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By Alameda County Environmental Health 11:44 am, Mar 28, 2017

March 27, 2017
RRM Project # IA605

Mr. Mark Detterman
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Re: ***Standard Protocols, Vapor Sampling Locations and Intervals, and Draft Notification Documents***
Former Four Seasons Cleaners
13778 Doolittle Drive
San Leandro, California

Dear Mr. Detterman:

This document, prepared by RRM, Inc. on behalf of Marina Faire Shopping Center, presents standard field procedures for collecting soil vapor, sub-slab vapor, indoor air, soil, and groundwater samples as well as excavation procedures (Attachment A); the revised draft fact sheet prepared for the site with communication of air monitoring and controls during remediation work (Attachment B); and a sample site health and safety plan for the proposed remediation work (Attachment C).

Should you have any questions regarding the contents of this document, please call RRM at (831) 475-8141.

Sincerely,
RRM, Inc.

Julie Avanto

REGISTERED PROFESSIONAL ENGINEER
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Attachments: Attachment A – Standard Field and Laboratory Procedures
Attachment B – Draft Fact Sheet
Attachment C - Sample Site Health and Safety Plan

A

STANDARD FIELD AND LABORATORY PROCEDURES

ATTACHMENT A

STANDARD FIELD AND LABORATORY PROCEDURES

FIELD PROCEDURES

CPT Boring and Soil and Groundwater Sampling

Soil borings are advanced using a Cone Penetrometer Test (CPT) rig. CPT is a direct-push technology using hydraulics to advance a cone-tipped steel rod into the ground. The cone is just under 1.75-inches in diameter, and is fitted with electronic strain gauges that measure the load on the cone tip and the friction on the metal sleeve just behind the cone as the cone and rod are pushed into the ground. The cone is also fitted with a port, just behind the tip, connected to a pore-pressure transducer. The three parameters; cone bearing load, sleeve friction, and pore-water pressure, are measured and recorded continuously as the cone is advanced. Through known relationships between the parameters, the soil behavior type and stratigraphic interpretation may be inferred. All CPT data are recorded inside the rig and soil lithology and chemical detector responses are plotted in the field upon completion of each boring.

Soil samples are collected for lithologic description and chemical analysis by advancing a 1.5-inch diameter core sampler with either 48-inch or 24-inch long acetate liners into undisturbed soil during drilling. The sample intervals retained for chemical analysis are capped with Teflon® tape and plastic end caps, placed in sealed plastic bags, labeled, logged onto a chain-of-custody document, and stored on ice pending transport to a laboratory certified by the state of California using appropriate chain-of-custody documentation.

Groundwater samples are obtained by driving a Hydropunch®-type sampling tool to target depths based on soil behavior type and stratigraphy using the CPT rods. Upon reaching the target depth the rods are withdrawn slightly, exposing a screen just behind the tool tip that allows groundwater to enter the hollow center of the rods. A small diameter bailer is used to retrieve the sample through the CPT rods. The groundwater sample is transferred to an appropriate container, sealed, labeled, and stored on ice pending transport to the laboratory. Upon completion of boring and sampling, cement grout is pumped into each borehole under positive pressure as the boring tools are withdrawn to ensure that cross-contamination through the CPT borehole is minimized.

Direct-Push Soil Boring and Soil and Groundwater Sampling

Direct-push soil borings are installed using the Geoprobe® Dual Tube Soil Sampling System to the target depth. A large bore sampler equipped with a 24-inch long acetate liner is used to core and sample soil continuously to the desired depth. The acetate liners containing the soil core are withdrawn from the borehole and the soil contained within is logged by a field geologist using the Unified Soil Classification System and standard geologic techniques. In addition, based on field observations such as moisture content, changes in lithology, changes in color and evidence of contamination a segment of the liner containing a soil core is preserved as a soil sample for chemical analyses. Samples are sealed with Teflon tape, plastic end caps, appropriately labeled, and placed into chilled storage. Sampling and drilling equipment is cleaned with tri-sodium phosphate prior to and between uses.

Where groundwater is encountered, a grab groundwater sample is collected by lowering a small diameter, stainless steel bailer into each borehole. Groundwater collected into the bailer is transferred directly into EPA-approved sample containers appropriate for the analytical methods required for the investigation. Upon completion of drilling and sampling each borehole is backfilled to the surface using neat cement.

Groundwater Monitoring and Remediation Well Installation

Groundwater monitoring wells are permitted and installed in accordance with state and local guidelines using a subcontracted state licensed driller. Soil borings are drilled using 8- to 10-inch diameter hollow-stem augers to the target depth. An RRM, Inc. geologist logs the borings from soil samples and auger cuttings. Under the direction of a State of California Professional Geologist, descriptive information denoted on the boring logs includes soil and groundwater information and well installation data. Drilling and sampling equipment is steam-cleaned or cleaned with tri-sodium phosphate prior to and between uses.

Soil samples for logging purposes and possible chemical analysis are collected at 5-foot depth intervals, changes in lithology, and or based on conditions encountered in the field. Soil samples for chemical analyses are collected from 2-inch diameter split-spoon samplers equipped with 6-inch brass liners. The brass liners are capped with Teflon, plastic end caps, and placed in sealable plastic bags. The brass liners are then stored in iced coolers and transported to a state certified laboratory, with chain-of-custody documentation.

Groundwater monitoring wells are constructed to monitor the water-bearing strata and remediation wells are constructed to influence contaminated intervals. Well construction information is denoted on the boring logs in the field. Well construction materials consist of 1- to 4-inch diameter flush-threaded Schedule 40 PVC casing with factory-slotted screen and sand pack materials selected based on site conditions, a bentonite and cement grout surface seal, and a locking cap and protective vault box or stovepipe.

The well screen extends from the bottom of each boring to a depth based on site conditions with solid casing extending to the ground surface. The sand pack is then placed from the bottom of each boring to approximately 6-inches above the upper limit of the well screen. A 6-inch thick bentonite seal is then placed on top of the sand pack, with cement grout placed on top of the bentonite seal extending to the ground surface. Traffic proof well vault boxes are then placed over the wells. After well completion, well elevations and locations were surveyed relative to an established datum by a licensed surveyor.

Field Screening

Soil samples collected during boring activities are screened in the field for volatile organic compounds using a photo-ionization detector (PID). The procedure consists of obtaining approximately 30 grams of soil and placing it into a clean container. The container is warmed for 20 minutes and the headspace within the container is measured for VOCs, in parts per million by volume (ppmv).

Well Development/Groundwater Sampling

Development of newly constructed wells is performed utilizing surge block/swab and groundwater extraction techniques. Well development is performed until the majority of suspended fines were removed or until approximately ten casing volumes were removed. Well development documentation consists of recording data including: time, groundwater and total well depth, turbidity, gallons removed, and well stabilization parameters (pH, conductivity, temperature). Development and purge waters are stored on site in 55-gallon drums pending proper disposal at a State-licensed facility. Well seals are allowed to cure at least 48-hours prior to development. Groundwater sampling procedures consist of initially measuring and documenting the water level in the well. Each well is then purged a minimum of three casing volumes or until dry. During purging, well stabilization parameters (temperature, pH, and electrical conductivity) were monitored. After 80% recovery of the water levels, a groundwater sample is collected with a new disposable bailer and placed into the appropriate EPA-approved containers. Sampling equipment is cleaned with tri-sodium phosphate and rinsed with clean water between uses. The samples are labeled and transported under iced storage to the laboratory using appropriate chain-of-custody documentation.

Sub-Slab and Soil Vapor Sampling

Sub-Slab and soil vapor sampling are conducted using the October 2011, *Vapor Intrusion Guidance Document* prepared by the State of California Department of Toxic Substances Control (DTSC) and July 2015, *Advisory – Active Soil Gas Investigations* prepared by DTSC and Regional Water Quality Control Board – Los Angeles.

To collect sub-slab and soil vapor samples, soil vapor monitoring points are driven to depths approximately 12 inches and 5 feet below the surface of the concrete slab. A vapor probe with a permeable probe tip attached to Teflon™ tubing is placed in the hole at the target sampling depth and sand pack is placed around and above the permeable probe tip. An approximate 6-inch to 1-foot thick layer of dry bentonite chips is placed in the annular space above the sand pack or to above the base of

the slab for sub-slab samples; hydrated bentonite is placed above the dry bentonite and water is added at the surface for a proper seal. The probes are constructed with a gas-tight fitting that is flush to the slab. For sub-slab samples, Entech Slab-Tight™ sub-slab samplers may also be used. Sampling occurs at least two hours after probe installation.

The sampling procedure entails drawing a soil vapor sample through the probe, Teflon™ tubing, and into a sample manifold. The sample manifold is outfitted with Swagelok-type valves, vacuum pressure gauges, a one-liter Summa™ sample canister, and six-liter Summa™ purge canister. A default of three purge volumes is used. The sampling flow rate is maintained at a rate between 100 millimeters/minute and 200 milliliters/minute. During sampling, helium is used as a tracer to test for leaks. This is accomplished by placing a shroud over the wellhead and sampling manifold, and filling the enclosed space with a mixture of helium and air.

Indoor Air Sampling

Indoor air sampling is conducted using the Department of Toxic Substances Control October 2011 *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance).* Indoor air samples are collected over an 8-hour period during daytime hours. The samples are collected in the center of the room away from doors and at heights similar to the breathing zone (approximately 3 to 5 feet above the floor), to the extent practical. One ambient outdoor background sample is collected concurrently with the indoor samples in an upwind location, from a height of approximately 6 feet from the ground surface, at a distance equal to at least approximately twice the height of the building, and away from any potential contamination sources or trees.

The indoor air samples are collected using 6-liter evacuated Summa® canisters that are pre-cleaned and supplied by a California-certified analytical laboratory; each of the canisters are equipped with a flow controller, particulate filter, and vacuum gauge. The flow controller on the canister is preset by the laboratory to collect an integrated 5-liter air sample at standard atmospheric conditions over a period of approximately 8 hours. After placement of the canister in the sampling location, air sampling is initiated by opening the valve on the canister. Sample collection times, vacuum readings, and gauge numbers are recorded in the field.

Remediation Excavation

Control Measures: To reduce the generation of dust and fumes, efforts are made to limit the handling of the excavated soil. All contaminated soil not immediately being handled, moved, or transported is kept covered with plastic sheeting. This includes soil staged inside the building or inside of any bins or dumpsters. Soil under transport is covered with a tarp. In the event that nuisance conditions exist during excavation activities, water may be used to knock down excessive dust and/or vapors.

Engineering controls are implemented during backfill and excavation activities to minimize the potential for harmful vapors and odors to collect in the work zone or migrate to adjacent units. Duct fans are used to vent the inside of the building during construction activities. The intake sides of the duct fans are located near vapor or exhaust sources. The exhaust sides of the duct fans are routed outside the building to at least 8 feet above grade. At least one door or other opening remains open at each end of the building to facilitate airflow. In addition, larger flow fans are available to help circulate air through the workspace to prevent vapors or exhaust fumes from collecting inside the building or adjacent units. If equipment exhaust fumes are a problem, an exhaust hose is connected at the exhaust point of any equipment operating inside the building so that it will discharge outside the building.

Air Monitoring: Air monitoring is performed during work activities. The information obtained is used to make decisions about upgrading or downgrading personal protection equipment and/or implementing engineering controls. Air monitoring for VOCs focuses on concentrations of PCE, TCE, 1,1-DCE, vinyl chloride (VOCs) and CO since: 1) PCE is the dominant contaminant of concern, 2) 1,1-DCE and vinyl chloride have the most restrictive PELs, and 3) work is conducted in an enclosed space with combustion engines operating. Air monitoring criteria and action levels are presented in the following table.

Chemical of Concern	Monitoring Frequency	Action Level Cal-OSHA PEL	Actions
1) PCE, TCE 2) 1,1-DCE 3) Vinyl Chloride 4) CO	Beginning of tasks with potential for exposure and hourly afterward.	1.) PCE, TCE - 25 ppm 2.) 1,1-DCE - 1 ppm 3.) Vinyl Chloride - 1 ppm 4.) CO - 25 ppm	1) Require respiratory protection for workers in these areas. 2) Upgrade engineering controls to control dust 3) For CO, immediately move to fresh air; upgrade ventilation.

Air monitoring for VOCs is accomplished with direct-reading instrumentation (i.e. Mini-Rae photo-ionization detector [PID]). Detector tube samplers used to monitor for CO. The monitoring frequency is initially set as described above and evaluated as collected data are generated and may be revised as the project progresses. Air monitoring is conducted in the breathing zone throughout the work area and at the adjacent units. Additional excavation safety procedures are documented in the sample site health and safety plan presented in Attachment C.

Confirmation Soil Sampling: Soil samples are collected either directly from the excavation sidewall or from the excavator bucket; a clean 2-inch diameter 6-inch long stainless steel sample tube is driven into the soil in the target sampling area. The soil sample tubes are capped with Teflon® tape and plastic end caps, placed in sealed plastic bags, labeled, logged onto a chain-of-custody document, and stored on ice

pending transport to a laboratory certified by the state of California using appropriate chain-of-custody documentation.

LABORATORY ANALYTICAL METHODS

Selected soil and groundwater samples are submitted to a California state-certified laboratory and analyzed for halogenated volatile organic compounds (HVOCs) by EPA Method SW846 8260B. Sub-slab soil vapor samples are analyzed for HVOCs using EPA Method TO-15 Modified, and for helium, oxygen, carbon dioxide, and methane using American Society for Testing and Materials (ASTM) Modified D-1946. Indoor air samples are analyzed for HVOCs using EPA Method TO-15 Modified SIM.

B

DRAFT FACT SHEET

Fact Sheet on Interim Remedial Measures

Four Seasons Cleaners
13778 Doolittle Drive, San Leandro, CA Alameda County
ACEH File No. RO0003155
March 22, 2017

This fact sheet is being provided to describe site background, past work to investigate site contamination, next steps, the oversight process for the site, and how you can obtain more information.

Winter 2017

Summary

The Alameda County Environmental Health Department (ACEH) has requested this fact sheet be issued to inform you of recently completed investigations and proposed interim remedial measures at the Four Seasons Cleaners property (site), located at 13788 Doolittle Drive in San Leandro, California (Figure 1).

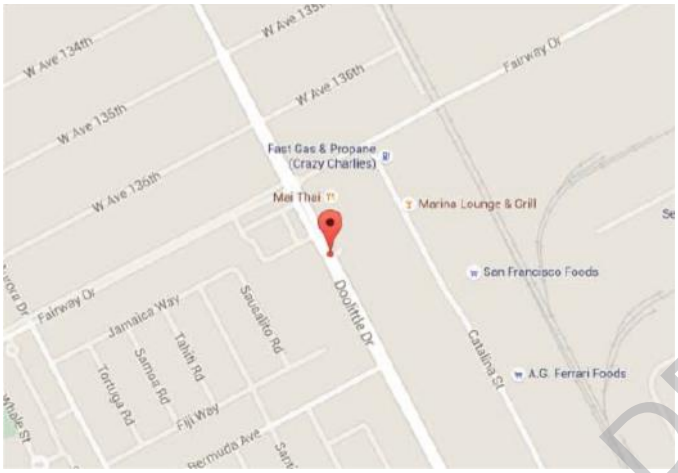

Figure 1

The purpose of the prior investigation work was to gather sufficient information on the nature and extent of contamination in environmental media including air, land and groundwater to the extent needed define the most heavily impacted areas (source areas) and the potential risks posed to indoor air and groundwater. The purpose of the proposed interim remedial measures (IRMs) is to mitigate risks to indoor air quality and groundwater by cleaning up the known source areas to the extent practicable. This fact sheet summarizes investigation results and the remedial measures proposed to mitigate risks to indoor air quality and groundwater. It also includes information contacts and a glossary of certain terms.

Background

The Former Four Seasons Cleaners site is situated within a commercial area of the Marina Faire Shopping Center in San Leandro, California. The subject site is located within a larger shopping mall located on the southeast corner of Fairway and Doolittle Drives, with multiple other operating businesses within suites of the facility. The subject site was a small retail dry-cleaner for 30 years or more that ceased operations and vacated the premises in late 2015. At that time the site housed a 55-gallon chemical capacity closed-loop dry cleaning machine, which was bolted to the floor. Prior to 2001, the dry cleaning operation utilized tetrachloroethylene (PCE) as the chlorinated solvent cleaning agent.

Environmental Investigation Activities

Environmental investigations have been performed at the site beginning in 2014; these investigations have included soil, soil vapor, and groundwater sampling to assess the type and extent of contamination at the site.

These investigations identified that volatile organic compounds (VOCs), primarily PCE, were accidentally released to the subsurface in the vicinity of the former machine and a nearby floor drain as a result of former dry cleaning operations at the site.

VOCs, primarily PCE and its breakdown products, have been detected in shallow soil, soil vapor, and groundwater directly underlying the former PCE use and storage areas. The data indicate that the highest concentrations of PCE in soil-vapor are located beneath the dry cleaning operation suite in the vicinity of the former floor drain. Concentrations of PCE in groundwater have also been detected in the parking lot in front of the facility to the west and southwest.

Concentrations reported in samples were found at concentrations greater than applicable regulatory agency screening levels. The presence of these chemicals at concentrations exceeding regulatory screening levels does not indicate that adverse impacts to human health or the environment are necessarily occurring, but rather indicates that a potential for adverse risk may exist and that additional evaluations and/or the implementation of conservative preventative measures are warranted.

Four Seasons Cleaners vacated the premises in late 2015. Between February and May 2016, twelve indoor air samples have been collected, two inside the former cleaners, and the rest in the units surrounding the former cleaners. The only samples containing detectable levels of PCE in indoor air were collected within the adjoining dentist office and are

suspected to have resulted from some PCE source within the dental unit. Because the levels were detected during two sampling events and were greater than applicable regulatory agency screening levels, the property owner retained a licensed contractor to increase air exchange rates in the dental office.

Next Steps/IRMS

The property owner has proposed the following conservative interim remedial measures which will be conducted pending County and in some cases City approval: (1) Detoxify the dry cleaning unit and legally close the permitted hazardous material storage areas pursuant to federal, state and local requirements including removal of certain areas of the slab and certain sewer lines previously used for storing/handling or receiving virgin and spent PCE and PCE laden wastes. (2) Remove and replace suspected secondary source areas to the extent practicable including the potentially contaminated slab area and underlying base-rock, and the impacted native soils from 2 to 7 feet from grade. (3) Install a horizontal vapor extraction well network centered in the known and suspected contaminated intervals for use in feasibility testing and likely future short-duration full scale remediation; (4) Install a protective sub-slab venting well network for use in mitigating vapor intrusion concerns during and, if needed, after implementation of active remediation taking advantage of the slab replacement over the entire suspected contaminated interval. (5) Delineate the Shallow and Deeper A-Zone Aquifer immediately southwest (down gradient) of the suspected source area. (6) Establish the gradient of the Shallow A-Zone and the vertical gradient between the Shallow and Deeper A Zones immediately southwest (down gradient) of the suspected source area. (7) Install sufficient air sparging wells, sub slab monitoring points, and shallow soil vapor monitoring wells for use in feasibility testing the soil vapor extraction (SVE) and sparging enhanced SVE (SESVE) processes on the basis they are generally considered and prove to be, at least in part, the most cost effective remedial options for concurrently mitigating PCE releases and addressing vapor intrusion concerns. (8) Conduct sufficient feasibility testing over up to 60 hours using a blower, compressor and drummed activated carbon to confirm the supposition that the above are the most cost effective options for mitigating residual PCE in impacted media and to establish design criteria for a full scale system. The protective effect of the sub slab venting system will be pilot tested at the same time. During the remedial excavation and pilot testing work, safeguards will be taken to ensure compliance with OSHA rules that serve to ensure the protection of workers and building tenants. Indoor air quality will be protected with temporarily increased ventilation rates using industrial fans and minimum hourly air monitoring with hand held meters throughout the former dry cleaner unit and at the adjacent tenant units. County approval is currently in place for all but item 8. A city building permit is needed for items 2 and 3.

Timeline

As noted above, substantial interim remediation and pilot test work is currently being planned. Fieldwork is tentatively planned for June through July 2017, and a report documenting the results will be completed by the end of the third quarter 2017. The site will be evaluated at this time to assess whether further remediation or mitigation are required to protect human health and the environment leading to the preparation of a formal remedial action plan (RAP).

How to Get More Information

There are several ways that interested parties will be informed of future work. First, information repositories are being established where reports, data, workplans, and other materials can be viewed. One is the Alameda County Environmental Health Department's website at http://www.acgov.org/aceh/index.htm, where the electronic files for the case are available on-line.

A second way interested parties can obtain information is to contact the site representatives/ spokespersons listed below.

For More Information

Please contact any of the following individuals with any questions or concerns you may have:

Mark Detterman, Senior Hazardous Materials Specialist, 510-567-6876, mark.detterman@acgov.org

Julie Avanto, PE, Lead Professional in Responsible Charge, RRM, Inc., 951-660-5991, julie@rrmsc.com

Brian Kelleher, Project Coordinator, Kelleher & Associates Environmental Mgmt LLC, 408-712-1214; bkellehr@ix.netcom.com

Glossary of Terms

Tetrachloroethylene —Tetrachloroethylene, commonly known as PCE, is a colorless organic liquid with a mild, chloroform-like odor. The greatest use of PCE is in the textile industry, and as a component of aerosol dry-cleaning products. It is a known human carcinogen.

Soil-vapor—Soil-vapor refers to the air that is present in the open spaces between soil particles between the ground surface and the water table. It includes air (primarily oxygen and nitrogen, like above ground), water vapor, and occasionally pollutants.

Volatile organic compounds (VOCs)—VOCs are organic liquids, including many common solvents that readily evaporate at temperatures normally found at ground surface and at shallow depths. Many VOCs are known human carcinogens. Examples of VOC usage include dry cleaning solvent, carburetor cleaner, brake cleaner, and paint solvents. If VOCs are chlorinated as is the case for PCE, they are called halogenated VOCs or HVOCs.

Interim remedial measures (IRMs) – these are active steps to mitigate gross pollution impacts that are devised and implemented prior to preparing a formal remedial action plan. They typical involve excavation and/or soil vapor extraction and serve the purpose of cleaning up near surface impacts that pose vapor intrusion risk or removing free phase contamination floating on the water table.

Soil vapor extraction (SVE) – a remediation process under which contaminated soil vapors are pulled from the ground using a vacuum pump that is connected to horizontal or vertical vapor extraction wells typically 4 inches in diameter that have screened intervals within the impacted soil that overlie impacted groundwater

Air sparging (AS) – a remediation process often used in conjunction with SVE under which highly compressed air is injected via 2-inch diameter wells screened for a short interval below the bottom of an impacted water bearing zone to cause volatile contaminants dissolved in the water to move from aqueous phase to vapor phase and migrate upward.

C

SAMPLE SITE HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN

Former Four Seasons Cleaners
13778 Doolittle Drive
San Leandro, California

Prepared by:
RRM, Inc.
2560 Soquel Avenue, Suite 202
Santa Cruz, California 95062

March 27, 2017

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1.0 INTRODUCTION

This Health and Safety Plan (HSP) describes procedures for protecting the public, personnel, and sub-contractors from hazards associated with work activities at the site. A copy of this HSP shall be made available to each person working on the site during excavating, backfilling, and drilling procedures to inform those of the hazards associated with working at the site. The provisions established in this document are applicable to all personnel and sub-contractors working on the property.

Relevant sections of the following regulatory guidelines have been incorporated into this HSP:

- California Occupational Safety and Health Administration (Cal-OSHA), Title 8 California Code of Regulations (CCR), Chapter 4, Subchapter 7, *General Industry Safety* Orders;
- Cal-OSHA 8 CCR, Chapter 4, Subchapter 4, *Construction Safety Orders;*
- Cal-OSHA, 8 CCR Section 3203.1, *Illness and Injury Prevention*

2.0 PROJECT SAFETY AUTHORITY

A. ON-SITE PROJECT SAFETY

Personnel responsible for the project safety are:

Matt Paulus - Project Safety Officer (RRM, Inc.)

Robert Giattino - Company Safety Officer (RRM, Inc.)

The Project Safety Officer and the Company Safety Officer have the authority to upgrade or downgrade the provisions of this Site Safety Plan as site conditions change. In addition, the Project Safety Officer shall be responsible for the following:

- Safety Supplies & Equipment Inventory for the Project Site
- Accident/Incident Reporting
- Decontamination/Contamination Reduction Procedures.

B. RRM SAFETY OFFICER

The Company Safety Officer is responsible for assuring on-site safety and loss prevention functions. These responsibilities include:

- Health surveillance of all RRM employees.
- Assuring that safety procedures in effect are in compliance with all appropriate federal, state, and company regulations.
- Maintenance of personnel exposure monitoring records.
- Assuring appropriate personal protective equipment is adequate for actual hazards of on-site conditions.

- Assuring appropriate exclusion areas are identified and delineated.

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3.0 HAZARD ANALYSIS

3.1 CHEMICAL HAZARDS

PCE and TCE are present in soil, groundwater, and soil gas at the site. Additionally, breakdown products of PCE may also be present at the site. The sum of PCE, TCE, and associated breakdown products are characterized and measured in the field as volatile organic compounds (VOCs). Work will be performed in an enclosed space with equipment powered using internal combustion engines; consequently, carbon monoxide (CO) may be present. A brief description of each compound is listed below; Material Safety Data Sheets (MSDS) are included in Appendix A for PCE and CO.

3.1.1 1,1-Dichloroethylene (1,1-DCE)

Also known as vinylidene chloride, 1,1-DCE is a volatile colorless liquid with a mild, sweet, chloroform-like odor. The vapor is heavier than air and may travel along the ground in the downgradient direction. Exposure routes for 1,1-DCE are inhalation, skin absorption, ingestion, skin and/or eye contact. 1,1-DCE can irritate the eyes, skin, or throat. 1,1-DCE can cause dizziness, headache, nausea, and breathing difficulty. Ingestion may cause aspiration into the lungs with the risk of chemical pneumonitis. 1,1-DCE can cause liver or kidney disturbance and is listed by the National Institute of Occupational Safety and Health (NIOSH) as a potential occupational carcinogen. The International Agency for Research on Carcinogens (IARC) provides 1,1-DCE with a rating of 1, a known human carcinogen. The Cal-OSHA Permissible Exposure Limit (PEL) for 1,1-DCE is 1 part per million (ppm).

3.1.2 1,2-Dichloroethylene (1,2-DCE)

1,2-DCE is a volatile colorless liquid with a slightly acrid, chloroform-like odor. The vapor is heavier than air and may travel along the ground in the downgradient direction. Exposure routes for 1,2-DCE are inhalation, ingestion, skin and/or eye contact. 1,2-DCE can irritate the eyes, respiratory system or can cause central nervous system depression. The Cal-OSHA PEL for 1,2-DCE is 200 ppm.

3.1.3 Tetrachloroethylene (PCE)

PCE is a volatile colorless liquid with a mild chloroform-like odor. The vapor is heavier than air and may travel along the ground in the downgradient direction. Exposure routes for PCE are inhalation, skin absorption, ingestion, skin and/or eye contact. PCE can irritate the eyes, skin, nose, throat, or respiratory system. PCE can cause nausea, flush face and neck, dizziness, incoordination, headache, drowsiness, skin redness, and liver damage. NIOSH designates PCE as a potential occupational carcinogen, and PCE is rated by the IARC to be a probable human carcinogen. The Cal-OSHA PEL for PCE is 25 ppm.

3.1.4 1,1,1-Trichloroethane (TCA)

TCA is a volatile colorless liquid with a mild chloroform-like odor. The vapor is heavier than air and may travel along the ground in the downgradient direction. Exposure routes for TCA are inhalation, ingestion, skin and/or eye contact. TCA can irritate the eyes or skin, and can cause headache, weakness, central nervous depression, poor equilibrium, dermatitis, cardiac arrhythmias, and liver damage. The Cal-OSHA PEL for TCA is 350 ppm.

3.1.5 Trichloroethene (TCE)

TCE is a volatile colorless liquid with a mild chloroform-like odor. The vapor is heavier than air and may travel along the ground in the downgradient direction. Exposure routes for TCE are inhalation, skin absorption, ingestion, skin and/or eye contact. TCE can irritate the eyes or skin, and can cause headache, visual disturbance, weakness, dizziness, tremor, drowsiness, nausea, vomiting, dermatitis, cardiac arrhythmias, parasthesia, and liver damage. NIOSH indicates that TCE is a potential occupational carcinogen, and PCE is rated by the IARC to be a probable human carcinogen. The Cal-OSHA PEL for TCE is 25 ppm.

3.1.6 Vinyl Chloride (VC)

VC is a colorless gas with a pleasant odor at high concentrations. The vapor is heavier than air and may travel along the ground in the downgradient direction. Exposure routes for VC are inhalation, skin and/or eye contact. VC can cause weakness, abdominal pain, gastrointestinal bleeding, enlarged liver, and pallor or cyanosis of extremities. NIOSH indicates that PCE is a potential occupational carcinogen and PCE is rated by the IARC to be a known human carcinogen. The Cal-OSHA PEL for PCE is 1 ppm.

3.1.7 Carbon Monoxide (CO)

CO is a colorless and odorless gas with a vapor density equal to air. The exposure route for CO is inhalation. CO is an asphyxiate, and low levels in air may impair reaction time or sensory perception. Because of the affinity for hemoglobin, even small amounts can pose a serious hazard. The Cal-OSHA PEL for CO is 25 ppm.

3.2 PHYSICAL HAZARD EVALUATION

The primary physical hazards potentially associated with the site are expected to include:

1. Heat Stress,
2. Drilling and Excavation Equipment,
3. Miscellaneous Small Equipment,
4. Noise,
5. Open Excavation,
6. Work Area, and
7. Fire.

3.2.1 Heat Stress

All on-site personnel must be familiar with the symptoms of heat stress, and the conditions during which it may occur. Heat stress symptoms may include nausea, headache, lightheadedness, lack of coordination, or slurred speech. The use of protective clothing greatly enhances the likelihood of heat stress. Where site conditions warrant, the Site Safety Officer (SSO) will monitor for heat stress and, if necessary, implement work/rest regimens. Potable water and/or an electrolyte replacement fluid such as Gatorade will be available on-site at all times.

3.2.2 Drilling and Excavation Equipment

Drilling and excavation equipment will be used during the soil investigation and remediation at the site. Hazards include falling and tipping objects, equipment movement, rotating equipment, drive belts, motors, compressed cylinders, control lines, pneumatic and hydraulic equipment, and noise. On-site personnel will be made aware of the presence of equipment, incidental hazards, and the hazards of working around such equipment. Communication between equipment operators and other on-site personnel will be emphasized. Standard construction hand signals will be used when noise or distance considerations preclude the ability to hear equipment operator instructions.

3.2.3 Miscellaneous Small Equipment

Equipment such as steam cleaners, air compressors, pressure washers, hand tools, and machines may be operated within the work area. Hazards include those identified for drilling and excavation equipment, and the potential for punctures while handling small tools and equipment. Mitigation of hazards associated with small equipment and tools will be accomplished in large part by operating in accordance with the manufacturer's recommended safe practices.

3.2.4 Noise

Work around heavy equipment always entails the possibility of excessive noise. When readings consistently exceed 80 A-weighted decibels (dBA), or exceed 130 dB for impact noise, hearing protection will be required. Workers on site can readily recognize excessive noise when they have difficulty in hearing verbal communication at approximately an arms length. The type of hearing protection worn will depend upon the noise levels, the consistency of the noise source, and the Noise Reduction Rating of the hearing protection devices available.

3.2.5 Open Excavation

As part of the excavation procedure, there will be periods where the excavation will be left open while waiting for backfill. Up to ten (10) excavation bores may be open before backfilling begins. Open excavation boreholes constitute significant tripping hazard and require awareness of clear pathways for movement. While open, excavation boreholes shall be covered using ¾-inch plywood at all times. No excavation boreholes shall be left open overnight.

3.2.6 Work Area

Good housekeeping practices will be exercised in all work areas to minimize hazards associated with tripping, slipping, or contacting dangerous equipment or chemicals. Cleared walkways and safety zones are required in all areas where employees are working.

3.2.7 Fire

Appropriate measures will be taken to reduce the fire risk through observation of the work activities, good housekeeping, and through maintenance of adequate fire-fighting equipment, including ABC fire extinguishers. Appropriate fire extinguishers are required to be readily available on all work sites.

4.0 HAZARD MITIGATION

4.1 GENERAL FIELD SAFETY

1. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of materials is prohibited in any area where the possibility of contamination occurs.
2. Hands must be thoroughly washed upon leaving a contaminated or suspected contaminated area.
3. Legible and understandable precautionary labels shall be prominently affixed to containers of raw materials, intermediates, products, mixtures, scrap, waste debris, and contaminated clothing.
4. Contaminated protective equipment shall not be removed from the regulated area until it has been cleaned or properly packaged and labeled.
5. Removal of materials from protective clothing or equipment by blowing, shaking, or any other means, which may disperse materials into the air, is prohibited.
6. Personnel on-site must use the “buddy” system when wearing any respiratory protective devices. Communications between members must be maintained at all times. Emergency communications shall be pre-arranged in case of encountering unexpected situations. Visual contact must be maintained between pairs on-site; each team should remain in close proximity to assist each other if necessary.
7. Personnel shall be cautioned to inform each other of subjective symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract.
8. Contact with soil, surface water, and groundwater shall be minimized.
9. Gross decontamination and removal of all personal protective equipment shall be performed prior to exiting the job site.

4.2 TRENCH AND EXCAVATION SAFETY

1. A Cal-OSHA Competent Person is required to be at the site during all excavation operations where open excavations exist.
2. Open excavation boreholes shall be covered at all times using ¾-inch plywood.
3. Identification of underground utilities shall be performed prior to any excavation.
4. Where excavations are deeper than 5 feet, entry shall not be permitted.
5. Spoils piles, equipment, and tool storage shall be located well back from the edge of excavations to avoid a surcharge on the edge of the excavation.
6. A spotter shall be used if equipment operators cannot see the edge and full depth of the excavation.
7. Water spray shall be applied to the active work areas to reduce dust and minimize fugitive dust emissions.
8. Equipment operators shall be instructed to keep drop heights to a minimum when moving contaminated soils.

4.3 HEAVY EQUIPMENT SAFETY

1. Overhead and underground utilities shall be identified prior to work.
2. The equipment shall be inspected daily.
3. Dust control protocols shall be followed during work.
4. Safety equipment shall include fire extinguishers, seat belts, backup alarms, and over protection.
5. Safety procedures shall include traffic management, spotters, safe operation, and safe equipment mounting and dismounting.
6. All employees shall be clear of equipment before starting. Equipment operators shall perform a complete walk around inspection before starting equipment.
7. All engines shall be shut down prior to refueling.
8. No adjustments, cleaning, or repairs shall be made to equipment while the equipment is running. All exposed gears, sprockets, chain drives, and belt and pulley drives shall have guards replaced directly following repairs, lubrication, cleaning or similar operations.
9. Only trained employees are permitted to operate equipment.
10. All vehicle wheels shall be kept on the ground during loading.
11. No eating, reading, or other distractions are allowed while engaged in the operation of heavy equipment. Equipment shall not be operated if the operator is physically unfit to do so.

12. Clearances shall be checked when working near electrical wires, guy lines, and structures. Avoid contact of drill rig booms with the cable lines, electrical wires, and structures. Equipment booms shall not operate within 10 feet of high voltage overhead power lines.
13. Operators shall inspect equipment daily to ensure that it is in good working order, and all safety equipment is operational. This includes brakes, horn, alarms, etc.
14. An appropriately sized and rated fire extinguisher shall be readily available whenever gasoline/diesel operated equipment is in use.
15. Load limits of the equipment shall be strictly observed.
16. The operator shall be the only person allowed on the equipment.
17. Compressed air hoses and connections require careful handling. All hoses shall be secured to prevent whipping. Carefully inspect all hoses for signs of wear, crimping, or worn connections prior to use.

4.4 GEOLOGIC FIELD SAFETY

1. The minimum protective clothing requirements for drilling and excavation operations are work clothes, hard hats, steel-toed boots, safety glasses, and protective gloves. Other safety gear may be required and must be available on site.
2. The first four to five feet of borings must be hand augured and the bottom and sides of the borings must be proved to avoid contact with underground utilities.
3. Ear protection shall be worn as necessary in the vicinity of the operating rig.
4. The work site must be kept in an orderly and organized fashion. Replace tools, supplies, and equipment to designated storage areas.
5. Existing utilities on the site must be avoided in the process of normal site work. Notify Underground Service Alert (800/642-2444) prior to performing subsurface work.
6. Overhead power lines that may be located at the site present a potential for electrical contact. A minimum distance of ten feet from power lines will be maintained at all times.
7. Barricades and cones shall be employed to delineate a safe work area in high traffic areas.

4.5 CONSTRUCTION MANAGEMENT SAFETY

1. The minimum protective clothing requirements are work clothes, hard hats, steel-toed boots, and safety glasses. Other safety gear may be required and must be available on site.
2. Shallow portions of excavations must be dug carefully and/or by hand. Supervisors must carefully watch for signs of backfill or warning tape.
3. Movement of heavy objects must be accomplished using mechanical or personnel assistance.
4. Ear protection will be worn as necessary in the vicinity of the operating equipment.

5. The work site must be kept in an orderly and organized fashion. Replace tools, supplies, and equipment to designated storage areas.
6. Utilize barricades and cones in order to delineate a safe work area in high traffic areas.
7. Wear reflective vests when working in high traffic areas.
8. A high degree of safety awareness is required when working with heavy machinery or in high traffic areas. Awareness of ever changing site conditions is critical to site safety.
9. Existing utilities on the site must be avoided in the process of normal site work. Notify Underground Service Alert (800/642-2444) prior to performance of subsurface work.
10. Overhead power lines that may be located at the site present a potential for electrical contact. A minimum distance of ten feet from power lines will be maintained at all times.
11. Maintain eye contact with backhoe or tractor operator at all times.
12. Be aware of soil stability at all times.
13. Secure the excavation at the end of each shift.

4.6 USE OF BARRICADES/WARNING SIGNS

1. Approved warning signs, barriers, guards, flags, "Men at Work" signs, flares, and lights and night, shall be installed and properly maintained whenever hazards exist due to construction work along surface streets.
2. Such warnings shall be placed immediately at the point of excavations, obstructions, or other hazards. In addition, they shall be placed sufficiently far in advance and to the rear of the operations to provide adequate notice and warning to approaching motorists and pedestrians.
3. All signs used during hours of darkness shall be reflectorized or illuminated. Where there is a serious interference from extraneous light sources and a reflectorized installation is not likely to give effective performance, and illuminated sign shall be used.
4. Signs shall be placed in positions where they will convey their messages most effectively. Placement, therefore, must be accommodated to highway design and alignment. Signs shall be so placed that the driver will have adequate time for response.
5. As a general rule, signs shall be located on the right-hand side of the street, or roadway. Where special emphasis is deemed necessary, dual installations may be made which will consist of duplicate signs opposite each other on the left and right sides of the roadway, respectively. Within a construction or maintenance zone, it is often necessary and/or desirable to erect signs on portable supports placed within the roadway itself. It is also permissible to mount appropriate signs on barricades.
6. Standards for height and lateral clearance of roadside signs shall be in accordance with local and state law. Signs mounted on barricades, or temporary supports, may be at lower heights,

but the bottom of the sign shall be not less than one foot above the pavement elevation. Higher mounting heights are desirable.

7. Conditions of pedestrian or vehicular traffic may require an employee to be stationed to warn traffic. If additional control of traffic is necessary, request assistance from an appropriate agency such as the local police department.

4.7 FIRE AND EXPLOSION SAFETY

1. Vehicles and equipment will contain fire extinguishers as required by Cal-OSHA regulations. All contractors and subcontractors will locate additional 10-pound Type ABC Fire Extinguishers within the immediate work area, if required, so that the maximum travel distance does not exceed 75 feet.
2. Gasoline and diesel will not be used as a cleaning solvent or for any purpose other than to power vehicles or equipment.
3. Trash and debris will be kept to a minimum.
4. Emergency telephone numbers will be posted in all work areas.
5. All combustible or flammable materials brought on site will be stored in DOT and/or NFPA-rated containers. Quantities of these materials brought on site will be minimized.
6. Smoking will not be permitted in the restricted work areas. Smoking will be permitted in designated areas in the support zone only. Smoking will not be permitted near fuel storage areas or near similar potential fire hazards.

4.8 AIR MONITORING AND CONTROLS

Demolition and excavation work inherently dust generates dust. To reduce exposure to dust in the active business area, plastic sheeting will be hung in all openings to the work area (even openings with doors). In the workspace, ventilation will be enhanced with portable industrial fans and circulation will be maximized by opening the building's doorways and running the roof turbine fans.

Engineering controls will be implemented during site backfill and excavation activities to minimize the potential for harmful vapors and odors to collect in the work zone or migrate to adjacent properties. Specific controls will incorporate the following activities:

- Duct fans will be used to vent the inside of the building during construction activities. The intake sides of the duct fans will be located near vapor or exhaust sources. The exhaust sides of the duct fans will be routed outside the building in the vertical direction at least 8 feet above grade. At least one door or other opening will remain open at each end of the building to facilitate airflow. In addition, larger air mover fans will be available to help circulate air through the workspace to prevent vapors or exhaust fumes from collecting inside the site building or adjacent buildings. If equipment exhaust fumes still are a problem, an exhaust hose will be connected at the exhaust point of any equipment operating inside the building so that it will discharge outside the building.

- All contaminated soil not immediately being handled, moved, or transported will be kept covered with plastic sheeting. This includes soil staged inside the building or inside of any bins or dumpsters. Soil under transport will be covered with a roll on tarp.

Vapor monitoring will be conducted during all excavating work in accordance with Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 40 requirements and any project-specific provisions of the issued permit(s). A portable photoionization detector (PID), or other approved field instrument, will be used for this monitoring, calibrated at the beginning of each work-day to 25 parts per million by volume (ppmv) isobutylene and measurements converted to ppmv as PCE. The minimum monitoring frequency will be one reading every hour. If the monitoring indicates the presence of fugitive vapors with concentrations over 25 ppmv, additional engineering controls measures will be implemented. Plastic sheeting and water will be available for covering and misting actions, respectively.

4.9 PERSONAL PROTECTION EQUIPMENT (PPE)

In this section, personal protective equipment (PPE) is specified to protect against the potential hazards identified in Section 4.0. PPE described herein was selected based on the work activity, contaminant types, potential contaminant concentrations, and routes of entry. The use of PPE is secondary to the elimination of the potential hazard or source of exposure and/or implementation of engineering controls.

4.9.1 Levels of Protection

The following activities were considered in specifying the appropriate level of PPE:

- Activities that take place outside the site building that do not upset the ground surface and do not generate airborne dust. (Physical hazards)
- Activities that take place inside the site building that do not upset the ground surface and do not generate airborne dust. (Physical hazards and exposure to CO)
- Activities that take place inside the site building that upset the ground surface, generate airborne dust, and potentially result in: 1) direct contact with soil containing concentrations of PCE and/or TCE; 2) inhalation of volatilized PCE and/or TCE; and 3) inhalation and/or ingestion of dust containing PCE and/or TCE. (Physical hazards and exposure to CO, PCE, and TCE)
- Activities that take place outside the site building that may result in: 1) direct contact with soil containing concentrations of PCE and/or TCE; 2) inhalation of volatilized PCE and/or TCE; and 3) inhalation and/or ingestion of dust containing PCE and/or TCE. (Physical hazards and exposure to PCE, and TCE)

4.9.2 PPE for Physical Hazards

Equipment	Type	Required Standard
Headgear	Hardhat (in areas with overhead hazards only)	ANSI Z89.1
Eyewear	Safety glasses with side shields	ANSI Z87.1

Equipment	Type	Required Standard
Footwear	Steel-toe work boots with side shanks	ANSI Z41.1 (75 pound test)
Gloves	Leather gloves where appropriate. Nitrile gloves required when handling soil, liquid, or vapor samples	None applicable
Clothing	Standard field work long pants and shirt	None applicable
Hearing Protection	Earplugs and/or earmuffs to maintain worker's exposure below 80 dBA as an 8-hour time-weighted average.	OSHA NRR to meet the 80 dBA requirement

4.9.3 PPE for Physical Hazards and Exposure to CO, PCE, and TCE

Equipment	Type	Required Standard
Respirator (Initial)	Air monitoring/sampling will be conducted during the beginning of each task with the highest potential for exposure to volatile organic compounds (VOCs) and hourly afterward to confirm that personal exposures are below Cal-OSHA PEL standards for PCE and TCE. Respiratory protection will be downgraded if air monitoring/sampling results indicate no hazard.	NIOSH rated organic vapor cartridges. MSA Cartridge life expectancy calculator for VOCs provided in Appendix B
Headgear	Hardhat	ANSI Z89.1
Eyewear	Safety glasses with side shields	ANSI Z87.1
Footwear	Steel-toe work boots with side shanks	ANSI Z41.1 (75 pound test)
Gloves	Leather gloves where appropriate. Nitrile gloves required when handling soil, liquid, or vapor samples	None applicable
Clothing	Tyvek® coveralls and booties required when VOC concentrations exceed Cal-OSHA PELs. Standard fieldwork long pants and shirt required when concentrations are below Cal-OSHA PELs.	None applicable
Hearing Protection	Earplugs and/or earmuffs to maintain worker's exposure below 80 dBA as an 8-hour time-weighted average.	OSHA NRR to meet the 80 dBA requirement

Note: PCE and/or TCE concentrations characterized in the field by VOC concentration.

4.9.4 Air Monitoring Action Levels

Personal and area air monitoring and sampling activities will be performed during work activities. The information obtained will be used to make decisions about upgrading or downgrading PPE and/or implementing dust suppression engineering controls. Air monitoring for VOCs will focus on concentrations of PCE, TCE, 1,1-DCE, vinyl chloride (VOCs) and CO since: 1) PCE is the dominant contaminant of concern, 2) 1,1-DCE and vinyl chloride have the most restrictive PELs, and 3) work will

be conducted in an enclosed space with combustion engines operating. Air monitoring criteria and action levels are presented in the following table.

Chemical of Concern	Monitoring Frequency	Action Level Cal-OSHA PEL	Actions
1) PCE, TCE 2) 1,1-DCE 3) Vinyl Chloride 4) CO	Beginning of tasks with potential for exposure and hourly afterward.	1.) PCE, TCE - 25 ppm 2.) 1,1-DCE - 1 ppm 3.) Vinyl Chloride - 1 ppm 4.) CO - 25 ppm	1) Require respiratory protection for workers in these areas. 2) Upgrade engineering controls to control dust 3) For CO, immediately move to fresh air; upgrade ventilation.

Note: ppm = parts/million

4.9.5 Air Monitoring

Air monitoring for VOCs will be accomplished with direct-reading instrumentation (i.e. Mini-Rae photo-ionization detector [PID]). Detector tube samplers will be used to monitor for CO. The PID manufacturer's recommendations regarding calibration and use shall be strictly followed, and the duration of measurement shall facilitate an accurate measurement. The monitoring frequency will be initially set as described in Section 4.9.4 and evaluated as collected data area generated and may be revised as the project progresses.

4.10 WORK ZONES AND SECURITY MEASURES

The site must be controlled to reduce the possibility of exposure to any contaminants present, and to eliminate the possibility of off-site transport of contaminants. The possibility of exposure or translocation of contaminants can be reduced or eliminated in a number of ways, including:

- Setting up security or physical barriers to exclude unnecessary personnel from the general area,
- Minimizing the number of personnel and equipment on-site consistent with effective operations,
- Establishing work zones within the site,
- Conducting operations in a manner to reduce the exposure of personnel and equipment,
- Minimizing the airborne dispersion of contaminants, and
- Implementing the appropriate personnel and equipment decontamination procedures.

4.10.1 Field Operations Work Area

Work areas (zones) will be established based on the anticipated presence of contamination. Within these zones, prescribed operations will occur utilizing appropriate PPE. The planned zones are:

1. Exclusion Area (contaminated). The actual areas where work is being performed are considered to be the exclusion areas. Access to these areas will be strictly limited to the personnel needed to conduct the work being performed.

2. Contamination Reduction Area. An area near each active work zone will be designated as the contamination reduction area. Disposable protective gear will be removed and placed in garbage bags prior to leaving the reduction zone. Heavy equipment and non-disposable gear will be cleaned at a decontamination area within this zone.

3. Support Area (non-contaminated). Areas located away from active work areas and out of the zone of potential impact of hazards will be used for staging and support of the work being performed on site. Any contaminated materials and equipment must be fully decontaminated prior to entering these areas.

During work activities, barricades, cones, and caution tape will be used as necessary to keep the public from the exclusion, contamination reduction, and support zones. Prior to concluding work in the evening, all equipment will be removed from the contamination reduction and support zones.

4.10.2 Decontamination Procedures

As part of the system to prevent or reduce the physical transfer of contaminants by people and/or equipment from on-site, procedures will be instituted for decontaminating anything leaving the Exclusion Area and Contamination Reduction Area. These procedures include the decontamination of personnel, protective equipment, monitoring equipment, cleanup equipment, etc. In cases where the Contamination Reduction Zone is not directly adjacent to the Exclusion Area, gross decontamination will occur in the Exclusion Area, followed by more detailed cleaning in the Contaminant Reduction Area. This gross decontamination will be performed to the extent necessary to keep contaminants from spreading to other "clean" areas of the site. In general, decontamination at the site consists of rinsing equipment, personnel, etc., with copious amounts of water and washing with detergent water solutions. The spent solution, brushes, sponges, containers, stands, etc., used in the decontamination process must be properly dispose.

5.0 STANDARD OPERATING PROCEDURES

5.1 TRAINING REQUIREMENTS

All personnel assigned to this project will be required to demonstrate that they have completed the initial 40-Hour Hazardous Waste Operations Training Requirements (HAZWOPER). An annual 8-hour refresher course is also required in accordance with California Code of Regulations, Title 8 Section 5192. All employees shall be prepared to provide proof of initial HAZWOPER Training and a current 8-hour refresher certification.

Field personnel and their sub-contractors will attend a project briefing, or tail gate session, for safety issues and project work task review before beginning work. All site personnel shall have completed training relative to the project operations plans, and the materials to be encountered during the project.

The purpose of this safety procedure is to define minimum requirements for scheduling and holding safety meetings and tailgate sessions for all employees.

1. For each job site, the SSO shall schedule and hold a safety meeting for all employees prior to beginning work on the site. It is the responsibility of each Manager/Supervisor to see that this requirement is met.

2. It is recognized that, due to scheduling, it may be impossible for all employees to attend a safety meeting at one time. If a significant number of personnel are unable to attend the scheduled meeting, a second meeting shall be scheduled during the site operation covering the same subject matter.

3. When a few employees will be unable to attend the regularly scheduled meeting, it shall be sufficient to provide those employees a copy of the minutes of the meeting.

4. Employees attending safety meetings must sign an attendance record that shall become part of the file copy of the records of the meeting. Employees who receive copies of the minutes in lieu of attendance must also sign the attendance record.

5. The subject matter of each meeting shall be dictated by the needs of each operational project or job site. This subject matter will typically follow a brief outline of the Site Safety Plan.

5.2 EMERGENCY CONDITIONS

During the safety meetings, site workers will be trained in, and reminded of, provisions of this emergency response plan, the communication systems, and evacuation routes. In addition, emergency response plan details will be discussed, as necessary, at the safety briefings. Emergencies that may occur at the site may include accidental releases of gases, chemical spills, fires, explosions, and personal injuries

The work site shall be equipped with a basic first-aid kit and a fire extinguisher. A mobile phone will be available for use at the job site.

5.2.1 Site Emergency Warning Systems

Several warning systems may be utilized depending on the work site conditions or emergency involved, including:

1. Verbal Communications,

2. Vehicle Horns,

3. Portable hand-held compressed gas horns, and

4. Portable hand-held radios.

One long blast is used to signify emergency evacuation of the immediate restricted work area to a predetermined location, upwind, where a head count will be taken and further instructions given. The predetermined location will be identified at the daily safety briefings.

Repeated short blasts will be used to signify evacuation of all personnel form the site to a predetermined location, upwind, where further instructions will be given after a head count is taken.

Verbal instructions between crewmembers are typically adequate to communicate steps that are required in emergency situations. In cases where parts of the crew are distant from the center of activity, vehicle horns may be necessary to indicate site emergencies. This type of communication needs to be followed by verbal instructions on necessary emergency actions.

5.3 EMERGENCY PROCEDURES

5.3.1 General

- The site safety officer (SSO) has primary responsibility for responding to and correcting emergency situations. This may include taking appropriate measures to protect the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the area.
- Upon hearing an alarm, all non-emergency communications will cease. Crewmembers will proceed to give all pertinent information to the SSO in a systematic and orderly manner.
- Power equipment shall be shut down and operators will stand by for instructions.
- Individuals not assigned specific contingency response duties will proceed immediately to the predetermined safe site.
- Upon arrival at the safe site, a complete head count will be given to the SSO. Individuals will stay at the safe site until the contingency is secured or further instructions are given.
- Vehicles and equipment will contain fire extinguishers as required by Cal-OSHA regulations. The contractor will locate additional 10-pound Type ABC Fire Extinguishers within the immediate work area, if required, so that the maximum travel distance does not exceed 75 feet. Heavy equipment shall be equipped with an appropriate size and type fire extinguisher as required by Cal-OSHA.

5.3.2 Emergency Telephone Location and Telephone Numbers

Telephone Location. At least one cellular telephone will be located within the designated work area either as a personal cell phone or staged in vehicles. All site staff will be instructed to place emergency phone calls from these phones if needed.

Telephone Numbers

Nature of Emergency	Phone Number
Ambulance	911
Fire	911
Police	911

Nature of Emergency	Phone Number
Poison Control Center	(800) 662-9886
Chemical Spills	(800) 852-7550
Hospital	(650) 696-5400

If an injury occurs due to an accident or exposure to a hazardous substance, the injured person will be transported to the Contamination Reduction Zone where appropriate first aid and treatment can begin. The SSO will investigate the cause of the injury and make any necessary changes in work procedures.

In the event of an accident resulting in physical injury requiring medical treatment, first aid will be administered and the injured worker will be transported for emergency treatment to:

Hospital

Map in Appendix C

NOTES

A

MATERIAL SAFETY DATA SHEETS (MSDS) FOR PCE AND CO

B

MSA CARTRIDGE LIFE EXPECTANCY CALCULATOR

C

HOSPITAL MAP