulic or pressurized equipment parts
- § Swing radius of equipment
- § Operator blind spots
- § Hot equipment parts

Control Measures: Use equipment in accordance with its intended purpose. Machinery must be grounded prior to use and equipped with emergency stop devices. Workers must locate and test these devices prior to using the equipment. When the equipment is in use, one worker must be readily available to engage emergency stop devices unless other workers remain away from the equipment while in operation. Equipment must remain at least 10 feet away from any overhead utility line unless the line has been otherwise isolated or shielded from accidental contact. Derricks/masts of mobile equipment must be lowered prior to relocating equipment from one location to another while onsite. Personnel who work with or near rotating or other moving parts are prohibited from wearing jewelry, loose clothing or other similar means that could become entangled within the equipment. Long hair should be tied back and protective clothing should fit securely. Workers should not collect samples or otherwise place hands in or near augers when it is rotating, and workers must also avoid climbing mast of equipment when it is in operation. Wheels should be chocked and hand brakes set to secure equipment when at rest.

Contact with hot parts must be avoided and it should be noted that metal parts become extremely hot with sun exposure, which can cause significant skin burns. Workers are prohibited from working beneath elevated loads and must avoid any area impacted by the swing radius of operating equipment unless a spotter is used. Additionally, workers must be aware of operator blind spots which may also require the use of a spotter.

3.2.13.2 Aerial and Scissor Lifts

Use of aerial and scissor lifts is strictly prohibited. Company personnel are not appropriately trained for working with aerial and scissor lifts and are therefore not authorized on these machines without additional safety training and approval from the safety department. Workers should be aware that aerial and scissor lifts are not synonymous and are covered under two separate OSHA regulations. Regulatory requirements for aerial lifts can be found in §1926.453, while requirements for scissor lifts (defined by OSHA as a mobile scaffolding system) can be found in §1926.452(w). This equipment can reach elevations in excess of 4 feet triggering fall protection. It should be noted that per OSHA guidelines, aerial lifts require the use of personal fall arrest systems in conjunction with the use of a guardrail system, while scissor lifts require the use of personal fall arrest systems only in the absence of a guardrail system.

3.2.14 Noise

OSHA regulates worker exposures to noise. The established action limit for an 8-hour workday is 85 decibels (dB), a time-weighted average (TWA). Levels at or in excess of this limit can cause hearing loss, which depending upon exposure can be a temporary or permanent loss. Noisy environments can also interfere with worker communication and comprehension, which poses additional safety risks.

Noise exposures can be measured using sound level meters or noise dosimeters. Certain work-related processes considered to be noisy include but are not limited to the following:

- Remediation systems – systems vary, but noise levels have been measured ≥90 dB
- Heavy equipment operation (including vac trucks) – have been measured ≥120 dB
- Use of power tools – sound levels vary (electric drill – 95 dB, power saw 110 dB, power drill – 130 dB, pneumatic drill – 120 dB)
- Work conducted nearby high traffic roadways – typical freeway traffic is 70 dB; however, large 18-wheelers have been measured ≥90 dB
- Coring and cutting of concrete – use of jackhammers or coring equipment have been measured ≥130 dB

Control Measures: When available, workers should carry sound level meters to assess noise levels. In the absence of monitoring equipment, workers who must shout at a co-worker 5 feet away are likely triggering regulatory threshold limits for noise exposures. Those environments ≥85 dB require the use of administrative controls or protective equipment. Administrative measures such as limiting work hours within noisy environments should be the first line of defense used to control worker exposures to noise levels in excess of 85 dB. When this cannot be achieved use hearing protectors such as earplugs, canal caps or ear muffs to protect worker hearing.

3.2.15 Repetitive Motion

Some tasks require a degree of repetition that may put strain on muscles and joints of the body. Poor posture can also put a similar degree of strain on the body. Typical symptoms of repetitive motion strain do not necessarily occur immediately (i.e., they can appear at rest during sleep) and include but are not limited to the following:

- Tingling, swelling or numbness of wrists, knees, elbow or other joints
- Sharp, piercing pain
- Loss of flexibility or muscle strength

Control Measures: Avoid performing repetitive tasks that target specific parts of the body for extended periods of time. Recognize symptoms promptly and vary job task for a while. Stretching and flexibility exercises can strengthen muscles over time. Report any signs or symptoms of repetitive motion strain to the HSD immediately. These injuries progressively worsen so prevention is imperative.

3.2.16 Scaffolding

Use of scaffolding systems, which includes walking, working, assembling, disassembling, and/or other similar uses, is strictly prohibited. Company personnel are not appropriately trained for working with scaffolding systems and are therefore not authorized on these systems without additional safety training and approval from the safety department. Work requiring the use of a scaffolding system will be subcontracted to appropriately qualified contractors.

3.2.17 Slips, Trips, and Falls

Open boreholes generated through drilling or direct push as well as improper materials storage can pose tripping hazards. In addition, typical groundwater monitoring activities can result in open monitoring wells producing the same results. Trenching and excavating jobs can result in large, open earth depressions of varied depths and widths in which workers, tools or equipment could potentially fall. Carbon change-outs, asbestos/lead sampling, aboveground storage tank inspections and/or maintenance, and use of catwalks may require work at elevations ≥4 feet, which may require additional safety measures such as the use of fall protective equipment (i.e. full-body harness and lanyard). Only personnel who have received additional fall protection training are considered competent for performing these tasks – all other workers are prohibited from working at elevations ≥4 feet without additional training and certification.

Control Measures: Store all materials away from work areas until ready for use and keep all travel paths unobstructed. Walk around materials – never walk over them. Use secured, steel sheet plates or wood to cover open boreholes. Use company truck and cones to isolate traffic from open monitoring wells. Heavy equipment, barricades and caution tape must be used to isolate open excavations from vehicular traffic and unauthorized personnel. Use full-body harness and lanyard to tie-off to stable structure when working on walking/working surfaces at elevations ≥4 feet (refer to Section 3.2.19). Refer to Section 3.2.11 for fall hazards associated with the use of ladders.

3.2.18 Traffic and Secluded Areas

Most petroleum remediation activities occur at active retail gasoline facilities, which expose workers to vehicular traffic. In some cases, work may be required within roadway right-of-ways or workers may be required to cross highways to perform work on an adjoining property or within a median. Secluded areas are not typical of most field-related projects; however, they do exist on occasion. Workers required to perform tasks at remote locations should be aware that these locations may be unlawfully inhabited and/or have the potential for illegal activities.

Control Measures: Use buddy system when working in high traffic areas as first line of defense, especially on spill bucket closures, groundwater sampling, or other similar tasks that require workers to bend, kneel or sit at or slightly above ground level which greatly decreases worker visibility. When these conditions are triggered, the buddy system will require one worker to stand nearby the other worker to create a unit whereby the observer has the primary responsibility of ensuring the safety of the worker with decreased visibility. When working upright, the buddy system will permit workers to separate only to distances that are clearly visible to both workers in a manner that ensures both can continuously monitor the other during all phases of the task. For example, during the sample collection, workers must fill vials or other containers at the vehicle so that they remain in an upright position during collection. Collections at the well are prohibited unless workers are together as a unit because when workers are separated, this process generally requires the worker to bend or kneel, which decreases the visibility of that individual. In addition, the worker is no longer in a position to observe his/her co-worker voiding the effectiveness of the buddy system. If operating as a unit, one worker may observe while the other collects the sample at the well.

When the buddy system cannot be implemented, use the company vehicle and cones to clearly define and block traffic from your work area. Relocate vehicle and cones when work area changes. Workers must wear high visibility safety shirts or ANSI Class II vests to increase visibility even when using additional safety precautions. Reflective clothing/vests are required when working at night or decreased illumination. Additional illumination requirements for night work can be found in Section 3.2.10. When conducting night tasks on or near road system right-of-ways, workers must additionally adhere to appropriate state DOT roadway and traffic control requirements. When working in secluded or unsafe areas, the following measures are required:

- Schedule work during daylight hours
- Contact local police department and inquire about security
- Never go to site alone; use buddy system
- Notify manager or co-worker regarding your location, estimated time to perform duties and anticipated time of return; make intermittent calls throughout the day
- Have cell phone readily available and pre-set to 911
- Carry whistle and pepper spray as alternate methods of defense
- Wear work clothes and protective equipment to identify you are there in a professional capacity
- Park vehicle nearby and never exit the vehicle if anyone or anything appears suspicious

Note: The use of the buddy system as outlined above applies to traffic hazards only and should not be incorporated universally without additional discussion and management approval. For instance, the use of the buddy system as required when conducting emergency response is clearly specified by OSHA §1910.120 in a manner that opposes the previously outlined requirements. In the absence of regulatory direction, PPM will adhere to this definition of the buddy system.

3.2.19 Walking/Working Surfaces

3.2.19.1 Elevated Walking/Working Surfaces

Carbon change-outs, asbestos/lead sampling, and aboveground storage tank inspections and/or maintenance may require work at elevations ≥4 feet. In addition, use of catwalks may exist at heights ≥4 feet. According to §1910.21, a catwalk is considered a runway which is defined as a passageway for persons, elevated above the surrounding floor or ground level, such as a footwalk along shafting or a walkway between buildings. When working on multilevel surfaces, any floor deteriorations or openings must be obstructed to prevent inadvertent falls from an elevated surface. Working at elevated heights can create fall hazards that can result in a fatality or serious physical impairment. Due to these risks, tasks such as these may require additional safety measures such as the use of fall protective equipment (i.e. full-body harness and lanyard). Only personnel who have received additional fall protection training are considered competent for performing these tasks - all other workers are prohibited from working at elevations ≥4 feet without additional training and certification.

Control Measures: Walking/working surfaces located greater than 4 feet (general industry) above ground surface requires fall protection in the form of a guardrail system to protect against inadvertent falls from elevated heights. Use barriers to isolate floor openings to prevent inadvertent trips and/or falls through such openings. Holes and openings must always be covered when not otherwise needed to perform a task. To protect workers from falling objects, runways must include toeboards, screens, guardrail system, debris nets, catch platforms, canopy structures, or barricades. Workers on lower levels must also wear hard hats at all times. Runways should consist of a nonskid surface material or grating, handrail supports for 200 pounds of force, and means of egress that is permanent and stationary (ex. fixed ladders or stairs). Workers should wear laced footwear with rubber soles to give better foot and ankle support and to reduce the likelihood of slips.

3.2.19.2 Uneven Walking/Working Surfaces

Uneven walking and/or working surfaces are not uncommon. Sites with minimal grounds-keeping can disguise potholes, which could result in trips/falls or foot injuries. Dense vegetation can also disguise dips and potholes. Using limbs, branches, or other similar debris to cross over streams creates an unstable ground surface that can become structurally unsafe after repeated use.

Control Measures: When work is to be performed at an inactive facility, bring weed eaters and sprayer to address overgrown vegetation. When grounds keeping is the responsibility of the client, the Project Manager should call in advance and request site maintenance be performed prior to PPM's arrival onsite. Workers should also wear laced, steel-toed boots which gives better ankle support than slip-on safety footwear. When working in highly vegetative areas that must be accessed, workers should use mechanical equipment to clear cut access paths or use other hand tools. Avoid walking over vegetation or other debris that may become unstable after repeated use.

3.2.19.3 Unstable Soils and Cave-Ins

Soil is an extremely heavy material, and may weigh more than 100 pounds per cubic foot. A cubic yard of soil may weigh more than 2,700 pounds. That is nearly one and a half tons, the equivalent weight of a car. Furthermore, wet soil or rocky soil is usually heavier. The human body cannot support such heavy loads without being injured. The primary hazard associated with a trench or excavation is a cave-in. Common excavations consist of an average depth of 10-15 feet, and when soils cave-in on or around a worker, it will generally result in death.

Control Measures: Any trench or excavation ≥4 feet in depth must have the following protective measures implemented:

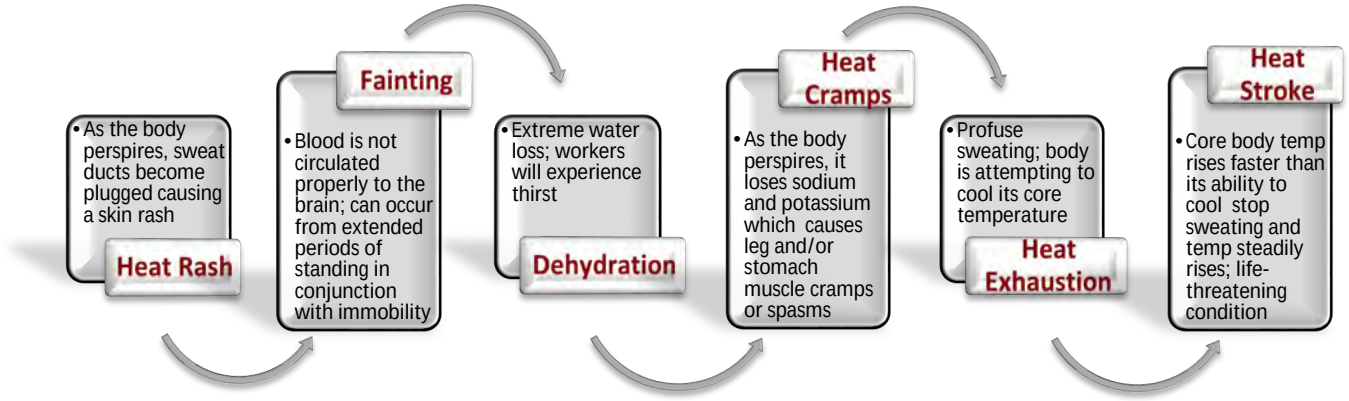
- § Perform visual inspections prior to start of work daily and conduct additional inspections warranted by changes in site conditions.
- § Provide onsite competent person with the knowledge and authority to correct any noted hazards derived from daily visual inspections.
- § Keep all tools, materials, equipment and workers at least 2 feet away from edge of trench/excavation.
- § Ladder or other means of egress in accordance with 29 CFR 1926.651(c)(2) must be provided by the subcontractor and be present onsite at all times – PPM requires a ladder be present onsite under these conditions regardless of whether a worker enters the trench/excavation.
- § When controls are used and workers are required to enter a trench/excavation, ladders must be placed so that workers are not required to travel lateral distances greater than 25 feet.

OSHA requires that any trench/excavation with a depth ≥4 feet use engineering controls to prevent cave-ins. In addition, OSHA also requires that any trench/excavation with a depth ≥20 feet use a qualified engineer to determine the appropriate engineering control. *When PPM does not incorporate these engineering controls, under no circumstances must any individual enter a trench/excavation with a depth of 4 feet or greater. In addition, no equipment requiring an individual to be placed on or inside the equipment during its operation is permitted inside the trenched/excavated area. Soil packing and obtaining samples must be conducted through alternative methods*.

3.2.20 Weather

3.2.20.1 Heat Stress

Heat is a common concern for states in the southern U.S. and the use of personal protective clothing only adds to this stress. Heat stress can occur in as little as 15 minutes. Symptoms are generally progressive but some exceptions do apply. Some symptoms of heat stress may not arise, may go unnoticed or may occur simultaneously depending on the degree of progression and the awareness level of the worker. The following symptoms are associated with heat stress:



Control Measures: Heat stress can occur very rapidly; therefore, workers must be alert to the signs and symptoms and should be additionally aware of sluggishness or behavioral changes in their co-workers. Workers should be acclimated to their environment and breaks should be taken as necessary to replenish fluids and cool down core body temperature. Alternate workers as necessary to keep work going. Remove excess protective clothing and break in a shaded, cool area. Any worker exhibiting symptoms of heat stress will be prohibited from performing additional duties for the remainder of the day.

3.2.20.2 Cold Stress

The degree of coldness depends upon temperature, wind and wetness. When exposed to colder climates, the body loses heat faster than it can be generated. Prolonged exposures can rapidly use up the body's stored energy resulting in frostbite, trench foot, chilblains and hypothermia.

COLD STRESS	DEFINITION	SYMPTOMS OF EXPOSURE
Trench foot	Injury to the feet when immersed in water for prolonged period of time; wet feet lose heat and blood vessels constrict causing cells to die due to lack of oxygen	Reddening of skin, numbness, leg cramps, swelling, tingling pain, blisters or ulcers, bleeding under skin, gangrene (foot turns dark purple, blue or gray)
Chilblain	Exposures to temperature slightly above freezing to 60°F causing damage to capillary blood vessels in skin; damage is permanent and returns with additional exposures	Redness and itching mostly on cheeks, ears, fingers and toes, possible blistering, inflammation, possible ulceration (severe cases)
Frostbite	Injury caused by freezing of the skin (nose, ears, cheeks, chin, fingers or toes); can lead to amputation	Reduced blood flow to hands/feet numbness, tingling or stinging, aching, bluish or pale, waxy skin
Hypothermia	Body is losing heat faster than it can be generated producing an abnormally low body temperature, which impairs the brain and makes a person unable to think clearly or move well; is extremely dangerous because a person may not realize it is happening	Early symptoms - shivering, fatigue, loss of coordination, confusion and disorientation; Late symptoms – no shivering, blue skin, dilated pupils, slowed pulse and breathing and loss of consciousness

Control Measures: Workers should be acclimated to their environment, wear multiple layers of clothing, remove wet or damp clothing promptly and breaks should be taken as necessary to drink warm fluids and warm core body temperature. Alternate workers as necessary to keep work going. Any worker exhibiting symptoms of cold stress will be prohibited from performing additional duties for the remainder of the day.

3.2.20.3 Adverse Weather Conditions

Adverse weather conditions can include heavy rainfall, thunderstorm, lightning, hail, snow, tornado watch/warning, tropical storm or hurricane advisory to name a few. These types of weather conditions interfere with travel and field work. Workers who attempt to drive under these conditions put themselves at risk.

Control Measures: Follow local weather advisories and postpone work as necessary. Weather conditions can change rapidly while onsite. Carry NOAA weather radios when in the field to monitor changes in weather. Be prepared to use stop-work authority as necessary to address changes in weather. Plan your escape route in advance and be prepared to move to higher ground and/or evacuate. Never drive through flooded roads.

3.3 BIOLOGICAL HAZARDS AND CONTROLS

3.3.1 Insects and Mosquitoes

Insects and mosquitoes are prominent in just about any work location. Large ant beds as well as other insect nests such as hornets, wasps, yellow jackets and bees can be found as early as spring. They can reside in trees, high vegetative areas, holes within the ground or within piles of trash and debris.

Mosquitoes can carry infectious diseases such as West Nile virus and Zika virus, which can cause long-term debilitating illnesses, birth defects, or fatality. They are most active at dusk or dawn. Symptoms vary and can appear between 3-14 days after a bite.

- West Nile (mild symptoms): fever, headache, body aches, nausea, vomiting, and swollen lymph glands or skin rash on chest, stomach and back; symptoms may last for several days to a few weeks; occurs in up to 20% of people infected.
- West Nile (severe symptoms): high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis; symptoms may last for several weeks and neurological symptoms may be permanent; occurs in 1 out of 250 people infected.
- Zika: mild fever, skin rashes, muscle and joint pain, and conjunctivitis (pink eye) that usually last between 2-7 days; can cause severe birth defects in offspring of pregnant women.

Control Measures: PPM contracts a professional spraying company to spray for insect nests; however, workers should carry pest-control materials as necessary and keep extra cans of wasp, hornet, bee and ant spray as a secondary precaution. Workers required to carry allergy treatments such as an epinephrine injection (epipen) must keep this nearby at all times, and co-workers must know the location of this treatment should it be needed. To prevent mosquito bites, use insect repellant containing DEET, wear long-sleeved shirts and long pants and remove any standing water from buckets or barrels where mosquitoes can lay their eggs.

3.3.2 Ticks and Spiders

Spiders can be found in highly vegetative areas, in and around remediation systems and in other similar areas. Black widow spiders are commonly found inside well vaults, beneath a system in dark crevices and other similar dark spaces.


Black Widow


Brown Widow


Brown Recluse

Ticks can be encountered in highly vegetative areas with limited grounds keeping. Ticks are external parasites and there are more than 800 different species. Deer ticks carry Lyme disease, but <5% of all tick bites result in Lyme infection. Symptoms of Lyme infection include: flu-like illness with red skin rash that occurs within 3 weeks of bite. Rash should be circular and can increase daily. Symptoms of exposure should be reported immediately to the safety department and medical attention should be sought as necessary.

Control Measures: PPM contracts a professional spraying company to spray for spiders when also spraying for insects. Avoid placing hands and arms in dark spaces that cannot be seen. Use caution when opening well vaults or when working in other dark places. Do post-job body inspection and remove ticks immediately.

3.3.3 Rodents, Reptiles and Roaming Animals

The southeast U.S. is home to various species of venomous snakes. Venomous snakes will likely be found beneath piles of debris, near bodies of water or in high or heavily vegetative areas. They generally have a triangular-shaped head, elliptical pupils, and some have rattlers. A few common species of venomous snakes are identified below.


Southern Copperhead


Water Moccasin


E. Diamondback Rattler


Coral Snake

Facilities located nearby lakes, rivers, bayous, streams or that otherwise have ponds may have alligators present. Alligators will come out of the water and onto land surface to build nests for their eggs or to sunbathe. They are also known to lie beneath the water's surface in wait when they are preparing to attack and they may not be visible to workers.

Highly vegetative areas and areas with trash or debris can be home to rodents such as rats or mice. Remediation systems provide warmth in colder climates and it is not uncommon to find rodents and other animals within or around the unit.

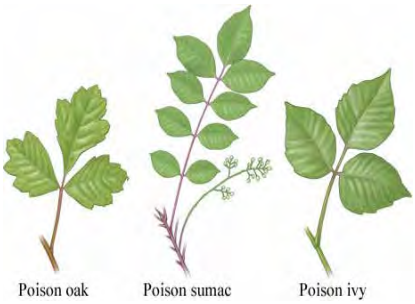
Sites located in populated areas may have wandering animals. Pets may be trained to attack when approached, may have mange (parasitic skin diseases) or may carry other diseases.

Control Measures: When working in or around bodies of water, workers must be aware of any indicators of alligator presence, which require that workers immediately evacuate the area. General awareness and caution must be used when working in highly vegetative areas and workers must never place hands or other parts of body in an area that is not clearly visible. Snake guards/chaps should be worn when working in suspected snake-infested areas. Workers must

avoid wandering animals – they may appear to be a pet; however, they can carry diseases and they may bite or scratch.

3.3.4 Poison Plants

Heavily vegetative areas may have poisonous plants such as poison ivy, oak or sumac, which produce a poisonous sap called urushiol. Typically the first exposure to these plants may not result in any symptoms as this is classified as a "sensitization period". Future exposures to these plants will then produce bumps often mistaken for mosquito bites until they begin to ooze. This is spread by scratching affected areas and touching other unaffected areas.



Control Measures: First line of defense is to be able to identify and avoid these plants. Weed killers should be used to minimize mowing and to eliminate exposure to poison ivy, oak or sumac. It should be noted that poisonous plants still thrive throughout the winter and they are more difficult to locate without their leaves. Workers should wear long-sleeved shirts and long pants tucked into boots when working in highly vegetative areas. Pre-medicated towelettes or lotions form a barrier on the skin and prevent adverse reactions. Rubbing alcohol can remove the oil resin up to 30 minutes after exposure, and antihistamines (non-drowsy) can also be taken post-exposure to minimize the reaction.

3.3.5 Bloodborne Pathogens

Sharps hazards come in various forms and may include hypodermic needles, cutting tools or equipment/machinery with sharp edges like box cutters, scissors, machinery blades, etc. Hypodermic needles are occasionally encountered at some jobsites. Needles may be used for insulin injections or drug use. Other sharps may become contaminated upon contact with infected sources. Life-threatening illnesses such as hepatitis or human immunodeficiency virus [HIV] (also referred to as bloodborne pathogens) may be transmitted via contaminated sharps so workers should be extremely cautious at all field locations. Also, bloodborne pathogens can be transmitted from an infected individual to another when providing first aid. All individuals and sharps must be treated as other potentially infectious materials (OPIM).

Control Measures: Never reach beneath the remediation system or stick hands in areas not clearly visible. Do a visual inspection before reaching for any component or item. Never recap a needle! Remove needles carefully using puncture-resistant gloves. Place them in plastic containers with a closed lid. Duct tape the lid before discarding. Drop off at community drop sites (where available). This type of waste is considered biohazardous waste; however, only healthcare facilities and medical waste industries are regulated. Be aware that the state of Florida requires disposal of this waste at established drop off locations, but all other states in which PPM has an office only recommend using these locations where available. Avoid contact with sharp edges of equipment/machinery, use cutting tools in accordance with manufacturer's guidelines, and always cut away from or perpendicular to the body. Use the concept of universal precautions for infection control. This concept is to treat all human blood and certain human body fluids as if known to be infectious for HIV, hepatitis B, and other bloodborne pathogens.

4.0 EXPOSURE MONITORING

As part of company-related processes, employees will or have the potential to be exposed to various chemical hazards. Chemicals that pose an inhalation hazard may not be considered a threat to worker health until a regulatory limit or more stringent company-imposed action limit is triggered. In addition, some chemicals can become flammable at certain limits. To ensure workers are not working within hazardous or flammable atmospheres, ambient air monitoring will be performed for any work-related process in which chemicals pose an inhalation hazard and have assigned regulatory limits for permissible worker exposures or are otherwise considered a potential fire hazard. Air monitoring will not be required when working with or near materials considered to be non-hazardous in nature or do not otherwise pose an inhalation or fire hazard to workers.

4.1 TERMINOLOGY/DEFINITIONS

In order to determine existing or potential worker overexposures to hazardous or flammable substances, workers must first understand common exposure terminology. Some commonly used exposure terms are defined in the following table:

TERM	DEFINITION
Action Limit	Company-assigned exposure limit assigned to a chemical that is more stringent than the regulatory or recommended exposure limit.
Ceiling Limit	Maximum concentration of a chemical a worker can be exposed to at any point during a work shift. This is an instantaneous reading.
Flammability/Explosive Range	The concentration range (LEL-UEL) of a combustible or flammable material (gas/vapor) that will burn or explode when introduced to an ignition source.
Immediately Dangerous to Life and/or Health (IDLH)	Concentration of a chemical beyond which a worker will be capable of escaping death or permanent injury without help in less than 30 minutes.
Lower Flammability/ Explosive Limit (LFL/LEL)	The lowest concentration of a gas/vapor needed to produce a fire or explosion when exposed to an ignition source.
Permissible Exposure Limit (PEL)/Threshold Limit Value (TLV)	OSHA's regulatory exposure limit is the PEL, whereas the TLV is used to represent other published recommended exposure limits (NIOSH or ACGIH).
Short-Term Exposure Limit (STEL)	Maximum concentration of a chemical a worker can be exposed to without adverse effects over a 15-minute period (unless otherwise noted) not to exceed 4 times per work shift with 1-hr rest intervals between exposures.
Time-Weighted Average (TWA)	Maximum concentration of a chemical a worker can be exposed to without any adverse effect. Based on an 8-hr day/40-hr week.
Upper Flammability/ Explosive Limit (UFL/UEL)	The highest concentration of a gas/vapor needed to produce a fire or explosion when exposed to an ignition source.

4.2 ESTABLISHING EXPOSURE AND FLAMMABILITY LIMITS

4.2.1 Exposure Limits

For any material that has an established regulatory or recommended exposure limit, PPM has established a more conservative action limit. It is the company's intention to take some form of action before a worker is exposed at regulatory or recommended levels. The exception to this concept applies only to contaminants with very low exposure limits and also to the detection capabilities of air monitoring equipment.

Action limits are established on a case-by-case basis and in accordance with general industry practice. When ambient air concentrations trigger action limits, engineering, administrative or work practice controls should be incorporated to eliminate the exposure or reduce worker exposures to an acceptable limit. When this cannot be achieved, workers will be required to upgrade personal protective equipment.

4.2.2 Flammability Limits

PPM has adopted general industry practice by setting its flammability action limits to be 10% of the regulatory limit. Since lower and upper explosive limits are provided as a percentage, PPM has additionally converted the flammability ranges of commonly encountered combustible and flammable materials into parts per million (ppm). Regardless of the volatile monitoring equipment used, workers will be able to determine when a given work environment is or becomes a flammable environment. Workers must also recognize that when working in environments in which chemical concentrations >UEL, as effective control measures are introduced the chemical concentration will again fall back into the flammability range and ignition sources must be eliminated until concentrations once again fall below the material's assigned LEL.

4.3 REGULATORY EXPOSURE LIMITS

Whenever an action, regulatory or recommended exposure limit is triggered, workers must be prepared to immediately report site conditions to management, to develop and implement alternative control measures, to evacuate the site when warranted and/or be prepared to upgrade personal protective equipment (i.e., wear respiratory protection). Workers must be aware that in order to wear respiratory protection, they must first be medically cleared by a physician, be fit-tested to a specific respirator and have received training in accordance with the procedures outlined within the company's Respiratory Protection program. To ascertain eligibility, workers must receive authorization from the safety department prior to using a respirator.

Action, regulatory, and/or recommended exposure limits assigned to routine chemicals commonly encountered by workers are outlined within the following table:

CONSTITUENT	TOXICITY					FIRE
	ACTION	PEL/TLV	STEL	CEILING	IDLH	LEL-UEL
Activated carbon	--	--	--	--	--	--
Alconox®[nuisance dust]	5	5	--	--	--	--
Aldrin[pesticide]	0.25	0.25	--	--	25	--
Aluminum[metal]	5	5	--	--	--	--
Aluminum oxide[nuisance dust]	5	5	--	--	--	--
Ammonia[base]	50	50	35†	--	300	15,000-28,000
Arsenic[metal]	0.01	0.01	--	--	5	--
Analytix AN-754GH	--	--	--	--	--	--
Asbestos	0.1	0.1	1	--	--	--
Barium[metal]	0.5	0.5	--	--	--	--
Benzene	1	1	5	--	500	1,200-7,800
n-Butane	400	800	--	--	--	1,600-8,400
Cadmium[metal]	0.005	0.005	--	--	9	--
Calcium hydroxide[base]	5	5	--	--	--	--
Carbon dioxide[dry ice]	2,500	5,000†	30,000	--	40,000	--

CONSTITUENT	TOXICITY					FIRE
	ACTION	PEL/TLV	STEL	CEILING	IDLH	LEL-UEL
Carbon tetrachloride	2	2†	--	25	200	--
Chloroform	2	2†	2 [60-min]	50	500	--
Chromium[metal]	0.5	0.5	--	--	250	--
Coal tar pitch volatiles[PAH]	0.2	0.2	--	--	80	--
Copper[metal]	1	1	--	--	100	--
DDT[pesticide]	1	1	--	--	500	--
Dieldrin[pesticide]	0.25	0.25	--	--	50	--
Diesel	100[skin]	100[skin]	--	--	--	600-7,500
Dust [Total]	15	15	--	--	--	--
Dust [Respirable]	5	5	--	--	--	--
Dust [Portland Cement]	50	50	--	--	--	--
Endrin[pesticide]	0.1	0.1	--	--	2	--
Ethylbenzene	100	100†	125†	--	800	800-6,700
Gasoline	100	300†	500†	--	--	1,400-7,600
Heptachlor[pesticide]	0.5	0.5	--	--	35	--
Hexane	50	50†	--	--	1,100	1,100-7,500
Hydrochloric acid[HCl]	--	--	--	5	50	--
Hydrogen peroxide[30-50%]	1	1	--	--	75	--
Hydrogen Sulfide[H_2S]	1	1	--	10	100	4,000-44,000
Iron[metal]	--	--	--	--	--	--
Isobutylene	--	--	--	--	--	1,800-9,600
Isopropyl alcohol	200	400†	500†	--	2,000	2,000-12,700
Kerosene	50	100	--	--	--	700-5,000
Klozur[sodium persulfate]	5	5	--	--	--	--
Lead[metal]	0.05	0.05	--	--	100	--
Lindane[pesticide]	0.5	0.5	--	--	50	--
Liquinox®	--	--	--	--	--	--
Lubricating oils[motor oil]	--	--	--	--	--	--
Magnesium[metal]	--	--	--	--	--	--
Mercury[metal/vapor]	0.1[skin]	0.1†[skin]	--	0.1†[skin]	10[skin]	--
Methane	--	--	--	--	--	5,000-15,000
Methylene chloride	25	25	125	--	2,300	13,000-23,000
MTBE	50	50	--	--	--	1,000-8,000
Muriatic acid[HCl]	--	--	--	5	50	--
Naphthalene[PAH]	10	10†	15†	--	250	900-5,900
Nitric acid	2	2†	4†	--	25	--
NXT[Klozur – sodium persulfate]	5	5	--	--	--	--
Oil[crude]	0.2[mg/m³]	0.2[mg/m³]	--	--	--	1,000-8,000
ORC®/ORC Advanced®	5	5	--	--	--	--
Ozone	0.05	0.1†	0.3†	0.1	5	--
PCB	0.5[skin]	0.5[skin]	--	--	5	--
Perchloroethylene[PERC]	25	25†	--	150[cap]	150	--
Phosphoric acid[H_3PO_4]	1	1†	3†	--	1,000	--
Potassium hydroxide[base]	2	2†	--	2	--	--
Propane	500	1,000	--	--	2,100	2,100-9,500
RegenOx A or B™	--	--	--	--	--	--
Selenium[metal]	0.2	0.2	--	--	1	--
Silver[metal]	0.01	0.01	--	--	10	--

CONSTITUENT	TOXICITY					FIRE
	ACTION	PEL/TLV	STEL	CEILING	IDLH	LEL-UEL
Sodium carbonate[base]	--	--	--	--	--	--
Sodium hydroxide[base]	2	2	--	2†	10	--
Sulfuric acid[H_2SO_4]	1	1	15†	--	15	--
Tetrachloroethylene[PERC]	25	25†	100	150[cap]	150	--
Toluene	100	100†	150†	300	500	1,100-7,100
Trichloroethylene	50	50†	200†	200	1,000	8,000-10,500*
Vinyl chloride	1	1	--	5[15-min]	--	3,600-33,000
Xylene	100	100†	150†	--	900	1,100-7,000
Zinc[metal]	--	--	--	--	--	--

NOTES:
† - More protective OSHA PELs vacated by the 11th Circuit Court of Appeals in July 1992; however, OSHA can enforce under the General Duty Clause. PPM will adhere to these exposure limits to ensure worker health and wellbeing is maintained.
Diesel, dusts, heavy metals, bases/alkalis, Trap & Treat BOS-200, and PCBs are all measured as mg/m^3 – not ppm!
Asbestos is measured as number of fibers per unit air (f/cc); Portland cement is measured as million parts per cubic feet (mppcf).
Action limit and PEL are time-weighted averages over 8-hour work period. STEL is TWA over 4 15-min periods, with the exception of asbestos, which has a 30-minute excursion limit. Others are instantaneous readings.
PAHs - coal tar pitch volatile components of TPH-D include anthracene, benzo(a)pyrene, chrysene, phenanthrene and pyrene, all of which have the same permissible exposure and IDLH limits; therefore, all components lumped into one group. The only other regulated component of PAH is naphthalene which is a component of crude or refined oil and is listed separately from other PAHs.
Only the regulated pesticide components of EPA SWA-846 Methods 8080/8081 are included above.
Perchloroethylene (PCE) has a ceiling limit of 200 ppm for 5 minutes within any 3-hr period not to exceed 300 ppm but this has been capped at 150 ppm to match IDLH concentrations for this material. Trichloroethylene's flammability range is effective ≥77ºF.

Any constituent not otherwise specified above that is anticipated as part of company-related processes in which workers have the potential to be exposed must be immediately reported to the safety department and will require a site-specific HASP. This HASP will be generated and issued by the safety department and requires a 1-week advanced notice.

4.4 MONITORING EQUIPMENT AND CALIBRATION

Because PPM works with a variety of chemicals, not all constituents can be detected with one universal monitoring device. Some monitoring equipment can provide instantaneous readings, while others require laboratory analysis (wet method analysis). In addition, each monitoring device has its advantages and disadvantages. Some commonly used monitoring devices used by PPM include the following:

- **Organic vapor analyzers (OVA)**. This monitoring device is used to detect volatile and semi-volatile substances. Some OVAs used by the company include MiniRAE 2000 PGM 7600, GasTech®, RKI Eagle® photoionization detector (PID), and Micro FID® flame ionization detector (FID). The advantage of this monitoring device is that it is a direct-read instrument and provides instantaneous readings. Some disadvantages of this equipment are that it generally does not provide readings less than 1 ppm, it does not give percent LEL or provide oxygen content. OVAs generally detect a group of chemicals and do not indicate which compound is being detected.

- **Ozone meters**. This monitoring device is used to detect ozone gas and is also a direct-read instrument. The ozone meter used by some offices within the company is the EcoSensor Ozone Sensor A-21ZX. It is chemical-specific but has some interference from other oxidizing gases.

§ **PortaSens II gas detector**. The monitoring device is a portable, direct-read gas leak detector that has the ability to measure a variety of different gases by simply inserting a gas-specific sensor. This instrument is lightweight and can measure gases such as acetylene, ammonia, carbon monoxide, fluorine, formaldehyde, hydrogen, hydrogen chloride, hydrogen cyanide, hydrogen peroxide, hydrogen sulfide, oxygen, ozone, phosgene, and sulfur dioxide. For a composite list of gases, refer to the manufacturer's website.

§ **Portable air monitoring pumps**. These monitoring devices are used to assess continuous personnel and background exposures and are commonly used for sampling heavy metals, asbestos, silica or nuisance/respirable dusts. A common portable air monitoring pump used by the company is the SKC AirChek52®. Pumps are set to a specific flow rate of air (can be low volume or high volume) and contaminants are captured using a filter, which is later sent for laboratory analysis. Some advantages of this monitoring equipment are that these pumps are small, light-weight and portable. Some disadvantages of this monitoring equipment are that they do not provide instantaneous readings; exposures are unknown until laboratory results are received.

§ **Personal monitoring badges**. These monitoring devices are used to assess continuous personnel exposures. They are light-weight, easy to use and can target specific constituents as opposed to a group of compounds. Badges must be sent to lab for analysis so they do not provide instantaneous readings. In addition, other constituents with similar chemical make-up can cause interference giving inaccurate exposures so samplers must be able to identify potential cross-interference prior to sampling.

§ **Colorimetric indicator tubes**. These monitoring devices are used to assess continuous personnel exposures. Passive diffusion tubes are used when determining longer term exposures and workers need only break off the tip of the tube to initiate sampling. Pumps can also be used to draw in air and generally give a short-term exposure assessment during the period of time the air is extracted. Tubes are contaminant-specific and change color when in contact with the constituent giving an instantaneous reading.

Colorimetric tubes have a $^{+/-}$25% degree of error and chemicals with similar make-up can cause interference giving inaccurate exposures so samplers must be able to identify potential cross-interference prior to sampling.

To ensure it is in good working order, air monitoring equipment must be calibrated in accordance with manufacturer recommendations for each monitoring device. Workers must be aware that each office utilizes different monitoring equipment; therefore, readings from instruments calibrated with methane may not be the same as readings from instruments calibrated with hexane. Be sure to use the instrument's conversion tables as provided by the manufacturer when warranted. In addition, some metals can produce toxic gases when burned or exposed to open flames; therefore, the safety data sheet should be referenced when working with metal-contaminated soils.

4.5 SAMPLE COLLECTION

To appropriately determine exposures, samples must be collected within the breathing zone (shoulder level) of the worker, subcontractor or other affected pedestrian when relevant to site concentrations and location of these concentrations in relation to the general public. It should be noted that there may be times in which samples must be collected at the source (i.e., inside manhole) for technical purposes. These concentrations must be identified and reported as separate readings not indicative of worker exposures. Additional precautions must be taken to prevent impact to worker breathing zone during the sample collection when at or near the contaminant source. Depending on the concentrations in this given area or when impact to worker breathing zone cannot otherwise be avoided, respiratory protection may be required.

4.6 MONITORING FREQUENCY AND DOCUMENTATION

Ambient air monitoring is required prior to field work to establish a baseline and intermittently throughout the course of a project to compensate for changes in site conditions. Samples must be collected every two hours so long as concentrations are well below established action limits. Areas selected for monitoring must compensate for worker/subcontractor exposures, general public exposures, residential areas, potential nearby business exposures, etc. and may warrant numerous collection locations.

When there is a noted increase in ambient site concentrations, the sampling frequency must be increased to every 30 minutes until site conditions indicate a decreasing trend. If site concentrations are elevating at a rapid pace, continuous air monitoring must be conducted to ensure no threshold limits are triggered. This may require temporary postponement of site activities until concentrations can be reduced to an acceptable limit. Whenever any threshold limit is triggered, site activities must be halted and the safety department notified.

All monitoring areas, concentrations, sample collection times and/or notations (i.e., change in site conditions, contaminant source readings, etc.) must be documented using the company's Ambient Air Monitoring Report form. Forms must be completed fully and returned to the safety department for review upon completion of the project.

5.0 PERSONAL PROTECTIVE EQUIPMENT

While the use of protective clothing/equipment provides protection against chemical and physical hazards, there are additional disadvantages associated with its usage. Personal protective equipment can be heavy, bulky and uncomfortable, slow down the work process and/or increase the degree of heat stress put on a worker. Therefore, the use of personal protective equipment is always a last resort. Only when other alternatives such as engineering, administrative or work practice controls fail to eliminate or reduce a hazard to an acceptable level will the use of protective clothing and/or equipment become a consideration.

5.1 PROTECTIVE CLOTHING AND EQUIPMENT

5.1.1 Head Protection

In accordance with 29 CFR 1910.135, the company provides head protection from impact and penetration hazards posed by falling objects, projectiles, and shock/burn hazards posed by contact with electricity. While OSHA requires that head protection be provided, it is the American National Standards Institute (ANSI) that sets criteria for head protection. ANSI Z89.1-2014 separates protective helmets into different types and categories as follows:

HARD HAT TYPES	
Type I – hard hat that provides protection from impact to the top of the head only	Type II – hard hat that provides protection from impact to the top and sides of the head

CLASSIFICATION	PROTECTION PROVIDED	
Class G [Formerly Class A]	G – General; intended to reduce the force of impact of falling objects and reduce the danger of contact with exposed low-voltage electrical conductors; proof-tested at 2,200 volts of electrical charge	
Class E [Formerly Class B]	E – Electrical; intended to reduce the force of impact of falling objects and reduce the danger of contact with exposed high-voltage electrical conductors; proof-tested at 20,000 volts	
Class C [Formerly Class C]	C – Conductive; intended to reduce the force of impact of falling objects, but offer no electrical protection	

PPM's preference for hard hat selection is ANSI Z89.1-2014 approved Type II, Class E hard hat with ratchet suspension; however, Type I and Class G hard hats are permitted for use. PPM prohibits the use of Class C hard hats because they provide no protection against electrical hazards.

5.1.2 Eye and Face Protection

In accordance with 29 CFR 1910.133, the company requires each affected employee to use appropriate eye and/or face protection when exposed to hazards from particulates, flying particles (projectiles), molten metal, liquid chemicals, chemical gases, vapors, or fumes, metal shavings, and/or potentially injurious light radiation. PPM requires the use of safety glasses with side-shield protection for all outdoors field activities. Workers are permitted to use prescriptive lenses so long as side-shield protectors are used. Safety glasses may be upgraded to goggles or face shields when mixing chemicals, when dealing with chemical splash hazards, or when working in extremely dusty environments that cannot otherwise be addressed through the use of controls. Face shields may also be required when working with projectiles. Eye and face protection must be ANSI Z87.1-2010 approved.

5.1.3 Hand Protection

In accordance with 29 CFR 1910.138, the company requires workers to use appropriate hand protection when their hands are exposed to hazards such as those from skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes. PPM bases this selection on an evaluation of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, and the hazards/potential hazards identified. The following gloves are recommended for typical company tasks:

- Nitrile gloves – good for working with oil and grease and can also protect against some dry chemicals; they are disposable and easy to use; this is the most commonly used glove provided by the company

- Neoprene, vinyl [PVC] and rubber gloves – also good for working with chemicals such as janitorial or cleaning products, fuels, oils and grease; can be purchased as disposable or reusable; neoprene is preferred when working with acids or bases

- Butyl or laminate gloves – good for working with ketones
- Latex gloves – good for working with bloodborne pathogens such as viral and bacterial agents; nitrile gloves will work as well so latex is not commonly provided by the company

- Cotton or leather gloves – good for material handling of heavy and abrasive objects; leather is sturdy and can resist splinters from wood products and provides some protection against heat
- Cut-resistant gloves – good when working with sharp or cutting objects; there are various brands of cut-resistant gloves including Kevlar®, Magid® and Ansell®

Hand protection must be ANSI/ISEA 105-2011 approved. *Note: ISEA is the International Safety Equipment Association*.

5.1.4 Foot Protection

In accordance with 29 CFR 1910.136, the company requires workers to use protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, sharp edges, slippery surfaces, and unlevel walking/working surfaces. PPM requires ASTM F2412/F2413-approved steel-toed footwear for all field sites. *Exception: Rubber boots or other footwear may be used when workers collect samples within body of water or when workers are required to enter a boat*. Composite-toed shoes are permitted when they meet the ASTM testing requirements for compressive strength.

5.1.5 Skin Protection and Visibility

Typical PPM jobsites warrant level D protective clothing, which consists of long pants and short or long-sleeved shirt. Other clothing may be required based on the hazard exposure and is outlined below:

- Fire-retardant clothing – required by clients within the oil and gas industry to access their facility
- High visibility clothing – reflective, high visibility company-provided t-shirts or DOT Class II/III reflective high visibility safety vests are required when working in/nearby active traffic and when working on/nearby roadway right-of-way

Special considerations may require that full-body protective suits such as Tyvek®, Saranex™, or Tychem® be worn. The need for this type of equipment requires pre-planning by the safety department and management and must be discussed during the proposal phase of a project. Skin protection must be ANSI 103-2010 approved.

5.1.6 Hearing Protection

Preservation of hearing is of utmost importance. Most of the hearing lost cannot ever be recovered. Through the aging process, workers will be prone to natural hearing loss. Therefore, it is the company's responsibility to distinguish between natural and work-related hearing loss and to ensure that workers exposed to noise levels ≥85 dB are provided with hearing protection. The most common form of hearing protection provided to workers is the earplug. Earplugs come in various shapes and sizes and are relatively inexpensive so they can be tailored to the comfort

preferences of the individual. Workers who do not respond well to the use of earplugs will be provided canal caps or ear muffs upon verbal request to the safety department. Hearing protection must be ANSI S12.68-2007 approved.

5.1.7 Respiratory Protection

In accordance with 29 CFR 1910.134, the company provides respiratory protection when workers are exposed to hazardous materials at triggered regulatory threshold limits. Only those workers who have been medically cleared by a physician are permitted to wear respiratory equipment. Workers that have been medically cleared must also be fit-tested prior to respirator use. Documentation must be received by the safety department before a worker is approved for respiratory use.

Because workers are not required to work with extremely hazardous materials, with unknowns or within oxygen-deficient environments, supplied-air respiratory equipment is not applicable to current company processes. PPM purchases a variety of National Institute for Occupational Safety and Health (NIOSH)-approved air-purifying half-mask and full-face respirators to be worn when ambient chemical concentrations trigger company-assigned action limits. It should be noted that because most field work is conducted in outdoor, open environments, respiratory protection is generally not required.

5.1.8 Electrical Protective Equipment

Insulating equipment such as rubber insulating blankets, rubber insulating matting, rubber insulating covers, rubber insulating line hose, rubber insulating gloves, and rubber insulating sleeves is required when working on or near energized equipment and/or devices. Insulating equipment must be capable of withstanding, without failure, the voltages that may be imposed upon it. Insulating equipment must be proof-tested and inspected in accordance with the provisions outlined within 29 CFR 1910.137. Use of damage or defective insulating equipment is strictly prohibited!

5.1.9 Life Saving Equipment

In accordance with 29 CFR 1926.106, employees working over or near water, where the danger of drowning exists, must be provided a U.S. Coast-Guard-approved life jacket or buoyant work vest. Where applicable, ring buoys with at least 90 feet of line must be provided and readily available for emergency rescue operations. The distance between ring buoys cannot exceed 200 feet. In addition, at least one life-saving skiff must be immediately available at locations where employees are working over or adjacent to water.

5.2 OTHER PROTECTIVE AIDS

Protective equipment can be used in a number of ways to draw attention to the worker or work area, to isolate the work area from unauthorized persons and/or traffic, or to identify the hazard(s) posed by the activity. Common examples of protective equipment used by PPM include, but are not limited to the following:

- Signs, posters, labels
- Cones, barricades, caution tape
- Heavy equipment/machinery or company vehicles
- Steel plate covers or wood for monitoring wells and/or holes
- First aid kit
- Flashing lights
- Flag extensions on cones for greater visibility
- Portable 10 or 20-lb ABC fire extinguishers

- § Lockout/tagout devices
- § Handheld eyewash bottles

5.3 PROJECT-SPECIFIC PPE REQUIREMENTS

Depending on the degree of the hazard(s) posed by field tasks, various levels of protective clothing and equipment may be required. Protective clothing and/or equipment required by routine tasks covered by this HASP are outlined further in the table below. Protective clothing and/or equipment not otherwise covered by this plan will require a site-specific HASP. Contact the HSD for further instructions.

FIELD TASK	PROTECTIVE CLOTHING/EQUIPMENT										
	STEEL-TOED SHOES[1]	SAFETY GLASSES[2]	HIGH VISIBILITY SHIRT/VEST[3]	GLOVES[4]	HEARING PROTECTOR[5]	HARD HAT (CLASS E)[6]	GOGGLES/FACE SHIELD[7]	RESPIRATOR (APR)[8]	HARNESS/LANYARD	FLOTATION DEVICES/BUOYS	FIRE RETARDANT CLOTHING[9]
Asbestos inspections or sampling	X	X	X	X				X			
Carbon change-out	X		X	X	X	X	X	X	X		
Chemical injection	X	X	X	X	X	X					
§ Working with dry powder	X		X	X	X	X	X	X			
§ Working with liquid/mixing w/H_20	X		X	X	X	X	X				
Compliance audits/visual inspections[Phase 1]	X	X	X								
DPT - drilling, geoprobing[Hand Auger]	X	X	X	X							
DPT - drilling, geoprobing[Heavy Equipment]	X	X	X	X	X	X					
Groundwater sampling	X	X	X	X							
Mobile vacuum event	X	X	X	X	X						
Mobile ozone	X	X	X	X	X						
Monitoring well plugging and abandonment	X	X	X	X	X	X					
Operation and maintenance of system	X	X	X	X	X						
Remediation system install/demobilization	X	X	X	X	X	X					
Spill bucket replacement/closure	X	X	X	X	X	X					
Trenching and excavating	X	X	X	X	X	X					
UST pull/closure	X	X	X	X	X	X					
Any work over or near water body		X		X			X			X	
Any work performed at oil and gas facility, terminals, or other similar property	X	X		X	X	X					X

1 – Steel-toed boots/shoes or equivalent ANSI-approved composite-toe footwear
2 – Safety glasses must be equipped with side-shield protection; prescription lenses are permitted if equipped with side-shield protection
3 – DOT Class II or III high visibility clothing or safety vests with exposure to traffic and/or mobile equipment
4 – Nitrile gloves for petroleum contamination; Kevlar®/leather gloves for cutting hazards; other chemical-resistant gloves needed for more stringent chemical hazards
5 – Ear plugs, canal caps or ear muffs when noise levels ≥85 dB
6 – Class E hard hats required for protection against electrical hazards
7 – Safety glasses must be upgraded to goggles or face shield when working with/mixing powders or when working with liquids that present splash hazard
8 – Air-purifying respirator (half-mask or full-face) required for all asbestos sample collections and when chemical threshold limits are triggered and control measures are ineffective
9 – Fire-retardant clothing is a client-specific requirement; clients within the oil/gas industry generally require fire-retardant clothing

5.4 REDUCTION OF PROTECTIVE CLOTHING AND EQUIPMENT

The use of protective clothing and equipment is mandatory at all times during the course of a project except when inside a designated break area. A break area will be assigned by the Site Safety Officer during the pre-entry safety briefing. The break area must be:

- Located a minimum of 50 feet away from the work zone
- Located where ambient concentrations are not > chemical detection limit
- Located out of the way of vehicular traffic and must not hinder any functions of other businesses

The break area must be clearly designated by posting cones, barricades, or caution tape. Affected personnel and subcontractors must be informed of the break area during the pre-work safety briefing. Only when inside the break area may protective clothing and/or equipment be removed. If the conditions noted above cannot be met, the safety department must be contacted. Variances may be granted based on certain site conditions.

6.0 SITE ACCESS, CONTROL, AND DECONTAMINATION

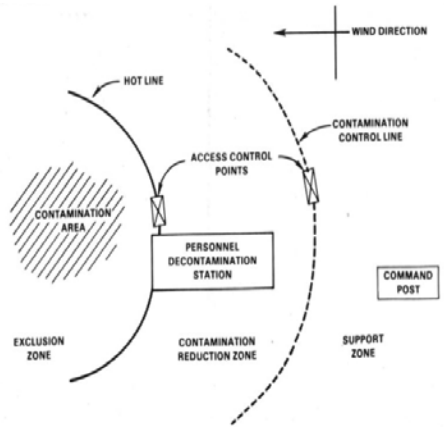
6.1 SITE ACCESS

Typical PPM jobsites occur in areas open and accessible to the general public. However, when working at unguarded gated facilities, workers must secure appropriate means of site access from the client. This can include a coordinated effort to meet the client at a designated date and time, or acquiring keys to the facility from the client. *Note: Personnel and/or subcontractors are prohibited from climbing over or crawling beneath site fencing to secure site access.*

6.2 DESIGNATED WORK ZONES

Each jobsite must be assigned designated work areas to isolate hazardous work areas from unprotected persons, to prevent the migration of contamination, and to prevent the transfer of contamination through impacted protective clothing as well as monitoring and sampling equipment. Designated work areas include the following:

- Exclusion zone – the area denoting site contamination where heavy equipment operation and sample collection is likely to occur
- Contamination reduction zone – the area surrounding the exclusion zone where clothing and equipment is decontaminated to prevent the transfer of contaminants
- Support zone – any area not otherwise considered the exclusion or contamination reduction zone



6.3 AUTHORIZED PERSONNEL

Only authorized personnel are permitted within the exclusion zone. An authorized person is considered to be any individual who has a relevant role or function in relation to the project, participates in onsite safety briefings, and signs the HASP acknowledgement form. Facility managers, client, agency representatives, and law enforcement or regulatory officials may refuse to participate in planned safety meetings or HASP review. As this situation arises, all equipment and job tasks should be temporarily halted to allow for onsite inspection and monitoring by these individuals. When unauthorized persons exit the exclusion zone, all site activities may resume.

6.4 STOP-WORK AUTHORITY

The SSO has full stop-work authority and should use this authority under the following conditions:

- When a hazardous condition, unsafe behavior or other safety concern is noted
- When a near-miss or incident is reported
- When an unauthorized individual enters the designated work zone
- When lightning or other signs of inclement weather is noted within the area
- When a contaminant action limit is triggered
- When unexpected conditions arise that could warrant changes to safety procedures and/or scope of work

6.5 GENERAL SITE CONTROL AND SAFETY PRECAUTIONS

The following denotes simple procedures for maintaining site control and worker safety:

- Designated parking and pedestrian walkways in areas a reasonable distance away from active investigation
- Use buddy system whenever feasible
- Perform pre-job inspection to establish appropriate baselines and to visually inspect for obstacles, clearances, etc.
- Avoid smoking on the jobsite unless within authorized areas (i.e., break areas when deemed appropriate by the SSO for smoking)
- Use appropriate safety devices (i.e., cones, barricades, etc.) to clearly identify work zones and break areas
- Prevent unauthorized entry and use stop-work authority as necessary
- Perform post-job inspection to ensure all materials have been removed from the site; pay close attention to the vehicles to ensure animals or person(s) are not located beneath the vehicle and that all cab and toolbox doors have been secured

6.6 DECONTAMINATION PROCEDURES

In order to prevent the spread of contamination from impacted work zones, monitoring equipment, sampling equipment, and/or workers, decontamination must take place. Decontamination is defined as the removal or reduction of contaminants. Decontamination procedures vary based on the degree of site contamination as well as the contaminant(s) involved, and this process must take place within the contamination reduction zone. As impacted workers and equipment exit the exclusion zone, they must be decontaminated using appropriate detergent solutions. Disposal protective clothing must be discarded in garbage bags or lined containers for proper disposal.

Typical company functions require a low level of decontamination which involves the cleaning of bailers, purge materials and/or other similar equipment as samples are collected in various areas of a jobsite. Most chemicals in which workers are exposed are classified as skin and eye irritants; therefore, it is important for workers to remove contaminated clothing as soon as possible, flush eyes for a minimum of 20 minutes and use alconox®/liquinox® solution to wash impacted skin.

7.0 EMERGENCY RESPONSE

7.1 ALARMS AND ONSITE NOTIFICATIONS

To compensate for unexpected conditions and/or changes in existing site conditions, each jobsite must have an effective communication system in place. Workers are notified of emergencies through various forms of effective communication consisting of the following:

- Verbal communication – is generally the most effective form of communication for the majority of all job-related tasks associated with a project
- Hand communication – hand signals are used in place of verbal communication under the following conditions:
  - When noise levels become elevated due to heavy equipment operation or other similar measures that prevent workers from hearing verbal communications
  - When equipment operator's line of vision is obstructed
  - Under any situation deemed necessary by the SSO
- Continuous horn blast of vehicle or air horn – used in lieu of verbal and hand communications due to:
  - Large, dispersed work zones or multiple work areas that prevent overall effectiveness of other forms of communication
  - Multiple site distractions that inhibit immediate worker attention
  - Elevated noise levels that inhibit immediate worker attention

  One continuous blast is to be used so as not to confuse workers with other equipment sounds.

7.2 PERSONNEL ASSESSMENT AND EVACUATION

Once an alarm has been triggered, workers must be evacuate the work zone and meet in the designated area assigned during the pre-entry safety briefing. This location is determined by the SSO based on distance from existing hazards and verification that it is upwind of any chemical hazard source. Site evacuation is warranted under the following conditions:

- When ambient air concentrations meet or exceed an established action limit assigned for a constituent
- When new hazards not otherwise addressed within this safety plan are encountered
- When subcontractor, field personnel, clients, or regulatory officials violate the safety provisions outlined within this plan
- Upon client or regulatory agency request
- Under any condition the SSO deems unsafe

When evacuation is warranted, all field personnel and subcontractors will meet at the designated area for a preliminary head count, which is conducted by the SSO. Further provisions will be discussed at that time.

7.3 INCIDENT, NEAR-MISS, AND HAZARD RECOGNITION REPORTING

Incidents, near-misses or other noted hazards must be reported promptly to the safety department so that each case can be further investigated to determine the root-cause of the event in order to prevent future recurrences. An incident is defined as an occurrence that results in worker injury or property damage. Examples of an incident include but are not limited to the following:

- § Underground storage tank (UST) puncture
- § Auto-related accident regardless of fault
- § Contact with overhead or subsurface utilities (i.e., water, sewer, telephone, fiber optic, power, transfer product lines, etc.)
- § Chemical spill or release
- § Slips, trips, or falls

A near miss is defined as an unplanned event that did not result in injury, illness or damage but had the potential to do so. Unexpected hazards may arise from unsafe acts or conditions or changes in site conditions. Incidents, near-misses and hazards must be reported to the safety department immediately once the site has been secured. The site is considered secured once all leaks have been properly contained, and the area has been evacuated and further isolated to prevent unauthorized entry. All reports must be made to the District Manager or can be made to the safety department directly. In addition, all reports must be documented using the Incident, Near-Miss and Hazard Recognition Report.

7.4 INJURY REPORTING AND CASE MANAGEMENT

Any incident that results in injury must be reported immediately to the HSD. Reported injuries or illnesses that warrant medical care must be managed by the safety department. In order to achieve this, all cases are evaluated for medical necessity. Whenever possible, workers are sent to the company's pre-established occupational medicine clinics that specialize in work-related injury care. Workers are permitted to seek medical attention (911) without prior company consent only when the injury appears to be life-threatening or when the injury requires immediate medical attention and contact with designated company officials cannot be achieved.

Workers who seek medical attention without company consent will be required to pay for their own medical care out-of-pocket. This provision also applies to follow up care when an injury/illness does not get better. Workers must additionally report changes in medical condition to the HSD, and additional medical evaluations must be coordinated by the company.

7.5 GENERAL MEDICAL CARE AND FIRST AID

It is company policy that all field workers be trained in adult CPR and first aid. Workers who have received this level of training should be prepared to administer care for minor injuries. Certified workers may additionally be called upon to provide care to more seriously injured persons while waiting for additional medical attention. If the victim is conscious, workers must indicate that they are certified and they must additionally obtain consent prior to administering care. Consent is implied when the victim is unconscious.

Some general emergency care provisions are outlined below (not all-inclusive):

HAZARD CATEGORY	HAZARD	RESPONSE
Chemical	Inhalation	Move worker to fresh air. If vomiting, dizzy or groggy, seek medical attention immediately. Administer CPR if certified.
	Dermal/Contact	Remove contaminated clothing and flush affected area with soap/water for ~20 minutes. Seek medical care if pain persists.
	Ingestion	Seek immediate medical attention. Do not give fluids to an unconscious person. Do not induce vomiting.
	Eye	Flush with copious amounts of water for ~20 minutes. Seek medical attention if pain persists.

HAZARD CATEGORY	HAZARD	RESPONSE
Physical	Heat stress	Apply warm, moist heat and pressure to reduce pain in legs/ abdomen. Give electrolyte drinks by mouth, if conscious. Remove excess clothing and attempt to cool core body temperature promptly using cold water. Medical attention is warranted for extreme heat stress.
	Cold stress	Remove any wet clothing immediately and bundle in extra clothing and/or blankets. Drink warm fluids, if conscious. Attempt to warm core body temperature using heater or other methods. Medical attention is warranted for extreme cold stress.
	Sprain/strain	Use combination heat/cold therapies to reduce swelling and apply pain relief. Take an over-the-counter naproxen sodium (Aleve) or ibuprofen (Advil) for pain and inflammation. Seek medical attention if pain persists for more than a few days.
	Tingling/ numbness	Generally an indication of swelling but can lead to permanent nerve damage. Take an over-the-counter naproxen sodium (Aleve) or ibuprofen (Advil) for pain and inflammation. Seek medical attention if symptoms persist.
	Cuts/lacerations	Apply pressure to wound for blood to clot and use bandages to cover wound. Antibiotic creams can prevent infection. Seek medical attention for deep cuts that require stitches.
	Ringing in ears	Symptom of hearing loss, which will require medical testing to determine if this is a temporary or permanent hearing loss.
Biological	Needle stick	Immediately remove needle. Squeeze the area to extract blood from the wound. Seek immediate medical care and carry the needle with you to the medical clinic.
	Insect/spider/ tick/animal bite	Immediately remove insect or tick and pay close attention over the next few days for symptoms of delayed illness. Seek medical attention if noted. Seek medical attention for black/brown widow and brown recluse spider bites as well as animal bites.
	Poison plants	Pay attention for evidence of allergic reaction (itching, redness and irritation) and seek medical attention if over-the-counter remedies prove ineffective or if affected area spreads.

***Caution:** Individuals with heart problems, on a "low sodium" diet, or who otherwise have blood pressure issues and work in hot environments should consult a physician for proper alternative care when working under these conditions.*

7.6 HAZARDOUS SUBSTANCE RELEASE

In the event that hazardous substances migrate from the work zone and potentially endanger unprotected personnel or the community, the area will be isolated and the spill contained and cleaned by authorized personnel. On-site activities will cease until the release is brought under control and the site is returned to its previous condition or otherwise poses no additional harm to site personnel. All hazardous materials must be containerized and labeled until it can be profiled and disposed in accordance with regulatory requirements at an approved landfill. Workers should reference the SDS for additional information.

7.7 REGULATORY, CLIENT, OR OTHER AGENCY NOTIFICATIONS

In the event of an emergency, all reporting must be made to your direct project or office manager and/or safety department. Other required client, regulatory or other agency notifications will be made by management within appropriate reporting deadlines.

8.0 WASTE MANAGEMENT

Under normal conditions associated with the remediation process, groundwater monitoring wells are purged of impacted groundwater and as part of the investigation process, impacted soils are stored within containers until these wastes can be profiled and disposed at an approved landfill. Other chemicals may be ordered for maintenance or to otherwise facilitate the remediation process. It is the company's objective to ensure all containers are in good condition and labeled appropriately so as to prevent any release of contaminated materials from these containers until it can be appropriately disposed.

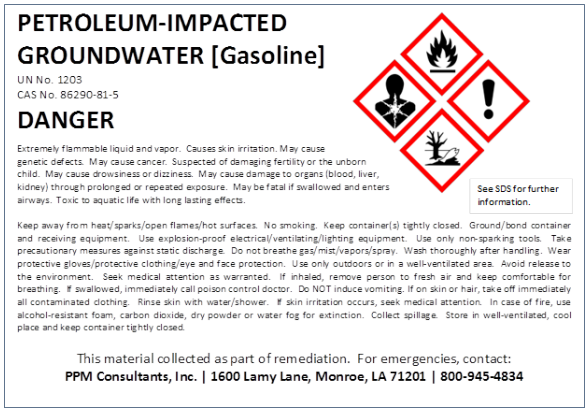
8.1 CONTAINER LABELING

All containers used by the company must be appropriately labeled – even when a waste is in accumulation or a material is still in use. Containers are defined by the company as any bucket, bottle, barrel, drum, jar, tote, can, box, crate, tank, or other similar means used to contain, store, and/or transport materials. Containers may be movable or stationary and can vary in weight and dimension; however, common containers used by the company include drums, totes, buckets, soil bags or super sacks.

8.1.1 Hazardous Material/Waste Labeling

Any hazardous material or waste container(s) must be labeled in accordance with 29 CFR 1910.1200 using a globally harmonized system (GHS) for chemical classification and labeling. Tags using the same GHS-format should be used for soil bags and super sacks. Each label must contain six required elements, which include the following:

- § Product identifier – should match the product name on the safety data sheet
- § Signal word – "danger" (severe) or "warning" (less severe)
- § Hazard statements – phrase assigned to a hazard class used to describe the nature of the product's hazards
- § Precautionary statements – a measure to minimize or prevent adverse effects that results from exposure
- § Supplier identification – name, address, and telephone number of the supplier or manufacturer*



- § Pictograms – graphical symbols used to convey specific hazard information visually

Note: Hazardous materials ordered by PPM must have the manufacturer or supplier information posted on the containers; however, materials generated as part of the remediation process must identify PPM as the emergency contact.

The GHS labeling system will replace the HMIS labeling system previously used by the company. In general, HMIS labels may still be used in conjunction with, or as a component of, the GHS labeling system. The international requirements for HMIS labeling are similar to those developed by the American Coatings Association with the exception that the degree of hazard severity as indicated by the numbering system is reversed (example: under the old system the higher the number, the higher the hazard severity; under international GHS requirements, the lower the number, the higher the hazard severity). Therefore, workers may continue to see HMIS labels as part of the GHS labeling system when used by other companies; however, PPM will discontinue the use of HMIS labels moving forward.

8.1.2 Nonhazardous Material/Waste Labeling

Containers of nonhazardous materials and/or wastes must also be labeled. They will be labeled using the same labeling system as addressed within the previous section; however, workers should expect these labels to be less detailed since these materials are not likely to pose hazards. Continued use of this labeling system will permit workers to identify the contents of any container used by the company.

Once materials have been deemed as a waste, then non-hazardous waste labels must additionally be affixed to the container(s) so long as the material is truly considered to be a nonhazardous substance. Verbiage for this label template has been modified to meet the needs of the company, and workers are required to complete the label in accordance with the following requirements:

- § Generator – PPM must never be identified as the generator; wastes are generated on behalf of the client and therefore, must have the client's name.
- § Contact – PPM will be considered the contact; this will enable clients with multiple subcontractors to identify which of their contractors is generating the waste.
- § Phone – Provide PPM's phone number in case of emergency (800-945-4834).
- § Contents – Identify the material being stored within the container.
- § Start date – Indicate the date that the material is first placed inside the container; if the container will be accumulating, worker must still provide a date and must also indicate that it is in accumulation.

8.2 CONTAINER STORAGE AND DISPOSAL

In accordance with company policy, all wastes must be stored within fenced remediation systems, behind buildings or in other inconspicuous areas so as not to be disturbed by unauthorized individuals. Wastes must also be profiled and disposed within 90 days of task completion. Drums that are in accumulation may reside onsite for a period no greater than 365 days. Materials in accumulation must be profiled and disposed at least once per calendar year to ensure container integrity. Variances to this policy must be approved by the District Manager or safety department in advance.

8.3 CONTAINER INSPECTIONS

Containers stored at sites with a remediation system undergo routine visual inspections. Inspections occur on a quarterly basis to ensure that container integrity is maintained and that there is no evidence of leakage, excessive rusting, bulging or other forms of container damage that could result in a release. Inspections are documented and retained by the safety department. Evidence of container damage is promptly addressed.

9.0 PERSONNEL/CONTRACTOR SAFETY REVIEW

This HASP and any corresponding JSA(s) must be outlined during a safety briefing that is to be held by the SSO. This safety briefing shall occur prior to the start of the project and consists of an entire review of all relevant sections of this safety plan as it relates to all phases of the project. Affected company personnel, subcontractors, clients, and/or regulators assigned to the project must participate in the safety briefing to gain access to the work zone. Changes or additions in site personnel will require an additional safety briefing be conducted with all affected person(s) to permit site access. Participants of the safety briefing will be required to sign a form to acknowledge they have received safety instructions and agree to abide by the provisions outlined within the HASP and JSA.

Additional tailgate meetings shall occur on a daily basis prior to the initiation of work activities. All authorized persons must attend the tailgate meeting held by the SSO to discuss the safety provisions affected by the task(s) to be performed for that day. Each participant will be required to sign the tailgate meeting log to acknowledge they have received safety instructions and agree to abide by those provisions reviewed during the tailgate meeting. ***No one should be permitted to participate in the tailgate meetings until a complete review of the HASP and corresponding JSA(s) has been completed!***

10.0 CONTRACTOR RESPONSIBILITY AND SUPERVISION

Subcontractors must abide by all safety procedures outlined within this plan, or they will be required to leave the premises until these procedures are implemented. Subcontractors will be permitted to operate under a separate safety plan as long as it meets the minimum requirements established by this HASP, has been reviewed and approved by the HSD in advance of the project's start date, and does not other otherwise conflict with the provisions of this HASP.

Subcontractors may not initiate work without the authorization of PPM, and all subcontracted work must be performed under the supervision of a PPM representative. Managers and field workers must coordinate schedules with the subcontractor(s) in advance of the project. All field processes must be shut down when a PPM representative leaves the jobsite unless otherwise approved by the District Manager; however, notations must be made within the HASP when this exception is granted.

Subcontractors must provide advanced notification when bringing additional chemicals not otherwise covered by this safety plan onto the jobsite. A safety data sheet must be provided to the HSD for review/approval before any chemical will be permitted onsite. If approved, any additional hazards, preventive measures, and emergency response procedures associated with the introduction of these substances must be incorporated into this HASP prior to the start of the project.

11.0 CONFINED SPACE

Confined space is defined by OSHA as any space that is "large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy." In accordance with this definition, PPM will not be conducting any field-related task that can be defined as confined space entry. PPM personnel have not been adequately trained for confined space entry; therefore, in the event site conditions warrant this type of work, a qualified contractor will be hired for this task.

12.0 LIST OF ABBREVIATIONS

ACM	asbestos-containing material
ANSI	American National Standards Institute
BGS	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
CFR	Code of Federal Regulations
CHMM	Certified Hazardous Materials Manager
CO/CO_2	carbon monoxide/dioxide
CSP	Certified Safety Professional
dB	decibel
DEET	N,N-diethyl-meta-toluamide
DOT	Department of Transportation
fc	foot-candle
FID	flame ionization detector
GFCI	ground fault circuit interrupter
GHS	Globally Harmonized System of Chemical Classification and Labeling
GVWR	gross vehicle weight rating
HASP	health and safety plan
HEPA	high efficiency particulate air
HIV	human immunodeficiency virus
HMIS	hazardous materials information system
HSD	Health and Safety Director
HSSE	health, safety, security and environmental
IDLH	immediately dangerous to life and/or health
JSA	job safety analysis
kV	kilo volt
LEL	lower explosive limit
LFL	lower flammability limit
MTBE	methyl-tertiary butyl ether
NCHRP	National Cooperative Highway Research Program
NIOSH	National Institute for Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
O_2/O_3	oxygen/ozone
ORC	oxygen release compound
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
PACM	presumed asbestos-containing material
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
P.E.	Professional Engineer
PEL	permissible exposure limit
P.G.	Professional Geologist
PIC	Principal-in-Charge
PID	photo-ionization detector
PPM	PPM Consultants, Inc.
ppm	parts per million
SDS	safety data sheet
SS	Safety Supervisor
SSO	Site Safety Officer
STEL	short-term exposure limit
SVOC	semi-volatile organic compound
TPH	total petroleum hydrocarbon
TLV	threshold limit value
TWA	time-weighted average
UEL	upper explosive limit
UFL	upper flammability limit
VOC	volatile organic compound
UST	underground storage tank

FIELD FORMS

SUBSURFACE CLEARANCE CHECKLIST

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

SUBSURFACE CLEARANCE CHECKLIST

2019

Site Name: _____ Project No.: _____ Date: _____

Subsurface clearance measures are required for any ground surface disturbances that include, but are not limited to: digging, shoveling, trenching/excavating, subsurface injection, horizontal drilling, or other tasks similar in nature. The following preliminary checks are to be performed and documented by management and then turned over to the Safety Supervisor for inclusion in the health and safety plan [HASP] for further field documentation.

1.0 PREPARATION TASKS AND MARK-OUTS

ACTIVITY	Yes	No	N/A
Manager and field worker meeting held to discuss site objectives and establish procedures.	☐	☐	☐
Worker and subcontractor preliminary safety briefing conducted [PPM conference room].	☐	☐	☐
HASP request issued to Safety Supervisor or Health and Safety Director to initiate field work.	☐	☐	☐
All applicable local, state and federal permits have been obtained.	☐	☐	☐
Site access/permission has been secured.	☐	☐	☐
Most recent as-built drawings and/or site plans requested from client, owner, or site manager.	☐	☐	☐
Most recent as-built drawings and/or site plans received from client, owner, or site manager.	☐	☐	☐
Construction and/or installation photos requested from client, owner, or site manager.	☐	☐	☐
Construction and/or installation photos received from client, owner, or site manager.	☐	☐	☐
Reviewed site information to identify subsurface structures relevant to planned site activities.	☐	☐	☐
State One Call notified within required time-frame [i.e., 48/72-hr requirement].	☐	☐	☐

- If yes, complete following information and/or attach online reporting form.

  Date | Time called: _____ | _____ ☐ AM ☐ PM

  Site address: _____ City, State: _____ Zip: _____

  Parish/County: _____ Nearest intersection: _____

  Date to be marked: _____ Call made by: _____ Ticket No: _____

  Ticket expiration date: _____ One Call contact: _____

  Companies notified by One Call:

Private utility companies not subscribing to One Call have been notified. If yes, document below.	☐	☐	☐
Private mark-out company(s) will be used for this project.	☐	☐	--

State One Call Phone Numbers:

AL: 1-800-292-8525
AR: 1-800-482-8998
FL: 1-800-432-4770
GA: 1-800-282-7411
LA: 1-800-272-3020; ID#29890
MS: 1-800-227-6477
SC: 1-800-922-0983
TN: 1-800-351-1111

Additional notes/comments:

Person Completing Section 1 [Print]: _____ Signature: _____

Site Name: _____ Project No.: _____ Date: _____

The following section(s) are to be performed and documented by [or under the supervision of] the designated Site Safety Officer and retained within the HASP throughout the course of the project.

2.0 INITIAL SITE VISIT AND SELECTION OF GROUND DISTURBANCE LOCATIONS			
ACTIVITY	**Yes**	**No**	**N/A**
Location of all aboveground indicators of subsurface utilities/services has been identified.	☐	☐	☐
Location of utility mark-outs by all private utility companies has been identified.	☐	☐	☐
Location of area lights/signs and associated subsurface lines [electrical poles, etc.] identified.	☐	☐	☐
Location of all phones, fiber optic and associated subsurface lines identified.	☐	☐	☐
Location of all drains and associated interconnecting lines [sewer lines, etc.] identified.	☐	☐	☐
Location of all electrical junction boxes and associated interconnecting lines identified.	☐	☐	☐
Location of all natural gas meters or connectors and all interconnecting lines identified.	☐	☐	☐
Location of all other utilities/services [transformers, pipeline markers, etc.] identified.	☐	☐	☐
Location of tank pit/vent stack/fill port/dispenser/observation wells/shut-offs identified.	☐	☐	☐
Orientation, arrangement, location, size of tanks, STP and extractor covers identified.	☐	☐	☐
Location of paving scars indicative of product lines or other subsurface structures identified.	☐	☐	☐
Existing aboveground components that may indicate subsurface piping/structures identified.	☐	☐	☐
Presence and tracing of process/storm sewers identified and understood.	☐	☐	☐
Location of other pertinent features that may be of relevance to work scope identified.	☐	☐	☐
Clearance methods approved by Project Manager prior to start of the project.	☐	☐	☐

3.0 SUBSURFACE STRUCTURE DELINEATION			
ACTIVITY	**Yes**	**No**	**N/A**
HASP reviewed with all site personnel and subcontractors assigned to this project.	☐	☐	☐
Subsurface clearance reviewed with all site personnel/subcontractors assigned to this project.	☐	☐	☐
Work area is isolated using cones, barricades, caution tape, equipment, etc.	☐	☐	☐
Warning signs and other safety equipment is present onsite.	☐	☐	☐
All emergency shut-off switches [product dispensers, utilities, etc.] have been located.	☐	☐	☐

4.0 TRENCHING/EXCAVATION PRECAUTIONS			
ACTIVITY	**Yes**	**No**	**N/A**
Trench/excavation checklist completed daily prior to conducting field activities [≥4 ft BGS]	☐	☐	☐
Personnel prohibited from entering trench/excavation [≥4 ft BGS]	☐	☐	☐
At least one ladder present onsite for emergency egress [regardless of depth].	☐	☐	☐
Tools/materials stored and personnel kept at least 2 feet away from edge of excavation.	☐	☐	☐
If subsurface structures exposed, extra precautions are taken to ensure structural integrity.	☐	☐	☐

Person Completing Section 2-4 [Print]: _____ Signature: _____

Site Name: ______________________ Project No.: ______________ Date: ____________

The following section(s) are to be performed and documented by [or under the supervision of] the designated Site Safety Officer and retained within the HASP throughout the course of the project.

5.0 VISUAL INSPECTION AND DOCUMENTATION

TYPE OF DISTURBANCE	BORE-HOLE / WELL ID	BOREHOLE / TRENCH LOCATION	CLEARANCE METHOD USED	VISUALLY WITNESSED		CHECK ALL THAT APPLY
				INITIAL	TIME	
☐ Drilling ☐ Excavation ☐ Geoprobe ☐ Hand Auger ☐ MIP/LIF ☐ Trenching ☐ Other*	______ ☐ N/A	☐ Critical ☐ Exclusion ☐ Non-Critical ☐ Principal Variance Obtained for Excl. Zone	☐ Air Knife ☐ Electromagnetic ☐ GPR ☐ Hand Auger ☐ Post-Hole ☐ Push Probe ☐ Shovel ☐ Other*	☐ Yes ☐ No* ______	______	☐ Push probe effective for clearance HARD SOIL TYPE(S) ☐ Tiered-approach effective for clearance ☐ Hand auger effective for clearance ☐ Post-hole digger effective for clearance ☐ Shovel effective for clearance ☐ Water used and effective ☐ Water used and ineffective ☐ Water not used due to sample interference ☐ Operating under variance*
☐ Drilling ☐ Excavation ☐ Geoprobe ☐ Hand Auger ☐ MIP/LIF ☐ Trenching ☐ Other*	______ ☐ N/A	☐ Critical ☐ Exclusion ☐ Non-Critical ☐ Principal Variance Obtained for Excl. Zone	☐ Air Knife ☐ Electromagnetic ☐ GPR ☐ Hand Auger ☐ Post-Hole ☐ Push Probe ☐ Shovel ☐ Other*	☐ Yes ☐ No* ______	______	☐ Push probe effective for clearance HARD SOIL TYPE(S) ☐ Tiered-approach effective for clearance ☐ Hand auger effective for clearance ☐ Post-hole digger effective for clearance ☐ Shovel effective for clearance ☐ Water used and effective ☐ Water used and ineffective ☐ Water not used due to sample interference ☐ Operating under variance*
☐ Drilling ☐ Excavation ☐ Geoprobe ☐ Hand Auger ☐ MIP/LIF ☐ Trenching ☐ Other*	______ ☐ N/A	☐ Critical ☐ Exclusion ☐ Non-Critical ☐ Principal Variance Obtained for Excl. Zone	☐ Air Knife ☐ Electromagnetic ☐ GPR ☐ Hand Auger ☐ Post-Hole ☐ Push Probe ☐ Shovel ☐ Other*	☐ Yes ☐ No* ______	______	☐ Push probe effective for clearance HARD SOIL TYPE(S) ☐ Tiered-approach effective for clearance ☐ Hand auger effective for clearance ☐ Post-hole digger effective for clearance ☐ Shovel effective for clearance ☐ Water used and effective ☐ Water used and ineffective ☐ Water not used due to sample interference ☐ Operating under variance*

NOTES/COMMENTS: (ANY ITEM WITH * REQUIRE ADDITIONAL COMMENTS)

Site Name: ____________________ Project No.: ____________ Date: __________

The following section(s) are to be performed and documented by [or under the supervision of] the designated Site Safety Officer and retained within the HASP throughout the course of the project.

5.0 VISUAL INSPECTION AND DOCUMENTATION (CONTINUED)						
TYPE OF DISTURBANCE	BORE-HOLE / WELL ID	BOREHOLE / TRENCH LOCATION	CLEARANCE METHOD USED	VISUALLY WITNESSED		CHECK ALL THAT APPLY
				INITIAL	TIME	
☐ Drilling ☐ Excavation ☐ Geoprobe ☐ Hand Auger ☐ MIP/LIF ☐ Trenching ☐ Other*	_____ ☐ N/A	☐ Critical ☐ Exclusion ☐ Non-Critical ☐ Principal Variance Obtained for Excl. Zone	☐ Air Knife ☐ Electromagnetic ☐ GPR ☐ Hand Auger ☐ Post-Hole ☐ Push Probe ☐ Shovel ☐ Other*	☐ Yes ☐ No* _____	_____	☐ Push probe effective for clearance HARD SOIL TYPE(S) ☐ Tiered-approach effective for clearance ☐ Hand auger effective for clearance ☐ Post-hole digger effective for clearance ☐ Shovel effective for clearance ☐ Water used and effective ☐ Water used and ineffective ☐ Water not used due to sample interference ☐ Operating under variance*
☐ Drilling ☐ Excavation ☐ Geoprobe ☐ Hand Auger ☐ MIP/LIF ☐ Trenching ☐ Other*	_____ ☐ N/A	☐ Critical ☐ Exclusion ☐ Non-Critical ☐ Principal Variance Obtained for Excl. Zone	☐ Air Knife ☐ Electromagnetic ☐ GPR ☐ Hand Auger ☐ Post-Hole ☐ Push Probe ☐ Shovel ☐ Other*	☐ Yes ☐ No* _____	_____	☐ Push probe effective for clearance HARD SOIL TYPE(S) ☐ Tiered-approach effective for clearance ☐ Hand auger effective for clearance ☐ Post-hole digger effective for clearance ☐ Shovel effective for clearance ☐ Water used and effective ☐ Water used and ineffective ☐ Water not used due to sample interference ☐ Operating under variance*
☐ Drilling ☐ Excavation ☐ Geoprobe ☐ Hand Auger ☐ MIP/LIF ☐ Trenching ☐ Other*	_____ ☐ N/A	☐ Critical ☐ Exclusion ☐ Non-Critical ☐ Principal Variance Obtained for Excl. Zone	☐ Air Knife ☐ Electromagnetic ☐ GPR ☐ Hand Auger ☐ Post-Hole ☐ Push Probe ☐ Shovel ☐ Other*	☐ Yes ☐ No* _____	_____	☐ Push probe effective for clearance HARD SOIL TYPE(S) ☐ Tiered-approach effective for clearance ☐ Hand auger effective for clearance ☐ Post-hole digger effective for clearance ☐ Shovel effective for clearance ☐ Water used and effective ☐ Water used and ineffective ☐ Water not used due to sample interference ☐ Operating under variance*
NOTES/COMMENTS: (ANY ITEM WITH * REQUIRE ADDITIONAL COMMENTS)						

CRANE OPERATOR INSPECTION

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

CRANE OPERATOR INSPECTION

2019

Crane: Ford F-350 (Truck 109) Date of inspection: _____ Inspection Type: ☐ Monthly ☐ Pre-Use

Inspector Name [Print]: _____ [Signature]: _____

Instructions: Check all items indicated. Inspect and indicate as satisfactory = S, unsatisfactory = U, or not applicable = N/A. Any noted deficiencies must be outlined further under the Comment section.

Walk-Around Inspection	U	S	N/A	Walk-Around Inspection	U	S	N/A
Battery	☐	☐	☐	Hook/capacity	☐	☐	☐
Belts/hoses/lines	☐	☐	☐	Hydraulic filters/oil level	☐	☐	☐
Coolant level	☐	☐	☐	Hydraulic pump/tank	☐	☐	☐
Engine	☐	☐	☐	Levers	☐	☐	☐
Oil filter/level	☐	☐	☐	Lift cylinders	☐	☐	☐
Brakes/brake lights	☐	☐	☐	Load rating charts	☐	☐	☐
Drive line	☐	☐	☐	Lubrication/grease fittings	☐	☐	☐
Gauges – oil/fuel/amp/temp	☐	☐	☐	Master cylinder	☐	☐	☐
Hand throttle	☐	☐	☐	No load test	☐	☐	☐
Horn	☐	☐	☐	Outrigger beams/jacks	☐	☐	☐
Lights – backup/dash/dome	☐	☐	☐	Outrigger pads	☐	☐	☐
Lights – warning/indicator	☐	☐	☐	Safety guards/plates	☐	☐	☐
Operator manual	☐	☐	☐	Swing gear/motor	☐	☐	☐
Tires – axle/chocks/pressure	☐	☐	☐	Telescopic/main sections	☐	☐	☐
Boom	☐	☐	☐	Turntable/frame	☐	☐	☐
Boom pivot pin	☐	☐	☐	Housekeeping	☐	☐	☐
Controls	☐	☐	☐	Leaks – fuel/lube/oil/water	☐	☐	☐
Crane stability	☐	☐	☐	Sling – capacity/integrity	☐	☐	☐
Fire extinguisher	☐	☐	☐	Unusual noises	☐	☐	☐
Gantry/pendant/boom stops	☐	☐	☐	Warning tags	☐	☐	☐

Comments:

Findings:

- ☐ Crane is functioning properly and in good working condition
- ☐ Damages/defects noted and crane is in need of repair
- ☐ Damages/defects noted and truck crane should be taken out of service

Note: The knuckle-boom truck-mounted crane is not operated on a daily basis; therefore, inspections are not required daily but must be completed prior to each use and at least monthly. Inspections must be documented using this form and completed forms must be returned to the Health and Safety Director for recordkeeping.

FORKLIFT SAFETY INSPECTION

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

FORKLIFT SAFETY INSPECTION

2019

Forklift Make/Model: _____ Date of inspection: _____

Forklift Type:
- ☐ D/DS/DY – Diesel-powered
- ☐ E/ES/EE/EX – Electrically-powered
- ☐ G/GS – Gasoline-powered
- ☐ LP/LPS – Liquefied petroleum gas-powered

Inspector Name [Print]: _____ [Signature]: _____

Instructions: Check all items indicated. Inspect and indicate as satisfactory = S, unsatisfactory = U, or not applicable = N/A. Any noted deficiencies must be outlined further under Comment section.

Walk-Around Inspection	U	S	N/A	Walk-Around Inspection	U	S	N/A
Mast	☐	☐	☐	Oil level	☐	☐	☐
Carriage	☐	☐	☐	Coolant level	☐	☐	☐
Forks	☐	☐	☐	Fuel level	☐	☐	☐
Backrest	☐	☐	☐	Hydraulic fluid level	☐	☐	☐
Seatbelt	☐	☐	☐	Starting	☐	☐	☐
Tires	☐	☐	☐	Lift operation	☐	☐	☐
Axles	☐	☐	☐	Tilt operation	☐	☐	☐
Hydraulic hoses	☐	☐	☐	Horn	☐	☐	☐
Belts, pulleys	☐	☐	☐	Steering	☐	☐	☐
Overhead guard	☐	☐	☐	Parking brake	☐	☐	☐
Gauges and indicators	☐	☐	☐	Operational brake	☐	☐	☐
Fire extinguisher	☐	☐	☐	Other	☐	☐	☐
Batter connections	☐	☐	☐				
Fuel tank damage/leaks	☐	☐	☐				
Warning/operational lights	☐	☐	☐				

Comments:

Findings:
- ☐ Forklift is functioning properly and in good working condition
- ☐ Damages/defects noted and forklift is in need of repair
- ☐ Damages/defects noted and forklift should be taken out of service

PPM does not currently own a forklift. Forklifts are rented on an as-needed basis and are therefore not operated on a daily basis. Inspections must be completed by a competent person (forklift-certified operators only) and prior to each use. Inspections must be documented using this form and completed forms must be returned to the Health and Safety Director for recordkeeping.

INCIDENT/NEAR-MISS AND HAZARD RECOGNITION REPORT

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

INCIDENT/NEAR-MISS AND HAZARD RECOGNITION REPORT

A near-miss is a potential hazard or incident that has not resulted any personal injury or property damage. Unsafe working conditions, short-cuts or unsafe worker behaviors, improper use of equipment, use of malfunctioning equipment, or failure to implement HSSE protocols (to name a few) can lead to work-related incidents or injuries. It is the responsibility of all workers to report unsafe acts/conditions or incidents as they occur. All incidents, near-misses, or other recognized hazards must be reported to the Health and Safety Director using this form.

1. GENERAL INFORMATION

Name of person reporting [print]: _____ Date reported: _____

Title/position of person reporting: _____ Office location: _____

Office manager: _____ Type of event: ☐ Incident ☐ Near-miss ☐ Hazard report

2. DESCRIPTION OF INCIDENT, NEAR-MISS, OR HAZARD REPORTED

Type of hazard: ☐ Chemical hazard ☐ Physical hazard ☐ Biological hazard ☐ Other hazard

If an incident, indicate all that apply: ☐ Injury/illness ☐ Property damage ☐ Neither ☐ Other [describe below]

Describe the incident, near-miss or hazard in detail. Be descriptive when reporting incidents and near-misses outlining the actions leading up to and including the event. Attach photos, sketches, etc. when possible.

Describe all actions taken to bring the event to full closure.

Provide recommendations for corrective action/improvement.

INCIDENT LOG

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

INCIDENT LOG

2019

PPM Project No.: _____ Site Name: _____

Site Address: _____ City, State: _____ Zip: _____

Date of Incident: _____ Time of Incident: _____ Time Work Started: _____

TIME (Military)	PERSON CONTACTED (Name & Title/Position)	DESCRIPTION OF ACTION TAKEN (Describe in detail what was said, observed, actions taken, etc.)

(Note: If more space is warranted, use another page of the Incident Log. Be sure to re-complete the top portion of the form providing client and site information and label as page 2, etc. as needed.)

Page _____ of _____

TRENCH/EXCAVATION INSPECTION

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

TRENCH/EXCAVATION INSPECTION

2019

GENERAL INFORMATION AND SITE CONDITIONS

Site Name: _____ Project No.: _____ Date: _____

Inspector [Print Name]: _____ Inspector [Signature]: _____

Weather Conditions: ☐ Rain ☐ Sleet/Hail/Snow ☐ Sunny/Clear ☐ Overcast ☐ Other

Soil Class/Type: ☐ Sand ☐ Silt ☐ Clay ☐ Combination ☐ Other _____

Trench/Excavation Depth: ☐ 0-3 feet BGS ☐ 4-12 feet BGS ☐ 13-20 feet BGS ☐ >20 feet BGS

**NOTE: Complete top portion of form only if trench/excavation is 0-3 ft BGS; complete entire form if trench/excavation is ≥ 4 ft BGS. If ≥4 feet BGS, workers are prohibited from entering a trench/excavation without the use of engineering controls approved by P.E.*

OSHA 29 CFR 1926.650-652 requires that any open trench/excavation ≥4 feet BGS be inspected on a daily basis to ensure structural integrity is maintained. Should adverse weather conditions (i.e., rain or snow) arise during the course of a project or any other scenario that could possibly alter the stability of the trench/excavation, multiple inspections throughout the day must be conducted to ensure structural integrity is maintained. These inspections must be documented using this form and must be returned to the Health and Safety Director for recordkeeping upon completion of the project.

GENERAL TRENCH/EXCAVATION INSPECTION	Y	N	NA
Trench/excavation, adjacent areas, and protective systems inspected by Competent Person prior to start.	☐	☐	--
Surface encumbrances supported or removed.	☐	☐	--
Equipment, tools and other materials kept a minimum of 2 ft from edge of trench/excavation.	☐	☐	--
Employees, contractors and regulatory officials kept a minimum of 2 ft from edge of trench/excavation.	☐	☐	--
Appropriate personal protective equipment worn by all employees and subcontractors.	☐	☐	--
Barriers provided at all remote trenches/excavations.	☐	☐	--
Everyone onsite prohibited from working or walking under suspended loads.	☐	☐	--
Everyone onsite maintains 10-ft distance from operating equipment or spotter used to determine location.	☐	☐	--
UTILITY CLEARANCE AND ACCESS/EGRESS	**Y**	**N**	**NA**
State One Call contacted 48-72 hours prior to trenching/excavating.	☐	☐	--
Local utility companies not subscribed to One Call have been contacted by PPM 48-72 hours prior to start.	☐	☐	--
Onsite evidence that utilities have been marked.	☐	☐	--
If no to previous question, One Call/local utility companies have been contacted again to mark utilities.	☐	☐	☐
If no to previous question, Office Manager has approved authorization to proceed without utility marking.	☐	☐	☐
Underground installations protected, supported or removed while trench/excavation is open.	☐	☐	☐
At least one ladder is present onsite in case of emergency access/egress.	☐	☐	--
Work zone barricaded/coned or otherwise isolated to prevent unauthorized entry.	☐	☐	--
Unauthorized personnel denied access to work zone.	☐	☐	--
WATER ACCUMULATION/WET CONDITIONS	**Y**	**N**	**NA**
Precautions taken to protect workers from accumulation of water and potential cave-in.	☐	☐	--
Additional inspection made after change in weather or site conditions and prior to continuation of work.	☐	☐	☐
Water removal equipment monitored by a Competent Person.	☐	☐	☐
Surface water controlled or diverted to prevent impact to structural stability of trench/excavation.	☐	☐	☐
Trench/excavation determined to be stable subsequent to change in weather or site conditions.	☐	☐	☐
If no to previous question, work is ceased and limited access granted until trench/excavation is stabilized.	☐	☐	☐
Adjacent structures determined to be stable subsequent to change in weather or site conditions.	☐	☐	☐
If no to previous question, work is ceased and limited access granted until structures are stabilized.	☐	☐	☐
HAZARDOUS ATMOSPHERE(S)	**Y**	**N**	**NA**
Oxygen content between 19.5% and 21%.	☐	☐	--
Atmospheric testing conducted when reasonable possibility of oxygen deficiency or hazardous atmosphere.	☐	☐	☐
Ventilation provided to prevent flammable gas from building >10% LEL of the gas.	☐	☐	☐
Intermittent air monitoring conducted to ensure site conditions remain unchanged and acceptable.	☐	☐	--
Workers informed of warning signals and evacuation location in the event the site becomes unsafe.	☐	☐	--
Workers trained in proper use of personal protective and emergency response equipment.	☐	☐	--

NOTES/COMMENTS:

AMBIENT AIR MONITORING REPORT

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

AMBIENT AIR MONITORING REPORT

2019

Site Name: _____ Project No.: _____ Date: _____

Instrument Make: _____ Model: _____ Serial No.: _____

Instrument Detection Limit: _____ Calibrated: ☐ Yes ☐ No Calibration Gas: _____

Arrival Time: _____ Departure Time: _____

Sampler [Print Name]: _____ Sampler [Signature]: _____

AMBIENT AIR CONDITIONS

PPM works with numerous volatile and semi-volatile contaminants, some of which have threshold limits assigned by OSHA to ensure worker health is not impaired. To ensure site conditions are and remain acceptable, it is necessary that ambient site conditions be monitored frequently and consistently. The assigned Site Safety Officer must collect baseline samples. Additional samples should be collected in and around the work zone taking into consideration exposures to PPM personnel, subcontractors and the general public. A minimum of 4 samples must be collected within worker breathing zones every 2 hours so long as readings remain within acceptable action limits. Readings in excess of assigned action limits (outlined within the HASP) must be immediately reported to the Health and Safety Director and will require more frequent collections and may require site evacuation.

Action Limit$_{Gasoline}$:	100 ppm [toxicity]	10% or 1400 ppm [flammability]	All other COCs, see Table 5-1 of HASP

Draw diagram of site identifying all collection locations.

Description of Sample Locations

Sample ID	Describe location of sample collection point
AM-1	
AM-2	
AM-3	
AM-4	
AM-5	
AM-6	
AM-7	
AM-8	
AM-9	
AM-10	

Sample ID	NSEW	Result	Time	Sample ID	NSEW	Result	Time	Sample ID	NSEW	Result	Time

Notes/Comments:

TAILGATE SAFETY MEETING LOG

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

TAILGATE SAFETY MEETING LOG

2019

Site Name: _____ Project Number: _____

Trainer [Name/Title]: _____ / _____ Date: _____

This form is to be used in conjunction with the HASP and must document all items discussed during each daily safety tailgate meeting. Be sure to include notations for special considerations (i.e., subcontractor concerns, etc.) as they arise during the course of the project. All affected parties must participate in this safety briefing and sign the attendance portion of this form. Forms must be returned along with other field forms to the safety department upon completion of the project.

DAILY WORK PLAN ACTIVITIES

SAFETY TOPICS

Standard operating or safety procedures: _____

Required protective clothing and equipment: _____

Identify and discuss all chemical hazards: _____

Identify any special equipment used: _____

Other discussion items/requirements:

Emergency procedures (outline evacuation area, break area and directions to nearest medical facility):

Evacuation warning: _____

Evacuation area: _____ Break area: _____

Location of hospital: _____ Phone #: _____

ATTENDANCE RECORD

Print Name:	Signature:	Print Name:	Signature:

HASP ACKNOWLEDGMENT FORM

HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

HASP ACKNOWLEDGMENT FORM

2019

This HASP was derived specifically for the _____ facility and addresses hazards and procedures specific only to the above referenced site. I have read, understood, and agree to perform all field activities as outlined within this HASP as discussed in the pre-job safety briefing. I recognize that any additional hazards or changes in site conditions would require immediate reporting to the site safety officer and amendments to this written plan may be required.

PERSON REVIEWING HASP:

Name [Print]: _____ Signature: _____ Date: _____

ATTENDEES

Name [Print]	Signature	Date

APPENDIX I– COST PROPOSAL NO. 32 – MCAP2 / UIC PERMIT

Alabama Tank Trust Fund
Cost Proposal
Part I

I.1 Cost Proposal Information:

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
32 MCAP2/UIC	6/30/2020
UST or AST Incident Number:	Facility I.D. Number:
UST14-09-03	23413-097-000304

I.2 Facility Information

Facility Name:	Circle K Store No. 8261
Facility Address:	928 Telegraph Road Prichard, Alabama

I.3 Owner Information:

Owner Name:	Circle K Stores, Inc.
Owner Address:	25 West Cedar Street, Suite 100 Pensacola, Florida 32502
Employer Tax Number (IRS):	74-1149540

I.4 Response Action Contractor Information:

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-990-9000
Project Contact E-mail:	rodney.kilgore@ppmco.com
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number: 32

Facility Name: Circle K Store No. 8261

I.5 Activity Information:

	Indicate below the activities for which the cost proposal is submitted:
	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
X	Develop Corrective Action Plan
	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

Activities/Other/Brief Summary of Activities:

Develop second MCAP and Prepare UIC Permit Application

Provide proposed completion date for this phase of work activities:

90 days following ADEM approval

Provide projected date of cleanup completed:

Unknown

I.6 Subcontractor Information:

Indicate Subcontractors to be used during this phase of work:

Name & Address	Service Provided
.	

Cost Proposal Number:	Facility Name:
32	Circle K Store No. 8261

Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:

I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Mr. Scott Janashak - Environmental Manager
Email address:	sjanasha@circlek.com
Date:	7.1.2020

I.8 Cost Proposal- Contractor Signature:

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	6/30/20

I.9 Trust Fund Obligation Information:

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	$500,000.00
Total of Previously Approved Cost Proposals:	$343,054.40
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	$349,495.90
Estimate Percent Completion of entire project to date:	70%

I.10 Cost Proposal Amount

Proposed Costs under this Cost Proposal:	**$6,441.50**	**Personnel**	**$4,833.00**
		Field Equipment	**$0.00**
Owners Required Contribution for UST Release($5,000): *Applicable for CP#1 Only*		**Mileage**	**$0.00**
		Per Diem	**$0.00**
		Drilling	**$0.00**
Owners Required Contribution for AST Release($10,000): *Applicable for CP#1 Only*		**Analytical**	**$0.00**
		Other	**$1,608.50**
Total of This Cost Proposal:	**$6,441.50**		

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$6,441.50	23413-097-000304	32	UST14-09-03	Circle K Store No. 8261

Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal

Scenarios	Unit $	Units	Quantity	Requested$
CAP Modification (use Form "F" for input)	$3,628	/cap	1	$3,628.00
UIC Permit Application Preparation	$1,205	/permit	1	$1,205.00
	Total Report and Plan Costs			**$4,833.00**

Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal

Postage / Shipping and Copying (plans reports, ADEM and owner)	$85	/sow	1	$85.00
	Total Field Costs			**$85.00**

Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal

	Total Drilling Costs	**$0.00**

Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal

	Pass Through	Quoted Amoun	Requested$
UIC Permit Application (permit fee)	10%	$1,385.00	$1,523.50
Total Subs / Vendors / Utilities			**$1,523.50**

Part II- Alabama Tank Trust Fund Itemization Form "F" Cost Proposal

Use this form to list hours where a Unit Rate is not available, NOT FOR ADDING HOURS TO UNITS
Detailed description of activities must be entered where hours are claimed

CAP Modification

	Description of Activities			
Project Manager:	Secure Quotes, Design System specification,	$104.00	8	$832.00
PE/PG:	Review MCAP	$120.00	4	$480.00
Staff Geologist/ Engineer:	Prepare MCAP	$87.00	24	$2,088.00
Staff Scientist:		$81.00		
Draftsman:	Prepare figures	$63.00	2	$126.00
Clerical:	Prepare MCAP for submission	$51.00	2	$102.00
		CAP Modification		$3,628.00

APPENDIX J– COST PROPOSAL NO. 33 – EQUIPMENT PURCHASE

Alabama Tank Trust Fund
Cost Proposal
Part I

I.1 Cost Proposal Information:

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
33 EQUIPMENT PURCHASE	6/30/2020
UST or AST Incident Number:	Facility I.D. Number:
UST14-09-03	23413-097-000304

I.2 Facility Information

Facility Name:	Circle K Store No. 8261
Facility Address:	928 Telegraph Road Prichard, Alabama

I.3 Owner Information:

Owner Name:	Circle K Stores, Inc.
Owner Address:	25 West Cedar Street, Suite 100 Pensacola, Florida 32502
Employer Tax Number (IRS):	74-1149540

I.4 Response Action Contractor Information:

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-990-9000
Project Contact E-mail:	rodney.kilgore@ppmco.com
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number:	Facility Name:
33	Circle K Store No. 8261

I.5 Activity Information:

	Indicate below the activities for which the cost proposal is submitted:
	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
X	Develop Corrective Action Plan
	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

Activities/Other/Brief Summary of Activities:

Rent ozone sparge remediation system and purchase ozone sparge point materials

Provide proposed completion date for this phase of work activities:

120 days following ADEM approval

Provide projected date of cleanup completed:

Unknown

I.6 Subcontractor Information:

Indicate Subcontractors to be used during this phase of work:

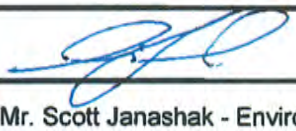
Name & Address	Service Provided
H2O Engineering, Inc.	Ozone Sparge System and Sparge Point Materials
189 Granda Drive, San Luis Obispo, CA	

Cost Proposal Number:	Facility Name:
33	Circle K Store No. 8261

Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:

I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Mr. Scott Janashak - Environmental Manager
Email address:	sjanasha@circlek.com
Date:	7-1-2020

I.8 Cost Proposal- Contractor Signature:

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	6/30/20

I.9 Trust Fund Obligation Information:

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	$500,000.00
Total of Previously Approved Cost Proposals:	$349,495.90
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	$372,808.51
Estimate Percent Completion of entire project to date:	75%

I.10 Cost Proposal Amount

Proposed Costs under this Cost Proposal:	**$23,312.61**	**Personnel**	**$1,311.00**
		Field Equipment	**$0.00**
Owners Required Contribution for UST Release($5,000): *Applicable for CP#1 Only*		**Mileage**	**$0.00**
		Per Diem	**$0.00**
		Drilling	**$0.00**
Owners Required Contribution for AST Release($10,000): *Applicable for CP#1 Only*		**Analytical**	**$0.00**
		Other	**$22,001.61**
Total of This Cost Proposal:	**$23,312.61**		

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$23,312.61	23413-097-000304	33	UST14-09-03	Circle K Store No. 8261

Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal

Scenarios	Unit $	Units	Quantity	Requested$
System Purchase Letter	$1,311	/ltr	1	$1,311.00
Total Report and Plan Costs				**$1,311.00**

Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal

Postage / Shipping and Copying (plans reports, ADEM and owner)	$85	/sow	1	$85.00
Total Field Costs				**$85.00**

Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal

Total Drilling Costs	**$0.00**

Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal

		Pass Through	Quoted Amoun	Requested$
Corrective Action System Rental		5%	$5,000.00	$5,250.00
Other/Misc. (receipts required)	Security Deposit	5%	$3,000.00	$3,150.00
Other/Misc. (receipts required)	System Delivery (one way)	5%	$5,500.00	$5,775.00
Other/Misc. (receipts required)	Ozone Sparge Points ($319.04 x 10)	10%	$3,190.40	$3,509.44
Other/Misc. (receipts required)	10 ft. Riser Pipe ($36.82 x 30)	10%	$1,104.60	$1,215.06
Other/Misc. (receipts required)	Well Head Connectors ($143.85 x 10)	10%	$1,438.50	$1,582.35
Other/Misc. (receipts required)	Ozone Tubing ($4.33/ft.x 1,300 ft.)	10%	$1,304.33	$1,434.76
Total Subs / Vendors / Utilities				**$21,916.61**

APPENDIX K – COST PROPOSAL NO. 34 – OZONE SYSTEM INSTALLATION AND STARTUP

Alabama Tank Trust Fund
Cost Proposal
Part I

I.1 Cost Proposal Information:

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
34 SYSTEM INSTALLATION	6/30/2020
UST or AST Incident Number:	Facility I.D. Number:
UST14-09-03	23413-097-000304

I.2 Facility Information

Facility Name:	Circle K Store No. 8261
Facility Address:	928 Telegraph Road Prichard, Alabama

I.3 Owner Information:

Owner Name:	Circle K Stores, Inc.
Owner Address:	25 West Cedar Street, Suite 100 Pensacola, Florida 32502
Employer Tax Number (IRS):	74-1149540

I.4 Response Action Contractor Information:

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-990-9000
Project Contact E-mail:	rodney.kilgore@ppmco.com
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number:	Facility Name:
34	Circle K Store No. 8261

I.5 Activity Information:

	Indicate below the activities for which the cost proposal is submitted:
	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
	Develop Corrective Action Plan
X	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

Activities/Other/Brief Summary of Activities:

Install ten ozone sparge points, install ozone system and connect sparge points to system, start-up and optimize ozone system, followed by report submittal.

Provide proposed completion date for this phase of work activities:

120 days following ADEM approval

Provide projected date of cleanup completed:

Unknown

I.6 Subcontractor Information:

Indicate Subcontractors to be used during this phase of work:

Name & Address	Service Provided
Walker Hill Environmental, Inc	Sparge point and system installation
Foxworth, MS	
Ecosouth Services	Waste Disposal
Axis, AL	

Cost Proposal Number:	Facility Name:
34	Circle K Store No. 8261

Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:

I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Mr. Scott Janashak - Environmental Manager
Email address:	sjanasha@circlek.com
Date:	7-1-2020

I.8 Cost Proposal- Contractor Signature:

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	6/30/20

I.9 Trust Fund Obligation Information:

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	$500,000.00
Total of Previously Approved Cost Proposals:	$372,808.51
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	$436,657.26
Estimate Percent Completion of entire project to date:	87%

I.10 Cost Proposal Amount

Proposed Costs under this Cost Proposal:	**$63,848.75**	**Personnel**	**$25,550.50**
		Field Equipment	**$350.00**
Owners Required Contribution for UST Release($5,000): *Applicable for CP#1 Only*		**Mileage**	**$517.50**
		Per Diem	**$0.00**
		Drilling	**$14,069.00**
Owners Required Contribution for AST Release($10,000): *Applicable for CP#1 Only*		**Analytical**	**$0.00**
		Other	**$23,361.75**
Total of This Cost Proposal:	**$63,848.75**		

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$63,848.75	23413-097-000304	34	UST14-09-03	Circle K Store No. 8261

Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal

Scenarios	Unit $	Units	Quantity	Requested$
CA System Installation Report (all Classes same)	$7,552	/report	1	$7,552.00
ADEM Solid Waste Profile Preparation	$216.50	/profile	1	$216.50
Total Report and Plan Costs				**$7,768.50**

Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal

Porous material 0-30 feet	$324	/well	10	$3,240.00
System Installation Oversight (up to 7 days in field)	$8,714	/system	1	$8,714.00
System Installation Oversight Adder (per day over 7 doc req.)	$974	/day	3	$2,922.00
System Startup	$1,664	/system	1	$1,664.00
Travel				
Mileage Rate			$0.575	
Mileage (One way office to site)			30	
Number of round trips to site			15	$517.50
Technician(s)-travel time	$63	/hr	4	$252.00
Geologist/Engineer-travel time	$87	/hr	10	$870.00
PG/PE-travel time	$120	/hr	1	$120.00
Equipment and Equipment Kits				
Sampling Expendables(gloves, ice, string, jars, foil, distilled water, paper towels, e	$50	/sow	1	$50.00
Monitoring Well/Boring Installation	$60	/day	5	$300.00
Postage / Shipping and Copying (plans reports, ADEM and owner)	$85	/sow	1	$85.00
Total Field Costs				**$18,734.50**

Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal

Scenarios	Unit $	Unit	Quantity	Requested$
Mileage Rate (Current Federal Rate)			$0.575	
Mileage (drilling device driven or ATV) (**ONE WAY** mileage up to 450 m	$2.30	/mile	150	
Number of Mobilizations (includes $200 mob/demob amount)			1	$890.00
Well Pad Completions for Monitoring Wells (2" and 4")(12" cover) [2]	$200.00	/well	10	$2,000.00
Sonic Drilling	$30.00	/foot	300	$9,000.00
Per Diem (overnight) (man days)(hotel receipts required)	$100.00	/day	9	$900.00
Pass Through (if appropriate) Enter "5" or "10" as appropriate			10%	$1,279.00
Total Drilling Costs				**$14,069.00**

Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal

	Pass Through	Quoted Amoun	Requested$
ADEM Solid Waste Profile (ADEM review fee)	10%	$250.00	$275.00
Corrective Action System Install	5%	$20,775.00	$21,813.75
Phone Costs (telemetry)	10%	$250.00	$275.00
Roll off Dumpster (includes hauling/handling)	10%	$270.00	$297.00

Cost Proposal Summary						
CP Total	Facility I.D. #	CP #	Incident Number	Site Name		
$63,848.75	23413-097-000304	34	UST14-09-03	Circle K Store No. 8261		
Solid Waste Soil Disposal (to include hauling/handli				10%	$560.00	$616.00
			Total Subs / Vendors / Utilities			**$23,276.75**

APPENDIX L – COST PROPOSAL NO. 35 - FIRST QUARTER O&M

Alabama Tank Trust Fund
Cost Proposal
Part I

I.1 Cost Proposal Information:

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
35 OM1	6/30/2020
UST or AST Incident Number:	Facility I.D. Number:
UST14-09-03	23413-097-000304

I.2 Facility Information

Facility Name:	Circle K Store No. 8261
Facility Address:	928 Telegraph Road Prichard, Alabama

I.3 Owner Information:

Owner Name:	Circle K Stores, Inc.
Owner Address:	25 West Cedar Street, Suite 100 Pensacola, Florida 32502
Employer Tax Number (IRS):	74-1149540

I.4 Response Action Contractor Information:

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-266-7915
Project Contact E-mail:	rodney.kilgore@ppmco.com
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number: 35

Facility Name: Circle K Store No. 8261

I.5 Activity Information:

	Indicate below the activities for which the cost proposal is submitted:
	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
	Develop Corrective Action Plan
X	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

Activities/Other/Brief Summary of Activities:

Operate ozone sparge system for three months and collect 17 GW samples, 2 private well samples, & 2 QAQC.

Provide proposed completion date for this phase of work activities:

30 days following end of O&M period

Provide projected date of cleanup completed:

Unknown

I.6 Subcontractor Information:

Indicate Subcontractors to be used during this phase of work:

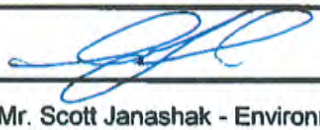
Name & Address	Service Provided
TestAmerica Laboratories, Inc.	Analytical
3355 McLemore Drive, Pensacola, FL	
Erwin Remediation, Inc.	Disposal
408 Ditmar Street, Pensacola, FL	

Cost Proposal Number:	Facility Name:
35	Circle K Store No. 8261

Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:

I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Mr. Scott Janashak - Environmental Manager
Email address:	sjanasha@circlek.com
Date:	7.1.2020.

I.8 Cost Proposal- Contractor Signature:

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	6/30/20

I.9 Trust Fund Obligation Information:

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	$750,000.00
Total of Previously Approved Cost Proposals:	$436,657.26
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	$468,655.66
Estimate Percent Completion of entire project to date:	62%

I.10 Cost Proposal Amount

Proposed Costs under this Cost Proposal:	**$31,998.40**	**Personnel**	**$8,668.90**
		Field Equipment	**$1,029.00**
Owners Required Contribution for UST Release($5,000): *Applicable for CP#1 Only*		**Mileage**	**$276.00**
		Per Diem	**$0.00**
		Drilling	**$0.00**
Owners Required Contribution for AST Release($10,000): *Applicable for CP#1 Only*		**Analytical**	**$1,688.50**
		Other	**$20,336.00**
Total of This Cost Proposal:	**$31,998.40**		

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$31,998.40	23413-097-000304	35	UST14-09-03	Circle K Store No. 8261

Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal

Scenarios	Unit $	Units	Quantity	Requested$
SEMR - Ozone, AS, SVE, Chemox, Biosparge - Reports				
1-12 wells, BTEX/MTBE/Naphthalene	$4,371	/report	1	$4,371.00
SEMR adder >12 wells, BTEX/MTBE/Naph	$37.50	/well	7	$262.50
Total Report and Plan Costs				**$4,633.50**

Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal

Groundwater Sampling Set-up (2hrs tech time)	$126.00	/sow	1	$126.00
Purge/Development Water Handling (see Basis)	$94.50	/sow	1	$94.50
Groundwater Sampling and Gauging 2" Well	$63.00	/well	15	$945.00
Groundwater Sampling and Gauging 4" Well	$72.45	/well	2	$144.90
Sample Private Well	$94.50	/well	2	$189.00
Ozone, biosparge, SVE, biovent and Air Sparge O&M 3 months	$1,928	/quarter	1	$1,928.00
Travel				
Mileage Rate			$0.575	
Mileage (One way office to site)			30	
Number of round trips to site			8	$276.00
Technician(s)-travel time	$63	/hr	8	$504.00
Project Manager-travel time	$104	/hr	1	$104.00
Equipment and Equipment Kits				
55-Gallon Drums	$50	/drum	2	$100.00
Sampling Expendables(gloves, ice, string, jars, foil, distilled water, paper towels,	$50	/sow	1	$50.00
Expendables O&M	$25	/day	6	$150.00
Groundwater Monitoring	$160	/day	1	$160.00
Bailers	$7	/bailer	17	$119.00
Ozone Sparge O&M	$75	/day	6	$450.00
Postage / Shipping and Copying (plans reports, ADEM and owner)	$85	/sow	1	$85.00

Analytical Samples

	Method			Pass Through	Sample #	
BTEX/MTBE/Naph (water)	8260	$65	/sample	10%	17	$1,215.50
VOC Water Supply	524.2	$150	/sample	10%	2	$330.00
Other	QAQC	$65.00	/sample	10%	2	$143.00
Total Field Costs						**$7,113.90**

Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal

Total Drilling Costs	**$0.00**

Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$31,998.40	23413-097-000304	35	UST14-09-03	Circle K Store No. 8261

	Pass Through	Quoted Amoun	Requested$
Corrective Action System Rental	10%	$15,000.00	$16,500.00
Phone Costs (telemetry)	10%	$250.00	$275.00
Power Costs	10%	$3,000.00	$3,300.00
Water Treatment/Disposal	10%	$160.00	$176.00
Total Subs / Vendors / Utilities			**$20,251.00**

APPENDIX M – COST PROPOSAL NO. 36 – SECOND QUARTER O&M

Alabama Tank Trust Fund
Cost Proposal
Part I

I.1 Cost Proposal Information:

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
36 OM2	6/30/2020
UST or AST Incident Number:	Facility I.D. Number:
UST14-09-03	23413-097-000304

I.2 Facility Information

Facility Name:	Circle K Store No. 8261
Facility Address:	928 Telegraph Road Prichard, Alabama

I.3 Owner Information:

Owner Name:	Circle K Stores, Inc.
Owner Address:	25 West Cedar Street, Suite 100 Pensacola, Florida 32502
Employer Tax Number (IRS):	74-1149540

I.4 Response Action Contractor Information:

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-266-7915
Project Contact E-mail:	rodney.kilgore@ppmco.com
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number: 36

Facility Name: Circle K Store No. 8261

I.5 Activity Information:

	Indicate below the activities for which the cost proposal is submitted:
	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
	Develop Corrective Action Plan
X	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

Activities/Other/Brief Summary of Activities:

Operate ozone sparge system for three months and collect 17 GW samples, 2 private well samples, & 2 QAQC.

Provide proposed completion date for this phase of work activities:

30 days following end of O&M period

Provide projected date of cleanup completed:

Unknown

I.6 Subcontractor Information:

Indicate Subcontractors to be used during this phase of work:

Name & Address	Service Provided
TestAmerica Laboratories, Inc.	Analytical
3355 McLemore Drive, Pensacola, FL	
Erwin Remediation, Inc.	Disposal
408 Ditmar Street, Pensacola, FL	

Cost Proposal Number:	Facility Name:
36	Circle K Store No. 8261

Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:

I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Mr. Scott Janashak - Environmental Manager
Email address:	sjanasha@circlek.com
Date:	7-1-2020

I.8 Cost Proposal- Contractor Signature:

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	6/30/20

I.9 Trust Fund Obligation Information:

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	$750,000.00
Total of Previously Approved Cost Proposals:	$468,655.66
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	$500,654.06
Estimate Percent Completion of entire project to date:	67%

I.10 Cost Proposal Amount

Proposed Costs under this Cost Proposal:	**$31,998.40**	**Personnel**	**$8,668.90**
		Field Equipment	**$1,029.00**
Owners Required Contribution for UST Release($5,000): *Applicable for CP#1 Only*		**Mileage**	**$276.00**
		Per Diem	**$0.00**
		Drilling	**$0.00**
Owners Required Contribution for AST Release($10,000): *Applicable for CP#1 Only*		**Analytical**	**$1,688.50**
		Other	**$20,336.00**
Total of This Cost Proposal:	**$31,998.40**		

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$31,998.40	23413-097-000304	36	UST14-09-03	Circle K Store No. 8261

Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal

Scenarios	Unit $	Units	Quantity	Requested$
SEMR - Ozone, AS, SVE, Chemox, Biosparge - Reports				
1-12 wells, BTEX/MTBE/Naphthalene	$4,371	/report	1	$4,371.00
SEMR adder >12 wells, BTEX/MTBE/Naph	$37.50	/well	7	$262.50
Total Report and Plan Costs				**$4,633.50**

Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal

Groundwater Sampling Set-up (2hrs tech time)	$126.00	/sow	1	$126.00
Purge/Development Water Handling (see Basis)	$94.50	/sow	1	$94.50
Groundwater Sampling and Gauging 2" Well	$63.00	/well	15	$945.00
Groundwater Sampling and Gauging 4" Well	$72.45	/well	2	$144.90
Sample Private Well	$94.50	/well	2	$189.00
Ozone, biosparge, SVE, biovent and Air Sparge O&M 3 months	$1,928	/quarter	1	$1,928.00
Travel				
Mileage Rate			$0.575	
Mileage (One way office to site)			30	
Number of round trips to site			8	$276.00
Technician(s)-travel time	$63	/hr	8	$504.00
Project Manager-travel time	$104	/hr	1	$104.00
Equipment and Equipment Kits				
55-Gallon Drums	$50	/drum	2	$100.00
Sampling Expendables(gloves, ice, string, jars, foil, distilled water, paper towels,	$50	/sow	1	$50.00
Expendables O&M	$25	/day	6	$150.00
Groundwater Monitoring	$160	/day	1	$160.00
Bailers	$7	/bailer	17	$119.00
Ozone Sparge O&M	$75	/day	6	$450.00
Postage / Shipping and Copying (plans reports, ADEM and owner)	$85	/sow	1	$85.00

Analytical Samples

	Method			Pass Through	Sample #	
BTEX/MTBE/Naph (water)	8260	$65	/sample	10%	17	$1,215.50
VOC Water Supply	524.2	$150	/sample	10%	2	$330.00
Other	QAQC	$65.00	/sample	10%	2	$143.00
Total Field Costs						**$7,113.90**

Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal

Total Drilling Costs	**$0.00**

Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$31,998.40	23413-097-000304	36	UST14-09-03	Circle K Store No. 8261

	Pass Through	Quoted Amoun	Requested$
Corrective Action System Rental	10%	$15,000.00	$16,500.00
Phone Costs (telemetry)	10%	$250.00	$275.00
Power Costs	10%	$3,000.00	$3,300.00
Water Treatment/Disposal	10%	$160.00	$176.00
Total Subs / Vendors / Utilities			**$20,251.00**

APPENDIX N – COST PROPOSAL NO. 37 – THIRD QUARTER O&M

Alabama Tank Trust Fund
Cost Proposal
Part I

I.1 Cost Proposal Information:

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
37 OM3	6/30/2020
UST or AST Incident Number:	Facility I.D. Number:
UST14-09-03	23413-097-000304

I.2 Facility Information

Facility Name:	Circle K Store No. 8261
Facility Address:	928 Telegraph Road Prichard, Alabama

I.3 Owner Information:

Owner Name:	Circle K Stores, Inc.
Owner Address:	25 West Cedar Street, Suite 100 Pensacola, Florida 32502
Employer Tax Number (IRS):	74-1149540

I.4 Response Action Contractor Information:

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-266-7915
Project Contact E-mail:	rodney.kilgore@ppmco.com
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number: 37

Facility Name: Circle K Store No. 8261

I.5 Activity Information:

	Indicate below the activities for which the cost proposal is submitted:
	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
	Develop Corrective Action Plan
X	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

Activities/Other/Brief Summary of Activities:

Operate ozone sparge system for three months and collect 17 GW samples, 2 private well samples, & 2 QAQC.

Provide proposed completion date for this phase of work activities:

30 days following end of O&M period

Provide projected date of cleanup completed:

Unknown

I.6 Subcontractor Information:

Indicate Subcontractors to be used during this phase of work:

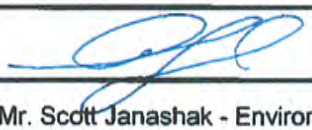
Name & Address	Service Provided
TestAmerica Laboratories, Inc.	Analytical
3355 McLemore Drive, Pensacola, FL	
Erwin Remediation, Inc.	Disposal
408 Ditmar Street, Pensacola, FL	

Cost Proposal Number:	Facility Name:
37	Circle K Store No. 8261

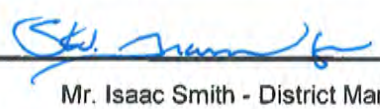
Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:

I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Mr. Scott Janashak - Environmental Manager
Email address:	sjanasha@circlek.com
Date:	7-1-2020

I.8 Cost Proposal- Contractor Signature:

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	6/30/20

I.9 Trust Fund Obligation Information:

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	$750,000.00
Total of Previously Approved Cost Proposals:	$500,654.06
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	$532,652.46
Estimate Percent Completion of entire project to date:	71%

I.10 Cost Proposal Amount

Proposed Costs under this Cost Proposal:	**$31,998.40**	**Personnel**	**$8,668.90**
		Field Equipment	**$1,029.00**
Owners Required Contribution for UST Release($5,000): *Applicable for CP#1 Only*		**Mileage**	**$276.00**
		Per Diem	**$0.00**
		Drilling	**$0.00**
Owners Required Contribution for AST Release($10,000): *Applicable for CP#1 Only*		**Analytical**	**$1,688.50**
		Other	**$20,336.00**
Total of This Cost Proposal:	**$31,998.40**		

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$31,998.40	23413-097-000304	37	UST14-09-03	Circle K Store No. 8261

Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal

Scenarios	Unit $	Units	Quantity	Requested$
SEMR - Ozone, AS, SVE, Chemox, Biosparge - Reports				
1-12 wells, BTEX/MTBE/Naphthalene	$4,371	/report	1	$4,371.00
SEMR adder >12 wells, BTEX/MTBE/Naph	$37.50	/well	7	$262.50
Total Report and Plan Costs				**$4,633.50**

Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal

Groundwater Sampling Set-up (2hrs tech time)	$126.00	/sow	1	$126.00
Purge/Development Water Handling (see Basis)	$94.50	/sow	1	$94.50
Groundwater Sampling and Gauging 2" Well	$63.00	/well	15	$945.00
Groundwater Sampling and Gauging 4" Well	$72.45	/well	2	$144.90
Sample Private Well	$94.50	/well	2	$189.00
Ozone, biosparge, SVE, biovent and Air Sparge O&M 3 months	$1,928	/quarter	1	$1,928.00
Travel				
Mileage Rate			$0.575	
Mileage (One way office to site)			30	
Number of round trips to site			8	$276.00
Technician(s)-travel time	$63	/hr	8	$504.00
Project Manager-travel time	$104	/hr	1	$104.00
Equipment and Equipment Kits				
55-Gallon Drums	$50	/drum	2	$100.00
Sampling Expendables(gloves, ice, string, jars, foil, distilled water, paper towels,	$50	/sow	1	$50.00
Expendables O&M	$25	/day	6	$150.00
Groundwater Monitoring	$160	/day	1	$160.00
Bailers	$7	/bailer	17	$119.00
Ozone Sparge O&M	$75	/day	6	$450.00
Postage / Shipping and Copying (plans reports, ADEM and owner)	$85	/sow	1	$85.00

Analytical Samples

	Method			Pass Through	Sample #	
BTEX/MTBE/Naph (water)	8260	$65	/sample	10%	17	$1,215.50
VOC Water Supply	524.2	$150	/sample	10%	2	$330.00
Other	QAQC	$65.00	/sample	10%	2	$143.00
Total Field Costs						**$7,113.90**

Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal

Total Drilling Costs	**$0.00**

Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal

Cost Proposal Summary

CP Total	Facility I.D. #	CP #	Incident Number	Site Name
$31,998.40	23413-097-000304	37	UST14-09-03	Circle K Store No. 8261

	Pass Through	Quoted Amoun	Requested$
Corrective Action System Rental	10%	$15,000.00	$16,500.00
Phone Costs (telemetry)	10%	$250.00	$275.00
Power Costs	10%	$3,000.00	$3,300.00
Water Treatment/Disposal	10%	$160.00	$176.00
Total Subs / Vendors / Utilities			**$20,251.00**

Simplifying the Complex

ppmco.com