Site-Specific Health and Safety Plan: ASARCO

Texas Custodial Trust
c/o Project Navigator, LTD.
El Paso Smelter Demolition

October 8, 2010
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Texas Custodial Trust c/o Project Navigator, LTD.

Site-Specific Health and Safety Plan: ASARCO

October 8, 2010

Project No. 0118148
El Paso Smelter Demolition
El Paso, TX

Jeffery L. Bauguss, P.E.
Partner-in-Charge

Amy L. McDonald
Project Manager

David Duncan, CIH CSP CHMM
Project Health and Safety Consultant

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
T: 281-600-1000
F: 281-600-1001
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ERM developed the following Health and Safety Plan (HASP) for use by ERM personnel and by ERM contractors (individually, an "ERM Contractor" and collectively, "ERM Contractors") for site activities associated with asset recovery and demolition. This HASP was prepared as an attachment to the overall site HASP that establishes minimum requirements for all site activities. ERM personnel must adhere to the practices and procedures specified in the HASP. Each ERM Contractor must review the HASP and agree to accept and abide by the HASP, subject to any modifications to the HASP (to address the ERM Contractor's more stringent practices and procedures) agreed upon in writing by ERM and the ERM Contractor. The ERM Contractor shall indicate such acceptance by signing this document prior to commencing work at the Site. However, if any ERM Contractor commences work at the Site, the ERM Contractor shall be deemed to have accepted the HASP and the terms hereof and the failure to execute and return to ERM a copy of this notice shall not be relevant to such interpretation.

If a contractor or a person other than the Client, ERM employees and ERM Contractors (individually, a "Third Party" and collectively, "Third Parties") receives a copy of the HASP, such Third Party should not assume that the HASP is appropriate for the activities being conducted by the Third Party.

NO THIRD PARTY HAS THE RIGHT TO RELY ON THE HASP. EACH THIRD PARTY SHOULD ABIDE BY ITS OWN SITE-SPECIFIC HEALTH AND SAFETY PLAN IN ACCORDANCE WITH ITS OWN PROFESSIONAL JUDGMENT AND ESTABLISHED PRACTICES.

ERM shall not be responsible for the implementation of any Third Party safety program(s), except to the extent otherwise expressly agreed upon by ERM and a Third Party in writing. The services performed by ERM for the Client and any right of the client and/or an ERM Contractor to rely on the HASP shall in no way inure to the benefit of any Third Party, including, but not limited to, employees, agents, or consultants and subcontractors of ERM Contractors, so as to give rise to any cause of action by such Third Party against ERM.

The HASP generated by ERM in connection with the Project is for use on a specific site and in connection with a specific project. ERM makes no representation or warranty as to the suitability of the HASP for reuse on another site or as to the suitability of the HASP for reuse on another project or for modifications made by the Client or a Third Party to the HASP.
All entrants to portions of the jobsite controlled by ERM must sign the HASP. Signing below certifies understanding and willingness to comply with the contents of this HASP. ERM has prepared this plan solely for the purpose of protecting the health and safety of ERM employees. Subcontractors, visitors, and others at the site are required to follow provisions in this document at a minimum, but must refer to their organization’s health and safety program for their protection.

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<tr>
<th>Printed Name</th>
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1.0 PROJECT AND SITE INFORMATION

1.1 GENERAL PROJECT INFORMATION

ERM developed this HASP for use on the former ASARCO El Paso Smelter Asset Recovery and Demolition project for the Texas Custodial Trust and Trustee, Project Navigator, LTD. ERM’s role is to provide construction and health and safety oversight of contractors performing asset recovery, decommissioning/decontamination and demolition activities at the site. The general objectives of this project are to:

- Mobilize/demobilize;
- Decontaminate personnel and equipment;
- Recover assets;
- Conduct asbestos and structural surveys;
- Abate asbestos;
- Demolish site structures; and
- Site grading related to demolition activities.

ERM will perform oversight of the following tasks performed by third parties:

- Demolition associated with asset recovery;
- Asset recovery;
- Asbestos surveys;
- Asbestos abatement activities;
- Structural surveys;
- Decontamination;
- Demolition of site structures; and
- Site grading related to demolition activities.

1.2 SITE NAME AND ADDRESS

ASARCO El Paso Plant
2301 West Paisano Drive
El Paso, Texas 79922-1622

1.3 SITE DESCRIPTION

The site began operations as a lead smelter in 1887. It was owned by Consolidated Kansas Smelting and Refining Company, which later merged with the American Smelting and Refining Company (ASARCO). ASARCO started producing copper in 1910, operated a Godfrey roaster for cadmium oxide productions in the 1930s, and constructed a slag fuming plant for zinc recovery in 1948. ASARCO added an antimony plant in 1970. The zinc plant was closed in
1982, the lead plant closed in 1985, the antimony plant shut down in 1986, and
the cadmium plant was shut down in 1992. Most recently, in February 2009, the
state air permit for the copper smelter was voided by the TCEQ at ASARCO's
request. The main potential chemicals of concern (PCOCs) are: Lead, Arsenic,
Cadmium, Chromium, Copper, Iron, Selenium, and Zinc. The media of concern
is slag, dust, soil and groundwater.

1.4 CLIENT HEALTH & SAFETY REQUIREMENTS

The client does not have any additional requirements for the work governed by
this HASP, other than those described in the overall site HASP and subsequent
sections below. While decommissioning, equipment and building rinsing,
demolition and other demolition-related activities are being performed, ERM
employees, ERM contractors, demo-related contractors contracted directly to the
Trust, and visitors are subject to the requirements contained in this HASP. ERM
will work with other parties on-site including the Trustee to develop site-wide
safe work practices, share learnings, and collaborate to provide a safe work
environment for all on-site personnel.

1.5 GENERAL SITE RULES

The following general rules will be adhered to at all times by ERM and ERM
Contractors:

• All personnel entering the site must check in with the gate guard and the
  ERM FSO.

• All individuals entering the site must demonstrate to the FSO that they have
  been adequately trained as defined in Section 3.

• All individuals must be familiar with emergency communication methods,
  how to summon emergency assistance and the assembly areas in the event of
  an emergency.

• Use of alcoholic beverages before and during operations is forbidden.
  Alcohol should not be consumed immediately after work hours as alcohol
can reduce the body’s ability to detoxify compounds absorbed during the
work day from minor exposures. In addition, alcoholic beverages will
dehydrate the body and intensify the effects of heat stress.

• Horseplay of any type is forbidden.

• All incidents, near misses and unsafe acts and conditions will be
  immediately reported to the ERM FSO, who will document such conditions
  in the field log. The ERM FSO will be responsible for communicating the
  event to the ERM PM and PIC per ERM protocols. The ERM FSO will also be
  responsible to ensure that all corrective actions are completed. Lessons
  learned will be shared with other site workers for mutual benefit.

• No smoking, eating, chewing gum or tobacco, taking medication, or applying
  cosmetics in areas of the site designated as “regulated areas” for asbestos,
  arsenic, or lead. Wash hands and face thoroughly prior to conducting any
activities after working in regulated areas. Obey all provisions established by chemical-specific plans, such as the Lead Exposure Control plan.

- Smoking, matches, and lighters are only allowed in the designated smoking area.

- Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.

- If PPE becomes torn or saturated with contaminated material, immediately leave the regulated area, go through the decontamination steps, and replace the affected PPE. Additionally, wash any exposed skin thoroughly with soap and water.

- The FSO will be responsible for determining what site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until the onsite lightning detector indicates lightening is a minimum of 15 miles away. During rain, lightning and/or thunder events, site workers should seek shelter in either a building or vehicle. In the event of a tornado, site workers should seek shelter in a building, except trailers, or in a low-lying area.

- Obey all onsite traffic rules as posted on the site and outlined in the Traffic Control Plan.
2.0  

**KEY PROJECT PERSONNEL AND RESPONSIBILITIES**

Table 2-1 includes the roles, names, contact information, and responsibilities of ERM personnel, ERM Contractors, and other individuals associated with the health and safety leadership of this project. This page must be posted on-site.
<table>
<thead>
<tr>
<th>Role</th>
<th>Person</th>
<th>Contact Information</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner-In-Charge (PIC)</td>
<td>Jeff Bauguss</td>
<td>Office: 281-600-1232 Mobile: 832-567-0725 E-mail: <a href="mailto:jeff.bauguss@erm.com">jeff.bauguss@erm.com</a></td>
<td>Final authority in approving the HASP and ensuring that the project team is supplied with the training, equipment and materials necessary for a safe work environment.</td>
</tr>
<tr>
<td>Project Manager (PM)</td>
<td>Amy McDonald</td>
<td>Office: 281-600-1070 Mobile: 713-628-5542 E-mail: <a href="mailto:amy.mcdonald@erm.com">amy.mcdonald@erm.com</a></td>
<td>Implementing the requirements of the ERM Health &amp; Safety Program on this project and maintaining management awareness of the project’s health and safety status. Provide H&amp;S leadership during project performance.</td>
</tr>
<tr>
<td>Construction Manager (CM)</td>
<td>Adrian Velazquez</td>
<td>Mobile: 484-319-8548 E-mail: <a href="mailto:adrian.velazquez@erm.com">adrian.velazquez@erm.com</a></td>
<td>Implementing the requirements of the ERM Health &amp; Safety Program on this project and maintaining management awareness of the project’s health and safety status. Provide H&amp;S leadership during project performance.</td>
</tr>
<tr>
<td></td>
<td>Karl Klotzbach</td>
<td>Mobile: 610-633-0100 E-mail: <a href="mailto:karl.klotzbach@erm.com">karl.klotzbach@erm.com</a></td>
<td></td>
</tr>
<tr>
<td>Field Safety Officer (FSO)</td>
<td>Mike Casbon</td>
<td>Mobile: 224-542-0954 E-mail: <a href="mailto:mike.casbon@erm.com">mike.casbon@erm.com</a></td>
<td>Assist the PM/CM by implementing HASP on a day-to-day basis. Recognize significant H&amp;S hazards and utilize STOP WORK authority when appropriate.</td>
</tr>
<tr>
<td>Project H&amp;S Consultant, Subject Matter Expert</td>
<td>Rick Ecord</td>
<td>Office: 404-816-6606 Mobile: 404-769-4561 E-mail: <a href="mailto:richard.ecord@erm.com">richard.ecord@erm.com</a></td>
<td>Assist in the recognition, evaluation, and control of hazards associated with the site.</td>
</tr>
<tr>
<td></td>
<td>David Duncan</td>
<td>Office: 281-600-1029 Mobile: 832-498-9345 E-mail: <a href="mailto:david.duncan@erm.com">david.duncan@erm.com</a></td>
<td></td>
</tr>
<tr>
<td>ERM Employees</td>
<td>Listed on Signature Page</td>
<td>N/A</td>
<td>ERM employees will fully participate in the implementation of the HASP by obtaining necessary training, attending site safety meetings, wearing designated PPE, complying with site H&amp;S rules, and advising the FSO of H&amp;S concerns at the site.</td>
</tr>
<tr>
<td>Client Contact</td>
<td>Roberto Puga</td>
<td>Office: 714-388-1802 E-mail: <a href="mailto:rpuga@projectnavigator.com">rpuga@projectnavigator.com</a></td>
<td></td>
</tr>
<tr>
<td>Project Navigator Onsite Contact</td>
<td>Walt Boyle</td>
<td>Mobile: 915-433-3779 E-mail: <a href="mailto:wboyle@projectnavigator.com">wboyle@projectnavigator.com</a></td>
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<td>Doug Solon</td>
<td>Mobile: 915-433-6361 E-mail: <a href="mailto:dsolon@projectnavigator.com">dsolon@projectnavigator.com</a></td>
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<tr>
<td>Role</td>
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<td>Responsibilities</td>
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<tr>
<td>Site Security Guards</td>
<td>Frank Guzman</td>
<td>915-276-3540</td>
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<tr>
<td>Subcontractor Safety Contact</td>
<td>TBD</td>
<td>Mobile:</td>
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<td>E-mail:</td>
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<tr>
<td>Local First Responders</td>
<td></td>
<td>Office: 911</td>
<td>When calling first responders notify them of possible contamination on patient</td>
</tr>
<tr>
<td>Local Hospital</td>
<td>University Medical Center of El Paso 2301 W Paisano Dr., El Paso, TX 79905</td>
<td>Office: 915-544-1200</td>
<td>Level I Trauma Center - ER</td>
</tr>
<tr>
<td>Local Hospital</td>
<td>Providence Memorial Hospital 2001 N Oregon St. El Paso, TX</td>
<td>Office: (915) 577-6011</td>
<td>Basic Trauma Center and ER</td>
</tr>
<tr>
<td>ERM Incident Intervention Service (WorkCare)</td>
<td>CA</td>
<td>1-888-II-XPRTS (1-888-449-7787)</td>
<td>First Aid advice given by occupational medical professionals for ERM employees</td>
</tr>
</tbody>
</table>
3.0 EMPLOYEE TRAINING AND MEDICAL SURVEILLANCE REQUIREMENTS

All ERM and ERM Contractor personnel working on-site (including their on-site supervisors) who may be exposed to hazardous substances, health hazards, or safety hazards will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility, and medically qualified to perform the work.

Visitors and Site Workers Who Will Not Enter Work Zones
Visitors to the site and site workers, such as security guards and maintenance personnel, who will not enter work zones must receive a safety briefing and site orientation, but are not required to meet additional training or medical surveillance requirements. Visitors and site workers are subject to all other requirements contained in this HASP. Additional requirements for visitors are covered in the Visitor Management Plan.

Short-Term Site Workers Who Will Enter Work Zones
Prior to mobilization, short term (i.e. less than 30 days on site) site workers performing intrusive field work associated with the decommissioning/decontamination and demolition activities as described in section 1.1 are required to have the following training and medical surveillance. Additional training as may be determined by Project Subject Matter Expert.

- Training meeting the requirements of 29 CFR 1910.120 or 29 CFR 1926.65 (as applicable), Hazardous Waste Operations and Emergency Response (HAZWOPER).
- Fit to work medical clearance.
- ERM Observation and Feedback Program Introduction.

Long-Term Site Workers Who Will Enter Work Zones
Site workers who will be working on site for 30 days or more and may be exposed to lead, cadmium and arsenic above published exposure levels are required to have the following additional training and medical surveillance.

- Participate in biological monitoring as may be required by Lead and Arsenic Standards including a minimum of pre and post project blood lead, cadmium, arsenic and ZPP tests for each site worker. More frequent blood sampling may be required based on potential chemical exposure.
- Lead, Cadmium and Arsenic training as required by OSHA standards.

Site Workers Potentially Exposed to Asbestos
Site workers who will be working on site and may be exposed to asbestos above published exposure levels are required to have the following additional training and medical surveillance.

- Asbestos training and licensing as required by standards.
• Negative initial asbestos exposure assessment per OSHA requirements for any work performed without the use of respirators.

**ERM CM and FSO**
The CM and/or FSO must possess additional training including:

• HAZWOPER Supervisor training;
• ERM FSO training;
• 10-hour OSHA Construction training; and
• Current CPR/First Aid certification.

The CM/FSO will verify that site personnel have received all appropriate training as required by this HASP prior to their arriving on-site by reviewing written training documentation. Copies of the written training documentation will be retained in the project file. ERM Contractor personnel will not be allowed to work at the site unless said training documentation is available.
4.0 FIELD ACTIVITIES

4.1 MAJOR PROJECT TASKS

Major tasks to be performed by ERM personnel include:

- Mobilization/demobilization;
- Air monitoring (perimeter and personal); and
- Field oversight of decontamination and demolition activities.

ERM will perform oversight of demo-related contractors subcontracted to ERM and those contracted directly to the client. As part of that oversight ERM will verify that demo-related contractors are in compliance with their site specific health and safety plans, contract HSE requirements, and applicable laws and regulations. Such oversight includes but is not limited to the following tasks that may be performed by demo-related contractors:

- Mobilization/demobilization;
- Demolition associated with asset recovery;
- Equipment dust removal;
- Facility dust removal;
- Asset recovery;
- Asbestos surveys;
- Asbestos abatement activities;
- Structural surveys;
- Demolition of all existing structures and foundations as described in contract documents; and
- Decontamination of vehicles leaving site.

Each of the tasks above has a Safe Work Practice (SWP) associated with it, or Job Hazard Analysis (JHA) prepared for it. SWPs and JHAs are further described below.

4.2 SITE PERSONNEL JOB TASKS & CERTIFICATION REQUIREMENTS

Workers with the following job descriptions may be engaged in activities conducted in at the site.

*Hydraulic Excavator w/ Attachments* - The excavator operator operates the excavator from within an environmentally controlled cab. The equipment may be equipped with various attachments including but not limited to: buckets of various sizes, bucket with thumb, or hydraulic shears of various types. Work is performed approximately eight to ten hours per day.
Aerial Lift/ Scissor Lift - The aerial lift operator will operate the aerial lift to access areas on various structures to perform inspection, dust removal, abatement or manual work tasks. The aerial lift operator must have prior experience operating an aerial lift and must be capable of training a ground operator to operate the aerial lift ground controls in the event of an emergency.

Truck Driver - The truck driver operates the vehicle from the cab. Trucks are used to haul materials within the site boundary and from the site to waste disposal facilities. The work is performed approximately eight to ten hours per working day.

Burners – Persons who use a torch to cut metal pieces to sizes that can be transported safely offsite for disposal or recycling.

Crane Operator – Persons who operate the crane in order to perform lifting activities. Crane Operators must demonstrate training and experience with each type of crane before receiving authorization to begin work. Crane operators must comply with OSHA requirements set forth in 29 CFR 1926.550 - Cranes and Derricks.

Riggers – Persons who determine the appropriate attachment points, size of cables, slings or other lifting devices in order that an object may be safely lifted by a crane and moved to another location. The rigger will also direct the crane operator during the lift. Riggers and crane operators also participate in developing lift plans as required.

Laborers – Field laborers will be used during completion of all work activities. In addition to providing assistance where needed for those activities listed in Section 4.1, other work duties will include, but are not limited to, construction of site structures (decon pad, trailer set up/renovation), welding, saw cutting, operation of stormwater pumps, equipment decontamination, and general site and equipment upkeep and maintenance.

Asbestos Surveyors – The surveyors will collect samples of suspect materials and quantify materials identified to contain asbestos.

Asbestos Abatement Personnel – The asbestos abatement personnel will be utilized during completion of asbestos abatement activities.

Structural Surveyors – The surveyors will observe conditions of site facilities and provide photo documentation.

Technical Personnel - This group includes the ERM or other personnel serving in various supervisory and data collection functions ranging from management to inspection to sample collection.

Demolition Competent Person – This person will be on site and provide oversight of demolition planning and activities.
*Visitors* - Visitors to the site not directly involved in proposed work activities will be considered in the HASP as technical personnel listed above. Visitors to the site not directly involved in proposed work activities must check in with the ERM CM to receive safety orientation and job specific information. Visitors must follow all applicable PPE requirements and remain outside of the exclusion zone and contamination reduction zone (where applicable) while observing activities. More information regarding visitor management is provided in the Visitor Management Plan.
5.0 HAZARD IDENTIFICATION AND CONTROL

5.1 JOB HAZARD ANALYSES

Prior to initiating any new project activity not covered by a Safe Work Practice, or when there is a change in site conditions, the FSO will assist project team members in completing a Job Hazard Analysis (JHA). The JHA will list the hazards associated with the project activity as well as associated control strategies. JHAs for the tasks are listed in Section 4.1, as well as a blank copy of the JHA form, are located in Appendix B. In addition to the broad tasks in Section 4.1, task-specific JHAs will be developed by the Demo-Related Contractors (and reviewed by ERM) to address specific dust removal and demolition activities.

5.2 SAFE WORK PRACTICES

ERM has Safe Work Practices (SWP) that define minimum requirements for controlling hazards related to the work and surroundings. These have been completed for tasks performed commonly by ERM employees. As such, jobsite tasks whose hazards are identified and controlled by use of a SWP do not require JHAs to be developed for them. Copies of the SWPs that have been identified as pertinent to the hazards inherent in the work for this project are identified in the table of contents and have been included in Appendix C.

5.3 SITE INSPECTIONS

The FSO or designee will inspect the job site at least once per day using the Site Walk Checklist in Appendix E as a guide. Completed checklists will be retained in the site safety file.

5.4 BEHAVIOR-BASED SAFETY

ERM uses a behavior-based safety program that uses Personal Safety Contracts, work observations and feedback sessions. The ERM behavior-based safety system is to be used by all ERM employees. Demo-related contractors must also use a behavior-based safety program for all site activities. The demo-related contractor may use their own behavior-based safety program upon review and approval of the ERM CM and FSO, or the demo-related contractors will be required to follow the ERM behavior-based safety program.

Everyone on site as part of this project will make a commitment to work safely and to look out for others on the job site. Personal Safety Contracts (PSCs) will be used by all ERM personnel and ERM Contractors to remind them of the hazards associated with the work at hand, as described in applicable JHAs.

Prior to the start of each work day, each worker will complete a Personal Safety Contract (PSC). By completing their PSCs each day, site workers agree to make a daily commitment to their own safety and the safety of those around them. The
PSC helps workers think about proper work techniques, appropriate PPE, and ambient site conditions immediately prior to beginning a work task. The PSC for a particular task is based on the JHA developed for that task. A copy of the PSC is located in Appendix F. All PSCs must be turned in to the FSO at the end of the work day or shift.

5.5 STOP WORK AUTHORITY

It is ERM policy that all site personnel have the authority, without fear of reprimand or retaliation to:

- **Immediately** stop any work activity that presents a danger to the site team or the public; and
- Get involved, question and rectify any situation or work activity that is identified as not being in compliance with the HASP or with broader ERM health & safety policies.

All site personnel are empowered to identify and correct Unsafe Acts, Unsafe Conditions and Near Misses before they can cause an Incident (see Section 13). It is the responsibility of the ERM CM and FSO to continue to remind all site workers that each person has stop work authority. It is a goal for the site to have a safety culture of:

**You see it, you own it!**

If someone sees an unsafe situation or act, even if that person is not directly involved in the unsafe work, it is the responsibility of the person making the observation to stop work and notify site workers of the unsafe situation. If someone utilizes their Stop Work Authority, then work can only be restarted by the ERM FSO, in concert with the ERM CM.

5.6 WORK PERMIT SYSTEM

Prior to beginning work each day, ERM will issue a Work Authorization to its subcontractors for the various activities. Depending on the work activities scheduled for that day and site requirements, additional checklists and/or permits may be required. Copies of the checklists and/or permits can be found in Appendix G.

5.7 CHEMICAL, BIOLOGICAL AND PHYSICAL HAZARDS

5.7.1 Chemical Hazards

Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the risk. Inhalation and skin contact are the most common routes of entry. Chemicals can be introduced into the body by
ingestion when chemicals present on the hands are transferred to food or cigarettes.

Based on historical process information and soil and ground water sampling analytical data, the following constituents of concern listed in Table 5-1 may be encountered at the site. International Chemical Safety Cards for the constituents of concern are located in Appendix H.

High and low pH substances may be encountered during demolition activities. Additional PPE may be required when working around these types of chemicals, including poly-coated protective clothing (e.g. Saranax), faceshield, gloves (per the MSDS or Safety Data Card for the specific chemical) and protective boot covers. Respiratory protection may also be required.

ERM has developed a Metals Exposure Compliance Program for its employees. The program addresses requirements set forth in the OSHA Lead, Arsenic and Cadmium Standards Title 29 Code of Federal Regulations 1926.62, 1926.1118, and 1926.1127 respectively. The Metals Exposure Compliance Program is provided in Appendix N. ERM contractors may adopt the ERM program or may elect to develop their own metals exposure control program.

TABLE 5-1: Constituents of Concern

<table>
<thead>
<tr>
<th>Constituents of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
</tr>
<tr>
<td>Cadmium</td>
</tr>
<tr>
<td>Chromium</td>
</tr>
<tr>
<td>Copper</td>
</tr>
<tr>
<td>High and Low pH Substances</td>
</tr>
<tr>
<td>Iron</td>
</tr>
<tr>
<td>Lead</td>
</tr>
<tr>
<td>Selenium</td>
</tr>
<tr>
<td>Silica</td>
</tr>
<tr>
<td>Zinc</td>
</tr>
</tbody>
</table>

Table 5-2 shows chemicals that may be used by ERM at the site as part of the project. The MSDSs for these chemicals are located in Appendix I.

TABLE 5-2: Chemicals Used for Project Execution

<table>
<thead>
<tr>
<th>Chemicals Used for Project Execution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropyl Alcohol</td>
</tr>
<tr>
<td>Gasoline</td>
</tr>
<tr>
<td>Diesel</td>
</tr>
<tr>
<td>Oxygen</td>
</tr>
<tr>
<td>Propane</td>
</tr>
<tr>
<td>Detergent</td>
</tr>
</tbody>
</table>

5.7.2 Biological hazards

The facility environment is likely to contain spiders, snakes, flying insects and other types of natural hazards. Below are some of the more common natural hazards at the site. Additional detail for these hazards and more may be found in Appendix C – Natural Hazards SWP.
**Brown Recluse Spiders**
During the day, it hides in dark niches and corners, where it may spin a poorly organized, irregular web. It is shy and will try to run from a threatening situation but will bite if cornered. Check boots and protective clothing for spiders prior to putting them. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Later the area around the bite site may develop into an ulcerous sore from 1/2 to 10 inches in diameter. Healing often requires a month or longer, and the victim may be left with a deep scar. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop. It should be noted that not all brown recluse bites result in ulcerations or scarring.

**Snakes**
The most effective way to prevent snakebites is to avoid snakes. Personnel should avoid walking in high grass and underbrush and avoid stepping over objects that snakes may be beneath. Instead, select a different travel path or step on the object rather than over the object. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants may be required at times during the project, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt. If a snake bites someone, notify the Field Safety Officer and seek medical services.

**Flying Insects**
Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur. Wear long-sleeved clothes and long pants treated with repellent if insects are identified on site. Do not treat unexposed skin. Use the repellent according to the manufacturer’s recommendations provided on the container. Personnel should report flu-like symptoms to the Site Safety Officer, medical attention may be needed.

**Other**
The facility may have areas of roosting birds and accumulated bird droppings. Bird droppings may contain a disease agent known as Histoplasmosis. Additional information on the hazards of Histoplasmosis and the exposure controls is included in Appendix C. Additionally, personnel may also be exposed to other types of animal droppings and mold spores during the demolition work.

**5.7.3 Physical hazards**
Per OSHA requirements, an engineering survey will be conducted by a competent person to determine the condition of the framing, floors, and walls, and possibility of unplanned collapse of any portion of the structure. However, care should be taken when accessing buildings, platforms, stairs and ladders as conditions are subject to change. In addition, once demolition begins the structural integrity of the facilities will be compromised as the facilities are demolished. Workers must be constantly aware of their surroundings and
operating heavy equipment. Workers must stay clear of restricted areas where demolition is taking place.

5.8 AMBIENT AIR MONITORING

Ambient air monitoring will be conducted by the FSO according to the Dust Monitoring Plan and the Metals Exposure Compliance Program. This will help verify that the proper selection of engineering controls, work practices, and PPE are implemented and that ERM is complying with applicable health and safety regulations.

The Dust Monitoring Plan is included in Appendix O.

Additional monitoring should be conducted under any of the following circumstances.

- Work begins on a different portion of the site;
- Change in job tasks;
- Change in weather;
- Change in ambient levels of hazardous constituents as indicated by the sense of smell, presence of visible emissions of particulate or changes in the physical appearance of the soil or ground water;
- When new hazardous substances are encountered; and
- During high-risk operations.

Ambient air monitoring will be conducted using instruments or methods as indicated in Table 5-3. If more than one instrument is listed, either instrument may be chosen. Not all work at the site will require ambient air monitoring for all contaminants. During the mobilization phase of a particular project task or activity, either the CM or the FSO will determine what contaminants may be encountered in order to have the appropriate instrumentation on-site. The Project Health and Safety Consultant is available to assist the CM or the FSO in determining the appropriate instrumentation.

TABLE 5-3: Ambient Air Monitoring Instruments

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Instrument or Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust</td>
<td>TSI AM500 air monitor or equivalent capable of measuring real time total particulate concentrations in air with datalogging. See Appendix X for additional information on dust monitoring.</td>
</tr>
<tr>
<td>Metals</td>
<td>NIOSH Sampling and Analytical Method 7300 Elements by ICP.</td>
</tr>
</tbody>
</table>

Direct reading instrumentation will be calibrated per manufacturer’s instructions. Cylinders of the appropriate calibration gas if required by the instrument will be required for fieldwork lasting longer than one day.
Table 5-4 outlines the steps to be taken by the FSO when the action levels of the various contaminants are exceeded. Respiratory protection is selected based on occupational exposure limits of the constituents at the site and the potential for exposure to vapors and dust from site activities. Pumps used to collect air samples to verify compliance with occupational exposure limits using NIOSH 7300 shall be calibrated before and after each use and samples will be submitted to an AIHA Accredited laboratory using appropriate chain of custody protocols.
### TABLE 5-4: Action Levels and Response Actions Requirements

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Action Level</th>
<th>Response Actions</th>
</tr>
</thead>
</table>
| **Inorganic Lead**| PEL = 0.05 mg/m³  
                 REL = 0.05 mg/m³  
                 Greater than 0.03 mg/m³ (action level) sustained in the breathing zone for 1 minute. | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 0.03 mg/m³, resume work  
- If readings are greater than 0.03 mg/m³ continue dust suppression, and don Level C PPE  
- See the Dust Monitoring Plan, Appendix O for further details |
| **Inorganic Arsenic** | PEL = 0.01 mg/m³  
                            Greater than 0.005 mg/m³ (action level) sustained in the breathing zone for 1 minute. | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 0.005 mg/m³, resume work  
- If readings are greater than 0.005 mg/m³ continue dust suppression, and don Level C PPE  
- See the Dust Monitoring Plan, Appendix O for further details |
| **Cadmium**       | PEL = 0.005 mg/m³  
                            Greater than 0.003 mg/m³ (action level) sustained in the breathing zone for 1 minute. | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 0.003 mg/m³, resume work  
- If readings are greater than 0.003 mg/m³ continue dust suppression, and don Level C PPE  
- See the Dust Monitoring Plan, Appendix O for further details |
| **Copper**        | PEL = 1 mg/m³  
                            REL = 1 mg/m³  
                            Greater than 0.5 mg/m³ (action level) sustained in the breathing zone for 1 minute. | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 0.5 mg/m³, resume work  
- If readings are greater than 0.5 mg/m³ continue dust suppression, and don Level C PPE |
| **Iron (as Iron Oxide Fe₂O₃)** | PEL = 5 mg/m³  
                            REL = 10 mg/m³  
                            Greater than 3 mg/m³ (action level) sustained in the breathing zone for 1 minute. | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 3 mg/m³, resume work  
- If readings are greater than 3 mg/m³ continue dust suppression, and don Level C PPE |
| **Selenium**      | PEL = 0.3 mg/m³  
                            REL = 0.2 mg/m³  
                            Greater than 0.1 mg/m³ (action level) sustained in the breathing zone for 1 minute. | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 0.1 mg/m³, resume work  
- If readings are greater than 0.1 mg/m³ continue dust suppression, and don Level C PPE |
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Action Level</th>
<th>Response Actions</th>
</tr>
</thead>
</table>
| Chromium | PEL = 0.5 mg/m³  
Greater than 0.3 mg/m³ (action level) sustained in the breathing zone for 1 minute. | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 0.3 mg/m³, resume work  
- If readings are greater than 0.3 mg/m³, continue dust suppression, and don Level C PPE |
| Silica  | REL = 0.05mg/m³  
Greater than 0.025 mg/m³ (action level) sustained in the breathing zone for 1 minute. | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 0.025 mg/m³, resume work  
- If readings are greater than 0.025 mg/m³, continue dust suppression, and don Level C PPE  
- See the Dust Monitoring Plan, Appendix O for further details |
| Nuisance Dust | Greater than 15 mg/m³ sustained in the breathing zone for 1 minute | - Stop work and leave the immediate area  
- Initiate dust suppression activities  
- FSO dons Level C PPE and monitors again after dust suppression is initiated  
- If readings are less than 1.5 mg/m³, resume work  
- If readings are greater than 1.5 mg/m³, continue dust suppression, and don Level C PPE |
6.0 PERSONAL PROTECTIVE EQUIPMENT

The level of PPE selected for a task is based on the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity;
- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done; and
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better identified.

Asbestos abatement workers will comply with PPE requirements as outlined in the Asbestos Abatement Work Plan.

In addition to summarizing the general PPE requirements for tasks performed at the site, Table 6-1 also serves as the written certification that the PPE Hazard Assessment has been conducted. The signature page containing the client’s name, project name and number, date and signatures of the parties responsible for the development of the HASP also serve as part of the written certification.

6.1 RESPIRATORY PROTECTION

The type of respiratory protection required will be based on the results of personal breathing zone and/or ambient air monitoring, and the professional judgment of either the FSO or the Project Health and Safety Consultant. Respiratory protection requirements associated with dust are outlined on Table 5-4, above.

29 CFR 1910.134, Respiratory Protection, requires that a respirator cartridge changeout schedule be developed for work with most organic compounds. Chemicals exposure constituents of concern consists only of silica and heavy metals for this project, so a cartridge changeout schedule is not required. Employees will be instructed to change respirator cartridges either when breathing becomes noticeably more difficult or at the end of the work shift, whichever occurs first.
# TABLE 6-1: Personal Protection Equipment Requirements

<table>
<thead>
<tr>
<th>PPE Level</th>
<th>Ensemble Components</th>
<th>Tasks Requiring Use</th>
</tr>
</thead>
</table>
| **Level D** | - Long pants and shirt with sleeves.  
- Safety-toed footwear.  
- Safety glasses with molded side shields.  
- Hard hat.  
- General purpose work gloves if task does not involve water or wet materials.  
- Hearing protection based on noise level  
- High visibility traffic vest.  
- Tyvek or equivalent outer garment may be required based on certain activities. | Workers performing any tasks in Contamination Reduction Zone (CRZ) or Support Zone (SZ). |
| **Level C** | - Air purifying respirator equipped with P-100 cartridges  
- Tyvek or equivalent outer garment  
- Rubber boots or disposable rubber boot covers that fit over steel toe workboots  
- Gloves | Activities which meet the action levels as specified in Table 5-4 based on direct read instrumentation.  
If gloves cannot be decontaminated then those gloves must be placed in a plastic bag and the bag must be properly disposed. Inside the bag they may be stored in the CRZ or outside, but must not be removed from the bag outside of the CRZ or Exclusion Zone (EZ). |
| **Level B** | Not authorized | Tasks requiring Level B PPE are not anticipated during this project. If Level B PPE is needed, as determined by the FSO and/or the Project Health and Safety Consultant, the HASP will be revised. |
| **Level A** | Not authorized | Tasks requiring Level A PPE are not authorized during this project. If Level A PPE is needed, as determined by the FSO and/or the Project Health and Safety Consultant, contact the North America H&S Leader for assistance. |
7.0 MEDICAL SUPPORT REQUIREMENTS

First aid supplies will be made available to all personnel on-site. A standard first aid kit suitable for up to 4 persons will be kept in the ERM office area. A first aid kit will be carried in all ERM company vehicles.

For the duration of the project, at least one individual currently certified to render emergency first aid and/or CPR will be present during all work activities.

Additional medical attention will be provided to employees who are injured, become ill or develop signs or symptoms due to possible exposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

Medical surveillance for potential metals exposure is described in Appendix N the Metals Exposure Compliance Program.
8.0  SITE INFRASTRUCTURE AND CONTROL

8.1  INFRASTRUCTURE

8.1.1  Smoking and Eating Areas

Smoking will only be allowed in designated areas. Upon mobilization at the site, the FSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate removal from the site.

Upon mobilization at the site, the FSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition. Employees will wash their hands and face before entering eating areas.

8.1.2  Sanitation and Potable Water

Containers used for drinking water will be equipped with a tap and capable of being tightly closed. In addition, the container will be labeled as “Drinking Water” or “Potable Water.” Disposal cups will be stored in a sanitary condition and a receptacle for disposing of the cups will be near-by.

Potable and nonpotable water containers and portable toilets (if used) will comply with OSHA 29 CFR 1910.141 requirements.

8.1.3  Temporary Facilities

Certain initial phases of this project will not require any temporary facilities. However subsequent phases will require such facilities. When such facilities are used, trailers and other temporary structures used as field offices or for storage will be anchored with rods and cables or by steel straps to ground anchors. The anchor system will be designed to withstand winds and must meet applicable state or local regulations for the anchoring of mobile trailer homes.

All temporary facilities will be maintained in a clean and sanitary condition to discourage the entrance of rodents or vermin. If rodents or vermin become an issue, the FSO will be responsible for implementing an extermination program per site-specific or client-specific guidelines.

8.1.4  Safety Equipment

A first aid kit containing first aid items for minor incidents only and a fire extinguisher is maintained in each ERM vehicle. There will be a first aid kit located in the ERM office trailer. Demo-related contractors are required to provide fire extinguishers, first aid kits, and other safety equipment as required by regulation and per the Demolition Work Plan.
The FSO will be responsible for verifying that on-site fire extinguishers are inspected monthly as required by 29 CFR 1910.157 Portable Fire Extinguishers. The monthly inspections will be documented on a tag attached to each extinguisher or a master list of fire extinguishers and their location. If the duration of the project exceeds one year, the FSO will contract with an outside vendor to perform the annual maintenance on all ERM fire extinguishers.

Eye wash stations will be located at the following designated locations:

- Location will vary as site activities progress. The location will be noted in each daily tailgate safety meeting.

### 8.1.5 Communications

Cell phones may be used as part of standard site communications; however, cell phones CANNOT be used while driving any type of vehicle or operating equipment. Two-way radios may also be used for communication between project team members.

### 8.2 SITE CONTROL

The site is fenced and the Trustee provides personnel to monitor entry into the site at a secured gate. Once demolition-related activities begins, the ERM CM will be in control of the site. ERM will work with the demolition contractor to delineate the active work zone, safe observation distances, Exclusion Zones, Contamination Reduction Zones and Support Zones (as applicable) for all demolition-related tasks. As the project progresses the locations and sizes of these zones may change. ERM will provide updates to all site parties as the various zones change shape. ERM will work with the demolition contractors to establish a traffic management plan identifying contractor travel paths and site roadways to be used during project activities. This plan will be updated during the project as progress is made and site conditions change. Malcolm Pirnie, Malcolm Pirie Contractors or other personnel directly contracted by the Trustee (covered under the HASP prepared by Malcolm Pirnie) may perform various site activities during demolition activities. The ERM CM will work with the Malcolm Pirnie designated representative or third party contractor to coordinate work activities.
9.0 **DECONTAMINATION PROCEDURES (WHERE APPLICABLE)**

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All site personnel should limit contact with contaminated soil, ground water or equipment to reduce the need for extensive decontamination.

Decontamination of equipment used in demolition activities is addressed in the Demolition Scope of Work Requirements.

Decontamination of equipment and personnel potentially exposed to lead must be in accordance with lead standard 29 CFR 1926.62.

Equipment and materials used in the decontamination process may include the following:
- High pressure/hot water cleaning using only potable water/fire water;
- Phosphate-free detergent;
- Five-gallon bucket;
- Potable water;
- Distilled water;
- Paper towels; and
- Brushes.

9.1 **PERSONNEL DECONTAMINATION**

The following procedures will be utilized for personnel decontamination:

1. Clean rubber boots with a mixture of water and a boot wash solution followed by a clean water rinse;

2. Wash hands and any skin that may have come in contact with affected soil or ground at the end of each shift water with moistened disposable towels, such as baby wipes, or soap and water. A shower area will be established in the regulated area. The shower area will be set up with a clean side and dirty side with an area to store clothing.

3. Soiled PPE and disposable towels and wipes shall be collected in an appropriate container and disposed of according to applicable regulations.

4. Wash water or other decontamination fluids shall be collected in an appropriate container and disposed of according to applicable regulations.

9.2 **EQUIPMENT DECONTAMINATION**

The following will be required for equipment and tool decontamination:

- Before leaving the work area, excess contamination will be removed from the equipment and tools and placed in approved, properly labeled containers.
• Decontamination of equipment will be performed in a designated decontamination area and in accordance with approved decontamination work plans.

• Disposal of all solids and liquids collected within the decontamination area will be in accordance with approved work plans.
10.0 **SPILL CONTAINMENT PROGRAM**

The spill contamination program for this project will involve the use of preventative measures to reduce the potential for environmental releases. These preventative measures will include the following:

- Equipment inspection;
- Staging equipment in designated staging areas;
- Secondary containment for fuel storage tanks; and
- General housekeeping practices.

If project activities involve the use of drums or other containers, the drums or containers will meet the appropriate DOT regulations and will be labeled, inspected and their integrity assured prior to being moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be overpacked into an appropriate container.

Per the Demolition Work Plan, if demo-related contractors provide on-site fuel storage in quantities above 1,320 gallons, then a Spill Prevention Countermeasures Control (SPCC) Plan must be prepared by the Contractor in accordance with 40 CFR 112.
11.0 CONFINED SPACE ENTRY PROCEDURES

Entry into permit-required confined spaces is not anticipated. If a project task or activity will involve entry into a permit-required confined space or if there is a question as to whether or not a job task or activity involves a permit-required confined space, the CM or FSO will contact the North America H&S Leader for assistance prior to entering the confined space. The Demo-Contractor is responsible to ensure that the entrant, attendant and supervisor are confined space trained and that emergency rescue provisions have been made prior to the start of work.
12.0 EMERGENCY RESPONSE PLAN

This section provides a summary of possible contingencies and emergency procedures to be implemented at the site. A full description of emergency action and fire prevention planning for the project is included in Appendix K.

12.1 PERSONNEL ROLES AND LINES OF AUTHORITY

The ERM FSO has primary responsibility handling emergency situations while demo-related activities are occurring at the site. This includes taking appropriate measures to ensure the health and safety of site personnel and in consultation with the Trustee, the public. The ERM FSO will be responsible for evacuating any person and providing decontamination, and arranging for medical treatment or first aid for any person injured or requiring medical attention.

Possible actions may involve the evacuation of personnel from the site area and verifying that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. If the ERM FSO is not available, the ERM CM or other ERM field staff will assume the FSO’s responsibilities. All site personnel will assist as directed by the ERM FSO in case of an emergency.

12.2 EMERGENCY ALARMS

During pre-mobilization meetings, the demolition contractors in cooperation with ERM will develop appropriate means of transmitting emergency alarms. Site specific methods developed will be added to this HASP and all personnel entering the site will be informed of the alarms and communication methods. Methods for communicating site emergencies may include but are not limited to the use of air horns, radios and cellular telephones.

12.3 EVACUATION PROCEDURES AND ROUTES

Evacuation alarms and routes will be determined cooperatively between ERM and demolition-related contractors during project mobilization. Evacuation plans will be updated as needed to reflect changes in plant access and traffic patterns due to work activities. Changes in evacuation routes or alarms will be communicated to all parties on site via daily safety meetings and on-site postings.

In the event of an emergency requiring evacuation to an Assembly Point, the ERM FSO will be responsible for accounting for the presence of all project team members and subcontractors on-site at the time of the emergency. Third parties will be responsible for accounting for their personnel and reporting such to the ERM CM or FSO. When evacuating, it is important to be aware of the prevailing wind direction and evacuate upwind or crosswind.

The evacuation routes and assembly points for the site are shown on the Evacuation Routes figure included as Appendix K. The evacuation routes and
assembly points may change throughout the duration of the project based on work locations and site conditions. The Evacuations Routes figure will be updated if evacuation routes and assembly points change.

12.4 RESPONDING TO SAFETY EVENTS

In the event an actual or suspected incident where personal injury or illness occurs, the ERM FSO should take the following actions sequentially as listed noting that if a third party employee is involved that party’s FSO or another responsible employee may also respond:

For minor illness
- Escort the employee to an air conditioned location;
- Monitor the employee’s condition;
- Determine if the employee requires additional treatment or can return to work; and
- If additional treatment is necessary, drive the ill employee to an occupational health clinic and contact Work Care.

For minor injuries
- Escort the employee to an air conditioned location (if possible);
- Provide first aid supplies;
- Determine if the employee requires additional treatment or can return to work; and
- If additional treatment is necessary, drive the injured employee to an occupational health clinic and contact Work Care.

For major illness or injuries
- Don appropriate PPE;
- Remove the exposed or injured person(s) from immediate danger;
- Decontaminate affected personnel as appropriate;
- Obtain ambulance transport to the local hospital in the event of any injury or illness deemed to require medical surveillance or treatment; and
- Evacuate other personnel until it is safe for work to resume.

12.5 REPORTING EMERGENCIES

At the earliest time practicable following the occurrence of a safety event situation, the ERM FSO will contact the ERM PM and ERM PIC to advise them of the situation. The ERM PM will then be responsible for promptly informing the following parties about the event:
- Injured/involved personnel’s supervisor;
• Partner-In-Charge; and
• Client Contact.

In the case of a safety event (Incident), the FSO, with the cooperation of the H&S Contact, will promptly begin formal documentation of and investigation into the root cases of the Incident following the occurrence of the incident. This process is defined in Section 13, below. Results and learnings from incidents and investigations will be shared with the Trustee and provided to other parties working on site for mutual benefit.

12.6 RESTARTING WORK FOLLOWING A SAFETY EVENT

The ERM PIC in consultation with the ERM FSO, CM, ERM PM and the Trustee will determine when it is safe to resume work at the site following an injury or on-site emergency.

12.7 EMERGENCY DRILLS

The emergency response/fire prevention plan will be rehearsed regularly as part of the overall training program for site operations. The frequency of this drill
(rehearsal) is outlined on Table 12-1. All drills will be documented on the Emergency Drill Evaluation Form found in Appendix K. Drills do not need to be elaborate. A table-top scenario during the daily safety meeting is an adequate drill.

**TABLE 12-1: Emergency Drill Frequency**

<table>
<thead>
<tr>
<th>Project Duration</th>
<th>Drill Frequency</th>
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<tbody>
<tr>
<td>Less than 30 days</td>
<td>None, cover during review/sign-off of HASP</td>
</tr>
<tr>
<td>Greater than one month but less than one year</td>
<td>Once</td>
</tr>
<tr>
<td>Greater than one year</td>
<td>Annually</td>
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</table>
13.0 REPORTING OF SAFETY EVENTS

Safety events are occurrences or conditions that may contribute to or result in an injury, occupational illness or property damage. ERM seeks to learn from the investigation of the following types of safety events:

- Unsafe acts and unsafe conditions;
- Near misses; and
- Incidents (injury, illness, property damage, fire, or chemical spill).

All work related injuries must be reported. For all medical emergencies, call 911 or the local emergency number. For non-emergency incidents, you must:

- Give appropriate first aid care to the injured or ill individual;
- Immediately call Incident Intervention at (888) 449-7787 (available 24/7);
- Notify PM/PIC or Divisional H&S Advisor;
- Enter the event into the Event Communication System (ECS), ERM’s electronic safety event reporting system, within 24 hours of the safety event occurring; and
- Near Misses, Unsafe Acts and Unsafe Conditions should be entered into the ECS within 24 hours of occurrence.

Results and learnings from incidents will be shared with the Trustee and other parties on site for mutual benefit.
14.0 SITE SAFETY BRIEFINGS

14.1 COMMUNICATION AND REVIEW OF THE HASP

An initial review of the site-specific HASP will be held either prior to mobilization or after mobilization but prior to commencing work at the site to communicate HASP details and answer questions to individuals working at the site. The following topics will be addressed during the briefing:

- Names of the ERM FSO and any designated alternate;
- Hazardous chemicals that may be encountered during on-site activities;
- Physical hazards that may be encountered on site;
- Special training requirements and Safe Work Practices;
- Work tasks;
- Emergency communication signals, codes, and location of emergency contact information;
- Emergency procedures for safety events, fires, and hazardous material incidents; and
- Emergency evacuation routes.

14.2 DAILY SAFETY MEETINGS

Daily safety meetings will be conducted each morning prior to starting work and following lunch each day prior to resuming work. The daily safety meetings will include a discussion of the following health & safety-related topics, among others:

- Who is doing what, where and how (including remediation-related work);
- The potential for overlapping site operations;
- Changes in evacuation routes and/or traffic patterns;
- Changes to the HASP or JHAs;
- Discussion of recent Incidents or safety observations; and
- Comments from the project personnel.

If applicable, representatives from other parties working on site will be encouraged to attend the daily safety meetings to enhance communications between parties performing simultaneous operations at the site. The meetings will be documented on the Daily Safety Meeting form found in Appendix N.
15.0 AUDITING AND HASP REVISIONS

Selected project field activities and project files shall be audited periodically. A full site audit for conformance with the HASP will occur at least once per year for projects with field duration of 1 year or longer. Full site audits may also be conducted for shorter duration projects. Project documentation audits may be conducted periodically for shorter term projects.

Revisions made to the site HASP in response to audit feedback, lessons learned from Incidents, or other reasons will be explained to all site personnel at the first daily safety meeting following the institution of the HASP revision.
Site Location Map and Map to Hospital

Appendix A

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
2301 W Paisano Dr, El Paso, TX 79922

1. Head north on W Paisano Dr
   go 0.4 mi
   total 0.4 mi

2. Make a U-turn
   About 8 mins
   go 3.9 mi
   total 4.3 mi

3. Turn left at S Piedras St
   About 2 mins
   go 0.5 mi
   total 4.8 mi

4. Turn right at Alameda Ave
   Destination will be on the left
   About 4 mins
   go 1.5 mi
   total 6.3 mi

4815 Alameda Ave, El Paso, TX 79905

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.

Map data ©2010 Google, INEGI

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.
Directions to 2001 N Oregon St, El Paso, TX 79902
2.3 mi – about 7 mins
<table>
<thead>
<tr>
<th>Step</th>
<th>Direction</th>
<th>Distance</th>
<th>Total Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Head north on W Paisano Dr</td>
<td>go 0.4 mi</td>
<td>total 0.4 mi</td>
</tr>
<tr>
<td>2.</td>
<td>Make a U-turn</td>
<td>go 0.6 mi</td>
<td>total 1.0 mi</td>
</tr>
<tr>
<td>3.</td>
<td>Exit onto W Yandell Dr toward I-85 S/Downtown</td>
<td>go 0.6 mi</td>
<td>total 1.6 mi</td>
</tr>
<tr>
<td>4.</td>
<td>Turn left at Lawton Dr</td>
<td>go 0.2 mi</td>
<td>total 1.8 mi</td>
</tr>
<tr>
<td>5.</td>
<td>Turn right at W Schuster Ave</td>
<td>go 0.3 mi</td>
<td>total 2.1 mi</td>
</tr>
<tr>
<td>6.</td>
<td>Turn left at N Oregon St</td>
<td>go 0.2 mi</td>
<td>total 2.3 mi</td>
</tr>
</tbody>
</table>

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.

Map data ©2010 Google, INEGI

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.
Job Hazard Analyses

Appendix B

October 8, 2010

Project No. 0118148

ASARCO Smelter Demolition

JHAs are task-specific documents developed in the field as tasks arise. JHAs will be maintained on site.
Applicable Safe Work Practices
*Appendix C*

*October 8, 2010*

*Project No. 0118148*

*ASARCO Smelter Demolition*

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*Environmental Resources Management Southwest, Inc.*

15810 Park Ten Place, Suite 300
Houston, Texas  77084-5140
(281) 600-1000
APPLICABLE SAFE WORK PRACTICES

SWP-01  HAZARD COMMUNICATION
SWP-03  MEDICAL SERVICES AND FIRST AID
SWP-04  AIRBORNE CONTAMINANTS
SWP-05  HEAT STRESS
SWP-06  COLD STRESS
SWP-07  NATURAL HAZARDS
SWP-08  PERSONAL PROTECTIVE EQUIPMENT
SWP-09  RESPIRATORY PROTECTION
SWP-10  CONFINED SPACE ENTRY
SWP-11  DRUM HANDLING
SWP-13  EXCAVATIONS
SWP-14  FALL PREVENTION AND FALL PROTECTION
SWP-16  FORKLIFT AND TRUCK OPERATIONS
SWP-17  HAND TOOLS
SWP-19  HEAVY AND MATERIAL HANDLING EQUIPMENT
SWP-20  LADDER SAFETY
SWP-21  LINE BREAKING AND BLANKING
SWP-22  LOCKOUT TAGOUT
SWP-25  PERSONNEL PLATFORM AND AERIAL WORK PLATFORM
SWP-29  WALL FLOOR PENETRATION
SCOPE

This procedure provides guidance on meeting regulatory requirements and ensuring that the information necessary for the safe use, handling and storage of hazardous chemicals is provided and made available to employees.

DEFINITIONS

- **Hazardous Chemical** – Any chemical which is a physical hazard or a health hazard.

- **Hazard Warning** – Any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s).

- **Health Hazard** – A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

- **Physical Hazard** – A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

PROCEDURE

A. RCM Health and Safety Coordinator will develop a chemical inventory of all known chemicals to be used or present as a potential contaminant at the job site.

B. RCM Health & Safety Coordinator will ensure that all containers (drums, bottles, etc.) are labeled with the identity of the known hazardous chemical contained and any appropriate hazard warnings. Containers that are not labeled or where labels have faded or been removed will be relabeled immediately.

C. RCM Health & Safety Coordinator will include NIOSH Universal Chemical Safety Data Cards for chemicals present as site constituents of concern and Material Safety Data Sheets (MSDSs) for chemicals brought to the site for the job. For assistance, contact the RCM Health and Safety Coordinator.

D. The Site Safety Officer will ensure employees have been trained on site-specific HazCom, including:
1. Methods that may be used to detect a release of hazardous chemical(s) in the workplace;
2. Physical and health hazards associated with chemicals;
3. Protective measures to be taken;
4. Safe work practices, emergency responses and use of personal protective equipment (PPE); and
5. Information on the Hazard Communication Standard including:
   a. Labeling and warning systems, and
   b. An explanation of Material Safety Data Sheets.

E. RCM Health & Safety Coordinator will identify PPE based on the task involved and the chemical properties.

F. The Site Safety Officer will inform employees of any non-routine tasks and the chemical hazards associated with the tasks. Review the safe work practices and use of required PPE prior to the start of such tasks.

G. The Site Safety Officer will provide information on hazardous chemicals known to be present to subcontractors and other employers on the site. Employers are responsible for providing necessary information to their employees. Ensure other onsite employers are provided with the applicable HazCom information.

H. All site personnel are required to report any incident of a chemical over-exposure or of a chemical spill to the Site Safety Officer. Follow the emergency response/spill response procedures described in the HASP.

REFERENCES

Regulatory References

Technical References
- NIOSH Universal Chemical Safety Data Cards

Procedural References
- SOP – 9, Personal Protective Equipment
- RCM Health and Safety Program, Appendix B, Section 3

REVISION LOG

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SCOPE

This procedure describes the requirements for providing medical services and first aid at the job site.

DEFINITIONS

None.

PROCEDURE

A. RCM Health & Safety Coordinator will identify the mode by which medical services and first aid will be administered and document in the Health and Safety Plan (HASP). This will generally be recorded by identifying the nearest medical facility to the job site and providing a map with the location identified.

B. In the absence of reasonably accessible medical services (i.e., within 5 minutes by ambulance), the Site Safety Officer or a person certified in first aid will be available at the site to render first aid.

C. At jobsites where the eyes or body of any employee may be exposed to corrosive or otherwise hazardous chemicals, quick-drenching/eye washing facilities must be provided.

D. First aid supplies must be easily accessible at a job site, when required. The contents of the kit must be checked by the Site Safety Officer before being sent out on each job and weekly during the job, to ensure that items used are replaced.

E. Field first aid kits should contain the following items:

- Band aids 3/4” x 3”
- Antiseptic wipes
- Non-stick pads, medium
- Burn cream, 8 oz.
- Kling rolled bandage 2”
- Foil packs
- Triangular bandage 51”
- Amoply, ammonia inhalants 0.33 ml.
- Hypo-allergenic first aid cream
- Tylenol, extra strength
- Adhesive Tape ½” x 5 yd
- Oval eye pads
- Scissors
- Butterfly bandages
- Examination gloves

REFERENCES

Regulatory References

- 29 CFR 1926.50, Medical Services and First Aid
Technical References
- ANSI Z308.1-1978, Minimum Requirements for Industrial Unit-Type First-aid Kits

Procedural References
- RCM Health & Safety Program, Appendix B, Section 2

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SCOPE

This procedure provides guidance on meeting regulatory requirements when airborne contaminants may be present at the job site. This procedure applies to all types of airborne contaminants which may cause adverse health effects. These contaminants may be in the form of dusts, mists, gases, vapors or fumes.

DEFINITIONS

None.

PROCEDURE

A. RCM Health & Safety Coordinator will develop an Air Monitoring Plan (AMP) for chemical constituents identified at the job site. The AMP must include the types of samples to be collected, such as real-time measurements, personal breathing zone and area samples, as well as identify the contaminants which will be monitored for.

B. Additional regulatory requirements may be triggered if a potential site contaminant is covered by an Occupational Safety and Health Administration (OSHA) substance-specific standard. The following list of contaminants have such regulations:

- Asbestos
- 13 Carcinogens
- Vinyl Chloride
- Inorganic Arsenic
- Lead
- Hexavalent Chromium
- Cadmium
- Benzene
- Coke Oven Emissions
- 1,2-Dibromo-3-Chloropropene
- Acrylonitrile
- Ethylene Oxide
- Formaldehyde
- Methyleneedianiline
- 1,3-Butadiene
- Methylene Chloride

REFERENCES

Regulatory References

- 29 CFR 1910.1000, Air Contaminants
- 29 CFR 1910.1001, Asbestos
- 29 CFR 1910.1003, 13 Carcinogens
- 29 CFR 1910.1017, Vinyl Chloride
- 29 CFR 1910.1018, Inorganic Arsenic
- 29 CFR 1910.1025, Lead
- 29 CFR 1910.1026, Hexavalent Chromium
- 29 CFR 1910.1027, Cadmium
- 29 CFR 1910.1028, Benzene
- 29 CFR 1910.1029, Coke Oven Emissions
- 29 CFR 1910.1044, 1,2-Dibromo-3-Chloropropene
• 29 CFR 1910.1045, Acrylonitrile
• 29 CFR 1910.1047, Ethylene Oxide
• 29 CFR 1910.1048, Formaldehyde
• 29 CFR 1910.1050, Methyleneedianiline
• 29 CFR 1910.1051, 1,3-Butadiene
• 29 CFR 1910.1052, Methylene Chloride

Technical References
• ACGIH Threshold Limit Values
• NIOSH Pocket Guide to Chemical Hazards

Procedural References
• SOP – 10, Respiratory Protection
• SOP – 11, Confined Space Entry
• SOP – 22, Line Breaking/Blanking

REVISION LOG

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</table>
SCROPE

This procedure provides work practices to minimize the impact of heat stress caused by exposure to hot environments or working conditions.

DEFINITIONS

- **Acclimatization** – The ability to adjust to hot working conditions. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

- **Heat Index** – An accurate measure of how hot it really feels when relative humidity (RH) is added to the actual air temperature.

PROCEDURE

A. The Site Safety Officer will implement techniques for preventing heat stress-related health issues. Prevention techniques include:

1. Provide shaded areas with cross-ventilation, if possible, for lunch and breaks.
2. Schedule physically demanding and strenuous tasks, or tasks requiring full-body chemical protection, for early in the day, if possible.
3. Drink at least 6-8 ounces of cool water every 60 minutes.
4. Use the buddy system and look for signs of heat stress. Any employee with signs of heat stress must immediately proceed to the break area. Signs and symptoms for various heat stress disorders and recommended first aid are listed in the following table.
5. The Site Safety Officer must verify that a work-rest cycle based on the heat index is implemented for site workers as applicable. Refer to the following three tables. To use the chart, read the temperature at the left and humidity across the top, the heat index is where the two intersect. For example, with a temperature of 96 and a humidity of 50%, the Heat Index is 108. Determine what the associated risk level is, based on the heat index. Use the risk level and heat index to determine the appropriate work-rest cycle.
Heat Index Chart

<table>
<thead>
<tr>
<th>Relative Humidity (%)</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
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Heat Index Risk Level and Associated Health Effects

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<th>Associated Risk</th>
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<tr>
<td>&gt;130</td>
<td>Extreme Danger</td>
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<tr>
<td></td>
<td>Heat stroke highly likely with continued exposure</td>
</tr>
<tr>
<td>105-130</td>
<td>Danger</td>
</tr>
<tr>
<td></td>
<td>Heat exhaustion and heat cramps likely and heat stroke possible with prolonged exposure and/or physical activity</td>
</tr>
<tr>
<td>90-105</td>
<td>Extreme Caution</td>
</tr>
<tr>
<td></td>
<td>Heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity</td>
</tr>
<tr>
<td>80-90</td>
<td>Caution</td>
</tr>
<tr>
<td></td>
<td>Fatigue possible with prolonged exposure and/or physical activity</td>
</tr>
</tbody>
</table>

NOTES:

- Heat Index values were devised for shady, light wind conditions. Exposure to full sun may increase these values by up to 15°.
- Heat Index values were devised for the general public wearing typical lightweight summer clothing. Acclimatized workers may be able to work under conditions with a slightly higher Heat Index.
- The use of personal protective equipment, including clothing increases the heat stress load on the body.
The work-rest cycle outlined below should be implemented based on the professional judgment of the Site Safety Officer and/or the Project Health and Safety Consultant. Workers must drink 8 ounces of cool water at each break.

<table>
<thead>
<tr>
<th>Heat Index</th>
<th>Risk Level</th>
<th>Work-Rest Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 130</td>
<td>Extreme Danger</td>
<td>15 minute break every 30 minutes</td>
</tr>
<tr>
<td>105-130</td>
<td>Danger</td>
<td>15 minute break every 60 minutes</td>
</tr>
<tr>
<td>90-105</td>
<td>Extreme Caution</td>
<td>15 minute break every 90 minutes</td>
</tr>
<tr>
<td>80-90</td>
<td>Caution</td>
<td>15 minute break every 120 minutes</td>
</tr>
</tbody>
</table>

B. The Site Safety Officer and the Construction Manager will observe workers to verify compliance with and effectiveness of prevention techniques.

C. The Site Safety Officer should provide first aid treatment for heat stress related health issues.

D. In the event a heat stress related incident occurs, the Site Safety Officer will report the incident following guidelines in the HASP.

REFERENCES

Regulatory References
None

Technical References
- NOAA – National Weather Service, Heat Index, Measure of How Hot it Feels

Procedural References
None

REVISION LOG

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SCOPE

This procedure provides work practices to minimize the impact of cold stress caused by exposure to cold environments or working conditions.

DEFINITIONS

- **Frostbite** – Occurs when the extremities do not get sufficient heat from the central body stores. The fluids around the cells of the body tissues freeze from exposure to low temperatures. This condition can result in damage to, and loss of, tissue. The most vulnerable areas are the nose, cheeks, ears, fingers, and toes.

- **Hypothermia** – This is the most severe form of cold stress and results from a drop in the body’s core temperature. Hypothermia can occur in relatively mild temperatures if there is a wind and the person’s clothing becomes wet. The signs or symptoms of hypothermia are:
  - First, uncontrollable shivering and the sensation of the cold;
  - Heartbeat slows and may become irregular;
  - Pulse weakens and blood pressure changes;
  - As the body’s core temperature drops, other signs may include cool skin, slow irregular breathing, and apparent exhaustion;
  - When core temperatures are in the mid-range, the victim may become listless, confused, exhibit severe shivering, or develop severe pain in the extremities; and
  - Final signs are a significant drop in blood pressure, fatigue, and shallow respiration.

PROCEDURE

A. The Site Safety Officer will implement techniques for preventing cold stress-related health issues. Prevention techniques include:

1. Require the use of additional protective clothing.
2. Allow workers to change clothes that have become wet.
3. Provide thermal insulating materials on metal handles of tools and equipment.
4. In snowy or icy conditions, require the use of UV eye protection, as well as from blowing crystals.
5. Provide a warm and sheltered area for changing clothes and taking breaks.
6. Provide hot liquids, such as soups, warm drinks, etc. in the break area.
7. Use the buddy system and look for signs of cold stress. Any employee observed with signs of cold stress shall immediately proceed to the break area.

B. The Site Safety Officer and the Construction Manager will observe to verify compliance with and effectiveness of prevention techniques.

C. The Site Safety Officer will provide first aid treatment for cold stress related health issues include moving to warm area. Seek medical attention if signs or symptoms of hypothermia or frostbite are present.

REFERENCES

Regulatory References
None.

Technical References
None.

Procedural References
None.

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SCOPE

This procedure provides guidance for determining appropriate means for handling natural hazards that may be encountered while conducting fieldwork.

DEFINITIONS

None.

PROCEDURE

Potential exposure natural hazards during performance of this project is believed to be minimal. However since the work is performed outside some precautions should be taken to guard against the following hazards. Keep in mind that the hazards may vary depending on the time of year or geographical region. Infrequent hard freezes may allow insects and snakes to be active all year round in some parts of the United States. Refer to Attachments 1 through 3 for photos and more thorough descriptions of the more common natural hazards, which might be encountered.

A. Identify type of natural hazard present.

B. When a natural hazard (such as poisonous plants, feral animals, insects and snakes) is encountered, back away and evaluate the situation.

C. Develop a plan which may include any of the following:

1. Remove the natural hazard if it can be done safely.

2. Avoid the natural hazard if it cannot be removed. Additionally, use appropriate PPE or outer clothing for protection from the hazard. Refer to SOP – 8, Personal Protective Equipment.

3. Get assistance in removing or working around the natural hazard. In some instances, this may require professional help from animal control or an insect expert.

D. In the event there is contact with the natural hazard, if it appears to be a life threatening situation, such as anaphylactic shock or a snake bite, seek medical attention immediately.

- OR -
A. **POISONOUS PLANTS**

1. Poison ivy is in the form of a vine, while oak and sumac are bush-like.
2. All produce a delayed allergic hypersensitivity.
3. The plant tissues have an oleoresin, which is active in live, dead, and dried parts and may be carried through dust, contaminated articles, and the hair of animals.
4. Symptoms usually occur 24 to 48 hours after exposure resulting in burning or stinging, and weeping and/or crusted blisters.
5. The best antidote for poisonous plants is recognition and avoidance.
6. Should exposure to any of these plants occur, notify the Site Safety Officer and wash the affected area with a mild soap and water, but do not scrub the area.

B. **TICKS**

1. Ticks attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission.
2. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites.
3. Periodically during the workday employees should inspect themselves for the presence of ticks.
4. Notify the Site Safety Officer of any tick bites as soon as possible, medical attention may be required.

C. **SPIDERS**

1. **Black Widow**
   a. The black widow is a common venomous spider found in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles.
   b. If disturbed, they typically will retreat to a corner of their web but can be induced to bite only if pressed against the skin.
   c. Notify the Site Safety Officer if bitten, because neurotoxins are injected, it is important to seek immediate medical attention.
2. **Brown Recluse**
   a. The brown recluse or Fiddle Back Spider is another common venomous spider.
b. It hides in dark niches and corners, where it may spin a poorly organized, irregular web.

c. It is shy and will try to run from a threatening situation but will bite if cornered.

d. Check boots and protective clothing for spiders prior to putting them on.

e. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Notify the Site Safety Officer if bitten.

f. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop.

D. FIRE ANTS

1. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers.

2. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations.

3. The first ant sting releases a chemical substance that triggers other ants of the colony to sting.

4. Anyone seeing fire ant mounds present at the work site should notify the Site Safety Officer, who will then notify the rest of the crew so the mounds may be avoided if possible.

E. CHIGGERS

1. Chiggers, also known as “red-bugs” or “harvest mites”, are the immature stages of a tiny red mite.

2. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush.

3. The larvae attach themselves to the clothing of people or to the fur of passing animals.

4. Wear loose-fitting clothing (if possible) when working outdoors. Apply a repellent containing DEET (N,N-diethyl-meta-toluamide), to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions.

5. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
6. Flowers of sulfur is another repellant of chiggers. Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.

F. FLYING INSECTS

1. Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur.
2. Wear long-sleeved clothes and long pants treated with repellent. Do not treat unexposed skin. Use the repellent according to the manufacturer’s recommendations provided on the container.
3. Personnel should report flu-like symptoms to the Site Safety Officer, medical attention may be needed.

G. SNAKES

1. The most effective way to prevent snakebites is to avoid snakes.
2. Personnel should avoid walking in high grass and underbrush.
3. Visual inspection of work areas should be performed prior to activities taking place.
4. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg.
5. No attempts at killing snakes should be made; many people are bitten in such an attempt.
6. If a snake bites someone, Notify the Site Safety Officer and seek medical services.

H. ALLIGATORS

1. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators.
2. Do not dump food or scraps into or near the water. This can attract alligators.
3. Always be aware of your surroundings and use caution and common sense.
4. If at any time personnel observe alligators at the site they will immediately inform the Site Safety Officer or Construction Manager, who will then notify the rest of the employees and local wildlife personnel.
I. FERAL ANIMALS

1. Feral animals such as rats or other wildlife may be encountered during fieldwork.
2. If an animal is diseased, injured or tending a nest, they may become aggressive.
3. Notify the Site Safety Officer or Construction Manager if feral animals are at the site, who will then notify the rest of the employees and local wildlife personnel.

ATTACHMENTS

Attachment 1, Poisonous Plants
Attachment 2, Insects
Attachment 3, Snakes
Attachment 4, Other Natural Hazards

REFERENCES

Regulatory References
None

Technical References
None

Procedural References

SOP – 8, Personal Protective Equipment

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Attachment 1

Poisonous Plants

Most species of poison ivy, oak, and sumac have three leaflets; hence, the saying, "Leaves of three, let it be." These plants vary significantly in appearance in different regions of the country, but in most species the flower and fruit structures arise in the angle between the leaf and the twig, the flowers are greenish in spring, and the plant's mature fruit is off-white or pale yellow-green.

Several varieties, including two species each of poison ivy, poison oak, and poison sumac and six subspecies of poison ivy (Toxicodendron radicans), are found in the United States. Poison ivy (see figure A below) generally grows east of the Rocky Mountains and poison oak in the West. Both poison ivy and poison sumac are found along the Gulf Coast. Poison oak prefers swampy areas in the Southeast.

Figures A1, A2: Courtesy of Lisa A. Gamer, MD; figure A3: staff photo; figure A4: Janet Robidoux

Figure A. Poison ivy (Toxicodendron radicans) can grow as a shrub or vine, but all varieties are characterized by glossy leaves that grow in clusters of three leaflets. The varieties shown here are found in Texas (1,2) and Minnesota (3). The off-white or pale yellow-green berries of poison ivy (4) often remain on the plant through the winter.
Poison Ivy

A climbing vine with three serrated-edge, pointed leaves grows in the East, Midwest and South. In the northern and western states, poison ivy grows as a non-climbing shrub.

The appearance of these plants is variable. Leaves are alternate and normally consist of three leaflets with the stalk of the central leaflet being longer than those of the other two are but can be found with five or even seven leaflets. The leaflets are two to four inches long, dull or glossy green with pointed tips. The middle leaflet is generally larger than the two laterals. The edges of the leaflets may be toothed, lobed, or smooth. Virginia Creeper (*Parthenocissus quinquefolia*) is non-poisonous vine with five leaflets that is often mistaken for poison ivy.

Poison ivy can be a shrub or a woody vine. Yellowish-green flowers occur in compact clusters in leaf axils, in June or July followed by waxy, gray-white berries about three-sixteenths of an inch in diameter in late summer.
Poison oak also has three leaves. It grows in the sandy soil of the Southeast as a small shrub. In the western United States poison oak is a very large plant that grows as a standing shrub or climbing vine. Eastern poison oak has the most "oak-looking" leaves of any of the species. It usually has multi-lobed leaves, no aerial roots on the stems, and fuzzy fruits and leaves. It loves sandy soils. Western poison oak is found only along the Pacific coast and into the mountains and it usually has aerial roots extending from the main stem.
Poison Sumac

A shrub or bush with two rows of 7-13 leaflets, most common in the peat bogs of the Northern United States and in swampy Southern regions of the country. A water loving swamp shrub (dendritic) or bush with two rows of 7-13 leaflets; growing from 6 to 20 feet in height, the Poison Sumac is found in the east from Quebec to Florida and westward along the coast to far west Texas between Shelby and Hardin counties.

Listed below are recommended actions to take to reduce the potential exposure to poisonous plant:

- Determine what types of poisonous plants may be present at the specific site.
- Use repellant sprays and coatings.
- Use netting or long sleeves with cuffs and long pants.
- Regularly inspect skin.
- Maintain a first aid kit on hand.
Chiggers, also known as “red-bugs” or “harvest mites”, are the immature stages of a tiny red mite. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush. The larvae attach themselves to the clothing of people or to the fur of passing animals. Before settling down to feed, chiggers move to a constriction, such as sock tops, waistbands, or armpits. Feeding chiggers inject a salivary fluid, which dissolves the host’s cells, and then they suck up the liquefied tissue. Within a few hours, small, reddish, intensely itching welts appear. These bites may continue to itch for several days up to two weeks after the chigger is dislodged. Following are suggestions that should provide some protection from chiggers:

- Stay out of areas where chiggers are likely to be present including wood lots, pastures, roadside ditches, or other areas with tall grasses and weeds. Chiggers are especially common in moist low-lying areas.

- Wear loose-fitting clothing (if possible) when working outdoors. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.

- Apply a repellent containing DEET to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions.

- Another repellant of chiggers is flowers of sulfur. Flowers of sulfur is powdered elemental sulfur available at a drug store or pharmacy as an over-the-counter preparation. It has a slight, rotten egg smell. Areas on the body that have tight clothing up against them such as socks, waistbands, etc. may be dusted with sulfur powder. Surveyors and other field personnel state that they fill a sock with sulfur and are able to dust these areas efficiently.
Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.

- Immediately after possible exposure to chiggers, take a bath, thoroughly scrubbing the body with hot soapy water. This will kill or dislodge many of the chiggers. The clothes that were worn when the bite(s) occurred should be placed in a plastic bag for temporary storage until they can be laundered.

- When bites begin to itch, one course of treatment is to apply rubbing alcohol, followed by one of the nonprescription local anesthetics. A baking soda paste, calamine lotion, or product such as “After-Bite” also will help reduce discomfort. Avoid scratching bites since this only increases irritation and may lead to a secondary infection of the bite.

Ticks

Ticks are vectors of many different diseases including Rocky Mountain spotted fever, Q fever, tularemia, Colorado tick fever, and Lyme disease. They attach to their host’s skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites. Periodically during the workday employees will inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.
- Do not twist the tick as you pull and do not squeeze its bloated body. That may actually inject bacteria into your skin.
- Thoroughly wash your hands and the bite area with soap and water. Then apply an antiseptic to the bite area.
- Save the tick in a small container with the date, the body location of the bite, and where you think the tick came from.
- Notify the SSO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States.
Spiders

A common venomous spider is the Black Widow. The adult female is glossy black with short, almost microscopic hairs and a crimson hourglass marking on the underside of the abdomen. They are found in dark corners of barns, stables, garages and piles of boxes and crates. They have also been known to reside in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles. Generally, Black Widows are not aggressive and usually can be induced to bite only if pressed against the skin. If disturbed, they typically will retreat to a corner of their web. However, these spiders are more aggressive if they are protecting an egg sac. After a bite, a dull numbing pain in the affected extremity occurs. In addition, pain and some muscular rigidity in the abdomen or the shoulder, back, and chest may occur. The bite may also produce headache, dizziness, skin rash, nausea, vomiting, anxiety and weakness, and increased skin temperature over the affected area may be observed. Ice may be placed over the bite to reduce the pain. Bites are rarely fatal to adults, but because the black widow spider injects neurotoxins, it is important to seek immediate medical attention.

Another venomous spider common in the southern United States is the Brown Recluse or Fiddle Back Spider. The Brown Recluse is about 1/4 to 1/2 inches in body length (most adults are about the size of a United States dime to a US quarter with legs extended). Coloration ranges from tan to dark brown, with the abdomen often darker than the rest of the body. The feature that most distinguishes the brown recluse from many other harmless spiders is a
somewhat darker violin-shaped marking on top of the leg-bearing section of the body. The neck of the violin "silhouette" points towards the rear (abdomen) of the spider. The brown recluse roams at night seeking its prey. During the day, it hides in dark niches and corners, where it may spin a poorly organized, irregular web. Eggs are deposited in 1/2 inch long off-white silken egg sacs, often appearing flattened beneath and convex above. It is shy and will try to run from a threatening situation but will bite if cornered. People are sometimes bitten while they are asleep because they roll onto a brown recluse spider while it is hunting in the bed. More often the victim is bitten while putting on a shoe or piece of clothing that a spider has selected for its daytime hiding place. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Later the area around the bite site may develop into an ulcerous sore from 1/2 to 10 inches in diameter. Healing often requires a month or longer, and the victim may be left with a deep scar. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop. It should be noted that not all brown recluse bites result in ulcerations or scarring.¹

Fire Ants

Fire ants are approximately 1/4-inch long and live in underground chambers that typically contain over 1,000 ants. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations. The first ant sting releases a chemical substance that triggers other ants of the colony to sting. Anyone seeing fire ant mounds present at the work site should notify the SSHO, who will then notify the rest of the crew so the mounds may be avoided if possible.

Flying Insects

Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur. Section 3.4.4 discusses problems associated with them. Mosquitoes can be the vectors for diseases such as the West Nile Virus and Saint Louis Encephalitis, reports of which appear in the media periodically. Avoiding mosquito bites is the best way to avoid potential exposure to mosquito-borne disease. Apply insect repellant containing DEET (N,N-diethyl-meta-toluamide), wear long-sleeved clothes and long pants treated with repellent and stay indoors during peak mosquito feeding hours (dusk until dawn) to further reduce your risk.

There is currently no vaccine to protect humans against Saint Louis Encephalitis or West Nile Virus. Individuals at project sites can reduce their risk from being infected with West Nile Virus by taking the following actions to protect against mosquito bites:

• Review the hazards of West Nile Virus periodically in morning safety meetings.
• Increase protective measures when working at dawn, dusk, and in the early evening.
• Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended. Understand that mosquitoes may bite through thin clothing, so personnel should evaluate the actual Level D clothing worn, for example, heavy, long
sleeve work shirts and heavy dungarees/jeans may be indicated. Activity at projects where disposable coverall use (i.e., Tyvek®) is specified, further reduces the risk of mosquito bites.

- For activities where only Level D PPE is specified, consider using disposable coveralls when working in wooded, highly vegetated, or swampy areas.

- Use an insect repellent containing approximately 30 percent DEET. In concentrations greater than 35 percent, DEET provides no additional protection. Use the repellent according to the manufacturer’s directions provided on the container. Use just enough repellent to cover exposed skin and clothing. Do not treat unexposed skin. Frequent reapplication or saturation is unnecessary for effectiveness. Avoid prolonged and excessive use of DEET.

- When additional protection against mosquitoes is necessary, commercially prepared “clothing and gear” insect repellants containing 0.5 percent permethrin may be used. These repellants, such as Repel Permanone™ are available in the sporting goods departments at major retailers. Clothing and gear insect repellants are not for use on skin. Use the repellent according to the manufacturer’s recommendations provided on the container.

- After returning from outdoor field activities, wash treated skin with soap and water.

- Personnel should report flu-like symptoms to the SSO.

**West Nile Virus**

The Centers for Disease Control and Prevention report that human illness from West Nile virus is rare, even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low. West Nile virus is spread by the bite of an infected mosquito, and can infect people, horses, many types of birds, and some other animals. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. On rare occasions, West Nile virus infection can result in a severe and sometimes fatal illness known as West Nile encephalitis (an inflammation of the brain). The risk of severe disease is higher for persons 50 years of age and older. There is no evidence to suggest that West Nile virus can be spread from person to person or from animal to person.

**Saint Louis Encephalitis**

The Centers for Disease Control and Prevention report mild infections occur without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially in infants) and spastic paralysis. There is no evidence to suggest that Saint Louis encephalitis can be spread from person to person or from animal to person.
# Table 1
## Flying Insect Information

<table>
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<th>Organism</th>
<th>Description</th>
<th>Habitat</th>
<th>Problem</th>
<th>Severity</th>
<th>Protection</th>
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<tr>
<td>Hornet</td>
<td>One inch long with some body hair. Abdomen is mostly black.</td>
<td>Round, paper like nest hanging from trees, shrubs, or under eaves of buildings.</td>
<td>One nest may contain up to 100,000 hornets that will attack in force at the slightest provocation.</td>
<td>Severe pain, allergic reactions similar to bees.</td>
<td>Do not come near or disturb nest. If a hornet investigates you, do not move.</td>
</tr>
<tr>
<td>Wasp</td>
<td>Very thin waist. Color can be black, yellow or orange with stripes.</td>
<td>Underground nest. Paper-like honeycomb nest in abandoned buildings hollow trees, etc.</td>
<td>Stings. Some species will attack if you get too close to the nest.</td>
<td>Severe pain, allergic reactions similar to bees. Can be fatal.</td>
<td>Avoid Nest. Do not swat at them.</td>
</tr>
<tr>
<td>Bee</td>
<td>Generally have yellow and black stripes and two pair of wings.</td>
<td>Hollow logs, underground nest, old buildings,</td>
<td>Stings when annoyed. Leaves venom sac in victim.</td>
<td>If person is allergic, nausea, shock, constriction of the airway can result. Death may result.</td>
<td>Be careful and watch where you walk. Cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you.</td>
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The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt.

If a snake bites someone, the following treatment should be initiated:

- Keep patient calm
• Notify emergency medical services
• Wash the wound and keep the affected body part still
• Apply direct pressure to site of bite if bleeding is extreme
• Keep the affected area lower than the heart
• Carry a victim who must be transported, or have him/her walk slowly
• Transport to closest medical facility
Attachment 4

Other Natural Hazards

Alligators

Alligators live in nearly all Louisiana parishes but are most common in the major river drainage basins and large lakes in the southern portion of the state. Most attacks involve animals over six feet long. Alligators become more active in the beginning of March, peaking in May, which is their mating season. Females will nest in June - July, and the eggs will hatch in August and September. Even a small amount of impounded water may contain a large alligator. Twilight and night are prime times for alligator attacks. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators. Do not dump food or scraps into or near the water. This can attract alligators. Always be aware of your surroundings and use caution and common sense. If at any time personnel observe alligators at the site they will immediately inform the SSO, who will then notify the rest of the crew and local wildlife personnel.

Feral Animals

Feral animals such as rats or other wildlife may be encountered during fieldwork. Typically, feral animals are as afraid or more afraid of humans and when encountered will run away from human contact. However, if an animal is diseased, injured or tending a nest, they may become aggressive. The most common disease encountered with feral animals is rabies. Signs of a rabies-infected animal include:

- Changes in an animal’s behavior;
- General sickness;
- Difficulty swallowing;
- An increase in drool or saliva;
- Wild animals that appear abnormally tame or sick;
- Animals that may bite at everything if excited;
- Difficulty moving or paralysis; and
- Death.

Animals in the early stage of rabies may not have any signs, although they can still infect you if they bite you. The incubation period is the time from the animal bite to when signs appear. In rabies, it is usually 1-3 months. However, it can last as long as several years. Once the virus reaches the brain or spinal cord, signs of the disease appear. In the event...
an animal is encountered on the site, do not approach it. If it exhibits one or more of the signs listed above, call local wildlife personnel to get as
SCOPE

This procedure provides guidance for determining appropriate Personal Protective Equipment (PPE) to be worn at the job site, based on new tasks and chemical or physical agents identified in the field. The initial determination for proper PPE is completed as part of development of the HASP.

DEFINITIONS

None.

PROCEDURE

A. The Site Safety Officer will complete a hazard assessment of the tasks involved and identify the appropriate PPE based on the task and the chemical or physical agents involved. The written hazard assessment certification must be documented in the HASP.

B. The Site Safety Officer will communicate to employees the PPE requirements for the tasks involved.

C. The Site Safety Officer will provide PPE that properly fits the employee(s).

D. The site Safety Officer will conduct daily site walks to verify appropriate use of PPE.

E. RCM Health & Safety Coordinator or the Site Safety Officer will provide training to the employees which includes at least the following:
   1. When PPE is necessary;
   2. What PPE is necessary;
   3. How to properly don, doff, adjust and wear PPE;
   4. The limitations of the PPE; and
   5. The proper care, maintenance, useful life and disposal of the PPE.

F. Re-training by the Site Safety Officer may be required if:
   1. Changes at the job site make previous training obsolete.
   2. Changes in the types of PPE make previous training obsolete.
   3. Inadequacies in an affected employee’s knowledge or use of PPE indicate the employee requires additional training.

G. Types of PPE include the following:
   1. Eye and Face Protection
STANDARD OPERATING PROCEDURE

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a. All eye and face protection must comply with ANSI Z87.1-1989.
b. Safety glasses
   • Side shields must be worn when there is a hazard of flying objects.
   • Prescription glasses must meet the ANSI Z87.1-1989 requirements or must have
     eye protection over them meeting the ANSI standard requirements.
c. Chemical goggles
d. Face shield

2. Head Protection
   a. All head protection (hard hats) must comply with ANSI Z89.1-1989.

3. Foot Protection
   All foot protection must comply with ANSI Z41-1991.
   a. Safety-toed shoes
   b. Rubber boots or rubber safety-toed boots

4. Hand Protection
   Hand protection must be selected based on the performance characteristics
   of the hand protection relative to the task(s) to be performed, conditions
   present, duration of use and the hazards and potential hazards identified. The RCM
   Health and Safety Coordinator must verify and document selection of appropriate
   chemical resistant gloves.
   a. Work gloves, such as leather or cotton
   b. Chemical gloves, such as nitrile, neoprene, Viton, butyl rubber
   c. Cut-resistant gloves, such as Kevlar

5. Hearing Protection
   a. Ear plugs
   b. Ear muffs

6. Respiratory Protection (Refer to SOP – 9)

7. Other PPE
   a. Disposable Coveralls
   b. Fire Resistant Clothing

REFERENCES

Regulatory References
• 29 CFR 1910.132, Personal Protective Equipment, General Requirements
• 29 CFR 1910.133, Eye and Face Protection
• 29 CFR 1910.135, Head Protection
• 29 CFR 1910.136, Foot Protection
• 29 CFR 1910.138, Hand Protection

Technical References
• ANSI Z87.1-1989, American National Standard Practice for Occupational and Educational Eye and Face Protection
• ANSI Z89.1-1989, American National Standard for Personal Protection – Protective headwear for Industrial Workers – Requirements
• ANSI Z41-1991, American National Standard for Personal Protection – Protective Footwear

Procedural References
• SOP – 9, Respiratory Protection

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SCOPE

This procedure identifies the work practices and regulatory requirements with regard to respiratory protection.

DEFINITIONS

- **Escape Respirators** – Respiratory devices providing protection only during escape from hazardous atmospheres.

- **Hazardous Atmosphere** - (1) Any atmosphere containing a toxic or disease-producing gas, vapor, dust, fume, or mist, either immediately or not immediately dangerous to life or health; or (2) Any oxygen-deficient atmosphere.

- **Immediately Dangerous to Life or Health (IDLH)** – A condition that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate, or delayed, permanent adverse health effects, or prevent escape from such an environment.

- **Oxygen Deficient Atmosphere** – An atmosphere containing less than 19.5 percent oxygen by volume.

PROCEDURE

A. The Site Safety Officer must verify that all employees required to wear respiratory protection at the jobsite are qualified (i.e., have completed a medical evaluation, been fit-tested and are trained.)

B. The RCM Health and Safety Coordinator will select respiratory protection based on the hazards at the jobsite. Selection of respiratory protection will be completed as part of the hazard assessment when completing the HASP. If unanticipated conditions are encountered at the jobsite requiring a change in respiratory protection, follow the respiratory protection upgrade process defined Section 5 of in the site specific HASP. Additionally, the Site Safety Officer should contact the RCM Health and Safety Coordinator to re-evaluate PPE requirements.

C. Inspection

1. All workers must inspect all non-emergency respirators before each use and during cleaning.

2. The Site Safety Officer must inspect respirators used for emergency use, at least monthly and in accordance with the manufacturer’s recommendations, and must check for proper function before and after each use. See Section G of this SOP for situations requiring emergency use respirators.
3. Respirator inspection shall include:
   - Check for tightness of connections.
   - Check condition of inlet coverings, head harness, valves, connecting tubes, harness assembly, hoses, filter, cartridges, canisters, end-of-service-life indicator, electrical components, and shelf-life date(s).
   - Check all rubber and elastomeric parts.
   - Check all air cylinders for proper charge.
   - For respirators maintained for emergency use, the inspection must be documented with the date of the inspection, the name of the inspector, the findings, remedial action taken, and a serial number or other means if identifying the respirator. A tag or label must be affixed to the storage compartment and replaced with a subsequent inspection tag/label.

4. Any respirator that does not pass inspection shall be immediately removed from service to be repaired or replaced.

D. Use

1. No facial hair is allowed which could come between the sealing surface of the face piece and the face, or interfere with the valve function.
2. Eye protection must be worn such that it does not interfere with the face piece seal.
3. Conduct a seal-check (positive and negative pressure) every time the respirator is donned.
4. The Site Safety Officer must evaluate continuing respirator effectiveness
   - Maintain surveillance of work area to assess jobsite conditions and respirator wearer(s) exposure or stress levels have not changed;
   - Direct respirator wearers to leave the work area:
     - to wash their faces and face pieces to prevent eye or face irritation associated with respirator use;
     - if a respirator wearer detects vapor or gas breakthrough, changes in breathing resistance or leakage of the face piece;
     - to replace the respirator filter, cartridge or canister elements.
   - If a respirator wearer detects breakthrough, changes in breathing resistance or leakage, they must replace or repair the respirator before returning to the work area. Change schedules for substances other than particulates will be addressed in the HASP or Job Hazard Analysis.

E. Maintenance

1. Clean and sanitize respirator after each use.
2. If respirators are not assigned, each respirator must be cleaned and sanitized before being used by a different employee.
3. Respirators being used for emergency use shall be cleaned after being used. These respirators must contain a tag or label on them telling the last date they were inspected and who inspected them.

4. Each respirator shall be cleaned in warm water (not exceeding 110°F or 43°C) with sanitizers that effectively clean the respirator and contain an antibacterial agent. For additional cleaning procedures, refer to 29 CFR 1910.134, Appendix B-2, Respirator Cleaning Procedures (Mandatory).

5. Replacement of parts or repairs may be done only by persons trained in proper respirator maintenance and assembly.

6. Replacement parts used shall be only those designated specifically for the respirator being repaired.

7. Any respiratory equipment not repairable, must be destroyed and discarded.

F. Site workers must store respirators to protect them from:
   1. physical damage including face piece or valve deformation;
   2. contamination;
   3. dust;
   4. sunlight;
   5. extreme temperatures;
   6. excessive moisture; and
   7. damaging chemicals.

G. Special Circumstances (including but not limited to Immediately Dangerous to Life and Health (IDLH) or unknown concentrations)

   If the Site Safety Officer or Construction Manager encounters special circumstances in the field which were not anticipated in the HASP, such as an IDLH atmosphere or an atmosphere with unknown concentrations or unknown constituents, contact your RCM Health and Safety Coordinator for assistance. Conditions requiring Self-Contained Breathing Apparatus (SCBA) or airline respiratory protection may require additional medical evaluation, fit-test of a different face piece and additional training. Additionally, when using supplied air, additional criteria apply regarding breathing air quality, quantity and flow. For additional information, refer to 29 CFR 1910.134(i).

REFERENCES

Regulatory References
   • 29 CFR 1910.134, Respiratory Protection

Technical References
   None
## STANDARD OPERATING PROCEDURE

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### Procedural References
- RCM Health and Safety Program, Appendix B, Section 1

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SCOPE

This procedure provides work practices to meet regulatory requirements for working in confined spaces and to ensure that proper planning has occurred as part of development of the HASP. There are two types of confined spaces covered by this procedure: a permit-required confined space and a non-permit confined space.

DEFINITIONS

- **Confined Space** – An area which:
  - Has adequate size and configuration for employee entry;
  - Has limited means of access or egress; and
  - Is not designed for continuous employee occupancy.

- **Entry into a Confined Space** – The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

- **Non-permit Confined Space** - A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

- **Permit-Required Confined Space** – A confined space that has one or more of the following characteristics:
  - Contains or has a potential to contain a hazardous atmosphere;
  - Contains a material that has the potential for engulfing an entrant;
  - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
  - Contains any other recognized serious safety or health hazard.

PROCEDURE

A. It is RCM’s standard policy and practice to never enter into a confined space, as defined above. However, there may be situations which require entry into a confined space. In those situations, a detailed written Confined Space Entry Program must be developed for the specific site and specific conditions anticipated to be encountered. Under these circumstances, he RCM Health and Safety Coordinator will develop the Confined Space Entry Program as part of the site specific HASP.

B. Additionally, specific training must be completed for any individual(s) involved in
confined space entry.

REFERENCES

Regulatory References
• 29 CFR 1910.146, Permit-Required Confined Spaces

Technical References
None

Procedural References
• ERM Corporate Health and Safety Program, Tanks, Vaults and Manholes

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SCOPES

This procedure identifies the work practices and regulatory requirements regarding drum handling at the jobsite.

DEFINITIONS

None.

PROCEDURE

A. When handling drums, follow the general drum handling requirements listed below:

1. Hazardous substances and contaminated, liquids and other residues must be handled, transported, labeled, and disposed of in accordance with 29 CFR 1910.120(j).
2. When practical, drums and containers must be inspected and their integrity must be assured prior to being moved.
3. Unlabeled drums and containers must be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.
4. Drums must be handled only if necessary. Prior to handling, all personnel should be warned about the hazards of handling and instructed to minimize handling as much as possible.
5. Drums and containers that cannot be moved without rupture, leakage, or spillage must be emptied into a sound container using a device classified for the material being transferred.
6. A ground-penetrating system or other type of detection system or device will be used to estimate the location and depth of buried drums or containers.
7. Soil or covering material must be removed with caution to prevent drum or container rupture.
8. Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, must be on hand and ready for use to control incipient fires.

B. When opening drums and containers, such as for sampling or waste characterization purposes, handling shock sensitive wastes, radioactive wastes, or when shipping drums, the RCM Health and Safety Coordinator must develop a site specific drum handling plan to be included in the HASP.

REFERENCES

Regulatory References
- 29 CFR 1910.120(j), Handling Drums and Containers
• 29 CFR 1926.65(j), Handling Drums and Containers

Technical References
None

Procedural References
• ERM Corporate Health and Safety Program, Drum/Container/Cylinder Handling Procedures

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SCOPE

This procedure provides requirements and safe work practices for personnel involved in excavation work. Please review the Excavation Safety Checklist (Attachment 1) in verifying that this procedure is being followed.

DEFINITION

- **Accepted Engineering Practices** – those requirements, which are compatible with standards of practice required by a registered professional engineer.

- **Benching (Bench System)** – a method of protecting employees from cave-ins by excavating the sides of an excavation from one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

- **Cave-in** – the separation of a mass of soil or rock from the sides of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity to entrap, bury, or otherwise injure and immobilize a person.

- **Competent Person** - one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

- **Excavation** - any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

- **Face or Sides** – the vertical or inclined earth surfaces formed as a result of excavation work.

- **Hazardous Atmosphere** – an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

- **Protective System** – a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective Systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

- **Registered Professional Engineer** – a person who is registered as a professional engineer in the state where the work is to be performed.

- **Shield (Shield System)** – a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect workers with in the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses.
• **Shoring (Shoring System)** – a structure such as a metal hydraulic lift, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

• **Sloping (Sloping System)** – a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation. The angle of incline required to prevent a cave-in varies with differences in factors such as the soil type, environmental conditions of exposure, and application of surcharge loads.

• **Support System** – means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

**PROCEDURE**

A. Prior to the start of excavation, the Construction Manager must complete the ERM subsurface clearance procedure to verify clearance of subsurface hazards at the excavation site. Subcontractor Contact should identify the location of utility installations (e.g., sewer, telephone, electric, water lines, etc.) that may be expected to be encountered during excavation.

1. Contact the utility company (-ies) and advise of proposed work requesting them to establish the location of the underground installations.

2. Underground installations must be protected, supported, or removed as necessary to safeguard employees.

B. When equipment is operated adjacent to an excavation or is required to approach the edge of an excavation, a warning system, such as barricades, hand or mechanical signals, or stop logs must be utilized. The system should be inspected:

1. Prior to the start of work and as needed throughout the shift.

2. After every rainstorm or other site condition change that could increase the instability of the excavation.

C. To prevent exposure to harmful levels of atmospheric contaminants or oxygen deficiency (atmospheres containing less than 19.5% oxygen), the following requirements apply:

1. The atmospheres in the excavation must be tested before employees enter excavations greater than 4 feet in depth per SOP 10 Confined Space Entry

2. The proper respiratory protection should be provided per SOP – 9 Respiratory Protection.
3. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing must be conducted as often as necessary to verify that the atmosphere remains safe.

D. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, must be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. The equipment should be attended when in use.

E. Employees should not work in excavations where water has accumulated or is accumulating, unless protective measures such as special support or shield systems to protect from cave-ins have been implemented to protect the employees against the hazards posed by water accumulation.

1. If water is controlled or prevented from accumulating by the use of water removal equipment, a competent person must monitor the water removal equipment and operations.

2. Diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering the excavation and to provide drainage of the area adjacent to the excavation.

3. Excavations subject to runoff from heavy rains require an inspection by a competent person.

I. Stability of other structures endangered by excavation operations must be stabilized by support systems such as shoring, bracing, or underpinning for the protection of employees. A registered professional engineer should be consulted for determination of stability of structures that may be affected during the excavation work.

K. Subcontractor Contact should verify materials and equipment are free from damage or defects that might impair their proper function.

L. Daily inspections of excavations, the adjacent areas, and protective systems must be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. A helpful excavation safety checklist is provided as Attachment 1.

ATTACHMENT

- Excavation Safety Checklist

REFERENCES
Regulatory References

- 29 CFR 1926.650 Scope, Application, and Definitions Applicable to this Subpart (Subpart P).
- 29 CFR 1926.651 Specific Excavation Requirements.
- 29 CFR 1926.652 Requirements for Protective Systems.

Technical References

None

Procedural References

ERM’s Subsurface Clearance Procedure

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<td>Prior to starting the job, were utilities notified and underground services located?</td>
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<tr>
<td>Were overhead transmission lines noted and precautions taken to ensure that equipment does not come in contact with them?</td>
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<td>☐</td>
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<tr>
<td>Have adequate signs been posted and barricades provided?</td>
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<td>☐</td>
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<tr>
<td>Are the workers wearing reflective vests, if necessary?</td>
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<td>Are vehicles, equipment, and spoil piles correctly placed to allow for the safe passage of traffic and the progress of the construction?</td>
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<td>Has traffic control (fire depts., etc.) been notified?</td>
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<td>Have undermined structures been shored, braced or underpinned, or has a registered Prof. Engineer determined that such measures are not necessary?</td>
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<td>Have means been provided to remove water from the excavation?</td>
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**NOTE:** Shoring and shielding must be removed in a manner that ensures the safety of workers, and excavations must be back filled as soon as work is completed.
SCOPE

This procedure provides work practices to meet regulatory requirements regarding fall prevention/fall protection for all employees working 6 feet or more above a lower level.

DEFINITIONS

None.

PROCEDURE

A. Fall prevention/protection is required when there is an unprotected side or edge which is 6 feet or more above a lower level. Example situations include but are not limited to:
   1. Horizontal walking/working surfaces;
   2. Leading edges;
   3. Holes in flooring or walls;
   4. Formwork and reinforcing steel;
   5. Ramps, runways and other walkways;
   6. Excavations;
   7. Roof work;
   8. Precast concrete erection; and
   9. Walking/working surfaces not otherwise addressed.

B. In addition, protection from falling objects must also be provided to employees working below, by requiring the use of head protection as well as one of the following methods:
   1. Erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels; or
   2. Erect a canopy structure and keep potential objects far enough from the edge so they would not go over if they were accidentally misplaced; or
   3. Barricade the area into which the objects could fall and prohibit employees from entering into the barricaded area.

C. Where fall prevention, in the form of a physical barrier, is not feasible, and a fall hazard exists, fall protection is mandatory. Fall protection can take on many forms depending on the job task being performed, i.e., permanent and temporary vertical and horizontal lifeline systems, full body harness, shock absorbing lanyards, nets, retractable devices, etc. These are some of the most common methods of fall protection available.

D. In the event work is to be conducted at a height greater than 6 feet, fall prevention and/or fall protection requirements must be incorporated into the HASP. The RCM Health and Safety Coordinator must develop a fall prevention/protection plan which...
will incorporate the use of physical barriers, administrative controls or fall protection equipment.

E. Additionally, training must be completed for any individual who will be using fall prevention / fall protection equipment. The Site Safety officer must verify all workers have received the appropriate training relative to fall prevention / fall protection.

REFERENCES

Regulatory References
- 29 CFR 1926.501, Duty to Have Fall Protection
- 29 CFR 1926.502, Fall Protection Systems Criteria and Practices

Technical References
None

Procedural References
None

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SCOPE

This procedure provides guidance on meeting regulatory requirements and provides expectations for the safe use, and handling of forklift / trucks.

DEFINITIONS

None.

PROCEDURE

A. TRAINING

1. The Construction Manager should verify that each forklift / truck operator is trained and certified to operate a fork lift /truck per the requirements of 29 CFR 1910.178 Powered Industrial Trucks.

2. Refresher training in relevant topics shall be provided when the operator:
   a. Is assigned to drive a different type of truck
   b. Operates the forklift in an unsafe manner
   c. Experience an incident

3. Operators shall be required to be re-evaluated at least once every three years.

B. INSPECTIONS

1. Prior to operating a forklift, the operator shall examine the unit for conditions that adversely affect the safety of the vehicle.

2. A lift truck found to be unsafe to operate shall have the ignition key removed and a "OUT OF SERVICE" tag attached to the steering wheel, noting the unsafe condition or reason it has been taken out of service.

3. Any truck found with a tag must be repaired before being used.

C. OPERATION

1. Forklift / truck shall be operated in accordance with the manufacturer’s operating procedures and regulatory requirements.

2. The lifting capacity of the forklift/ truck should not be exceeded. Capacities are located on a plate attached to the truck.

3. An unstable load should never be lifted.

4. Obey all signs and warnings.

5. Lifting personnel for repairs or maintenance shall be done only in approved cages or platforms.

6. Forklifts have a high center of gravity and should be driven slowly around turns and curves to prevent rollover.

7. Spread the forks out as far as they will go when picking up material. Also, if the forks are longer than the load, be careful not to disturb what is behind the load.

8. Never allow anyone to stand or walk under a raised load.

9. Before moving the truck, check to make sure that there are no obstacles in your way.
10. Always turn your head when backing up. Mirrors are to see what is behind you
    while moving forward.
11. Come to a complete stop before changing directions.
12. Drive extra slow on wet and slippery surfaces.
13. The seatbelt must be worn at all times.
14. Never dismount the forklift while it is running.
15. Never leave a load raised.
16. Never drive on a slope with a raised load.
17. Always drive perpendicular to a slope
18. Always verify the ability of surfaces to support the equipment before operating the
    forklift/truck non non-paved surfaces

REFERENCES

Regulatory References
• 29 CFR 1910.178 Powered Industrial Trucks

Technical References
None

Procedural References
None

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SCOPE

This procedure defines minimum expectations for the safe use and maintenance of tools and equipment, including tools and equipment which may be furnished by employees.

DEFINITIONS

Torque: The circular or rotating motion in tools such as drills, impact wrenches, saws, etc. which results in a strong twisting force

PROCEDURE

A. HAND TOOLS

1. Every tool was designed to do a certain job and employees should use tools only for their intended purpose.
2. Maintain hand tools in good condition - sharp, clean, oiled.
3. Do not force tools beyond their capacity or use "cheaters" to increase their capacity. Do not use tools for pry bars.

B. PORTABLE POWER TOOLS

1. GUARDING

Guards or shields must be installed on all power tools before issue. Do not use improper tools or tools without guards in place.

C. OPERATING PRACTICES

1. Loose clothing, rings, and other jewelry must not be worn around operating machines. Keep sleeves buttoned or rolled up.
2. Keep fingers away from moving parts. Shut off machines to remove waste. Use a brush to clean up and debur. Be sure machine is fully stopped and not coasting.
3. Inspect at least daily before start-up. Look for loose or damaged parts and inadequate lighting.
4. Use clamps or vise to hold work.
5. Many machines have Safety Interlocking devices. Verify their operation prior to use, and NEVER BYPASS SAFETY INTERLOCK DEVICES.
6. Examine each power tool before using it. Look for damaged parts, loose fittings, frayed or cut electric cords. Tag and return defective tools for repairs.
7. Some machines use both pneumatic and electric power. Both must be shut off to make repairs or to adjust moving parts. Bleed down tool to remove any stored energy left in the system.

8. Be prepared in case of jamming. Maintain good footing; and use two hands, Circular saws, chain saws and percussion tools shall not be equipped with a locking switch or trigger

9. Flying objects can result from operating almost any power tool. Be aware of others working around you and use proper eye protection.

10. Keep moving parts directed away from your body. Never touch a powered part unless power source is disconnected (such as drill chucks, blades, and bits).

11. Ground Fault Circuit Interrupters (GFCI) are required when using electrical power tools.

REFERENCES

Regulatory References

- 29 CFR 1910.244 Other Portable Tools and Equipment.
- 29 CFR 1926.300 General Requirements.

Technical References

None

Procedural References

SOP 08 Personnel Protective Equipment

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SCOPE

This procedure defines requirements for safe operation of heavy equipment operation. Heavy equipment includes backhoes, cranes, derricks, dozers, loaders, skid steers, and trucks.

DEFINITIONS

- **Crane** - means a mechanical device, intended for lifting or lowering a load and moving it horizontally, in which the hoisting mechanism is an integral part of the machine. A crane may be a fixed or mobile machine.

- **Derrick** - A "derrick" is an apparatus consisting of a mast or equivalent member held at the head by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes.

PROCEDURE

A. **TRAINING**

1. Equipment operators must demonstrate training and experience with each piece of equipment before receiving authorization to begin work.

B. **INSPECTION**

1. All heavy equipment must meet applicable design standards (i.e., ANSI, etc.).

2. The equipment must have a copy of the most recent annual and periodic inspections onboard.

3. The Subcontractor Contact or a designated qualified person must inspect all heavy equipment prior to operation (See Crane and Derrick Inspection Checklist), to verify proper working condition.

4. A copy of the manufacturer’s operating manual must be carried on all heavy equipments. The manual must include a load-rating chart that indicates safe loads in various configurations, wire and cable minimums and maximums, and any special operating considerations.

C. **OPERATION**

1. The Subcontractor must have a standard operating procedure that is implemented for heavy equipment operation.

2. Equipment must be operated in accordance with the manufacturer's instructions and recommendations.
3. Before starting equipment, the equipment operator must make sure no one is working on or near the machinery. If equipment must be operated in close proximity to other operations, a spotter will be required to work with the equipment operator. The spotter and equipment operator must be in radio communication.

4. Equipment operators must wear seatbelts and operate equipment in accordance with safe operating speeds and loading.

5. When working on slopes, the equipment should be positioned perpendicular to the slope with the center of gravity of the equipment on the lower edge of the slope.

6. Dump trucks must lower their beds PRIOR to moving from the dump site.

7. All employees should wear appropriate personal protective equipment in accordance with SOP – 8 Personal Protective Equipment.

8. Equipment operators should not get on or off a moving machine.

Note: If heavy equipment is located near overhead power lines, refer to SOP – 12 Electrical Safety to determine safe working distances.

ATTACHMENTS

- Crane and Derrick Inspection Checklist

REFERENCES

Regulatory References

- 29 CFR 1926.550 Cranes and Derricks.
- 29 CFR 1926.600 Equipment.
- 29 CFR 1926.602 Material Handling Equipment.

Technical References

None

Procedural References

RCM SOP – 8 Personal Protective Equipment
RCM SOP – 12 Electrical Safety
STANDARD OPERATING PROCEDURE

SOP #: 19
Title: Heavy and Material Handling Equipment
Last Rev.: 12/31/07
Page: 3 of 4

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ATTACHMENT 1

CRANE AND DERRICK INSPECTION CHECKLIST

Prior to operation each day, inspect:

1. □ All control mechanisms for maladjustment interfering with proper operation.
2. □ All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
3. □ All operator aids, motion and load limiting devices, and other safety devices for malfunction and inaccuracy of settings.
4. □ All chords and lacing.
5. □ All hydraulic and pneumatic systems - with particular emphasis given to those which flex in normal operation of the crane.
6. □ Hooks and latches for deformation, chemical damage, cracks, and wear.
7. □ Rope for proper spooling onto the drum(s) and sheave(s) and rope reeving for compliance with crane manufacturer’s specifications.
8. □ Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
9. □ Hydraulic system for proper oil level.
10. □ Tires for recommended inflation pressure (mobile cranes).
11. □ Wedges and supports for looseness or dislocation (climbing tower cranes).
12. □ Braces and guys supporting crane masts; anchor bolt base connections for looseness or loss of preload (tower cranes and derricks).
13. □ Derrick mast fittings and connections for compliance with manufacturer’s recommendations.
14. □ Barge or pontoon ballast compartments for proper ballast; deck loads for proper securing; chain lockers, storage, fuel compartments, and battening of hatches; fire fighting and lifesaving equipment in place and functional; hull void compartments sounded for leakage (floating cranes and derricks).
SCOPE

This procedure defines inspection, uses, handling, repair/disposal of defective ladders, and the type of ladders to be purchased.

DEFINITIONS

- **Ladders** - A ladder is an appliance usually consisting of two side rails joined at regular intervals by crosspieces called steps, rungs, or cleats, on which a person may step in ascending or descending.

- **Extension ladder** - An extension ladder is a non-self-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Its size is designated by the sum of the lengths of the sections measured along the side rails.

- **Step ladder** - A stepladder is a self-supporting portable ladder, nonadjustable in length, having flat steps and a hinged back. Its size is designated by the overall length of the ladder measured along the front edge of the side rails.

- **Special-purpose ladder** - A special-purpose ladder is a portable ladder, which represents either a modification or a combination of design or construction features in one of the general-purpose types of ladders previously defined, in order to adapt the ladder to special or specific uses.

PROCEDURE

A. The following rules apply to all ladders:

1. Maintain ladders free of oil, grease and other slipping hazards.
2. Do not load ladders beyond their maximum intended load nor beyond their manufacturer’s rated capacity.
3. Use ladders only for their designed purpose.
4. Use ladders only on stable and level surfaces unless secured to prevent accidental movement.
5. Do not use ladders on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement. Do not use slip-resistant feet as a substitute for exercising care when placing, lashing, or holding a ladder upon slippery surfaces.
6. Secure ladders placed in areas such as passageways, doorways, or driveways, or where they can be displaced by workplace activities or traffic to prevent
accidental movement. Alternatively, use a barricade to keep traffic or activity away from the ladder.

7. Keep areas clear around the top and bottom of ladders.
8. Do not move, shift, or extend ladders while in use.
9. Use ladders equipped with nonconductive side rails if the worker or the ladder could contact exposed energized electrical equipment.
10. Face the ladder when moving up or down.
11. Use at least one hand to grasp the ladder when climbing.
12. Do not carry objects or loads that could cause loss of balance and falling.
13. All ladders shall be inspected prior to use.
   a. Side rails, rungs, and steps.
   b. Safety feet of extension and straight ladders.
   c. Hardware guides, pawls and spreaders of stepladders.
   d. Extension rope and/or tie off rope.
14. It is the user’s responsibility to check the ladder each time you use it! Any defective ladder that is repairable will be tagged with a "Dangerous, Do Not Use" tag and taken out of service until repairs are made.
15. When working off a ladder - (Many Sites have policies more stringent than ours. We must always follow the most stringent).
   a. Face the ladder when ascending or descending.
   b. Only one person at a time on the ladder.
   c. Be sure the ladder is stable.
   d. Keep both feet on the ladder rungs. Do not place one foot on a line or piece of equipment and the other on the ladder to keep within reach of the work.
   e. Check overhead for power lines and other obstructions.
   f. Fall protection is required if you must stand backwards on the ladder, and under certain other hazardous conditions.
   g. Protect other persons in the area by barricading/roping off the area.
   h. A person must be tied off to an adequate overhead structure when working the same distance or less from an edge or elevation as the height of the ladder. Example: Working 8' from an edge while working off an 8' or higher ladder.

B. The following rules apply to straight and extension ladders.
1. Use help when raising or lowering a ladder. One person should walk the ladder up or down while the second person foots the base of the ladder.
2. Ladders shall not be used in a horizontal position as platforms, runways, or scaffolds.
3. Where portable straight ladders are used, they shall be of sufficient length to extend three feet (36 inches) above the upper landing surface, and be positively secured or held against shifting or slipping.

4. Hand lines shall be used to raise and lower tools and material that cannot be carried in tool belts.

5. Straight and Extension Ladders shall be pitched to assure the ladder base is one-quarter the overall working height of the ladder.

6. Use a safety harness and tie off when you are on the seventh (7) rung or of a ladder or are six (6) feet or more off the ground. Tying off is required when working backwards or when other critical or hazardous work is being performed.

7. All ladders shall be tied off adequately at the top. The only exception is when the ladder is only to be used for inspection or other one-trip activity not involving actual work. If a ladder is climbed without, being tied off, it must be "footed" and held at the base by a ground person.

8. When performing work from a ladder that requires a person to be tied off, the person can be tied off to the rail of the ladder itself. This method may only be used only if there is no other adequate tie off and the ladder is properly tied off.

9. Do Not tie to the rung of the ladder, if the rung breaks, you will fall to the ground. If tying to the ladder, only tie to the rail of the ladder.

C. The following rules apply to step ladders.

1. The top step of any stepladder, 3 feet and over shall not be used to stand on.

2. Stepladders are not to be used as straight ladders.

3. Step ladders 10 feet or higher must be tied off.

4. A person is required to be tied off when working on the seventh (7) step of a stepladder.

5. A person is required to be tied off, when working under (6) foot, when:
   a. The task is critical or hazardous.
   b. The person is standing backwards on the ladder.
   c. Site regulations require tying off.

6. You may step off a stepladder to a suitable safety platform or work area. Good, SAFE, common sense must be utilized. Stepping off is not allowed if:
   a. Site regulations prohibit this practice.
   b. It is necessary to step off the top or next to the top step of the ladder.
   c. The ladder is not stable and firm. Whenever possible, the top of the ladder should be tied off or held by a second person to enhance stability.
   d. The ladder cannot be secured directly to the platform that the employee is stepping onto.
REFERENCES

Regulatory References
- 29 CFR 1910.25 Portable Wood Ladders
- 29 CFR 1910.26 Portable Metal Ladders
- 29 CFR 1910.27 Fixed Ladders
- 29 CFR 1926.1053 Ladders

Technical References
None

Procedural References
None

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SCOPE

This procedure defines requirements for employees on acquiring a permit prior to line breaking and the process for installing and removing a blank. Refer to Attachment 1 Line Breaking and Blanking Checklist to verify the procedure is being followed.

DEFINITIONS

• **Blanking or Blinding** - the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

• **Double Block and Bleed** - the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

• **Line Breaking** - the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

PROCEDURE

A. PERSONAL PROTECTIVE EQUIPMENT

The appropriate type of personal protective equipment (PPE) employed in a given line breaking situation will vary with the hazards associated with the material, equipment, location and ability to verify that the equipment/line is clear.

1. The minimum protective equipment in any line-breaking situation that must be worn is:
   a. Hardhat
   b. Appropriate chemical resistant gloves
   c. Face shield
   d. Goggles
   e. Appropriate chemical protective clothing.

2. Additional PPE, including respiratory protection, should be used as needed per SOP-08 Personnel Protective Equipment and SOP-09 Respiratory Protection.
   a. When the lines, nozzles, fittings, tanks or vessel contains, or has ever contained, hot liquids, hazardous materials, acid at any strength, caustic or poisonous substances.
   b. Where the activity in working on the line is an emergency one resulting from
a leak or other abnormal situation such as the build-up of pressure.

B. **LINE BRAKING OPERATIONS**

1. The Subcontractor Contact responsible for the team members making the break must check to assure the break location is physically marked (i.e. Painted, Tagged) prior to the break and verified by the Construction Manager that the break site is correct.

   **Special Hazard:** A competent person must attend at the point of the actual line break whenever a hazardous condition is found or known to exist.

   a. The portion of the line being worked on shall be isolated from those preceding and following it in the most effective way. This will usually consist of blanking or shutting valves and locking and tagging them per Lockout / Tagout SOP - 22.

   b. Coordination between the Construction Manager and the Subcontractor Contact shall be such that each knows the line is being worked on. No other process work, maintenance or sampling is to be done on the line at the same time without mutual agreement that such work represents no danger to the men working on the line.

2. The Subcontractor should have a permitting process that applies to jobs requiring opening of or working on any process line; permanent or temporary, connected fittings, valve, pump or vessel, including blockages which have ever contained acid, caustic, flammable or other hazardous liquid or gas, no matter how long ago; or presently contains hot materials such as steam.

   Examples of such lines are:

   a. Acid
   b. Caustic
   c. Chlorine
   d. Anhydrous Ammonia
   e. Sulphur
   f. Natural Gas and Steam
   g. Instrument Air

3. All openings made during the course of the job should be documented and checked for closure before completion of the job and released for resumption of normal use.

4. A qualified gas tester must do a line clearance test, and testing should continue throughout the procedure.
5. Burning off old flange bolts is to be considered the last resort, and should be done only if all other alternative methods have been exhausted, such as splitting nuts with a nut buster, sawing all the way through or partial cutting then wringing off. Using spark proof tools and/or beryllium wrenches is the preferred method.

C. BLANKING OR BLINDING OPERATIONS

1. Blanking can only be performed by qualified and trained personnel.
2. All blank material must be compatible with the parent metal being blanked.
3. All gaskets must be compatible with the product (i.e., acid, caustics, water, etc.).
4. Installation or removal of any blank should follow the Subcontractor’s permit process.
5. All product in the line must be retained in a catch basin or pumped to a compatible container. – Draining lines to the ground is prohibited except for potable water lines.
6. When relieving pressure on air or gas line blanks, earplugs must be worn because screaming often occurs due to pressure.
7. When the product in the line has pressure, make sure you are aware of the direction of the bleed-off. The area must be barricaded. Only personnel directly involved in the line breaking should be in the area.
8. The Construction Manager and Subcontractor Contact must be aware of any blanking activity, and must be present on all first breaks.

ATTACHMENT

• Line Breaking and Blanking Checklist

REFERENCES

Regulatory References


Technical References

None

Procedural References

• SOP – 08 Personnel Protective Equipment
• SOP – 09 Respiratory Protection
• SOP – 10 Confined Space Entry
• SOP – 22 Lockout / Tagout

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ATTACHMENT 1

LINE BREAKING AND BLANKING CHECKLIST

Complete this section before signing, by checking off all of the appropriate boxes. Be prepared to discuss and/or answer any questions pertaining to this Line break, before requesting the permit.

YES NO N/A
1. Does this Line break involve acid, caustic, hazardous material or gas?
2. Is it necessary to wear an acid suit, acid hood, boots and gloves as required by the blanking and line breaking conditions?
3. Does the line, tank, vessel, etc., require obtaining a hot work permit, an explosive gas test, or any other type of permit?
4. Will the opening of this line break cause a change in the area conditions and/or atmospheric conditions?
5. Is it necessary to steam, purge, or flush out?
6. Is respiratory protection required? If so, what type must be worn?
7. Is there an adequate water supply with the adequate pressure at the line break location?
8. If the hose is valved off, is there a possibility of freezing?
9. Has the steam tracing been shut off and bled down and locked out?
10. Is the area roped off and/or barricaded?
11. Do you have the proper type fire extinguisher nearby?
12. Have you planned an escape route in the event of an emergency?
13. Is there a possibility of a spray, do you need to shield?
14. Has the line, tank, vessel, etc., been properly drained into a suitable container for safe handling and environmental control?
15. Have all of the vents been opened to prevent the possibility of an air lock?
16. Does this line break involve a radiation hazard?
17. Has the proper type scaffolding been erected, including a proper ladder for access and egress?
18. Have all of the valves been properly positioned, (whether opened or closed as required) locked, tagged, and tried as per SOP – 22 Lockout / Tagout?

19. Have all pumps, starters, hydraulic, electric or other forms of energy been brought to a zero state of energy, then locked, tagged, or blocked?

20. Do you have all of the necessary equipment such as tools, blanks, bolts, gaskets, etc. on hand before the actual break begins?
SCOPE

This procedure provides guidance on the control hazardous of energy to prevent injury to employees due to unexpected start-up or release of stored energy.

DEFINITIONS

- **Affected Employee**
  Any employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout/tagout or whose job requires them to work in an area in which such servicing or maintenance is being performed.

- **Authorized Employee**
  Any employee who locks out or initiates a tagout procedure on machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this procedure.

- **Circuit Breaker**
  Switch (housed in a distribution panel) controlling the flow of electricity (on/off) to the electrical equipment.

- **Control Switch**
  The switch controlling the flow or electricity between the disconnect switch source and the electrical equipment. Also called:
  a. Start-Stop button.
  b. Butterfly switch.
  c. Control station.

- **Disconnect Switch**
  Switch (normally housed in an electrical control room) controlling the flow of electricity (on/off) to the equipment and its control switch. This switch is also called:
  a. Combination starter switch.
  b. Switch and starter.

- **Zero Mechanical or Energy State**
  That state of a machine in which every power source that can produce machine member movement has been locked out. This includes blocking, controlling or isolation of electric, kinetic or potential energy sources.
• **Multi-Lockout Devices**
  A multi-lockout hasp mechanism which can be used so more than one lock can be attached during a lockout. Lock boxes are another alternative for using multiple locks.

• **Personal Lock**
  A safety lock used by authorized personnel that is durable and capable of withstanding excessive force. Any authorized employee uses it to lock out equipment. All locks will be on a "One Lock, One Key, One Employee" system.

• **Tags**
  A standard tag signed and dated shall be attached to the individual's lock. The tag shall be attached by passing the grommet through the lock shackle. The legend on the tag shall read, "DANGER, DO NOT OPERATE". Tags shall be capable of withstanding the environment to which they are exposed for a maximum period of time that exposure is expected.

**PROCEDURE**

1. The Construction Manager shall inform the affected party responsible for the machinery or equipment being repaired or serviced that the equipment needs to be shut down so it can be locked out, tagged out and tried (electrical only).

2. The authorized party shall be responsible for the de-energizing switches, circuit breakers, pneumatic valves, or hydraulic valves, which control the operations of machinery or equipment that contains or ever contained hazardous energy.

3. Prior to the start of any work, all machines and equipment must be brought to a "zero mechanical/energy state. The Authorized Employee conducting the lockout should attempt to activate ("Try") the equipment with the starting device, to verify the equipment does not show any sign of stored energy.

4. Each authorized employee shall remove their personal lock and tag when they have completed their job and are no longer required to perform any other task on the equipment.

5. When work continues beyond the shift, an individual’s lock and tag may remain in place if the Site allows. However, when returning to continue the work, each individual shall check their own lock and tag prior to starting work. Each individual must re-date their tag daily throughout the duration of the job. The re-dating will confirm that the individual checked their personal lock, assuring the equipment remains locked out.

6. Shift change and new crews coming in requires the change-out of locks and tags.
A. GROUP LOCKOUT

1. When it is impractical because of the magnitude or complexity of large jobs such as major facility shutdown or overhaul, group lockout can be utilized.

   a. The Construction Manager shall be responsible for arranging the shutdown for energized equipment to be locked and tagged out.
   b. The Subject Matter Expert shall apply locks and tags to all disconnect switches to be worked on.
   c. The keys shall be placed in a group lockbox or comparable mechanism. It shall have a hasp and keeper, which will permit application of a "Lockout Device" so it can accommodate more than one lock.
   d. Each authorized employee shall affix their personal locks and tag with their name and date to the "Lockout Device" on the "Group Lockbox".
   e. Each authorized employee is to test by "Trying" the control switch to assure the equipment has been electrically de-energized before starting work.

REFERENCES

Regulatory References

Technical References
None

Procedural References
None

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This procedure provides guidance on the use, testing, loading and safe work practices for the personnel and aerial platforms.

DEFINITIONS

- **Aerial Device** - An "Aerial device" is any vehicle-mounted device, telescoping or articulating, or both, which is used to position personnel.

- **Platform** – A "Platform" is any personnel-carrying device (basket or bucket) which is a component of an aerial device.

PROCEDURE

A. **USE**

Personnel platforms should only be used when the erection, use and dismantling of conventional means such as a ladder, stairway, elevated work platform or scaffold, would be hazardous, or is not feasible because of structural design or work site conditions. Only trained persons shall operate personnel and aerial platforms.

B. **TESTING**

Trial lift, inspection and proof testing.

1. A trial lift with unoccupied personnel platform loaded at least to the anticipated lift weight shall be made from ground level.
2. Daily trial lift shall be performed immediately prior to placing personnel on the platform.
3. The lift operator shall determine daily that all systems, controls and safety devices are activated and functioning properly.
4. The operator is to remain under the 50 percent limit of the hoist’s rated capacity.
5. The primary attachment shall be centered over the platform.

C. **PERSONNEL PLATFORM**

1. Must support its’ own weight and five times the maximum intended load.
2. Handrail must comply with Subpart M of the OSHA standard.
3. The platform shall be enclosed from the toeboard to the mid-rail
4. A grab rail must be installed inside the entire perimeter of the platform.
5. Swing out gate access face shall be equipped with a restraining device to prevent accidental opening.
6. Overhead protection is necessary when employees are exposed to falling objects.
7. The platform must be posted or permanently marked indicating weight of platform and maximum rated load capacity.

D. WORK PRACTICES

1. All body parts are to be kept inside the platform during the raising and lowering of the Personnel Platform.
2. Before employees enter or exit a hoisted personnel platform, the platform shall be secured to the structure unless this creates an unsafe condition.
3. Employees occupying the personnel platform shall use a body harness system capable of supporting a fall impact for employees using the anchorages. Employees working over or near water shall comply with OSHA standard 1926.106.
4. The personnel platform shall not be used as a material hoist.

E. PRE-LIFT MEETING

1. A pre-lift meeting attended by the lift operator and his foreman, signal person, and employees to be lifted and their foreman shall be held to review the appropriate provisions of the procedure.

NOTE: Refer to OSHA standard 1926.550 cranes and derricks for additional information.

REFERENCES

Regulatory References

- 29 CFR 1926.550 Cranes and Derricks.
- 29 CFR 1926.106 Working over or near water

Technical References

None
Procedural References

None

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This procedure provides guidance on the minimum safety requirements for wall / floor penetrations. Potential hazards that may exist when wall / floor openings are made (in addition to fall hazards) include but are not limited to, concealed pipes, existing electrical wiring, telephone lines and fire alarms.

PROCEDURE

Prior to cutting into walls/floors, visually survey the area of penetration to see if there are any pipes or electrical services that may present an obstacle. If blueprints are available, the Subcontractor should review the prints to determine if any services are present that may be hidden in the wall/floor. Hidden hazards should be expected. Services may be supplied from adjacent floors, rooms or concealed in floors.

Prior to cutting / penetrating walls / floors:

1. Determine if the wall is bearing or nonbearing.
2. For interior walls, remove the ceiling tiles to help determine what services may be hidden in the wall.
3. Cutting both faces of the wall at the same time is prohibited.
4. Barricade both sides of the wall or floor.
5. When it has been determined that utilities are in the wall or floor, and may present a hazard / interference, SOP 22 “Lockout/Tagout Procedure” must be implemented.
6. All floor or wall openings must comply with OSHA 29 CFR 1910.23 “Guarding Floor and Wall Openings and Holes”.
7. Before any power saws are used on masonry walls or floors, a visual inspection of both sides of the surface must be made for all utilities.
8. On hollow core walls, exploratory openings shall be made prior to creating an enlarged opening utilizing power tools.
9. The Subsurface Clearance Process must be followed for poured floors requiring core boring.

REFERENCES

Regulatory References

• 29 CFR 1910.23 Guarding Floor and Wall Openings.
Technical References

None

Procedural References

ERM Subsurface Clearance Procedures

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Subsurface Clearance Tools
Appendix D

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas  77084-5140
(281) 600-1000
Subsurface Clearance Location Disturbance Permit

Disturbance Location Designation:

ERM Project No.:

SSC Exp. Person:

### Contact Person Approval of Ground Disturbance Locations
(indicate verbal approval by printing “Verbal” in the signature space)

<table>
<thead>
<tr>
<th>Name (Print)</th>
<th>Company</th>
<th>Name (Sign)</th>
<th>Date / Time</th>
</tr>
</thead>
</table>

### Critical Zone Determination and Clearance Depth
(It is not preferred to initiate Ground Disturbance Activities within a Critical Zone)

If the Disturbance Location is known or suspected to fall within a Critical Zone, then a sketch (see reverse) or other map must be used to confirm proximal Critical Zones.

This Location Is:

- **Inside a Critical Zone.** Partner-in-Charge is aware & approved disturbance at this location. Physical Clearance will proceed to the deeper of: **0.6m / 2 feet below the frost line, 2.3m / 7 feet below ground level, or 20% deeper than the expected invert elevation of the service**

- **Outside a Critical Zone.** Physical Clearance will proceed to the deeper of: **0.6m / 2 feet below the frost line or 1.2m / 4 feet below ground level.**

### Physical Clearance Technique at This Location

- Cleared using the following technique:
  - None. Waived by PIC. (Ensure documentation in the HASP.)
  - Reason: ___________________________ Date / Time: ___________________________

### Physical Clearance Executed & Observed By:

<table>
<thead>
<tr>
<th>Company</th>
<th>Representative(s)</th>
<th>Date / Time Complete</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Was any Subsurface Structure discovered (damaged or undamaged) during Clearance?

- **No** (Proceed)  
- **Yes** If Yes: Discussed with PIC (Date / Time):
  - Agreed Action: ___________________________

### SSC Process Complete

<table>
<thead>
<tr>
<th>Name of SSC Experienced Person (Print)</th>
<th>Name (Sign)</th>
<th>Date / Time</th>
</tr>
</thead>
</table>

ERM Health & Safety

Page 1 of 2

Last Rev: Sept. 2009

English Version
(Optional) Critical Zone Determination Sketch

Instructions:

1. Create a sketch of the disturbance (in the space to left or attach) that contains the following information:
   
a. The disturbance location

b. Surface landmarks and overhead obstructions (buildings, roads, overhead lines, etc.)

c. Critical landmarks and Subsurface Structures (tanks, transformers, wells, racks, etc.)

d. Underground services:
   i. Identified in the HASP Site Service Model
   ii. Marked by Public or Private utility markouts
   iii. As relayed by the Contact Person
   iv. Nearest shutoff / isolation mechanism for each

e. Any surface clues as to potential underground services (junction boxes, drains, disturbed concrete, signage, etc.)

f. The site property boundary

2. Use your sketch to mark Critical Zones (3m or 10 feet) around critical landmarks and underground structures / services.

3. For Excavations, use your sketch to mark Excavation Buffers (0.6m or 2 feet) from Subsurface Structures.

4. If the disturbance location falls inside the Critical Zone, the preferred course of action is step out to a safe location outside a Critical Zone.

5. Disturbance within a Critical Zone can only proceed with PIC approval.
# Subsurface Clearance

**ERM Field Process Checklist**

- **Site Name:**
- **Client:**
- **ERM Project No.:**
- **SSC Exp. Person:**

## Project Basics

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Person requested and identified</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subcontractors meet ERM’s minimum safety criteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subcontractors understand their role in the SSC Process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSC Experienced Person with current SSC training assigned</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project staff with current SSC training assigned</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UXO / MEC risks assessed: UXO / MEC IS NOT present</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## General Field Activity & Site Walk

HASP read, understood and signed by project team

<table>
<thead>
<tr>
<th>Identified Visual Clue</th>
<th>Yes</th>
<th>No</th>
<th>Identified Visual Clue</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lights</td>
<td></td>
<td></td>
<td>Pipeline markers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signage</td>
<td></td>
<td></td>
<td>Fire hydrants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewer drains / cleanouts</td>
<td></td>
<td></td>
<td>Sprinkler systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable markers</td>
<td></td>
<td></td>
<td>Water meters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility poles with conduit leading to the ground</td>
<td></td>
<td></td>
<td>Natural gas meters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility boxes</td>
<td></td>
<td></td>
<td>UST fill ports and vent pipes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manholes</td>
<td></td>
<td></td>
<td>Steam lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pavement scarring</td>
<td></td>
<td></td>
<td>Remote buildings with no visible utilities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments / Others:

## Contact Person Approval of Ground Disturbance Locations

**Contact Person Approval of Ground Disturbance Locations** (indicate verbal approval by printing “Verbal” in the signature space)

- **Name (Print)**
- **Company**
- **Name (Sign)**
- **Date / Time**

## Pre-Clearance

- **Public Utility Markout completed**
- **Private Utility Markout completed**
- **Final Critical Zone determinations made by the SSC Experienced Person**

## Critical Zones

**Are there any ground disturbance locations known or suspected to be inside Critical Zones?**

- **Yes.** PIC must approve work within the Critical Zone. The SSC Location Disturbance Permit or equivalent is required for those locations.
- **No.** Physical Clearance will proceed to the deeper of: 0.6m / 2 feet below the frost line or 1.2m / 4 feet below ground level, whichever is deeper.

## Clearance for Point Disturbances

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate overhead clearance at ground disturbance locations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are disturbance locations known or suspected to be inside Critical Zones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Clearance successfully completed at all locations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Clearance for Excavations

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate overhead clearance at ground disturbance locations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate excavation plan and Excavation Buffer location(s) to subcontractor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are disturbance locations known or suspected to be inside Critical Zones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De-energize below ground services prior to beginning excavation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SSC Process Completed By (SSC Experienced Person)

- **Name (Print)**
- **Name (Sign)**
- **Date / Time**
This Checklist may be used to meet ERM’s Health and Safety Performance Standard #32

(Through Observation, interviews, and review of documents, assess the implementation of site safety and opportunities for improvement. Ensure that interviewed workers know the purpose of the conversation and are free to answer honestly. DO NOT INTEFER WITH WORK OR BE THE CAUSE OF AN INCIDENT YOURSELF!)

Site Identification: _____________________ Date of Observation _____________________
Prepared By: _____________________ ERM Subcontractor(s) _____________________
Work Observed (Scope) _____________________

<table>
<thead>
<tr>
<th><strong>HASP &amp; PERSONAL PROTECTIVE EQUIPMENT (PPE)</strong></th>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th>COMMENTS (Refer to Follow-Up Items if needed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 HASP has been reviewed and signed by all on site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2 HASP is readily available to all working on site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 HASP addresses specific work being completed, and contains Traffic Control Plan and Emergency Response procedures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4 HASP lists the minimum PPE required for the work being completed.</td>
<td></td>
<td></td>
<td></td>
<td>PPE = personal protective equipment.</td>
</tr>
<tr>
<td>1.5 All workers are wearing safety vests and/or highly reflective clothing if near vehicle traffic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.6 All workers are wearing appropriate PPE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7 PPE is maintained and in good condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.8 Incident and near miss reporting requirements are included in HASP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.9 (other)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SAFETY AND BEHAVIOR</strong></th>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Daily site safety meetings have been completed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2 Workers appear safety conscious and have a professional attitude</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3 Workers are familiar with the scope of work</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2.4 Smoking Area has been designated in a safe place outside of the Work Area</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2.5 Workers are aware of correct body positioning for the activities they are completing</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2.6 On-site field supervisor has OSHA 40-hour safety training or equivalent safety training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.7 All subcontractors have received initial safety orientation prior to project kick off</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.8 (other)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>SITE CONDITIONS</td>
<td>YES</td>
<td>NO</td>
<td>N/A</td>
</tr>
<tr>
<td>-----</td>
<td>----------------</td>
<td>-----</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>3.1</td>
<td>Manager/dealer/owner or other appropriate site representative has been notified of work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>Trip hazards have been identified and removed or controlled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td>Work Area is identified and secured (proper signage, barricades, lights, etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.4</td>
<td>Work Area is adequately sized and properly located</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>Spills, debris, or waste (contractor/consultant related) is contained and cleaned up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.6</td>
<td>Work Area is neat and orderly during and after completion of the work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.7</td>
<td>Utility mark-outs/notifications have been completed as appropriate for the work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.8</td>
<td>Work and equipment is positioned safely at appropriate distances from railroad tracks, traffic areas, and overhead power lines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.9</td>
<td>A Job Safety Analysis (JSA) or ERM Task Hazard Analysis (THA) is available with the HASP and has been reviewed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.10</td>
<td>A Traffic Control Plan is available with the HASP and is implemented if necessary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.11</td>
<td>O&amp;M Manual is stored on-site for sites with a Remediation System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.12</td>
<td>Temporary System Shut-down checklist is completed for sites with inactive Remediation Systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.13</td>
<td>Monitoring well boxes and pads, and soil boring pads/patches are in good condition (check entire site)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.14</td>
<td>Remediation System Compounds (including fences, trailers, and sheds) are in good condition / free of debris</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.15</td>
<td>Monitoring wells, Remediation Wells, Remediation System Buildings, Compounds and Equipment are locked and secured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.16</td>
<td>(other)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOOLS AND EQUIPMENT</td>
<td>YES</td>
<td>NO</td>
<td>N/A</td>
</tr>
<tr>
<td>---</td>
<td>---------------------</td>
<td>-----</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>4.1</td>
<td>Ladders and/or Scaffolding is in good condition, is properly used, and adequate for the work</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.2</td>
<td>Grinders and cutting equipment have the appropriate manufacturer guards in use</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.3</td>
<td>Other equipment (jackhammers, shovels, air-knife equipment, compressors, generators) are in good condition</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.4</td>
<td>Electrical cords and cables are in good condition and free from defects or damage</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.5</td>
<td>Compressed gas cylinders are stored and secured properly (vertically) with protective caps in place</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.6</td>
<td>Firefighting equipment is on site, adequate (20-lb extinguisher) and ready for immediate use</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.7</td>
<td>Drill rigs and Geoprobes have been inspected prior to use for safety concerns and are in good condition</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.8</td>
<td>All construction power (single phase receptacles outlets which are not part of the permanent facility wiring) is equipped with Ground-Fault Circuit-Interrupters (GFCI).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.9</td>
<td>Portable electric tools are properly grounded</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.9</td>
<td>Tools are being used as designed</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.10</td>
<td>(other)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5.0 WORKSCOPES, PROCEDURES and PERMITS</td>
<td>YES</td>
<td>NO</td>
<td>N/A</td>
<td>COMMENT</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----</td>
<td>----</td>
<td>-----</td>
<td>---------</td>
</tr>
<tr>
<td>5.1 Waste Management Plan is completed and available (if appropriate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2 Subsurface Clearance requirements have been followed and documented</td>
<td></td>
<td></td>
<td></td>
<td>Reference Subsurface Clearance Checklist.</td>
</tr>
<tr>
<td>5.3 Work Permit System is being followed with proper permit for Hot-Work, LO/TO or Confined Space entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4 Proper permits (local, state or federal) are on-site for work being completed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 Waste is properly contained, identified (labels are complete) and sampled or scheduled for removal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.6 (other)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FOLLOW UP ITEMS:**
- If a checklist item was corrected in the field, please mark as YES and note in the COMMENT area how the correction was implemented.
- If a checklist item was unable to be corrected in the field, please list below the follow-up items for ERM/Client/Sub-Contractor to implement to correct the deficiency or improve the process.
- If an activity was observed that was not related to a specific checklist item, please complete the "Other" box in the appropriate section of the above checklist.

**Follow Up Items:**

---

Attach additional comments, as necessary, to a new page.

Prepared By: ____________________________

(print)

Reviewed By: ____________________________

(print)

(print)
Personal Safety Contract Cards

Appendix F

October 8, 2010

Project No. 0118148

ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.

15810 Park Ten Place, Suite 300

Houston, Texas  77084-5140

(281) 600-1000
Date: __________
Name: __________

PPE Requirements
- Hardhat
- Safety glasses
- Steel toed shoes/boots
- Hearing protection
- Gloves
- Tyvek/Protective clothing
- Respirator
- Traffic vest/orange shirt
- Other

List the Hazards & Mitigations Associated with the Assigned Task

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
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<td></td>
</tr>
</tbody>
</table>

Emergency Preparedness
1) Location of nearest fire extinguisher?
2) Location of nearest eyewash station?
3) Location of nearest first-aid kit?
4) Who is the Site Safety Officer?

Date: __________
Name: __________

PPE Requirements
- Hardhat
- Safety glasses
- Steel toed shoes/boots
- Hearing protection
- Gloves
- Tyvek/Protective clothing
- Respirator
- Traffic vest/orange shirt
- Other

List the Hazards & Mitigations Associated with the Assigned Task

<table>
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<th>Mitigation</th>
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</tbody>
</table>

Emergency Preparedness
1) Location of nearest fire extinguisher?
2) Location of nearest eyewash station?
3) Location of nearest first-aid kit?
4) Who is the Site Safety Officer?

Date: __________
Name: __________

PPE Requirements
- Hardhat
- Safety glasses
- Steel toed shoes/boots
- Hearing protection
- Gloves
- Tyvek/Protective clothing
- Respirator
- Traffic vest/orange shirt
- Other

List the Hazards & Mitigations Associated with the Assigned Task

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<tbody>
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</tr>
</tbody>
</table>

Emergency Preparedness
1) Location of nearest fire extinguisher?
2) Location of nearest eyewash station?
3) Location of nearest first-aid kit?
4) Who is the Site Safety Officer?
• A PSC Card must be completed for each assigned task

• Keep this PSC Card on your person for the duration of the workday

• Turn in all PSC Cards to your supervisor at the end of each day

You see it, You own it!

Rev.: 05-08
RCM Personal Safety Contract Card Template Revision: 04-08

Instructions:

• Print the first two sides front and back on the same sheet of paper.
• Cut along the bold dashed lines
• Fold along the normal dashed lines with the RCM logo on the outside
• One printing makes four PSC Cards
Work Permit Forms
Appendix G

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition
SAFE WORK PERMIT

☐ Confined Space Entry  ☐ Hot Work  ☐ Line Breaking

Location: ________________________________  WO Number: ____________________________

Scope of Work: _______________________________________________________________________

Issued To: __________________________________________________________________________

Issued By: __________________________________________________________________________

Date & Time Issued: __________________________  Date & Time Expires: _______________________

Section I  General Information  (Complete for all permits)

1. Job Specific Hazards
   - Worksite Chemicals
   - Atmospheric Hazards
   - Thermal Burns
   - Chemical Burns
   - Corrosives
   - Flammable Liquids
   - Reactive Liquids
   - Toxic Substances
   - Ignition Sources
   - Electrical Hazards
   - Adjacent Work
   - Falls above 4'
   - Steam
   - Vehicle Traffic
   - Heat Stress/Cold Injuries
   - High Pressure
   - Radiation
   - Noise
   - Other

2. PPE/Equipment
   - Inner Gloves
   - Half-faced Respirator
   - Welding Shield
   - Tripod w/ lifting device
   - Outer Gloves
   - Full-Faced Respirator
   - Spark Proof Tools
   - Harness
   - Chemical Suit
   - Line Air Respirator
   - Fire Extinguisher(s)
   - Ventilation
   - Poly Coated Suit
   - SCBA
   - Decon Materials
   - GFCI
   - Hearing Protection
   - Chemical Goggles
   - Fire Extinguisher Station
   - Work lights
   - Safety Shoes/Boots
   - Face Shield
   - Eyewash Station
   - Two-way Radio
   - Safety Glasses w/ Side Shield
   - Hard Hat
   - Spill Response Equipment
   - Barricades/Warning Signals
   - Other

3. Rescue and Emergency Services
   - Service Name: __________________________  Contact Name: ___________________________
   - Telephone Number: _______________________

Section II  Confined Space Entry

1. Space to be Entered: __________________________

2. Purpose of Entry: __________________________

3. Describe how the hazards identified in Section I have been addressed/isolated: __________________________________________________________

4. Describe Communication Procedures used by Entrant and Attendant during entry: _______________________________________________________

Section III  Hot Work

1. Equipment to be worked on: __________________________

2. Precautions:
   - Fire hazards removed from area
   - Floor/wall openings covered
   - Area inspected by Supervisor
   - Welding equipment inspected
   - Fire extinguishers at location
   - Atmospheric tests complete
   - Spark and heat guards in place
   - Fire watch posted (> 30 min)
   - Adequate ventilation

3. Name of Fire Watch: __________________________  Fire watch start time: __________  Fire watch end time: __________
### Section IV  Line Breaking

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Line/Equipment positively identified?</td>
<td>Yes</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Line/Equipment properly drained/depressurized/purged/blanked?</td>
<td>Yes</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Line/Equipment cleaned of residual material?</td>
<td>Yes</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Bonding and grounding required?</td>
<td>Yes</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Non-sparking tools required?</td>
<td>Yes</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Atmospheric monitoring required?</td>
<td>Yes</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Containment/spill control required?</td>
<td>Yes</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section V  Atmospheric Monitoring (Complete for Confined Space Entry and Hot Work)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Initial Results</th>
<th>Periodic Results</th>
<th>Periodic Results</th>
<th>Periodic Results</th>
<th>Periodic Results</th>
<th>Periodic Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Monitored</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tester’s Initials/Signature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen (19.5%-23.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Flammability (&lt; 10% LEL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section VI  Personnel Accountability (Complete for all permits)

<table>
<thead>
<tr>
<th>Role</th>
<th>Signature</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issuing Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H&amp;S Lead</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendant</td>
<td></td>
<td></td>
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<tr>
<td>Attendant</td>
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<tr>
<td>Attendant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section VII  Special Instructions (Complete as necessary)

- 
- 
- 
- 
- 

### Section VIII  Contractors (Complete as necessary)

The following aspects of the permitted work activities have been discussed and coordinated with the contractor:

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Roles and Responsibilities</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Job Specific Hazards</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>PPE Requirements</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Rescue Activities and Emergency Response</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Section IX  Canceling the Permit (Complete for all permits)

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Has the job, defined in the scope above been completed?</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Have affected personnel been informed the job is complete?</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Has equipment been returned to service?</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Have safety devices been reinstalled?</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Have housekeeping/environmental issues been addressed?</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Closeout Signature: ____________________________  Time: ________  Date: ________
**ARSENIC**

**ARSENIC**

**CAS No:** 7440-38-2  
**RTECS No:** CG0525000  
**UN No:** 1558  
**EC No:** 033-001-00-X

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPHTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.</td>
<td>Powder, water spray, foam, carbon dioxide.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
</tbody>
</table>

**EXPOSURE**

**Inhalation**


Closed system and ventilation.  
Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

**Skin**

Redness.  
Protective gloves. Protective clothing.  
Remove contaminated clothes. Rinse skin with plenty of water or shower.

**Eyes**

Redness.

Face shield or eye protection in combination with breathing protection if powder.

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

**Ingestion**


Do not eat, drink, or smoke during work. Wash hands before eating. Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

**SPILLAGE DISPOSAL**

Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. DO NOT let this chemical enter the environment.

T Symbol  
N Symbol  
R: 23/25-50/53  
S: (1/2-)20/21-28-45-60-61  
UN Hazard Class: 6.1  
UN Pack Group: II

Do not transport with food and feedstuffs. Marine pollutant.

**EMERGENCY RESPONSE**

Transport Emergency Card: TEC (R)-61GT5-II

Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.

**PACKAGING & LABELLING**

T Symbol  
N Symbol  
R: 23/25-50/53  
S: (1/2-)20/21-28-45-60-61  
UN Hazard Class: 6.1  
UN Pack Group: II

Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission © IPCS 2005

SEE IMPORTANT INFORMATION ON THE BACK.
### IMPORTANT DATA

<table>
<thead>
<tr>
<th>Physical State; Appearance</th>
<th>Routes of exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODORLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.</td>
<td>The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</td>
</tr>
<tr>
<td><strong>Chemical dangers</strong></td>
<td><strong>Inhalation risk</strong></td>
</tr>
<tr>
<td>Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce toxic arsine gas (see: ICSC 0222).</td>
<td>Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.</td>
</tr>
<tr>
<td><strong>Occupational exposure limits</strong></td>
<td><strong>Effects of short-term exposure</strong></td>
</tr>
<tr>
<td>TLV: 0.01 mg/m³ as TWA; A1 (confirmed human carcinogen); BEI issued; (ACGIH 2004).</td>
<td>The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract, cardiovascular system, central nervous system and kidneys, resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders, shock, convulsions and kidney impairment. Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.</td>
</tr>
<tr>
<td>MAK: Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).</td>
<td><strong>Effects of long-term or repeated exposure</strong></td>
</tr>
<tr>
<td></td>
<td>Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system, liver and bone marrow, resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment, anaemia. This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</td>
</tr>
</tbody>
</table>

### PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Sublimation point: 613/C</th>
<th>Solubility in water: none</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density: 5.7 g/cm³</td>
<td></td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.

### NOTES

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222).

Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Card has been partly updated in October 2005 in section Effects of long-term or repeated exposure.

### ADDITIONAL INFORMATION

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information.

©IPCS 2005
**CADMIUM**

**CAS No:** 7440-43-9
**RTECS No:** EU9800000
**UN No:** 2570
**EC No:** 048-002-00-0

**Cd**
**Atomic mass:** 112.4

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).</td>
<td>Dry sand. Special powder. NO other agents.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Finely dispersed particles form explosive mixtures in air.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
</tbody>
</table>

**EXPOSURE**

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!</th>
<th>IN ALL CASES CONSULT A DOCTOR!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Cough. Sore throat.</td>
<td>Local exhaust or breathing protection.</td>
</tr>
<tr>
<td>Skin</td>
<td>Protective gloves.</td>
<td></td>
</tr>
<tr>
<td>Eyes</td>
<td>Redness. Pain.</td>
<td>Safety goggles or eye protection in combination with breathing protection.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.

<table>
<thead>
<tr>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>T+ Symbol</td>
</tr>
<tr>
<td>N Symbol</td>
</tr>
<tr>
<td>S: 53-45-60-61</td>
</tr>
<tr>
<td>Note: E</td>
</tr>
<tr>
<td>UN Hazard Class: 6.1</td>
</tr>
</tbody>
</table>

Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs.

**EMERGENCY RESPONSE**

## IMPORTANT DATA

**Physical State; Appearance**
SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80/C AND TARNISHES ON EXPOSURE TO MOIST AIR.

**Physical dangers**
Dust explosion possible if in powder or granular form, mixed with air.

**Chemical dangers**
Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001). Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium, causing fire and explosion hazard.

**Occupational exposure limits**
TLV: (Total dust) 0.01 mg/m³; (Respirable fraction) 0.002 mg/m³; as TWA; A2 (suspected human carcinogen); BEI issued; (ACGIH 2005).
MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).

**Routes of exposure**
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

**Inhalation risk**
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

**Effects of short-term exposure**
The fume is irritating to the respiratory tract. Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.

**Effects of long-term or repeated exposure**
Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys, resulting in kidney impairment. This substance is carcinogenic to humans.

## PHYSICAL PROPERTIES

- Boiling point: 765/C
- Melting point: 321/C
- Density: 8.6 g/cm³
- Solubility in water: none
- Auto-ignition temperature: (cadmium metal dust) 250/C

## ENVIRONMENTAL DATA

## NOTES

Reacts violently with fire extinguishing agents such as water, foam, carbon dioxide and halons.
Depending on the degree of exposure, periodic medical examination is indicated.
The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential.
Do NOT take working clothes home.
Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible...
## CHROMIUM

**CAS No:** 7440-47-3  
**RTECS No:** GB4200000  
**Chrome (powder)**  
**Cr**  
**Atomic mass:** 52.0

---

### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>HAZARD/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible under specific conditions.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td></td>
</tr>
</tbody>
</table>

### EXPOSURE

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>PREVENT DISPERSION OF DUST!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inhalation</strong></td>
<td>Cough. Local exhaust or breathing protection.</td>
</tr>
<tr>
<td><strong>Skin</strong></td>
<td>Protective gloves. Remove contaminated clothes. Rinse skin with plenty of water or shower.</td>
</tr>
<tr>
<td><strong>Eyes</strong></td>
<td>Redness. Safety goggles. First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td><strong>Ingestion</strong></td>
<td>Do not eat, drink, or smoke during work. Rinse mouth.</td>
</tr>
</tbody>
</table>

### SPILLAGE DISPOSAL

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.

### PACKAGING & LABELLING

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### Important Data

**Physical State; Appearance**  
GREY POWDER

**Physical dangers**  
Dust explosion possible if in powder or granular form, mixed with air.

**Chemical dangers**  
Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances, causing fire and explosion hazard.

**Occupational exposure limits**  
TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA; A4; (ACGIH 2004).  
MÄK not established.

**Inhalation risk**  
A harmful concentration of airborne particles can be reached quickly when dispersed.

**Effects of short-term exposure**  
May cause mechanical irritation to the eyes and the respiratory tract.

### Physical Properties

- Boiling point: 2642°C
- Melting point: 1900°C
- Density: 7.15 g/cm³
- Solubility in water: none

### Environmental Data

### Notes

The surface of the chromium particles is oxidized to chromium(III) oxide in air.  
See ICSC 1531 Chromium(III) oxide.

### ADDITIONAL INFORMATION

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible...
COPPER

CAS No: 7440-50-8 (powder)
RTECS No: GL5325000
Atomic mass: 63.5

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Combustible.</td>
<td>NO open flames.</td>
<td>Special powder, dry sand, NO other agents.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EXPOSURE**

**PREVENT DISPERSION OF DUST!**

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Cough, Headache, Shortness of breath, Sore throat.</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest. Refer for medical attention.</td>
</tr>
<tr>
<td>Skin</td>
<td>Redness.</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>Eyes</td>
<td>Redness, Pain.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Abdominal pain, Nausea, Vomiting.</td>
<td>Do not eat, drink, or smoke during work.</td>
<td>Rinse mouth, Refer for medical attention.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**

Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).

**PACKAGING & LABELLING**

**SAFE STORAGE**

Separated from - See Chemical Dangers.
IMPORTANT DATA

Physical State; Appearance
RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.

Chemical dangers
Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard.

Occupational exposure limits
TLV: (Fume) 0.2 mg/m³;
TLV: (Dusts & mists as Cu) 1 mg/m³ (ACGIH 2007);
MAK: 0.1 mg/m³ (Inhalable fraction) Peak limitation category: II(2)
Pregnancy risk group: C (DFG 2007).

Routes of exposure
The substance can be absorbed into the body by inhalation and by ingestion.

Inhalation risk
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

Effects of short-term exposure
Inhalation of fumes may cause metal fume fever. See Notes.

Effects of long-term or repeated exposure
Repeated or prolonged contact may cause skin sensitization.

PHYSICAL PROPERTIES

Boiling point: 2595/C
Melting point: 1083/C
Relative density (water = 1): 8.9
Solubility in water: none

ENVIRONMENTAL DATA

NOTES

The symptoms of metal fume fever do not become manifest until several hours.
Card has been partially updated in January 2008: see Occupational Exposure Limits.

ADDITIONAL INFORMATION

LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information.

©IPCS 2006
## Copper (I) Oxide

<table>
<thead>
<tr>
<th>CAS No: 1317-39-1</th>
<th>RTECS No: GL8050000</th>
<th>EC No: 029-002-00-X</th>
</tr>
</thead>
</table>

Dicopper oxide  
Cuprous oxide  
Red copper oxide  
Cu₂O  
Molecular mass: 143.1

### Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>Types of Hazard/Exposure</th>
<th>Acute Hazards/Symptoms</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible.</td>
<td></td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Exposure

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Prevention</th>
<th>First Aid/Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Cough. Sore throat. Metal fume fever. Metallic taste. See Notes.</td>
<td>Local exhaust or breathing protection.</td>
</tr>
<tr>
<td>Skin</td>
<td>Dry skin.</td>
<td></td>
</tr>
<tr>
<td>Eyes</td>
<td>Redness. Pain.</td>
<td>Safety goggles or eye protection in combination with breathing protection.</td>
</tr>
</tbody>
</table>

### Spillage Disposal

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.

### Packaging & Labelling

EU classification  
Xn Symbol  
N Symbol  
R: 22-50/53  
S: (2-)22-60-61

### Emergency Response

<table>
<thead>
<tr>
<th>Emergency Response</th>
<th>Safe Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
0421 COPPER (I) OXIDE

IMPORTANT DATA

Physical State; Appearance
YELLOW, RED OR BROWN CRystalline Powder.

Occupational exposure limits
TLV: (as Cu, dust) 1 mg/m$^3$ as TWA;
TLV: (as Cu, fume) 0.2 mg/m$^3$ as TWA; (ACGIH 2007).
MAK: (Inhalable fraction) 0.1 mg/m$^3$; Peak limitation category: II(2);
Pregnancy risk group: C; (DFG 2006).

Routes of exposure
The substance can be absorbed into the body by inhalation and by ingestion.

Inhalation risk
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

Effects of short-term exposure
The substance irritates the eyes and the respiratory tract. Inhalation of fumes may cause metal fume fever. The substance may cause effects on the kidneys and liver after ingestion. The effects may be delayed.

Effects of long-term or repeated exposure
Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES

Decomposes below boiling point at 1800°C
Melting point: 1232°C

Relative density (water = 1): 6.0
Solubility in water: none

ENVIRONMENTAL DATA

NOTES
Headache, cough, sweating, nausea and fever may be caused by freshly formed fumes or dust of copper oxide.
The symptoms of metal fume fever do not become manifest until 4-12 hours after exposure.
C.I. 77402, Copox, Copper Nordox, Copper Sardex, Perenox, Yellow Cuprocide are trade names.

Card has been partly updated in October 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.
Card has been partly updated in October 2006. See sections Occupational Exposure Limits, Ingestion First Aid.
Card has been partially updated in July 2007: see Occupational Exposure Limits.

ADDITIONAL INFORMATION

LEGAL NOTICE

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### FERRIC OXIDE

**CAS No:** 1309-37-1  
**RTECS No:** NO7400000  
**UN No:** See Notes  
**Anhydrous ferric oxide**  
**Iron (III) oxide**  
**Diiiron trioxide**  
**Iron trioxide**  
**Ferric sesquioxide**  
**Fe₂O₃**  
**Molecular mass:** 159.7

#### TYPES OF HAZARD/EXPOSURE

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>Not combustible.</td>
<td></td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td>EXPLOSION</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### EXPOSURE

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Cough.</td>
<td>Avoid inhalation of dust.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td>Skin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eyes</td>
<td>Redness.</td>
<td>Safety goggles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
<tr>
<td>Ingestion</td>
<td></td>
<td>Do not eat, drink, or smoke during work.</td>
<td></td>
</tr>
</tbody>
</table>

#### SPILLAGE DISPOSAL

Personal protection: P1 filter respirator for inert particles. Sweep spilled substance into covered containers.

#### PACKAGING & LABELLING

<table>
<thead>
<tr>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

#### EMERGENCY RESPONSE

<table>
<thead>
<tr>
<th>EMERGENCY RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

#### SAFE STORAGE

<table>
<thead>
<tr>
<th>SAFE STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
**1577 FERRIC OXIDE**

### IMPORTANT DATA

**Physical State; Appearance**
REDDISH BROWN TO BLACK CRYSTALS OR POWDER

**Chemical dangers**
Reacts with carbon monoxide causing explosion hazard.

**Occupational exposure limits**
TLV: (as Fe) 5 mg/m³ as TWA; A4; (ACGIH 2004).
MAK: (as the respirable fraction of the aerosol) 1.5 mg/m³; (DFG 2004).

**Inhalation risk**
A nuisance-causing concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

**Effects of short-term exposure**
May cause mechanical irritation.

**Effects of long-term or repeated exposure**
Lungs may be affected by repeated or prolonged exposure to dust particles, resulting in siderosis, a benign condition.

### PHYSICAL PROPERTIES

- **Melting point:** 1565°C
- **Density:** 5.24 g/cm³
- **Solubility in water:** none

### ENVIRONMENTAL DATA

### NOTES

There is a UN number associated with ferric oxide but this relates to iron oxide, spent, or iron sponge, spent obtained from coal gas purification which is spontaneously combustible.

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

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**LEAD**

**CAS No:** 7439-92-1  
**RTECS No:** OF7525000

**Lead metal**  
**Plumbum**  
**(powder)**  
**Pb**  
**Atomic mass:** 207.2

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPOMTS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
</tbody>
</table>

**EXPLOSION**  
Finely dispersed particles form explosive mixtures in air.

<table>
<thead>
<tr>
<th><strong>EXPOSURE</strong></th>
<th>See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.</th>
<th><strong>PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Local exhaust or breathing protection.</td>
<td>Fresh air, rest.</td>
</tr>
<tr>
<td>Skin</td>
<td>Protective gloves.</td>
<td>Remove contaminated clothes. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>Eyes</td>
<td>Safety spectacles.</td>
<td>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

**SPILLAGE DISPOSAL**  
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.

**PACKAGING & LABELLING**

**EMERGENCY RESPONSE**

**SAFE STORAGE**

Separated from food and feedstuffs and incompatible materials. See Chemical Dangers.
IMPORTANT DATA

Physical State; Appearance
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

Physical dangers
Dust explosion possible if in powder or granular form, mixed with air.

Chemical dangers
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

Occupational exposure limits
TLV: 0.05 mg/m³ as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/m³; (EU 2002).

Routes of exposure
The substance can be absorbed into the body by inhalation and by ingestion.

Inhalation risk
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

Effects of long-term or repeated exposure
The substance may have effects on the blood, bone marrow, central nervous system, peripheral nervous system and kidneys, resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES
Boiling point: 1740/C
Melting point: 327.5/C
Density: 11.34 g/cm³
Solubility in water: none

ENVIRONMENTAL DATA
Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.

NOTES
Depending on the degree of exposure, periodic medical examination is suggested.
Do NOT take working clothes home.
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

LEGAL NOTICE
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# SELENIUM

**CAS No:** 7782-49-2  
**RTECS No:** VS7700000  
**EC No:** 034-001-00-2

*(powder)*  
**Se**  
**Atomic mass:** 79.0

---

<table>
<thead>
<tr>
<th>TYPES OF HAZARD/EXPOSURE</th>
<th>ACUTE HAZARDS/SYMPTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Combustible. Gives off irritating or toxic fumes (or gases) in a fire.</td>
<td>NO open flames. NO contact with oxidants.</td>
<td>Powder, AFFF, foam, carbon dioxide. NO water.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td>Risk of fire and explosion on contact with oxidants.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eyes</strong></td>
<td>Redness. Pain. Blurred vision.</td>
</tr>
<tr>
<td><strong>Ingestion</strong></td>
<td>Metallic taste. Diarrhoea. Chills. Fever. (Further see Inhalation).</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>SPILLAGE DISPOSAL</th>
<th>PACKAGING &amp; LABELLING</th>
</tr>
</thead>
</table>
| Do NOT wash away into sewer. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles. | T Symbol  
R: 23/25-33-53  
S: (1/2-)20/21-28-45-61 | Airtight. Do not transport with food and feedstuffs. |

---

<table>
<thead>
<tr>
<th>EMERGENCY RESPONSE</th>
<th>SAFE STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fireproof. Separated from strong oxidants, strong acids, food and feedstuffs. Dry.</td>
<td></td>
</tr>
</tbody>
</table>
### IMPORTANT DATA

#### Physical State; Appearance
ODOURLESS SOLID IN VARIOUS FORMS. DARK RED-BROWN TO BLUISH-BLACK AMORPHOUS SOLID OR RED TRANSPARENT CRYSTALS OR METALLIC GREY TO BLACK CRYSTALS.

#### Chemical dangers
Upon heating, toxic fumes are formed. Reacts violently with oxidants strong acids. Reacts with water at 50°C forming flammable/explosive gas (hydrogen - see ICSC0001) and selenious acids. Reacts with incandescence on gentle heating with phosphorous and metals such as nickel, zinc, sodium, potassium, platinum.

#### Occupational exposure limits
TLV: 0.2 mg/m³ as TWA; (ACGIH 2004).
MAK: (Inhalable fraction) 0.05 mg/m³; Peak limitation category: II(4); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).

### PHYSICAL PROPERTIES

- Boiling point: 685°C
- Melting point: 170-217°C
- Relative density (water = 1): 4.8

### ENVIRONMENTAL DATA

Solubility in water: none
Vapour pressure, Pa at 20°C: 0.1

### NOTES

Do NOT take working clothes home.
Card has been partly updated in April 2005. See sections Occupational Exposure Limits, EU classification, Emergency Response.

### ADDITIONAL INFORMATION

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible
# Zinc Oxide

**CAS No:** 1314-13-2  
**RTECS No:** ZH4810000  
**EC No:** 030-013-00-7

**Zinc white**  
**Zinc monoxide**  
**C.I. Pigment White 4**  
**ZnO**  
**Molecular mass:** 81.4

## Types of Hazard/Exposure

<table>
<thead>
<tr>
<th>ACUTE HAZARDS/SYMPOTOMS</th>
<th>PREVENTION</th>
<th>FIRST AID/FIRE FIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>Not combustible.</td>
<td>In case of fire in the surroundings: use appropriate extinguishing media.</td>
</tr>
<tr>
<td><strong>EXPLOSION</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Exposure

<table>
<thead>
<tr>
<th>EXPOSURE</th>
<th>PREVENT DISPERSION OF DUST!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td>Protective gloves. Rinse and then wash skin with water and soap.</td>
</tr>
<tr>
<td>Eyes</td>
<td>Safety goggles. First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</td>
</tr>
</tbody>
</table>

## Spillage Disposal

Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.

## Packaging & Labelling

| N Symbol | R: 50/53  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S: 60-61</td>
<td></td>
</tr>
</tbody>
</table>

## Emergency Response

## Safe Storage

---

IPCS  
Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission © IPCS 2004

SEE IMPORTANT INFORMATION ON THE BACK.
0208 ZINC OXIDE

IMPORTANT DATA

Physical State; Appearance
WHITE POWDER

Chemical dangers
Reacts violently with aluminium and magnesium powders, and with chlorinated rubber on heating causing fire and explosion hazard.

Occupational exposure limits
TLV: (as respirable fraction) 2 mg/m³ as TWA; (ACGIH 2004).
TLV: (as respirable fraction) 10 mg/m³ as STEL; (ACGIH 2004).
MAK: (as fume) 1 mg/m³, Respirable fraction; Peak limitation category: I(1); (DFG 2003).

Routes of exposure
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

Inhalation risk
A harmful concentration of airborne particles can be reached quickly especially for zinc oxide fume particles.

Effects of short-term exposure
Inhalation of fumes may cause metal fume fever. The substance as a fume is irritating to the respiratory tract. The effects may be delayed. See Notes.

PHYSICAL PROPERTIES

Melting point: 1975/C
Density: 5.6 g/cm³

Solubility in water: none

ENVIRONMENTAL DATA

NOTES

The symptoms of metal fume fever do not become manifest until a few hours have passed.
Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

ADDITIONAL INFORMATION

LEGAL NOTICE

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Project Material Safety Data Sheets

Appendix I

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
EMERGENCY OVERVIEW

CAUTION!
OSHA/NFPA COMBUSTIBLE LIQUID - SLIGHT TO MODERATE IRRITANT
EFFECTS CENTRAL NERVOUS SYSTEM
HARMFUL OR FATAL IF SWALLOWED

Moderate fire hazard. Avoid breathing vapors or mists. May cause dizziness and drowsiness. May cause moderate eye irritation and skin irritation (rash). Long-term, repeated exposure may cause skin cancer. If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): CHEMTREC (800) 424-9300
COMPANY CONTACT (business hours): Corporate Safety (732) 750-6000
MSDS INTERNET WEBSITE: www.hess.com (See Environment, Health, Safety & Social Responsibility)

SYNONYMS: Ultra Low Sulfur Diesel (ULSD); Low Sulfur Diesel; Motor Vehicle Diesel Fuel; Diesel Fuel #2; Dyed Diesel Fuel; Non-Road, Locomotive and Marine Diesel Fuel; Tax-exempt Diesel Fuel

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and CHEMICAL INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>INGREDIENT NAME (CAS No.)</th>
<th>CONCENTRATION PERCENT BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel (68476-34-6)</td>
<td>100</td>
</tr>
<tr>
<td>Naphthalene (91-20-3)</td>
<td>Typically &lt; 0.01</td>
</tr>
</tbody>
</table>

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher. Diesel fuel may be dyed (red) for tax purposes. May contain a multifunctional additive.

3. HAZARDS IDENTIFICATION

EYES
Contact with liquid or vapor may cause mild irritation.

SKIN
May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.
INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information.

IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

4. FIRST AID MEASURES

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:
FLASH POINT: > 125 °F (> 52 °C) minimum PMCC
AUTOIGNITION POINT: 494 °F (257 °C)
OSHA/NFPA FLAMMABILITY CLASS: 2 (COMBUSTIBLE)
LOWER EXPLOSIVE LIMIT (%): 0.6
UPPER EXPLOSIVE LIMIT (%): 7.5

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.
LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

FIRE FIGHTING INSTRUCTIONS
Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA-approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY’S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE

HANDLING PRECAUTIONS
Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Diesel fuel, and in particular low and ultra low sulfur diesel fuel, has the capability of accumulating a static electrical charge of sufficient energy to cause a fire/explosion in the presence of lower flashpoint products such as gasoline. The accumulation of such a static charge occurs as the diesel flows through pipelines, filters, nozzles and various work tasks such as tank/container filling, splash loading, tank cleaning; product sampling; tank gauging; cleaning, mixing, vacuum truck operations, switch loading, and product agitation. There is a greater potential for static charge accumulation in cold temperature, low humidity conditions.

Documents such as 29 CFR OSHA 1910.106 "Flammable and Combustible Liquids, NFPA 77 Recommended Practice on Static Electricity, API 2003 "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents and ASTM D4865 "Standard Guide for Generation and Dissipation of Static
Electricity in Petroleum Fuel Systems" address special precautions and design requirements involving loading rates, grounding, bonding, filter installation, conductivity additives and especially the hazards associated with "switch loading." ("Switch Loading" is when a higher flash point product (such as diesel) is loaded into tanks previously containing a low flash point product (such as gasoline) and the electrical charge generated during loading of the diesel results in a static ignition of the vapor from the previous cargo (gasoline).]

Note: When conductivity additives are used or are necessary the product should achieve 25 picosiemens/meter or greater at the handling temperature.

**STORAGE PRECAUTIONS**

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

**WORK/HYGIENIC PRACTICES**

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves.

### 8. EXPOSURE CONTROLS and PERSONAL PROTECTION

#### EXPOSURE LIMITS

<table>
<thead>
<tr>
<th>Components (CAS No.)</th>
<th>Source</th>
<th>Exposure Limits</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel: (68476-34-6)</td>
<td>OSHA</td>
<td>5 mg/m³, as mineral oil mist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACGIH</td>
<td>100 mg/m² (as totally hydrocarbon vapor) TWA</td>
<td>A3, skin</td>
</tr>
<tr>
<td>Naphthalene (91-20-3)</td>
<td>OSHA</td>
<td>10 ppm TWA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACGIH</td>
<td>10 ppm TWA / 15 ppm STEL</td>
<td>A4, Skin</td>
</tr>
</tbody>
</table>

#### ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

**EYE/FACE PROTECTION**

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

**SKIN PROTECTION**

Gloves constructed of nitrile, neoprene, or PVC are recommended. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.
RESPIRATORY PROTECTION
A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE
Clear, straw-yellow liquid. Dyed fuel oil will be red or reddish-colored.

ODOR
Mild, petroleum distillate odor

BASIC PHYSICAL PROPERTIES

BOILING RANGE: 320 to 690 °F (160 to 366 °C)
VAPOR PRESSURE: 0.009 psia @ 70 °F (21 °C)
VAPOR DENSITY (air = 1): > 1.0
SPECIFIC GRAVITY (H₂O = 1): 0.83 to 0.88 @ 60 °F (16 °C)
PERCENT VOLATILES: 100 %
EVAPORATION RATE: Slow; varies with conditions
SOLUBILITY (H₂O): Negligible

10. STABILITY and REACTIVITY

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS
Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers; Viton ®; Fluorel ®

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL PROPERTIES

ACUTE TOXICITY
Acute dermal LD50 (rabbits): > 5 ml/kg  Acute oral LD50 (rats): 9 ml/kg
Primary dermal irritation: extremely irritating (rabbits)  Draize eye irritation: non-irritating (rabbits)
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenic: OSHA: NO  IARC: NO  NTP: NO  ACGIH: A3

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal’s skin with soap and water between applications reduced tumor formation.

MUTAGENICITY (genetic effects)
This material has been positive in a mutagenicity study.
12. ECOLOGICAL INFORMATION
Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

13. DISPOSAL CONSIDERATIONS
Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION

<table>
<thead>
<tr>
<th>PROPER SHIPPING NAME:</th>
<th>Diesel Fuel</th>
<th>Placard (International Only):</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARD CLASS and PACKING GROUP:</td>
<td>3, PG III</td>
<td></td>
</tr>
<tr>
<td>DOT IDENTIFICATION NUMBER:</td>
<td>NA 1993 (Domestic)</td>
<td>UN 1202 (International)</td>
</tr>
<tr>
<td>DOT SHIPPING LABEL:</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

Use Combustible Placard if shipping in bulk domestically

15. REGULATORY INFORMATION

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION
This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

<table>
<thead>
<tr>
<th>ACUTE HEALTH</th>
<th>CHRONIC HEALTH</th>
<th>FIRE</th>
<th>SUDDEN RELEASE OF PRESSURE</th>
<th>REACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

SARA SECTION 313 - SUPPLIER NOTIFICATION
This product may contain listed chemicals below the de minimis levels which therefore are not subject to the supplier notification requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372. If you may be required to report releases of chemicals listed in 40 CFR 372.28, you may contact Hess Corporate Safety if you require additional information regarding this product.

CALIFORNIA PROPOSITION 65 LIST OF CHEMICALS
This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

<table>
<thead>
<tr>
<th>INGREDIENT NAME (CAS NUMBER)</th>
<th>Date Listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Engine Exhaust (no CAS Number listed)</td>
<td>10/01/1990</td>
</tr>
</tbody>
</table>

CANADIAN REGULATORY INFORMATION (WHMIS)
Class B, Division 3 (Combustible Liquid) and Class D, Division 2, Subdivision B (Toxic by other means)
16. OTHER INFORMATION

**NFPA® HAZARD RATING**
HEALTH: 0
FIRE: 2
REACTIVITY: 0

Refer to NFPA 704 “Identification of the Fire Hazards of Materials” for further information

**HMIS® HAZARD RATING**
HEALTH: 1 * * Chronic
FIRE: 2
PHYSICAL: 0

**SUPERSEDES MSDS DATED:** 02/28/2001

**ABBREVIATIONS:**
AP = Approximately  < = Less than  > = Greater than
N/A = Not Applicable  N/D = Not Determined  ppm = parts per million

**ACRONYMS:**
ACGIH American Conference of Governmental Industrial Hygienists  NTP National Toxicology Program
AIHA American Industrial Hygiene Association  OPA Oil Pollution Act of 1990
ANSI American National Standards Institute  OSHA U.S. Occupational Safety & Health Administration
API American Petroleum Institute  PEL Permissible Exposure Limit (OSHA)
(212) 642-4900  REL Recommended Exposure Limit (NIOSH)
CERCLA Comprehensive Emergency Response, Compensation, and Liability Act  SARA Superfund Amendments and
DOT U.S. Department of Transportation  Reauthorization Act of 1986 Title III
[General info: (800) 467-4922]  SCBA Self-Contained Breathing Apparatus
EPA U.S. Environmental Protection Agency  SPCC Spill Prevention, Control, and
HMIS Hazardous Materials Information System  Countermeasures
IARC International Agency For Research On Cancer  STEL Short-Term Exposure Limit (generally 15 minutes)
MSHA Mine Safety and Health Administration  TLV Threshold Limit Value (ACGIH)
NFPA National Fire Protection Association  TSCA Toxic Substances Control Act
(617) 770-3000  TWA Time Weighted Average (8 hr.)
NIOSH National Institute of Occupational Safety and Health  WEEL Workplace Environmental Exposure Level (AIHA)
NOIC Notice of Intended Change (proposed change to ACGIH TLV)  WHMIS Canadian Workplace Hazardous Materials Information System

**DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES**
Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.
EMERGENCY OVERVIEW

DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT
- EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

1. CHEMICAL PRODUCT and COMPANY INFORMATION (rev. Jan-04)

Amerada Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): CHEMTREC (800)424-9300
COMPANY CONTACT (business hours): Corporate Safety (732)750-6000
MSDS Internet Website www.hess.com/about/environ.html

SYNONYMS: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS * (rev. Jan-04)

<table>
<thead>
<tr>
<th>INGREDIENT NAME (CAS No.)</th>
<th>CONCENTRATION PERCENT BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline (86290-81-5)</td>
<td>100</td>
</tr>
<tr>
<td>Benzene (71-43-2)</td>
<td>0.1 - 4.9 (0.1 - 1.3 reformulated gasoline)</td>
</tr>
<tr>
<td>n-Butane (106-97-8)</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Ethyl Alcohol (Ethanol) (64-17-5)</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Ethyl benzene (100-41-4)</td>
<td>&lt; 3</td>
</tr>
<tr>
<td>n-Hexane (110-54-3)</td>
<td>0.5 to 4</td>
</tr>
<tr>
<td>Methyl-tertiary butyl ether (MTBE) (1634-04-4)</td>
<td>0 to 15.0</td>
</tr>
<tr>
<td>Tertiary-amyl methyl ether (TAME) (994-05-8)</td>
<td>0 to 17.2</td>
</tr>
<tr>
<td>Toluene (108-88-3)</td>
<td>1 - 25</td>
</tr>
<tr>
<td>1,2,4- Trimethylbenzene (95-63-6)</td>
<td>&lt; 6</td>
</tr>
<tr>
<td>Xylene, mixed isomers (1330-20-7)</td>
<td>1 - 15</td>
</tr>
</tbody>
</table>

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol or MTBE and/or TAME). Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.
3. HAZARDS IDENTIFICATION (rev. Dec-97)

EYES
Moderate irritant. Contact with liquid or vapor may cause irritation.

SKIN
Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Contains benzene, a regulated human carcinogen. Benzene has the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with systemic toxicity. See also Section 11 - Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES (rev. Dec-97)

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.
5. **FIRE FIGHTING MEASURES**  (rev. Dec-97)

**FLAMMABLE PROPERTIES:**
- **FLASH POINT:** -45 °F (-43 °C)
- **AUTOIGNITION TEMPERATURE:** highly variable; > 530 °F (>280 °C)
- **OSHA/NFPA FLAMMABILITY CLASS:** 1A (flammable liquid)
- **LOWER EXPLOSIVE LIMIT (%):** 1.4%
- **UPPER EXPLOSIVE LIMIT (%):** 7.6%

**FIRE AND EXPLOSION HAZARDS**
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

**EXTINGUISHING MEDIA**
- **SMALL FIRES:** Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.
- **LARGE FIRES:** Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

During certain times of the year and/or in certain geographical locations, gasoline may contain MTBE and/or TAME. Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration - refer to NFPA 11 “Low Expansion Foam - 1994 Edition.”

**FIRE FIGHTING INSTRUCTIONS**
Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. **ACCIDENTAL RELEASE MEASURES**  (rev. Dec-97)

**ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.**

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product.
vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE (rev. Dec-97)

HANDLING PRECAUTIONS

******USE ONLY AS A MOTOR FUEL******
******DO NOT SIPHON BY MOUTH******

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS
Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES
Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION (rev. Jan-04)

EXPOSURE LIMITS

<table>
<thead>
<tr>
<th>Component (CAS No.)</th>
<th>Source</th>
<th>TWA (ppm)</th>
<th>STEL (ppm)</th>
<th>Exposure Limits</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline (86290-81-5)</td>
<td>ACGIH</td>
<td>300</td>
<td>500</td>
<td>A3</td>
<td></td>
</tr>
<tr>
<td>Benzene (71-43-2)</td>
<td>OSHA</td>
<td>0.5</td>
<td>2.5</td>
<td>Carcinogen</td>
<td>A1, skin</td>
</tr>
<tr>
<td>n-Butane (106-97-8)</td>
<td>ACGIH</td>
<td>800</td>
<td>2000</td>
<td>A4</td>
<td></td>
</tr>
<tr>
<td>Ethyl Alcohol (ethanol) (64-17-5)</td>
<td>OSHA</td>
<td>1000</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl benzene (100-41-4)</td>
<td>OSHA</td>
<td>100</td>
<td>125</td>
<td>A3</td>
<td></td>
</tr>
</tbody>
</table>
Component (CAS No.) | Source | TWA (ppm) | STEL (ppm) | Exposure Limits | Note
--- | --- | --- | --- | --- | ---
n-Hexane (110-54-3) | OSHA | 500 | -- | skin | 
Methyl-tertiary butyl ether (MTBE) (1634-34-4) | ACGIH | 50 | -- | A3 | 
Tertiary-amyl methyl ether (TAME) (994-05-9) | None established | 
Toluene (108-86-3) | OSHA | 200 | -- | Ceiling: 300 ppm; Peak: 500 ppm (10 min.) | 
1,2,4-Trimethylbenzene (95-63-6) | ACGIH | 50 | -- | A4 (skin) | 
Xylene, mixed isomers (1330-20-7) | OSHA | 100 | -- | 
ACGIH | 100 | 150 | A4 | 

**ENGINEERING CONTROLS**
Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

**EYE/FACE PROTECTION**
Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

**SKIN PROTECTION**
Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as that made of E.I. DuPont Tychem®, products or equivalent is recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

**RESPIRATORY PROTECTION**
A NIOSH-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

**9. PHYSICAL and CHEMICAL PROPERTIES** (rev. Jan-04)

**APPEARANCE**
A translucent, straw-colored or light yellow liquid

**ODOR**
A strong, characteristic aromatic hydrocarbon odor. Oxygenated gasoline with MTBE and/or TAME may have a sweet, ether-like odor and is detectable at a lower concentration than non-oxygenated gasoline.

**ODOR THRESHOLD**

<table>
<thead>
<tr>
<th>Description</th>
<th>Odor Detection</th>
<th>Odor Recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-oxygenated gasoline:</td>
<td>0.5 - 0.6 ppm</td>
<td>0.8 - 1.1 ppm</td>
</tr>
<tr>
<td>Gasoline with 15% MTBE:</td>
<td>0.2 - 0.3 ppm</td>
<td>0.4 - 0.7 ppm</td>
</tr>
<tr>
<td>Gasoline with 15% TAME:</td>
<td>0.1 ppm</td>
<td>0.2 ppm</td>
</tr>
</tbody>
</table>

**BASIC PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOILING RANGE:</td>
<td>85 to 437 °F (39 to 200 °C)</td>
</tr>
<tr>
<td>VAPOR PRESSURE:</td>
<td>6.4 - 15 RVP @ 100 °F (38 °C) (275-475 mm Hg @ 68 °F (20 °C)</td>
</tr>
<tr>
<td>VAPOR DENSITY (air = 1):</td>
<td>AP 3 to 4</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY (H₂O = 1):</td>
<td>0.70 – 0.78</td>
</tr>
<tr>
<td>EVAPORATION RATE:</td>
<td>10-11 (n-butyl acetate = 1)</td>
</tr>
<tr>
<td>PERCENT VOLATILES:</td>
<td>100 %</td>
</tr>
</tbody>
</table>
10. STABILITY and REACTIVITY  (rev. Dec-94)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID
Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

INCOMPATIBLE MATERIALS
Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

11. TOXICOLOGICAL PROPERTIES  (rev. Dec-97)

ACUTE TOXICITY
Acute Dermal LD50 (rabbits): > 5 ml/kg  
Acute Oral LD50 (rat): 18.75 ml/kg  
Primary dermal irritation (rabbits): slightly irritating  
Draize eye irritation (rabbits): non-irritating  
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenicity: OSHA: NO  
IARC: YES - 2B  
NTP: NO  
ACGIH: YES (A3)

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

This product may contain methyl tertiary butyl ether (MTBE): animal and human health effects studies indicate that MTBE may cause eye, skin, and respiratory tract irritation, central nervous system depression and neurotoxicity. MTBE is classified as an animal carcinogen (A3) by the ACGIH.

12. ECOLOGICAL INFORMATION  (rev. Jan-04)

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, oxygenates such as ethers and alcohols will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. The API (www.api.org) provides a number of useful references addressing petroleum and oxygenate contamination of groundwater.

13. DISPOSAL CONSIDERATIONS  (rev. Dec-97)

Consult federal, state and local waste regulations to determine appropriate disposal options.
14. TRANSPORTATION INFORMATION (rev. Jan-04)

DOT PROPER SHIPPING NAME: Gasoline
DOT HAZARD CLASS and PACKING GROUP: 3, PG II
DOT IDENTIFICATION NUMBER: UN 1203
DOT SHIPPING LABEL: FLAMMABLE LIQUID

15. REGULATORY INFORMATION (rev. Jan-04)

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION
This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)
Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

<table>
<thead>
<tr>
<th>ACUTE HEALTH</th>
<th>CHRONIC HEALTH</th>
<th>FIRE</th>
<th>SUDDEN RELEASE OF PRESSURE</th>
<th>REACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

SARA SECTION 313 - SUPPLIER NOTIFICATION
This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

<table>
<thead>
<tr>
<th>INGREDIENT NAME (CAS NUMBER)</th>
<th>CONCENTRATION WT. PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene (71-43-2)</td>
<td>0.1 to 4.9 (0.1 to 1.3 for reformulated gasoline)</td>
</tr>
<tr>
<td>Ethyl benzene (100-41-4)</td>
<td>&lt; 3</td>
</tr>
<tr>
<td>n-Hexane (110-54-3)</td>
<td>0.5 to 4</td>
</tr>
<tr>
<td>Methyl-tertiary butyl ether (MTBE) (1634-04-4)</td>
<td>0 to 15.0</td>
</tr>
<tr>
<td>Toluene (108-88-3)</td>
<td>1 to 15</td>
</tr>
<tr>
<td>1,2,4-Trimethylbenzene (95-63-6)</td>
<td>&lt; 6</td>
</tr>
<tr>
<td>Xylene, mixed isomers (1330-20-7)</td>
<td>1 to 15</td>
</tr>
</tbody>
</table>

US EPA guidance documents (www.epa.gov/tri) for reporting Persistent Bioaccumulating Toxics (PBTs) indicate this product may contain the following deminimis levels of toxic chemicals subject to Section 313 reporting:

<table>
<thead>
<tr>
<th>INGREDIENT NAME (CAS NUMBER)</th>
<th>CONCENTRATION - Parts per million (ppm) by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polycyclic aromatic compounds (PACs)</td>
<td>17</td>
</tr>
<tr>
<td>Benzo (g,h,i) perylene (191-24-2)</td>
<td>2.55</td>
</tr>
<tr>
<td>Lead (7439-92-1)</td>
<td>0.079</td>
</tr>
</tbody>
</table>
CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION (rev. Jan-04)

NFPA® HAZARD RATING
- HEALTH: 1 Slight
- FIRE: 3 Serious
- REACTIVITY: 0 Minimal

HMIS® HAZARD RATING
- HEALTH: 1 * Slight
- FIRE: 3 Serious
- REACTIVITY: 0 Minimal
  * CHRONIC

SUPERSEDES MSDS DATED: 12/30/97

ABBREVIATIONS:
- AP = Approximately
- < = Less than
- > = Greater than
- N/A = Not Applicable
- N/D = Not Determined
- ppm = parts per million

ACRONYMS:
- ACGIH American Conference of Governmental Industrial Hygienists
- AIHA American Industrial Hygiene Association
- ANSI American National Standards Institute
- API American Petroleum Institute
- CERCLA Comprehensive Emergency Response, Compensation, and Liability Act
- DOT U.S. Department of Transportation
- EPA U.S. Environmental Protection Agency
- HMIS Hazardous Materials Information System
- IARC International Agency For Research On Cancer
- NTP National Toxicology Program
- OSHA U.S. Occupational Safety & Health Administration
- PEL Permissible Exposure Limit (OSHA)
- SCBA Self-Contained Breathing Apparatus
- SPCC Spill Prevention, Control, and Countermeasures
- SARA Superfund Amendments and Reauthorization Act of 1986 Title III
- TSCA Toxic Substances Control Act
- TWA Time Weighted Average (8 hr.)
- WEEL Workplace Environmental Exposure Level (AIHA)
- WHMIS Workplace Hazardous Materials Information System (Canada)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.
ISOPROPYL ALCOHOL (90 - 100%)

1. Product Identification

Synonyms: 2-Propanol, sec-propyl alcohol, isopropanol, sec-propanol, dimethylcarbinol
CAS No.: 67-63-0
Molecular Weight: 60.10
Chemical Formula: (CH₃)₂ CHOH

2. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No</th>
<th>Percent</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropyl Alcohol</td>
<td>67-63-0</td>
<td>90-100%</td>
<td>Yes</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>0-10%</td>
<td>No</td>
</tr>
</tbody>
</table>

3. Hazards Identification

Emergency Overview
WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

SAF-T-DATA™ Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. Exposure to high concentrations has a narcotic effect, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness and possibly death.
Ingestion:
Can cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult = about 250 mls (8 ounces).
Skin Contact:
May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Chronic exposure may cause skin effects.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this agent.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 12°C (54°F) CC
Autoignition temperature: 399°C (750°F)
Flammable limits in air % by volume:
lel: 2.0; uel: 12.7
Listed fire data is for Pure Isopropyl Alcohol.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry, well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Small quantities of peroxides can form on prolonged storage. Exposure to light and/or air significantly increases the rate of peroxide formation. If evaporated to a residue, the mixture of peroxides and isopropanol may explode when exposed to heat or shock.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Isopropyl Alcohol (2-Propanol):
- OSHA Permissible Exposure Limit (PEL): 400 ppm (TWA)
- ACGIH Threshold Limit Value (TLV): 200 ppm (TWA), 400 ppm (STEL), A4 - not classifiable as a human carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, Industrial Ventilation: A Manual of Recommended Practices, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Rubbing alcohol.

Solubility:
Miscible in water.

Specific Gravity:
0.79 @ 20°C/4°C

pH:
No information found.

% Volatiles by volume @ 21°C (70°F):

http://www.jtbaker.com/msds/englishhtml/i8840.htm
10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Heat, flame, strong oxidizers, acetaldehyde, acids, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, aluminum, oleum and perchloric acid.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation rat LC50: 16,000 ppm/8-hour; investigated as a tumorigen, mutagen, reproductive effector.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>NTP Carcinogen--</th>
<th>Known</th>
<th>Anticipated</th>
<th>IARC Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropyl Alcohol (67-63-0)</td>
<td>No</td>
<td>No</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Water (7732-18-5)</td>
<td>No</td>
<td>No</td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

**Domestic (Land, D.O.T.)**

Proper Shipping Name: ISOPROPANOL
Hazard Class: 3
UN/NA: UN1219
Packing Group: II
Information reported for product/size: 200L

**International (Water, I.M.O.)**

Proper Shipping Name: ISOPROPANOL
Hazard Class: 3
UN/NA: UN1219
Packing Group: II
Information reported for product/size: 200L

15. Regulatory Information
### Chemical Inventory Status - Part 1

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>TSCA</th>
<th>EC</th>
<th>Japan</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropyl Alcohol (67-63-0)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Water (7732-18-5)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Chemical Inventory Status - Part 2

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Korea</th>
<th>DSL</th>
<th>NSDL</th>
<th>Phil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropyl Alcohol (67-63-0)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Water (7732-18-5)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Federal, State & International Regulations - Part 1

- **SARA 302**
  - RQ: No
  - TPQ: No
  - List: Yes
  - Chemical Catg.: No
- **SARA 313**
  - RQ: No
  - TPQ: No
  - List: Yes

### Federal, State & International Regulations - Part 2

- **RCRA**
  - CERCLA: No
  - 261.33: No
  - 8(d): No
- **TSCA**
  - No

### Australian Hazchem Code:

2[S]2

### Poison Schedule:

None allocated.

### WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

### 16. Other Information

**NFPA Ratings:**

- Health: 1
- Flammability: 3
- Reactivity: 0

**Label Hazard Warning:**

WARNING: FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

**Label Precautions:**

- Keep away from heat, sparks and flame.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Avoid breathing vapor or mist.
- Avoid contact with eyes, skin and clothing.

**Label First Aid:**

If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

**Product Use:**

Laboratory Reagent.

**Revision Information:**

No Changes.

**Disclaimer:**

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)
Air Monitoring Documentation Form
Appendix J

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas  77084-5140
(281) 600-1000
# Ambient Air Monitoring Form

**Document Routing**

| SSO | Retain copy in site health & safety file. DO NOT use this form for personal or area industrial hygiene monitoring use the IH Sample Data Sheet |

## 1. Work Information

<table>
<thead>
<tr>
<th>ERM Representative:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Crew Members &amp; Employers:</td>
</tr>
</tbody>
</table>

## 2. Monitoring Details

<table>
<thead>
<tr>
<th>Time</th>
<th>Ambient Air Monitoring Location</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</table>

## 3. Completion

Name: 

Signature: 

---

ERM Remediation & Construction Management 1 Form Rev.: 05-08
# Industrial Hygiene Sample Data Sheet

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Sample Date</th>
<th>Sample Type (circle)</th>
<th>Personal</th>
<th>Area (SSN in U.S.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Surname</th>
<th>Given Name</th>
<th>Worker ID number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

Where was sample collected?
Facility name | Work area | Sub area |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
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</table>

Sample collection (circle) Active (pump), Passive (OVM), Noise

Pump or noise dosimeter serial number:
Calibration:

<table>
<thead>
<tr>
<th>LPM</th>
<th>LPM</th>
<th>LPM</th>
<th>LPM</th>
<th>LPM</th>
<th>Average flow</th>
</tr>
</thead>
<tbody>
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<td></td>
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</table>

Before sample
After sample
Sample average
Flow

Noise dosimeter or other direct reading device calibrated or calibration verified (circle) Y N

<table>
<thead>
<tr>
<th>Start time</th>
<th>Stop time</th>
<th>Elapsed time in minutes (From pump timer or by calculation for pumps or OVM)</th>
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</thead>
<tbody>
<tr>
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</table>

Environmental conditions: Temperature Relative humidity %  Circle one: Indoors Outdoors
Wind Speed (if outdoors) Wind Direction
Describe other environmental conditions:

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results (from laboratory)</th>
<th>Analyte</th>
<th>Results (from laboratory)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Field notes: May be on page 2 or on back of this sheet (back of this sheet preferred)
Field Notes:

Describe items such as; was worker a smoker, was the work day an average day, a busy day or a light day; did the worker perform any unusual tasks during the day? Provide a brief description of the worker’s job. What type of tasks did the worker perform during the day? Were there any upsets or upset conditions during the day? If so, what were they and when did they occur?
Emergency Action and Fire Prevention Planning

Appendix K

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

To be maintained on site

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas  77084-5140
(281) 600-1000
Emergency Drill
Evaluation Form

Document Routing
SSO
Retain copy in site health & safety file.

1. Basic Information

Date of the Drill: ____________________________

Drill Facilitator: ____________________________

   Name ____________________________  Signature ____________________________

2. Describe the Drill Scenario below


3. Post-drill Review

Evaluation Date: ____________________________

a. List the Positive Attributes of the Drill below


b. List the Opportunities for Improvement below


c. List the corrective actions taken and their completion date below

<table>
<thead>
<tr>
<th>Corrective Action</th>
<th>Assigned to...</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Daily Safety Meeting Documentation Form

Appendix L

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas  77084-5140
(281) 600-1000
Daily Safety Meeting Documentation Form

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Project Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Date &amp; Time:</td>
<td>Meeting Leader:</td>
</tr>
</tbody>
</table>

### Document Routing

| FSO | Retain copy in site health & safety file. |

**What work will be conducted on site today and by whom?**

<table>
<thead>
<tr>
<th>Work Task</th>
<th>Conducted By</th>
</tr>
</thead>
</table>

**What overlapping operations/simultaneous operations will occur today?**


**Any follow-up from previous Major Incidents, Near Misses, Unsafe Acts or Unsafe Conditions discussed today?**


**List any new / short-service personnel on site today?**


### Safety Meeting Core Topics – All Site Workers and Visitors

- [ ] What PPE is required in order to enter the work zone?
- [ ] What are the potential hazards associated with today’s work? How will they be managed?
- [ ] What are the potential impacts of planned activities to: Visitors? Nearby workers? Public?
- [ ] Is everyone aware that they are empowered to stop work if something is questionable or unsafe?
- [ ] What happens and who do you contact if there is an injury or emergency? If working at an active facility, how will you be alerted of an emergency and what will you do?
- [ ] Who do you contact if you have questions, or before deviating from written procedures?
- [ ] Where is fire extinguisher, first aid kit, eyewash, safety shower located?
- [ ] Are any work permits required? Are permits completed and posted in plain view of workers?
- [ ] Have all excavation / borehole locations been cleared of underground utilities/structures, in accordance with ERM and client-specific subsurface clearance procedures?
- [ ] Have all tools / equipment / vehicles been inspected today to ensure safe operating condition?
- [ ] Will a follow-up safety meeting be conducted after lunch?
- [ ] Has anything unexpected or out-of-the-ordinary occurred on this job recently to share?
- [ ] What is the worst that could happen if something goes wrong today?
Daily Safety Meeting
Documentation Form

Project Name:  
Project Number:  
Meeting Date & Time:  
Meeting Leader:  

Safety Topics Related to ERM 2009 Incident Trends – All Site Workers and Visitors

☐ What activities occurring today could result in hand injuries? Is everyone aware that the use of fixed open-blade knives is not permitted without cut-resistant gloves?
☐ What manual activities are planned today? How will we specifically avoid overexertion?
☐ What areas of the site have slip/trip/fall hazards? Are everyone’s work boots in good shape?
☐ How will the on-site team avoid vehicle accidents? Is everyone aware that taking their eyes off the road for more than 2 seconds (for any reason) leads to vehicle accidents?

Who attended the safety meeting today (employees, subcontractors, visitors)?

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Signature</th>
<th>Sign-In Initials*</th>
<th>Sign-Out Initials**</th>
</tr>
</thead>
</table>

* Initials in this space verify that the employee is fit for performing work.  
**Initials in this space verify that the employee was uninjured during the workday.

Who visited the site today but was not involved in work activities?

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Arrival Time</th>
</tr>
</thead>
</table>

ERM 2 2 Form Rev.: 10-09
Visitor Management Plan
Appendix M

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
The following is a list of site procedures to be followed when a visitor arrives on site:

1. Visitor Check In – The Security Guard is to:
   A. Sign in visitors on daily log
   B. Provide directions to the construction office
   C. Instruct visitors where to park
   D. Notify the Construction Manager of the visitor’s arrival
   E. Verify that the visitor and Construction Manager meet at the construction office and that the visitor does not proceed elsewhere unescorted

2. Visitor Orientation – The Construction Manager and/or Site Safety Officer are to:
   A. Provide a copy of the visitor facility map and route to hospital;
   B. Conduct a daily safety briefing that includes a review of the visitor facility map, a review of the Site Practices JHA and a description of active work areas for the day;
   C. Verify visitor has proper PPE and allow visitor to borrow spare PPE if he/she does not have all required PPE

3. Conduct Site Walk or Other Site Activity - The Construction Manager and/or Field Safety Officer are to:
   A. Verify that visitor is wearing all required PPE before leaving the construction office area;
   B. Escort the visitor at all times on site; and
   C. Verify that the visitor signs out with the Security Guard when departing the site.
Lead Exposure Compliance Program

Appendix N

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
ERM Metals Exposure Compliance Plan

Revised January 11, 2011

This written safety plan is for work being conducted at the former Asarco Smelter site in El Paso, Texas (the Site) where ERM employees may be occupationally exposed to lead, arsenic or cadmium at levels exceeding established exposure limits and/or action levels due to lead, arsenic and cadmium presence in soil and potentially in dust at the Site. ERM employees will conduct oversight of decontamination and demolition activities at the Site. This plan applies to work where one or more of ERM’s employees may be working at the Site, and exposed to constituents at or above the action level for more than 30 days per year.

The purpose of this plan is to outline ERM’s approach to complying with the OSHA Lead, Arsenic and Cadmium Standards Title 29 Code of Federal Regulations 1926.62, 1926.1118, and 1926.1127 respectively. It should be noted that this plan is project specific and in no way supersedes any existing ERM program. Should this plan conflict in any way with the ERM North American Health and Safety Program the more conservative of the requirements shall apply.

Initial Exposure Monitoring
ERM will conduct initial exposure monitoring to assess and document an employee's metal exposure and periodically thereafter (when significant changed conditions occur). In the event that initial exposure monitoring indicates exposure below all of the listed action levels, no further action will be required by this plan.

In the event that initial exposure monitoring results in levels at or above the action levels the remainder of the plan shall be implemented. Both personal air samples and wipe samples in administrative/office areas will be collected and analyzed to ensure safe working conditions for ERM personnel onsite.

Until the initial exposure monitoring is complete with analysis of results, ERM employees providing general oversight within 100 feet of active demolition activities will wear a cartridge respirator fitted with P100 cartridges. Furthermore, employees are instructed to perform observations of contractor’s from an up-wind location. Implementation of this procedure is intended to reduce and maintain employee exposure to metals at or below the respective action levels or PELs. ERM’s respirator program includes a copy of the requirements of 20 CFR 1926.62(f), 29 CFR 1926.62 App. B, and 29 CFR 1910.134. The health and safety plan for the project contains additional information regarding respiratory protection.

Controls
Wherever all feasible engineering and work practices controls that can be instituted are not sufficient to reduce employee exposure to or below the permissible exposure limits of lead, arsenic or cadmium, the employer shall nonetheless use them to reduce employee exposure to the lowest feasible level and shall supplement them by the use of respiratory protection that complies with the requirements of the ERM respiratory
protection program. The ERM respiratory protection program meets the respiratory protection requirements of the Lead, Arsenic, Cadmium and Respiratory Protection (29 CFR 1910.134) Standards. When the requirements of the respective standards are met, employee exposure may be considered to be at the level provided by the protection factor of the respirator for those periods the respirator is worn. Those periods may be averaged with exposure levels during periods when respirators are not worn to determine the employee’s daily TWA Exposure Assessment.

Work practice controls such as the use of personal protective equipment and following good personal hygiene practices and housekeeping are required by OSHA and are required to be a part of this document. These work practice controls are included in the health and safety plan for this project.

Medical Surveillance/Removal Protection
All ERM employees who have a potential for exposure to lead, arsenic or cadmium will undergo baseline medical monitoring prior to exposure onsite. All potentially exposed employees will undergo periodic biological monitoring in order to verify effectiveness of the program. ERM removes employees from work who have exposures to lead, arsenic or cadmium at or above the action level each time a periodic and a follow-up blood sample indicates that the biological monitoring levels are at or above trigger levels specified in the Lead, Arsenic or Cadmium Standard. ERM also removes employees from work who have exposures to metals at or above the respective action level when a health care professional determines that they have medical conditions which, when exposed to the specific metal, places them at greater risk of health problems.

Multi-Employer Worksite
This job is a multi-employer worksite. Prior to activities beginning at this jobsite, all contractors performing work have cooperatively contributed to health and safety planning for the site. All contractor personnel onsite who will participate in demolition activities will attend daily tailgate safety meetings where potential hazards due to lead, arsenic and cadmium exposure will be discussed.

Plan and Standard Availability and Review
ERM employees are fully informed of this plan and applicable Standards (including appendices) are available on RegScan or the OSHA website www.osha.gov. The construction manager, field safety officer, and/or ERM safety representative will make frequent and regular inspections of this jobsite, materials, and equipment, and verify that a copy of this written plan is available at the Site. This Program will be reviewed and updated at least annually to reflect the current status of the program.

Administrative Duties
Mike Casbon, Sr. Construction Manager and Site Safety Officer is the program coordinator/manager and is responsible for its implementation. Brian Murphy, CIH, CSP, is the Sr. Safety Consultant providing technical support and program oversight. Copies of the written program may be obtained and attached to project-specific health and safety plans.
### Summary of Program Components

<table>
<thead>
<tr>
<th></th>
<th>Lead</th>
<th>Arsenic</th>
<th>Cadmium</th>
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<tbody>
<tr>
<td><strong>Permissible Exposure Limit</strong></td>
<td>PEL = 50 µg/m³</td>
<td>PEL = 10 µg/m³</td>
<td>5 µg/m³</td>
</tr>
<tr>
<td><strong>Action Level</strong></td>
<td>Action Level (AL) = 30 µg/m³</td>
<td>Action Level (AL) = 5 µg/m³</td>
<td>Action Level (AL) = 2.5 µg/m³</td>
</tr>
<tr>
<td><strong>Initial Exposure Monitoring</strong></td>
<td>Initial exposure monitoring will be conducted- initial monitoring will consist of two separate events occurring at least 7 days apart.</td>
<td>Initial exposure monitoring will be conducted- initial monitoring will consist of two separate events occurring at least 7 days apart.</td>
<td>Initial exposure monitoring will be conducted- initial monitoring will consist of two separate events occurring at least 7 days apart.</td>
</tr>
<tr>
<td>Initial monitoring results &lt; AL, no additional monitoring required unless conditions change. Changed conditions can be indicated by changes in work processes, work location, prevailing conditions, changes in real time monitoring data or changes in subcontractor monitoring data.</td>
<td>Initial monitoring results &lt; AL, no additional monitoring required unless conditions change. Changed conditions can be indicated by changes in work processes, work location, prevailing conditions, changes in real time monitoring data or changes in subcontractor monitoring data.</td>
<td>Initial monitoring results &lt; AL, no additional monitoring required unless conditions change. Changed conditions can be indicated by changes in work processes, work location, prevailing conditions, changes in real time monitoring data or changes in subcontractor monitoring data.</td>
<td></td>
</tr>
<tr>
<td><strong>Regulated Areas</strong></td>
<td>Where monitoring data indicate that workers may be exposed at or above the PEL warning signs as required by the standard shall be posted.</td>
<td>Where monitoring data indicate that workers may be exposed at or above the AL, regulated areas shall be established and marked with appropriate signage.</td>
<td>Where monitoring data indicate that workers may be exposed at or above the AL, regulated areas shall be established and marked with appropriate signage.</td>
</tr>
<tr>
<td>Based on monitoring results, if a regulated area is established for one metal then the area will be regulated for all metals.</td>
<td>Based on monitoring results, if a regulated area is established for one metal then the area will be regulated for all metals.</td>
<td>Based on monitoring results, if a regulated area is established for one metal then the area will be regulated for all metals.</td>
<td></td>
</tr>
<tr>
<td>Regulated or posted areas shall be accessed by authorized personnel only.</td>
<td>Regulated or posted areas shall be accessed by authorized personnel only.</td>
<td>Regulated or posted areas shall be accessed by authorized personnel only.</td>
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</tr>
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</table>
## Summary of Program Components

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<th></th>
<th>Lead</th>
<th>Arsenic</th>
<th>Cadmium</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exposure Controls</strong></td>
<td>Exposure control shall be accomplished through the use of water spray to reduce particulate emissions from demolition activities, through limiting access to the exclusion zone to authorized personnel only, and through the use of appropriate personal protective equipment such as respirators.</td>
<td>Exposure control shall be accomplished through the use of water spray to reduce particulate emissions from demolition activities, through limiting access to the exclusion zone to authorized personnel only, and through the use of appropriate personal protective equipment such as respirators.</td>
<td>Exposure control shall be accomplished through the use of water spray to reduce particulate emissions from demolition activities, through limiting access to the exclusion zone to authorized personnel only, and through the use of appropriate personal protective equipment such as respirators.</td>
</tr>
<tr>
<td><strong>Respiratory Protection</strong></td>
<td>Requirements of the ERM Respiratory Protection Program shall be followed prior to issuance of any respirator to ERM personnel. Contractors shall follow their own respiratory protection program requirements.</td>
<td>Requirements of the ERM Respiratory Protection Program shall be followed prior to issuance of any respirator to ERM personnel. Contractors shall follow their own respiratory protection program requirements.</td>
<td>Requirements of the ERM Respiratory Protection Program shall be followed prior to issuance of any respirator to ERM personnel. Contractors shall follow their own respiratory protection program requirements.</td>
</tr>
<tr>
<td><strong>Written compliance program required</strong></td>
<td>A written compliance program is required by the standard and this document shall fulfill that requirement.</td>
<td>A written compliance program is required by the standard and this document shall fulfill that requirement.</td>
<td>If exposure monitoring exceeds PEL a written compliance program is required. This document shall fulfill that requirement.</td>
</tr>
<tr>
<td><strong>Medical Surveillance</strong></td>
<td>Medical surveillance shall be required of ERM employees assigned to this project for 30 or more days regardless of metals exposure potential. Such surveillance shall consist of blood sampling and analysis for lead and zinc protoporphyrin (ZPP). At a minimum such sampling shall occur upon initial assignment to the project, annually and at the end of the project or when removed from the project whichever is more frequent. The frequency and type of biological monitoring may be increased or changed based on air sampling results as required by the standard.</td>
<td>Medical surveillance shall be required of ERM employees assigned to this project for 30 or more days regardless of metals exposure potential. Such surveillance shall consist of inclusion of the medical examination requirements of the Arsenic standard into the routine physical examination required by ERM for work with hazardous materials. At a minimum such sampling shall occur upon initial assignment to the project, annually and at the end of the project or when removed from the project whichever is more frequent. The frequency and type of biological monitoring may be increased or changed based on air sampling results as required by the standard.</td>
<td>Medical surveillance shall be required of ERM employees assigned to this project for 30 or more days regardless of metals exposure potential. Such surveillance shall consist of either blood or urine sampling and analysis for cadmium. At a minimum such sampling shall occur upon initial assignment to the project, annually and at the end of the project or when removed from the project whichever is more frequent. The frequency and type of biological monitoring may be increased or changed based on air sampling results as required by the standard.</td>
</tr>
</tbody>
</table>
## Summary of Program Components

<table>
<thead>
<tr>
<th></th>
<th>Lead</th>
<th>Arsenic</th>
<th>Cadmium</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PPE</strong></td>
<td>PPE Use: If medical clearance is required for the use of any PPE specified to reduce potential exposure to any contaminant (e.g. respirators), such persons are required to provide documented evidence of medical clearance before they shall be allowed to don such equipment and enter the exclusion zone.</td>
<td>PPE Use: If medical clearance is required for the use of any PPE specified to reduce potential exposure to any contaminant (e.g. respirators), such persons are required to provide documented evidence of medical clearance before they shall be allowed to don such equipment and enter the exclusion zone.</td>
<td>PPE Use: If medical clearance is required for the use of any PPE specified to reduce potential exposure to any contaminant (e.g. respirators), such persons are required to provide documented evidence of medical clearance before they shall be allowed to don such equipment and enter the exclusion zone.</td>
</tr>
<tr>
<td><strong>Reporting Air Monitoring</strong></td>
<td>Air monitoring and biological monitoring results shall be reported to the affected workers within 5 working days of receipt such data and copies of notifications will be kept in project files.</td>
<td>Air monitoring and biological monitoring results shall be reported to the affected workers within 5 working days of receipt such data and copies of notifications will be kept in project files.</td>
<td>Air monitoring and biological monitoring results shall be reported to the affected workers within 5 working days of receipt such data and copies of notifications will be kept in project files.</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td>Training - Training records of the individuals trained and the content of this training shall be kept in the project files. Workers shall receive awareness training including the following topics: 1. The content of this standard and its appendices 2. The nature of operations which could result in exposure to lead above the action level 3. The purpose, proper selection, fitting, use, and limitations of respirators 4. The purpose and description of the medical surveillance program 5. Engineering controls and work practices used to control exposure</td>
<td>Training - Training records of the individuals trained and the content of this training shall be kept in the project files. 1. Workers shall be informed of the characteristics of arsenic and typical arsenical compounds by being informed of the contents of 29CFR1910.1018 Appendix A 2. The concentration of As in the work areas and the specific nature of operations which could result in exposure to inorganic arsenic as well as any necessary protective steps 3. The purpose, proper selection, fitting, use, and limitations of respirators 4. The purpose and description of the medical surveillance program 5. Engineering controls and work practices used to control exposure 6. A review of the Arsenic Standard 7. Employee’s right of access to records under 29 CFR 1910.20 or 1926.33(g)(1) and (2)</td>
<td>Training - Training records of the individuals trained and the content of this training shall be kept in the project files. 1. Training will be provided prior to or at the time of initial project assignment 2. The training program will be made understandable to the workers. 3. Workers shall be informed of the characteristics of cadmium and the health hazards associated with Cd exposure. 4. The engineering controls associated with the worker’s job assignment. 5. The measures to be taken to protect workers from cadmium exposure. 6. The purpose, proper selection, fitting, use, and limitations of respirators 7. The purpose and description of the medical surveillance program 8. The content of the Cadmium Standard. 9. Employee’s right of access to records under 29 CFR 1910.20 or 1926.33(g)(1) and (2)</td>
</tr>
<tr>
<td>Lead</td>
<td>Arsenic</td>
<td>Cadmium</td>
<td></td>
</tr>
<tr>
<td>------</td>
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<td></td>
</tr>
<tr>
<td>6. Instructions to employees that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Employee’s right of access to records under 29 CFR 1910.20</td>
<td></td>
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</tr>
</tbody>
</table>
Dust Monitoring Plan
Appendix O

October 8, 2010
Project No. 0118148
ASARCO Smelter Demolition

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
Appendix O: Dust Monitoring Plan

Operations at the site will be conducted with a goal of “no visible dust” such that dust from the site does not migrate beyond the site boundary. The plan described below is intended to assess dust generated by site operations and verify that dust suppression activities are sufficient.

Fence Line Monitoring

Fence line monitoring will be performed continuously for total dust while work is ongoing. Total dust will be monitored using TSI DustTrack II or similar portable continuous particle size monitors (PC PSMs). Figure 1 indicates the seven locations where dust data will be collected. Monitoring total dust provides real time data that allows site personnel to take appropriate actions to reduce potential worker or public exposure to airborne constituents from the site.

Total dust measurements will be compared to a site-specific conservative total dust sentinel value which is used as an indicator for constituent concentrations in dust in lieu of the more costly and delayed approach of daily sample collection and laboratory analysis. The computed total dust sentinel value represents the allowable amount of total airborne dust above which may result in a potential airborne constituent concentration equal to the Effects Screening Levels (ESL) or National Ambient Air Quality Standards (NAAQS) value for that constituent. The sentinel value assumes that all dust contains arsenic, cadmium, chromium, copper, iron, lead, mercury, selenium, and zinc. The sentinel value explanation and calculation is provided in Attachment 1.

Perimeter Air Samples

In addition to monitoring total dust, periodic air samples will be collected. The air samples will be collected at the fence line monitoring locations shown in Attachment 1. Air samples will be collected with the TSI DustTrack II or similar air sampling equipment. Air samples will be submitted to a NELAC-certified lab and analyzed for total dust as arsenic, cadmium, chromium, copper, iron, lead, mercury, selenium, and zinc. The constituent concentrations will be compared to ESL or NAAQS values for each constituent.

Personal Air Monitoring

Personal air monitoring will be performed as outlined in Appendix N of this Health and Safety Plan.
Perimeter Dust Monitoring Criteria
Attachment 1

February 28, 2011
Project No. 0118148

Environmental Resources Management Southwest, Inc.
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
ERM and Malcolm Pirnie believe that the Effects Screening Levels (ESLs) as developed by the Texas Commission on Environmental Quality (TCEQ) and the National Ambient Air Quality Standards (NAAQS) for the primary constituents at the former Asarco Smelter site (the Site) are appropriate limits to protect public health around the Site.

The ESLs, per the TCEQ, “are not ambient air standards. If predicted or measured airborne levels of a constituent do not exceed the screening level, adverse health or welfare would not be expected to result. If ambient levels of constituents in air exceed the screening level, it does not necessarily indicate a problem, but a more in-depth review is conducted.”

At some sites, particulate samples are collected at the perimeter of a site and analyzed to determine the amount of airborne constituent per unit volume of air. This method does not provide real-time data that allows site personnel to take appropriate actions to reduce potential worker or public exposure to airborne constituents from the site. A conservative common approach for real-time monitoring data is to assume that constituents are present in all dust generated by work activities at the site and monitor total dust instead of collecting samples for laboratory analysis. This is a more cost-effective method to provide continuous data to help assess engineering controls effectiveness at reducing dust emissions, and thus constituent emissions potentially generated by site work activities.

Monitoring total dust requires that a total dust action level be developed. The computed total dust action level is a value that represents the allowable amount of total airborne dust (again, assuming all dust contains soil constituents) that above which would result in a potential airborne constituent concentration equal to the ESL or NAAQS value for that constituent.

The following computation was used to determine the dust action level for mixed dusts.

\[
\text{Dust Action Level Calculation for Mixed Dusts} = \frac{10^6}{\text{SafetyFactor}} \sum \left( \frac{\text{Concentration}}{\text{ExposureLimit}} \right)
\]

*Exposure Limit* is defined as the ESL or NAAQS for a constituent.

*Concentration* is the average soil concentration for a given soil constituent.

*Safety factor* is a constant used to provide a margin of safety as necessary based on professional judgment.
Appendix O: Dust Monitoring Plan

Attachment 1
Perimeter Dust Monitoring Criteria

The soil concentrations used to determine the dust action level are based on the average soil concentrations as provided by Malcolm Pirnie in the Air and Mini Ram SS 09.09.10.xls data file. Average soil concentrations are used because they are more representative of general site wide conditions than a single sample location that may contain a high constituent concentration.

A safety factor of 1 was chosen because the ESLs and NAAQS are already designed to be protective of public health.

As a matter of practice, site personnel oversee work activities and monitor for visible dust. Work is conducted with goals to reduce the potential to generate dust and to have no visible dust associated with work activities at the site boundary. Readings from the dust monitors are reviewed during the day and changes to work practices or dust control measures may be implemented if necessary based on data and/or visual observations.
### Sentinel Value Calculations

#### SENTINEL VALUE CALCULATION WORKSHEET

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Exposure Limit (mg/m³)</th>
<th>Average Soil Concentration (mg/kg)</th>
<th>Exposure Limit Based on Single Compound (EL Mix, mg/m³)</th>
<th>Dust Quotient for Each Compound (level/limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>0.0001</td>
<td>437</td>
<td>.23</td>
<td>4.37E+06</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.0001</td>
<td>101</td>
<td>.99</td>
<td>1.01E+06</td>
</tr>
<tr>
<td>Chromium</td>
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<td>108</td>
<td>33.33</td>
<td>3.00E+04</td>
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<tr>
<td>Copper</td>
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<td>2,932</td>
<td>3.41</td>
<td>2.93E+05</td>
</tr>
<tr>
<td>Iron</td>
<td>0.05</td>
<td>1,589</td>
<td>31.47</td>
<td>3.18E+04</td>
</tr>
<tr>
<td>Lead</td>
<td>0.0015</td>
<td>26,523</td>
<td>.06</td>
<td>1.77E+07</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.00025</td>
<td>5.E-4</td>
<td>5.E+5</td>
<td>2.00E+00</td>
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<td>Selenium</td>
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<td>86.96</td>
<td>1.15E+04</td>
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<tr>
<td>Zinc</td>
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<td>1,973</td>
<td>10.14</td>
<td>9.87E+04</td>
</tr>
<tr>
<td>Sum</td>
<td></td>
<td></td>
<td></td>
<td>2.35E+07</td>
</tr>
</tbody>
</table>

**Dust Exposure Level =** 0.043
Appendix O: Dust Monitoring Plan

Figure 1
Fence Line Dust Monitoring Locations