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Photographs taken in the Old Main Steam Plant prior to Demolition.

Mercury Safety Data Sheet

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Section 2. – Hazard identification

Section 3. Composition information

Section 4 – First Aid measures

Section 5. Fire Fighting Measures

Section 6. Accidental Release Measures

Section 7. Handling and Storage

Section 8. Exposure controls and personal protection

Section 9. Physical and chemical properties

Section 10. Stability and reactivity

Section 11. Toxicological information

Section 12. Ecological information

Section 13. Disposal considerations

Section 14. Transport information

Section 15. Regulations

Section 16. Other information

SAFL Actuator

Glass ware

Fume Hood

Vacuum pump

Container of mercury

Contaminated masonry

Beads of mercury on floor

Asbestos Safety Data Sheet

Section 1. Identification

For emergency information call:

Section 2. – Hazard identification

Section 3. Composition Information

Section 4. – First Aid measures
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1.0 General

The University of Minnesota has prepared this Health and Safety Plan (HASP) for Environmental abatement and demolition tasks at the Old Main Steam Plant, the Incinerator and the surrounding area. These buildings and the surrounding area are hereafter referred to as the Facility. Specific abatement locations are identified as the Site. The Site refers to the work area and the decontamination zones for the abatement work. The primary purpose of this HASP is to meet the requirements for a written plan in accordance with Employee Right-to-Know, as described in Minnesota Rules 5206.0700, subp. 1, Hazardous Waste Operations and Emergency Response, as described in 29 CFR 1926.65 and Resource Conservation and recovery Act (RCRA) 40 CFR 265.16. This HASP has been prepared to address the potential health and safety hazards that may exist for elements of abatement and demolition activities. The HASP identifies procedures for protecting workers during implementation of these tasks.

This HASP is applicable to work completed by University of Minnesota employees. University of Minnesota employees are the only site personnel. This HASP is being provided to all contractors with employees on the site. All on-site Contractors shall have a site specific HASP that meets the minimum requirements of this HASP and that covers their employees and subcontractors on site. This HASP is provided to all contractors with employees on the site. Contractors may use this HASP as a model for writing their own plan and may reference this document in their own site specific HASP. The Contractor is responsible for the health and safety of their own employees and subcontractor employees who work at the facility. The purpose of this HASP is to provide University of Minnesota employees, direction and information to ensure that any contact with potentially hazardous material is minimized, and that worker protection from construction related operations is maintained. All work will be performed according to the requirements of this HASP.

This HASP is designed to ensure the following:

1. Workers are aware of hazardous substances that may adversely affect workers’ health and the responses and steps required to minimize the physical and chemical hazards present on-site.

2. On-site operations and procedures will meet the requirements of OSHA Federal Regulations, in particular 29 CFR 1926 Hazardous Waste Operations and Emergency Response.

This HASP and its appendices will be kept at a designated central location in the Old Main Steam Plant or work trailer. HASP appendices provide additional descriptions for standard operating procedures, safety training, medical surveillance, hazard evaluations, excavation safety, confined space entry, material safety data sheets, and OSHA posters.

Site operations conducted by personnel will be conducted in accordance with the provisions of the HASP. Amendments to this plan will be documented (Form 1).

University of Minnesota personnel are required to sign the HASP acknowledgement sheet (Form 2), and University of Minnesota visitors are required to sign the Sign-In Sheet.
Contractors will be responsible for completing and maintaining their own employee HASP acknowledgements and visitor Sign-In Sheets.

## 2.0 Site Characterization

The Old Main Heating Plant, originally constructed in 1912, has undergone several renovations/additions over the years. It houses seven (7) coal & gas fired boilers, the last of which was shut down from steam production in 2000. The building housed a steam pipe fitter workshop area and provided key access points to the deep steam tunnels following shut down. Much of the building has fallen into disrepair.

The hazardous material abatement is needed to provide a safe work environment for future users. The existing boilers and piping within the Old Main building contain significant amounts of asbestos. Abatement/demolition of the boilers is also complicated by the fact that the building structural columns were built integral with the boilers. Therefore, some of the building columns will need to be removed and replaced as part of the boiler demolition work. The building exterior walls are in relatively good shape and will be refurbished where required. The building roof profile will be simplified by removal of the multiple penthouses and a new roof will be installed. The Main Heating Plant was constructed over 100 years ago, and many activities have occurred at the Site. The documented chemicals of concern are based on samples that have been collected throughout the buildings and from the soil. The University has discovered new and previously unidentified risks during abatement and demolition of old buildings. As new risks are identified, the information will be shared with all workers during daily safety meetings and the HASP will be amended to address the newly discovered risk. The hazardous materials addressed in this HASP were identified during previous investigations.

Facilities Management’s Hazardous Materials Program and Braun Intertec have analyzed several types of samples to characterize the environmental abatement waste streams that will need to be processed during abatement and demolition at the Site. The known waste streams are as follows:

- Asbestos containing materials (ACM),
- Mercury containing equipment and mercury containing sheet flooring
- Leaded coatings
- Incinerator ash
- Coal fly ash from coal combustion
- Coal dust
- Other types of contaminants that may be detected during abatement or demolition.

The analytical data are contained in the following documents that are available from FM – Hazardous Materials Program or the Department of Environmental Health and Safety.

- Bldg. #034 Hg and Silo Ash Final Report. Prepared by Dave Klaustermeier for Matt Stringfellow on May 1, 2013.
- Bldg. #078 Asbestos Destructive Sampling Report. Prepared by Dave Klaustermeier for
Known Chemical Hazards On-Site

Site activities may potentially expose personnel to hazardous substances in and around the buildings. The following selected hazardous substances are known or suspected to be present on-site based on laboratory analyses of samples and historical information about the building:

<table>
<thead>
<tr>
<th>Substance</th>
</tr>
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<tbody>
<tr>
<td>Asbestos*</td>
</tr>
<tr>
<td>PAHs</td>
</tr>
<tr>
<td>PCBs*</td>
</tr>
<tr>
<td>Fuel Oil</td>
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<tr>
<td>Lead</td>
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<tr>
<td>Mercury</td>
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<tr>
<td>Arsenic</td>
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<td>Cadmium</td>
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</tbody>
</table>

Health effects, exposure limits, and guidelines for selected hazardous substances of concern on-site as well as their physical and chemical properties are described in Table 1: Toxicity Profile for Selected Hazardous Substances on Site

Previously Unidentified Hazards

Other chemicals and hazards not listed may be present. These are hazards that may be uncovered during demolition. Based on the University’s experience with demolition and remodeling of other old buildings, new hazards may be found during the project. If a potential hazard that has not been previously identified is observed. STOP WORK IMMEDIATELY!! Notify your supervisor and prepare an addendum to this HASP. No work may proceed in the area of concern and will remain suspended until the addendum has been prepared, distributed, and communicated to all affected workers.

Health effects, exposure limits, and guidelines for selected hazardous substances of concern on site as well as their physical and chemical properties are described below.

Anticipated Abatement Tasks

- Removal of asbestos containing materials
- Dismantling and removal of gages and equipment with mercury filled ampules, and cleaning areas where mercury has been spilled
• Removal of ash and debris that contains elevated concentrations of heavy metals and may be contaminated with asbestos from Incinerator Building
• Removing loose and chipped leaded paint and leaded paint where beams will be cut with a welding torch.
• Removal of coal ash and coal dust
• Removing and dismantling equipment that may have previously unidentified hazardous materials
• Lead based paint that is peeling or needs to be removed prior to torch cutting.
• PCB containing oils and materials
• Cleaning areas contaminated by mercury spills
• Removal of fluorescent lamps, heating controls and electrical system controls that contain mercury
• Refrigerants from cooling units and water fountains
• Petroleum products including waste oil and oils in motors, door closings, grease, and hydraulic fluid
• Chemicals – boiler chemicals and miscellaneous paints and cleaners
• Miscellaneous items i.e. Acetylene tanks, electrical controls, arc welders, and other equipment

**Potential Hazard Summary**
Table 2 summarizes the potential hazards associated with activities at the Facility through a project task hazard analysis.

**Medical Emergency Procedure**
If a worker is seriously injured or is experiencing some type of medical crisis, call 911. For less serious medical care a decision may be made to directly transport a person to their medical provider for urgent care. Also, HealthPartners Occupational and Environmental Medicine (HPOEM) is the provider of occupational health services for University employees in the Twin Cities.

HealthPartners has locations that are convenient to both the Minneapolis and St. Paul campuses of the University.

The Riverside Clinic, located at 2220 Riverside Avenue in Minneapolis, offers Occupational Health services as well as Urgent Care/After Hours.

The St. Paul Clinic, just outside of downtown St. Paul at 205 S. Wabasha Street, offers Occupational Health services and Urgent Care/After Hours.

The Como Avenue Clinic, located at 2500 Como Avenue in St. Paul, will offer Urgent Care/After Hours services near the St. Paul Campus.

Regular appointment hours are Monday through Friday, 8 AM-5 PM. Urgent Care/After Hours service hours vary. Please call 952-853-8800 for hours, locations, and approximate wait times. You can also check the Urgent Care website for this information.

Download a map and directions
(http://www.ohs.umn.edu/prod/groups/ahc/@pub/@ahc/@ohs/documents/asset/ahc_asset_213376.pdf)
Decontamination Procedures

Asbestos removal will take place in a negative pressure enclosure with an attached five-stage decontamination unit equipped with a shower. All workers entering the negative pressure enclosure will remove their street clothing in the clean room, don disposable coveralls and a respirator equipped with a P100 filter prior to entering the enclosure and shall take a shower when leaving the enclosure. The appropriate level of respiratory protection (tight-fitting ½ mask or PAPR) will need to be determined by the airborne concentrations of contaminates within the enclosure.

All workers removing mercury containing materials will be required to have a second set of clothing on site. Workers performing mercury work shall wear clothing that can be disposed of if it becomes contaminated or shall wear shorts and work boots under the disposable coveralls. All workers will be required to wear disposable shoe covers, a disposable coverall, washable knee pads, disposable nitrile gloves under work gloves, and a respirator equipped with a P100/mercury vapor combination filter. The appropriate level of respiratory protection (tight-fitting ½ mask vs. PAPR) will be determined by air monitoring of the airborne contaminates at the site.

Prior to leaving the work site, the workers will need to be screened with a Lumex for the presence of mercury vapors. Any worker with mercury vapors above 500 nanograms/cubic meter (ng/m³) on their clothing, boots or body shall perform decontamination to reduce the vapor level below 500 ng/m³ prior to leaving the site. Decontamination procedures that have been effective on past projects include using industrial wet wipes to decontaminate boots and hand washing. There is a shower at the Facility and workers will have the option to use the shower prior to leaving the Facility. Any clothing that becomes contaminated with mercury shall remain on site and be managed as mercury impacted waste.

Facility has a shower on the second level of the plant. Due to the presence of asbestos, lead, mercury and other contaminates, it is highly recommend that workers use the on-site shower and locker room and leave clothing on site to minimize the tracking of dust and contaminates to their home.

Site Specific Hazards

There a numerous Environmental Hazards at this Facility that also poses a risk to workers health and safety. The specific environmental hazards can be found in the attached surveys. Beyond the Environmental Hazards that are on site, there are other hazards that are inherent to the site, some of which are listed below.
Confined spaces: The Facility has numerous confined spaces and entry into any of the confined spaces will be required to follow the U of M confined space entry program. Some of the confined spaces noted at the Facility include: boiler interiors, deaeration tanks, steam drums, coal bunker, ash silo, ash hoppers, breeching, sump pits, incinerator interiors, oil pump house shaft, and oil pump house lower tunnel. The Confined Space Permit is included as Form 8

Electrical Systems: A temporary electrical system will be installed to run existing systems that need to remain in service and to run temporary lights and construction panels on the site. All workers in the Facility will need to become familiar with the color-coded mc cable that will be supplying the temporary lights, panels and existing systems. This cable will be energized throughout the project and will need to be protected from damage during all work. Temporary electrical equipment used for construction purposes will be protected with ground fault circuit interrupters.

Steam and Condensate systems: Limited areas of the building will have live steam and condensate systems that are required to remain live to keep the existing campus steam system in service. Any workers that will be demolishing steam or condensate piping will need to become familiar with the existing live system to avoid damaging the existing live services within the building.

Fall Hazards: Much of the abatement and interior demolition work will take place in elevated areas that do not have floors. Workers will be required to use fall protection when working in these elevated areas with fall exposures of six (6) feet or greater.

Site Specific Access Control

Adolfson-Peterson Construction is the Construction Manager at Risk for the abatement project. All workers that will be on site must sign in at the Superintendent’s office located in the Facility at the beginning of each day and sign out at the end of each day.

3.0 Regulatory Basis

The OSHA Federal Regulations, including 29 CFR 1910.120 and 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response provide the basis for this Health and Safety Plan. Some of the hazardous materials have specific OSHA regulations such as 29 CFR 1926.1101 which regulates Asbestos in Construction and 29 CFR 1926.62 Lead in Construction.

The safety and health of on-site personnel will take precedence over cost and schedule considerations for all project work.
4.0 University Responsibilities and Administration

The organization structure for Facility activities is shown on the Figure 5, Project Organizational Chart.

Matt Stringfellow is the project manager for Capital Planning Project Management; he is the overall manager of the work required to for abatement, demolition and reconstruction of the power plant. The CPPM project manager is responsible for project implementation scope, schedule and budget. Office ((612) 626-6212); Cell ((612) 940-9429).

Michael Austin is the supervisor for the Safety and Environmental Protection Division of the Department of Environmental Health and Safety. His responsibilities include oversight the planning process, regulatory compliance, and implementation of the HASP. Office ((612-626-6436); Cell 651-442-0616.

Sean Gabor is the manager of Facilities Management – Hazardous Materials Program. He is responsible for abatement of hazardous materials on University properties, including safety regulatory compliance. Office (612) 625-7547; Cell (612) 875-8857.

Dave Klaustermeier is the abatement project manager for the Old Main Plant. He oversees the data collection, planning and daily operations for the University: Office (612) 624-6027); Cell (612) 581-5806)

Masoud Mohsenian is the University’s on-site inspector for building abatement work. He will oversee the daily operations and collect samples as needed. Office (612) 625-4555; Cell (612) 209-8807.

Mike Buck oversees regulatory compliance with hazardous material abatement statutes and rules. Mike will conduct on-site inspections and will be available for consultations regarding abatement issues. Office (612) 624-4715.

Janet Dalgleish will oversee all work associated with soil that maybe impacted from past releases, and protection of storm water during the abatement process. Office (612) 626-7095.

Each day, an on-site individual shall be designated as the Health and Safety Team Leader (HSTL). The HSTL will supervise the implementation of the HASP for University employees and will make all decisions regarding operations and work stoppages due to health and safety concerns.

The responsibilities of the HSTL are as follows with respect to University of Minnesota personnel on the site. Contractors shall be responsible for these actions with respect to their employees and subcontractors:

- Be responsible for implementation of the HASP at the initiation of site work.
- Conduct the pre-entry safety briefing for all on-site personnel and other safety requirements to be observed during field work.
• Be responsible to hold daily safety meetings for site personnel to discuss health and safety issues.
• Review and modify the HASP as more information becomes available concerning the hazardous materials involved.
• Suspend work activity if unsafe working conditions develop and ensure corrective action is/has been taken prior to re-commencing work.
• Coordination of the Emergency Action Plan (Section 13.0).
• Assure that safety equipment is provided, maintained and accessible to site personnel.
• Assure that site personnel are performing and documenting daily equipment operational checks.
• Track and monitor delineation of work zones and document the location of new work areas.
• Assure that site personnel comply with the “buddy system” while working in Exclusion Zones and DECON Zones.
• Investigate all injuries, illnesses, spills, fires, property damage incidents, and near misses affecting site personnel. Injuries and illnesses must be reported on a First Report of Injury and a supervisor must complete the Supervisor Incident Investigation Report. Spills, fires, property damage incidents, and near misses affecting site personnel should be reported on Form 11. Assure that the project field office is equipped with a copy of this HASP, site maps delineating work zones, Material Safety Data Sheets (MSDS) for all hazardous substances brought to the site, appropriate OSHA postings, first-aid kit, eyewash station, and potable water.
• Review work area safety audits and work area safety inspections to determine the effectiveness of the HASP and correct deficiencies as necessary. This information will be communicated to site personnel as appropriate. Work area safety audits will be documented on the Work Site Audit Form 5 and safety inspections will be documented on the Work Site Safety Inspection Checklist Form 6.

5.0 Medical Surveillance

In accordance with requirements detailed in OSHA Federal Regulations 29 CFR 1910.120 and 29 CFR 1296.65, all site personnel who may be exposed to potentially contaminated materials over the published exposure level for more than 30 days will have received medical surveillance by a licensed physician or physician’s group. The Office of Occupational Health and Safety Department will coordinate this care.

Medical certification required by anyone will be coordinated by the Office of Occupational Health and Safety. Exposure monitoring will be coordinated by the Department of Environmental Health and Safety.

6.0 Training and Project Site Meetings
All site personnel that will be cleaning up hazardous waste, are required, prior to working on-site, to complete training sessions in accordance with 29 CFR 1926 Hazardous Waste Operations. This training shall consist of a minimum of 40 hours of classroom instruction, and three days of actual field experience under the direct supervision of a trained, experienced supervisor, and 8 hours of refresher training within the past year.

Prior to commencing activities, a pre-entry safety briefing will be conducted with site personnel. Topics covered during the pre-entry safety briefing will include:

1. Project Site-specific health and safety hazards;
2. Personal Hygiene Practices
3. Level of PPE required;
4. Safe use of equipment;
5. Decontamination procedures; and

All personnel who attend this briefing will sign the Project Health and Safety Acknowledgment Sheet presented as Form 2, documented by the HSTL, and kept on file.

Site personnel shall attend regular safety (“toolbox”) meetings. These meetings will be conducted by the HSTL, and will cover specific health and safety issues, work area activities, changes in work area conditions, and a review of topics covered in the Project Site-specific pre-entry briefing. Topics discussed in the safety toolbox meetings will be documented along with a list of personnel who attend. Completed work area daily safety records, including safety toolbox meeting information (Form 3) will be kept on file or the meetings will be documented in the field book.

### 7.0 Site Control and Work Zones

Specific work zones, as defined below, will be delineated by temporary fencing, a flagged line, poly-sheeting enclosures, cones as appropriate to specific site location needs, or will be noted in field notebook if physical marking is not practical.

1. **Exclusion Zone** – This zone will include all areas where potentially contaminated soils or materials are to be handled and all areas where contaminated equipment or personnel travel.
2. **Decontamination Zone** – This zone will occur at the interface of the Exclusion Zone and Support Zone and will provide access for the transfer of construction materials and site equipment to the Exclusion Zone, the decontamination of vehicles prior to leaving the Exclusion Zone, the decontamination of personnel and clothing prior to entering the Support Zone, and for the physical segregation of the Support Zone and Exclusion Zone.
3. **Support Zone** – This area is the portion of the site defined as the area outside the zone of significant air and soil contamination. The Support Zone will be clearly delineated and procedures implemented to prevent active or passive migration of contamination from the work Project Site.
The project field office will be the central location for potable water supply and first-aid kit, communications, safety records, and lunch/break areas.

The general work areas and controlled access points will be delineated on the project Facility Map (Figure 2) and will be further detailed on work area location maps at each work area or in the field notebook. When changes occur in the delineation of these work zones or when work areas change, these changes will be documented and kept on file in the project field office. It is understood that the Exclusion Zone concept when working with mobile equipment will change when the location of the equipment moves to a new location.

The use of the “buddy system” is required for all site personnel covered by this HASP when working at the Site. All site personnel are to be observed by or in regular contact with at least one other worker while working at the Site. Names of “buddies” will be documented daily on the Work Area Daily Safety Record, in the field notebook, or on the (name) Sign-in sheet.

Regulations require most of the asbestos removal work on this site to take place inside negative pressure enclosures. The enclosures will be constructed out of polyethylene sheeting that is reinforced with construction materials. The asbestos abatement enclosures will have signage at all entrances to the enclosure and on all walls and large area critical barriers that warn workers that asbestos work is taking place.

In areas where negative pressure enclosures are not required to remediate specific hazardous materials, workers will need to set up regulated areas for the specific contaminant with the use of barrier tape, poly barriers, or physical barriers. Each regulated area that is created will need to have signage at all entrances to the regulated area warning workers of the specific contaminant that is being remediated.

8.0 Personal Protective Equipment

Due to the presence of asbestos and dust containing heavy metals, all on-site personnel within a work zone shall be equipped with Level C PPE or other PPE that is appropriate for the nature of work being completed. All required safety equipment and protective clothing for University employees shall be provided by the University of Minnesota, and employees shall keep equipment clean, well-maintained, and intact.

Engineering controls and work practices designed to reduce and maintain employee exposure at or below the permissible exposure limit (PELs) for the contaminants of concern will be implemented. Whenever engineering controls and work practices are not feasible, a reasonable combination of engineering controls, work practices and personal protective equipment (PPE) shall be used to reduce and maintain employee exposure at or below the permissible exposure limits for the contaminants of concern.

Safety equipment will be replaced if damaged or consumed.

The use of required PPE by personnel will be mandatory. Supervisory personnel will be responsible to enforce and make mandatory the use of applicable PPE for the employees under their supervision for the work being undertaken.
For the purpose of this HASP, all site activities within the Exclusion Zone will require Level D personal protection at a minimum, unless it is determined through the hazard analyses process that a less restrictive level of protection is required. Similar activities conducted outside the established Exclusion Zones will require Basic Level D personal protection. Any deviations from these levels of protection will be documented in the Work Area Daily Safety Record (Form 3).

### Basic Level D PPE

<table>
<thead>
<tr>
<th>Type</th>
<th>Properties</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot protection</td>
<td>Steel-toe</td>
<td>Boots</td>
</tr>
<tr>
<td>Head protection</td>
<td>Meets ANSI Z89.1 standard</td>
<td>Hard hat (during construction activities and when overhead hazards exist)</td>
</tr>
<tr>
<td>Hand protection</td>
<td>Abrasion resistant</td>
<td>Leather/cotton gloves (optional)</td>
</tr>
<tr>
<td>Eye protection</td>
<td>Meets ANSI Z87.1 standard</td>
<td>Glasses with side shields</td>
</tr>
</tbody>
</table>

### Modified Level D PPE

<table>
<thead>
<tr>
<th>Type</th>
<th>Properties</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot protection – tracking prevention</td>
<td>Steel-toe</td>
<td>Boots</td>
</tr>
<tr>
<td>Foot protection – tracking prevention</td>
<td>Tyvek or chemical resistant – based on type of work</td>
<td>Boot covers</td>
</tr>
<tr>
<td>Head protection</td>
<td>Meets ANSI Z89.1 standard</td>
<td>Hard hat (during construction activities and/or when overhead hazards exist)</td>
</tr>
<tr>
<td>Hand protection</td>
<td>Chemical resistant</td>
<td>Inner gloves (nitrile). A nitrile outer glove may be used when handling heavily contaminated articles.</td>
</tr>
<tr>
<td>Eye protection</td>
<td>Meets ANSI Z-87.1 standard</td>
<td>Glasses with side shields</td>
</tr>
</tbody>
</table>

### Level C PPE

Level C PPE: Level C PPE consists of modified level D PPE in addition to a half-mask air purifying respirator equipped with a P100 filter and a disposable coverall or a reusable coverall that remains on site and is laundered. Respiratory filters equipped with a dual P100 and mercury vapor cartridges will be required when working in a regulated area with mercury vapor concentrations above 5,000 ng/m³.

In the event that air monitoring indicates that respiratory protection is necessary, Level C PPE will consist of Level D or modified Level D PPE with a half-mask, air-purifying respirator with filters appropriate for the hazard. Prior to arriving at the Project Site, all on-site personnel, involved in abatement or removal activities where overexposure to mercury vapor or airborne particulates is expected, will have received medical surveillance, respirator use training, and have been fit tested for a half-mask respirator. The University of Minnesota has a written respirator program at [http://www.ohs.umn.edu/programs/rpp/home.html](http://www.ohs.umn.edu/programs/rpp/home.html)

Additional protective equipment guidelines to be implemented include:
• Prescription eyeglasses in use on the site will be safety glasses with side shields.
• Protective gloves may be worn over nitrile gloves by site personnel involved in any activities where the nitrile gloves may be damaged during project task work.
• All PPE worn on-site will be decontaminated or discarded at the end of each work day.
• No watches or other jewelry will be permitted during operation of hand held powered equipment.

Special Considerations

Work clothing that may become contaminated may require an outer disposable body clothing (e.g., Kleengard™ or Tyvek). Each worker shall have a clean set of clothes to change into if their clothes become contaminated and cannot be worn outside of the Facility. DEHS has laundry facilities for work clothing and it may be possible to wash the clothing and return them to the owner. Contact the HSTL if it is necessary to have contaminated clothing cleaned.

Heat/cold stress work activities conducted during warm and cold months may require modification of these PPE levels. Refer to Attachment A: Heat Stress Guidelines.

Hearing protection is required when personnel may be exposed to high noise levels (for example, when a worker cannot hear normal conversation).

High visibility vests are required when working near moving equipment or vehicles.

Boot covers or chemical resistant boots are required if walking inside Facility. Remove boot covers prior to leaving building or moving from an abatement site to a clean area.

Chemical resistant steel-toed boots may be used instead of steel-toed leather boots and boot covers if water is available for DECON.

9.0 Air Monitoring and Action Levels

During the progress of intrusive work, air quality measurements will be conducted to monitor exposure levels of organic vapors, combustibles, and hydrogen sulfide in the breathing zone, identified on the Toxicity Profiles in Table 1.

The air monitoring program may consist of monitoring with a combustible gas monitor, organic vapor meter, and hydrogen sulfide monitor in the breathing space. Particulate sampling for Asbestos and other materials will follow NIOSH protocol or other accepted industry standard. Operation and calibration procedures will be according to manufacturers’ instructions using a specified calibration gas. During periods when monitoring is necessary (i.e., during initial monitoring and subsequent monitoring when conditions change), daily calibration and maintenance records on the Work Area Daily Safety Record (Form 3) will be kept by the HSTL and filed in the project field office or documented in the field notebook.

Identification of air monitoring results in excess of the action levels cited in Section shall be reported to the HSTL who will determine when PPE should be upgraded or operations shut down and restarted.

If work is stopped because action levels have been exceeded, air monitoring will continue from
10.0 Personal Hygiene

All personnel performing or supervising work within the Exclusion Zone shall adhere to the personal hygiene-related provisions of this section.

The following equipment/facilities shall be available for the personal hygiene of all on-personnel:

1. Disposable coveralls, gloves, and over boots.
2. Disposal containers for used disposable protective equipment will be located in each work area.
3. Potable water will be located at each work area.
4. First aid kits and eyewash, as appropriate, will also be located at each work area.

The following regulations for personnel actively participating in the field sampling program shall be enforced:

1. On-site personnel will wear appropriate PPE when in the Exclusion Zone.
2. Used disposable outerwear will not be reused if deemed to be unsuitable to provide the necessary protection, and when removed, will be placed inside disposal containers provided for that purpose.
3. Smoking, eating and drinking is prohibited within the Exclusion and Decontamination Zone. These activities will be permitted only within designated lunch/break areas and documented on Work Area Daily Safety Record form or in field notebook. On-site personnel, upon leaving the Exclusion Zone, will thoroughly cleanse their hands, face, neck area and other exposed areas before smoking, eating or drinking.

11.0 Communications

General

Dial 911 for emergencies including police, fire and ambulance. Table 5 of the HASP provides a list of other contact numbers.

Emergency Alarm System

If evacuation of a work area is necessary, three long blasts are to be sounded with an air horn or vehicle horn and/or verbal warnings will be given. This signal indicates that immediate evacuation of all persons in the work area is necessary as a result of some immediate or impending danger. Operations will be shut down/suspended and all site personnel should evacuate to a safe area, as determined by the HSTL. If the emergency is related to an airborne hazard in an Exclusion Zone, the safe area will be located upwind of the Exclusion Zone. The signal method and possible safe area location(s) may vary depending on the type of emergency, size of site, and number of employees. This signal and location(s) to be used as a safe area will
be discussed at the Pre-entry Safety briefing, and any changes should be noted at daily "tool-box" meetings.

12.0 Emergency Action Plan (EAP)

Purpose
This plan is intended to provide immediate response to a serious site occurrence such as injury, explosion, spill, or fire. This plan is intended to be compatible with and to integrate the emergency response plan of local emergency service providers, and to satisfy the requirements of 29 CFR1910.120 (l) (1) and 29 CFR 1926.65 (1) (1) (Emergency Response Plan). Personnel roles and lines of authority are discussed in Section 4.0 and a list of emergency contact numbers is presented on Table 5. A hospital route map is provided on Figure 3. The details of this EAP will be communicated in the pre-entry safety briefing and specific scenarios reviewed for clarity on response activities.

Standard site emergency response will generally involve the evacuation of site personnel rather than attempting to assist in the handling of a site emergency.

Applicability
These Emergency Action procedures will be communicated to all on-site personnel. These emergency action procedures will be introduced at the pre-entry safety briefing and reviewed periodically thereafter. Any emergency response efforts carried out under this EAP will be reviewed by the Project Manager and the HSTL to determine if procedures need modification.

Pre-emergency Planning
The University of Minnesota Department of Emergency Management has been briefed about site activities, site hazards, and the potential for emergencies occurring at the site and to assure that this Emergency Action Plan is compatible and integrated with the disaster, fire, and/or emergency response plans required by the local emergency service providers. These local emergency response providers have indicated ability to respond to emergencies occurring at the site. Documentation of this contact and any future contacts, as new activities are identified, will be maintained on file or in field notebook.

As part of pre-emergency planning, site personnel will review and become familiar with the hospital location map prior to the commencement of site operations to be used in the event of minor injuries. A hospital route map is provided on Figure 3 of the HASP.

Site Security and Control
Site security and control measures in place for normal work activities will be continued during implementation of this EAP.

Emergency Recognition and Prevention
All site personnel are expected to conduct their work in a manner that does not contribute to emergency conditions (i.e., preventing fire, spills of hazardous substances). Furthermore, all site personnel performing intrusive activities (e.g., fence installation, drilling, and excavation activities) are required to clear utilities prior to the start of intrusive activities.
Site personnel are expected to be alert for any conditions that may lead to an emergency condition and to notify the HSTL immediately if such conditions develop.

**Medical Services and First Aid**

First aid kits and eyewash, as appropriate, will be available in each work area. The HSTL is responsible for checking the first aid kit each week to ensure all expendable items are replaced. First aid kits are intended to be stored to protect them from inclement weather.

If a worker is seriously injured or is experiencing some type of medical crisis, call 911. For less serious medical care a decision may be made to directly transport a person to their medical provider for urgent care. However, HealthPartners Occupational and Environmental Medicine (HPOEM) is the preferred provider of occupational health services for University employees in the Twin Cities. HealthPartners has locations that are convenient to both the Minneapolis and St. Paul campuses of the University.

- The **Riverside Clinic**, located at 2220 Riverside Avenue in Minneapolis, offers Occupational Health services as well as Urgent Care/After Hours.
- The **St. Paul Clinic**, just outside of downtown St. Paul at 205 S. Wabasha Street, offers Occupational Health services and Urgent Care/After Hours.
- The **Como Avenue Clinic**, located at 2500 Como Avenue in St. Paul, will offer Urgent Care/After Hours services near the St. Paul Campus.
- Regular appointment hours are Monday through Friday, 8 AM-5 PM. Urgent Care/After Hours service hours vary. Please call 952-853-8800 for hours, locations, and approximate wait times. You can also check the Urgent Care website for this information.

Download a map and directions ([http://www.ohs.umn.edu/prod/groups/ahc/@pub/@ahc/@ohs/documents/asset/ahc_asset_213376.pdf](http://www.ohs.umn.edu/prod/groups/ahc/@pub/@ahc/@ohs/documents/asset/ahc_asset_213376.pdf))

General emergency procedures for responding to potential exposures to hazardous substances are described in Table 6 for general emergency procedures and Table 7 for an overview of common first-aid incidents. Follow directions of emergency service providers, if available, in lieu of the se instructions. Provide emergency service providers with background information regarding chemical/physical exposure. Always call for medical transport in emergencies.

**Evacuation Escape Procedures**

In the event of an emergency necessitating evacuation (such as fire, explosion, or significant release of a flammable hazardous substance (i.e., hydraulic fluid, gasoline), site personnel will evacuate the work area, and rely on emergency service providers such as the local fire department, police department and/or hospital to assist in the handling of the emergency. Site personnel should not attempt any emergency service procedures, except those necessary to render first-aid and for the safe evacuation of others. Subcontractors should be advised to shut down and all personnel should evacuate to a safe area, as determined by the HSTL. This safe area should be in the predominantly upwind direction of the Exclusion Zone. The HSTL will
account for site personnel after emergency evacuation has been completed.

Evacuation escape procedures, routes, and the location of the “safe zone” will be discussed at the pre-entry briefing and documented daily at the “toolbox” safety meeting for each work area.

**Emergency Alarm System**

If evacuation of a work area is necessary, three long blasts are to be sounded with an air horn or vehicle horn and/or verbal warnings will be sounded. This signal indicates that immediate evacuation of all persons in the work area is necessary as a result of some immediate or impending danger. Subcontractors should be advised to shut down their operations and all personnel should evacuate to a safe area, as determined by the HSTL. This safe area should be in the predominantly upwind direction of the Exclusion Zone. The signal method and possible safe area location(s) may vary depending on the type of emergency, size of site, and number of employees and will be discussed at the pre-entry safety briefing, and any changes should be noted at daily "tool -box" meetings.

**Emergency Evacuation Routes**

Evacuation escape procedures, routes, and the location of the “safe zone” will be discussed and documented at the Pre-entry Safety Meeting and daily at the “toolbox” safety meeting for each work area and will be documented in the field notebook.

**Reporting Fires and Other Emergencies**

Anyone may contact emergency services by dialing 9-1-1. However, the HSTL is responsible for ensuring that emergency services are contacted in the event of a fire or other emergency. The HSTL should notify the Health and Safety Manager and the Project Manager.

After emergency services have cleared the work site, the Project Manager should make appropriate recommendation to the client for required notifications of local, state, and federal governmental agencies such as the Minnesota Duty Officer.

**Emergency Notification Procedures**

The following course of action should be taken if an emergency situation develops:

1. Notify proper emergency services (fire, ambulance, police, etc.) for assistance. See Table 5 for emergency contacts’ telephone numbers. Inform emergency services personnel of the type of work being performed so that the need for equipment and decontamination can be assessed.
2. Notify any other affected personnel at the site.
3. Contact the Project Manager or PIC to inform them of the incident as soon as possible.
4. The Project Manager should notify the appropriate parties including the client and the Health and Safety Manager.
5. Prepare a summary report of the incident for the Project Manager as soon as possible after the incident which should be kept on file.
Accountability of Persons

A clear chain of authority has been established to mobilize the resources necessary to respond to a fire or other emergency. The HSTL will take the initiative for project emergency notification procedures. This person should be informed of any on site emergencies, and is responsible for making sure appropriate evacuation procedures are followed and conducted in a safe and orderly manner. The HSTL should determine that all site personnel who were working in the evacuation area have been evacuated to safe locations.

The Project Manager has overall responsibility for this Emergency Action Plan and should be notified whenever this plan is utilized or whenever there is a question on proper implementation to allow for critique of the emergency response and subsequent follow-up.

Spill Containment Plan

The following materials have been identified to have the potential to spill or be released at the site:

1. Fuel Petroleum Products (e.g., gasoline, diesel fuel).
2. Oil-Based Petroleum Products (e.g., hydraulic fluid, motor oil).

Notification and Initial Assessment

In the event a spill occurs at the site, the discoverer will dial 911 immediately and then notify the Project Manager and the HSTL. The spill discoverer will provide the following information to the extent possible.

- Name of individual reporting spill
- Location of spill
- Number of injured personnel and nature of injuries (if applicable)
- Substance spilled
- Amount spilled (estimated)
- Rate material currently spilling (estimated)
- Time spill occurred (estimated)
- Extent which spill has traveled
- Other potential hazards

Safety Data Sheets (SDSs) for chemicals used on sites are included in the HASP appendices to this plan and will be maintained in the project field office.

The HSTL or specific designated person will assume the duty of Incident Commander until an appropriate alternate Incident Commander arrives. The Incident Commander will be trained in the National Incident Management System (NIMS).

During the initial assessment of the situation the Incident Commander must consider the following:

- What type of emergency is occurring?
• Has injury or death occurred?
• What areas / resources have been or will be affected?
• Is the source of the emergency under control?
• What type of response resources will be needed?

The Incident Commander will employ any or all of the following measures to ensure maximum protection of the safety and health of site personnel and the public:

• Use of PPE.
• Dismissal of all non-essential personnel.
• Advisement of local emergency response providers regarding the incident.
• Involvement of outside contractors to provide assistance.

**Containment, Clean-up and Disposal**

The following generally describes the procedures for containing spills at the site. In event of a spill dial 911 and report the spill.

**Fuel Petroleum Products** (e.g. gasoline, diesel fuel) –

1. All sources of ignition must be removed to prevent fire.
2. Refer to attached material safety data sheets for particular hazards and precautionary measures for specific petroleum product.
3. Use berms, sorbent pads, booms and/or other barrier for spill containment and clean-up and to prevent migration of petroleum product into storm drain or surface water bodies.
4. Should a spill occur near a shoreline, place a sorbent boom in the water adjacent to the spill immediately.
5. Should a spill occur that has the potential of entering a catch basin or storm sewer, sorbent boom should be placed at the outfall of said sewer immediately.
6. All employees involved in the clean-up are to be equipped with gloves, and appropriate body protection.
7. Apply the safety clay based adsorbent to the spill in sufficient quantity to adsorb all the liquid.
8. Fill out a hazardous waste label with the proper information.

**Oil-Based Petroleum Products** (e.g. hydraulic oil, motor oil) –

1. All sources of ignition must be removed to prevent fire.
2. Refer to attached material safety data sheets for particular hazards and precautionary measures for specific petroleum product.
3. Use berms, sorbent pads, booms and/or other barrier for spill containment and clean-up and to prevent migration of petroleum product into storm drain or surface water bodies.
4. Should a spill occur near a shoreline, a sorbent boom must immediately be placed in the water to contain the spill.
5. Should a spill occur that has the potential of entering a catch basin or storm sewer, sorbent boom should be placed at the outfall of said sewer immediately.
6. All employees involved in the clean-up are to be equipped with gloves, and body protection.
7. Caution shall be utilized and only non-sparking tools or equipment will be employed on the cleanup.
8. Apply the safety clay based adsorbent to the spill in sufficient quantity to adsorb all the liquid.
9. Fill out a hazardous waste label with the proper information.

Decontamination Procedures

In the event of emergencies involving serious or potentially serious injuries, the HSTL will contact emergency service providers immediately. Injured person(s) should be decontaminated as much as possible prior to transport to a medical facility. Where hazardous substances cannot be removed at the site, consider use of clean Tyvek to line the stretcher under the injured. Decontamination procedures described in Sections 14 and 15 should be followed whenever possible.

PPE and Emergency Equipment

In the event of an emergency requiring an emergency service, providers should use their own assigned protective equipment and emergency equipment. Protective equipment used for evacuation should be consistent with levels of protection and action levels as determined in this HASP.

13.0 Equipment and Personnel Decontamination

Procedures will be implemented to reduce the amount of contact of both personnel and equipment with potentially contaminated materials. These procedures include the following:

- Proper work practices that will lead to minimal direct contact with potentially contaminated material.
- Use of disposable equipment and clothing as much as practicable.

All site personnel will remove their protective clothing and wash their hands, face, neck area and other exposed areas with potable water and soap before entering the lunch and break areas to eat, drink or smoke or leaving the site.

Satellite decontamination stations will be set up for each work area and will be supplied with potable water, soap, and disposal containers as appropriate to aid in decontamination procedures. The location of these decontamination areas will be delineated in the field and documented on site work area maps. When an operation is conducted outside an Exclusion
Zone, decontamination procedures will not be required.

14.0 Contamination Migration Control

All vehicles and equipment used within the Exclusion Zone by site personnel will be decontaminated on the site as determined necessary prior to leaving the site. Decontamination, when required, will consist of the thorough cleaning of those parts of the equipment which come in contact with potentially contaminated material. The HSTL will monitor that equipment is clean or has been decontaminated prior to removal from the site.
15.0 Tables

Table 1  Toxicity Profile for Selected Hazardous Substances on Site
Table 2  Project Task Hazard Analysis
Table 3  Air Monitoring Action Levels
Table 4  Guidelines for Air Monitoring Frequency
Table 5  Emergency Contacts
Table 6  General Emergency Procedures to Potential Exposures
Table 7  First Aid Reference Guide
<table>
<thead>
<tr>
<th>Chemical</th>
<th>IDLH Level (PPM)</th>
<th>TLV (PPM)</th>
<th>STEL (PPM)</th>
<th>I.P. (eV)</th>
<th>Acute Effects</th>
<th>Chronic Effects</th>
<th>Flammable Range</th>
<th>Carcinogenicity Class</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic (7440-38-2)</td>
<td>Inorganic compounds Ca 5 mg/m³ (as As)</td>
<td>10 µg/m³ (PEL for organic compounds) 0.01 mg/m³ (PEL for inorganic compounds) 0.5 mg/m³ (TWA for organic compounds (as As)) (MN OSHA)</td>
<td>NA</td>
<td>NA</td>
<td>Inhalation can cause severe respiratory irritation; oral exposure may cause cramps, gastrointestinal (G.I.) damage, swelling and death.</td>
<td>Skin changes may be produced (including pigmentation changes) upon oral or inhalation exposure; vascular, nervous system and liver injury may result if inhaled or ingested.</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: Yes US EPA: A ACGIH: A13</td>
</tr>
<tr>
<td>Asbestos, all forms (1332-21-4)</td>
<td>Ca</td>
<td>0.1 fiber/cc</td>
<td>1.0 fiber/cc</td>
<td>NA</td>
<td>Acute effects are not expected.</td>
<td>Chronic inhalation exposure to asbestos may cause asbestosis, lung cancer, and mesothelioma (a cancer of the lining of the lung cavity). Asbestosis, characterized by the formation of scar tissue in the lungs, develops several (from 7 to 30) years after the period of exposure. Symptoms include cough, shortness of breath, and chest pain.</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: Yes US EPA: A ACGIH: A1</td>
</tr>
<tr>
<td>Chemical</td>
<td>IDLH Level (PPM)</td>
<td>TLV (PPM)</td>
<td>STEL (PPM)</td>
<td>I.P. (eV)</td>
<td>Acute Effects1</td>
<td>Chronic Effects2</td>
<td>Flammable Range</td>
<td>Carcinogenicity Class</td>
<td>Other</td>
</tr>
<tr>
<td>-------------------</td>
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<td>---------------------------------------------------</td>
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<td>---------------------------</td>
</tr>
<tr>
<td>Cadmium (7440-43-9)</td>
<td>Ca 9 mg/m3 (as Cd)</td>
<td>10 µg/m3</td>
<td>5 µg/m3 (PEL)</td>
<td>NA</td>
<td>Ingestion may lead to nausea, diarrhea, muscle cramps; high doses may lead to unconsciousness.</td>
<td>Chronic oral exposure may produce bone and kidney damage.</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: Yes, US EPA: B1, ACGIH: A23, Cadmium dust properties vary depending on specific compound, Odor: odorless</td>
</tr>
<tr>
<td>Fuel Oil</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Inhalation or ingestion exposure may cause headache, nausea, confusion, drowsiness, convulsions, and coma. No. 2 Fuel Oil: Mild eye and moderate skin irritation, practically nontoxic.</td>
<td>May produce kidney damage.</td>
<td>0.6</td>
<td>7.5</td>
<td>Some fuel oils may be carcinogenic, VP: 2-26 mm Hg at 21ºC, BP: 304-1090ºF, Fl. P: 100-336ºF, Sol: ~5 mg/L</td>
</tr>
<tr>
<td>Gasoline(8006-61-9)</td>
<td>Ca</td>
<td>300</td>
<td>500</td>
<td>NA</td>
<td>Inhalation overexposure to vapors can cause bronchopneumonia, pulmonary edema, inebriation, and vomiting.</td>
<td>Dermatitis and blistering of the skin may occur from repeated dermal contact.</td>
<td>1.4</td>
<td>7.6</td>
<td>OSHA: No, US EPA: No, ACGIH: No3, VP: 263 mm Hg, BP: 102ºF, Sol: Insoluble, Fl. P: -45ºF</td>
</tr>
</tbody>
</table>

**Chemical IDLH**

**TLV (PPM)**

**STEL (PPM)**

**I.P. (eV)**

**Acute Effects1**

**Chronic Effects2**

**Flammable Range**

**Carcinogenicity Class**

**Other**
<table>
<thead>
<tr>
<th>Chemical</th>
<th>IDLH Level (PPM)</th>
<th>TLV (PPM)</th>
<th>STEL (PPM)</th>
<th>I.P. (eV)</th>
<th>Acute Effects 1</th>
<th>Chronic Effects 2</th>
<th>Flammable Range</th>
<th>Carcinogenicity Class</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead (inorganic) (7439-92-1)(29 CFR 1910.1025)</td>
<td>100 mg/m3</td>
<td>0.05 mg/m3 (8 hrs.)</td>
<td>NA</td>
<td>NA</td>
<td>Early signs of acute inhalation exposure are fatigue, metallic taste in mouth, and sleep disturbance.</td>
<td>Inhalation and ingestion may produce abdominal pain, weakness, muscle cramps. Effects of chronic exposure to low lead levels are subtle (blood lead of 40-60 μg/L); chronic intoxication is thought to produce anemia and have an adverse effect on nervous system development.</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: No US EPA: B2ACGIH: No3</td>
</tr>
<tr>
<td>Mercury (all forms except alkyl) (skin) (7439-97-6)</td>
<td>10 mg/m3 as Hg</td>
<td>0.025 mg/m3 as Hg</td>
<td>NA</td>
<td>NA</td>
<td>Inhalation of high concentrations of mercury vapor can cause bronchitis and chest pains; ingestion may result in abdominal pain, diarrhea, shock, and liver and kidney damage.</td>
<td>Chronic inhalation or ingestion exposure to both inorganic and organic mercury compounds may result in nervous system disorders; psychic and emotional disturbances, kidney damage and digestive disturbances. Exposure to organic mercury</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: No US EPA: D ACGIH: No</td>
</tr>
<tr>
<td>Chemical</td>
<td>IDLH Level (PPM)</td>
<td>TLV (PPM)</td>
<td>STEL (PPM)</td>
<td>I.P. (eV)</td>
<td>Acute Effects1</td>
<td>Chronic Effects2</td>
<td>Flammable Range</td>
<td>Carcinogenicity Class</td>
<td>Other</td>
</tr>
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</tr>
<tr>
<td>Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)</td>
<td>Ca</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Acute toxicity appears low in lab animals, although occupational exposure has caused skin reactions and eye irritation. Acute and chronic effects of cPAHs and nPAHS are similar.</td>
<td>Dermatitis may result from skin exposure; animal studies show oral administration may lead to blood disorders and liver, kidney, and ocular effects. cPAHs may produce immuno-suppressive effects in humans.</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: Yes US EPA: B2 (benzo(a) pyrene) ACGIH: A1 (coal tar pitch volatiles) A2 (benzo(a) Properties vary; Low VP</td>
</tr>
<tr>
<td>Lead (inorganic) (7439-92-1)(29 CFR 1910.1025)</td>
<td>100 mg/m3</td>
<td>0.05 mg/m3 (8 hrs.)</td>
<td>NA</td>
<td>NA</td>
<td>Early signs of acute inhalation exposure are fatigue, metallic taste in mouth, and sleep disturbance.</td>
<td>Inhalation and ingestion may produce abdominal pain, weakness, muscle cramps. Effects of chronic exposure to low lead levels are subtle (blood lead of 40-60 μg/L); chronic intoxication is thought to produce anemia and have an adverse effect on nervous system functions.</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: No US EPA: B2ACGIH: No3</td>
</tr>
<tr>
<td>Mercury (all forms except alkyl) (skin)(7439-97-6)</td>
<td>10 mg/m3</td>
<td>0.025 mg/m3 inorganic forms including metallic mercury 0.10 mg/m3, as Hg-aryl NA (inorganic and aryl forms), as Hg0.01 mg/m3 (organo)alkyl</td>
<td>NA</td>
<td>NA</td>
<td>Inhalation of high concentrations of mercury vapor can cause bronchitis and chest pains; ingestion may result in abdominal pain, diarrhea, shock, and liver and kidney damage.</td>
<td>Chronic inhalation or ingestion exposure to both inorganic and organic mercury compounds may result in nervous system disorders; psychic and emotional disturbances, kidney damage and digestive disturbances. Exposure to organic mercury</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: No US EPA: DACGIH: No VP: 0.0012 mm Hg BP: 674ºF Sol: Insoluble Fl P: NA Odor: Odorless</td>
</tr>
<tr>
<td>Chemical</td>
<td>IDLH Level (PPM)</td>
<td>TLV (PPM)</td>
<td>STEL (PPM)</td>
<td>I.P. (eV)</td>
<td>Acute Effects1</td>
<td>Chronic Effects2</td>
<td>Flammable Range</td>
<td>Carcinogenicity Class</td>
<td>Other</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------------------</td>
<td>-----------</td>
<td>------------</td>
<td>-----------</td>
<td>---------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>-----------------</td>
<td>-----------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Naphthalene (skin) (91-20-3)</td>
<td>250</td>
<td>10</td>
<td>15</td>
<td>8.12</td>
<td>Oral exposure may produce abdominal pain, nausea, vomiting. Skin/e...</td>
<td>Inhalation of vapors and ingestion of dusts may lead to cataracts and retinal degeneration. Dermatitis may result from skin contact.</td>
<td>0.9</td>
<td>5.9</td>
<td>OSHA: No</td>
</tr>
<tr>
<td>Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)</td>
<td>Ca</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Acute toxicity appears low in lab animals, although occupational exposure has...</td>
<td>Dermatitis may result from skin exposure; animal studies show oral administration may lead to blood disorders and liver, kidney, and ocular effects. cPAHs may produce immuno-suppressive effects in humans.</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: Yes (benzo(a) pyrene) US EPA: B2 (benzo(a) pyrene) ACGIH: A1 (coal tar pitch volatiles)A2 (benzo(a) pyrene)</td>
</tr>
<tr>
<td>Non-carcinogenic (nPAHs)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Acute toxicity appears low in lab animals, although occupational exposure has...</td>
<td>Dermatitis may result from skin exposure; animal studies show oral administration may lead to blood disorders, and liver, kidney, and ocular effects.</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: No US EPA: No ACGIH: No</td>
</tr>
<tr>
<td>Chemical</td>
<td>IDLH Level (PPM)</td>
<td>TLV (PPM)</td>
<td>STEL (PPM)</td>
<td>I.P. (eV)</td>
<td>Acute Effects</td>
<td>Chronic Effects</td>
<td>Flammable Range</td>
<td>Carcinogenicity Class</td>
<td>Other</td>
</tr>
<tr>
<td>----------</td>
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<td>--------------</td>
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<td>-------</td>
</tr>
<tr>
<td>Polychlorinated Biphenyls, 54% chlorine (PCBs) (skin) (11097-69-1)</td>
<td>Ca5 mg/m3</td>
<td>0.5 mg/m3</td>
<td>0.001 (NIOSH)</td>
<td>NA</td>
<td>Oral ingestion of PCBs has produced liver damage, general fatigue, and weight loss in rats; nausea, swelling of the hands and face may occur upon acute exposure.</td>
<td>Chronic human exposure to PCBs has led to headaches, fever, vomiting, diarrhea and chloracne (a skin disease).</td>
<td>NA</td>
<td>NA</td>
<td>OSHA: No US EPA: B2ACGIH: No3 VP: 0.0004 mm Hg BP: 617-734ºF Fl P: Relatively nonflammable Sol: Insoluble Odor: Mild hydrocarbon odor</td>
</tr>
</tbody>
</table>
**Terminology for Table 1: Toxicity Profile for Selected Hazardous Substances on Site**

**TLV (Threshold Limit Value):** The ACGIH time-weighted average airborne concentration, to be used as a guideline for a normal 8-hour workday and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

**PEL (Permissible Exposure Limit):** OSHA-regulated time-weighted average airborne concentration for a normal 8–hour workday and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

**IDHL (Immediately Dangerous To Life or Health):** IDLHs that were originally in the Standards Completion Program that did not take into consideration carcinogenic effects.

**BP:** Boiling point

**C (Ceiling):** The concentration that should not be exceeded during any part of the working exposure.

**Ca:** Potential occupational carcinogen (NIOSH – National Institute for Occupational Safety and Health)

**CNS:** Central nervous system

**FI P:** Flash point

**Flamm. Range:** Flammability Range

**GI:** Gastrointestinal

**I.P.:** Ionization potential

**IDLH:** Immediately dangerous to life and health

**LEL:** Lower explosive limit in air, % by volume

**MLT:** Melting Point

**MN RAL:** Minnesota Recommended Allowable Limit for drinking water contaminants

**NA:** Not available

**NOC:** Not otherwise classified

**OT:** Odor threshold

**PAHs:** Polynuclear aromatic hydrocarbons

**PCBs:** Polychlorinated biphenyls

**ppm:** Parts per million

**Skin:** Indicates skin absorption as an additional exposure route

**Sol:** Solubility in water

**Sp.Gr.:** Specific gravity

**STEL (Short-term 15-minute TWA Concentration, which should not be exceeded at any time during a exposure limits):** workday. The duration of a STEL exposure should not be repeated more than four times per day.

**TWA:** Time weighted average

**UEL:** Upper explosive limit in air, % by volume

**VP:** Vapor pressure in mm of Mercury
## Toxicity Profile Reference

### Carcinogen Categories

<table>
<thead>
<tr>
<th>Group</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. EPA Classification of Overall Weight-of-Evidence for Human Carcinogenicity</td>
<td></td>
</tr>
<tr>
<td>A B1</td>
<td>Human carcinogen—sufficient evidence from epidemiological studies.</td>
</tr>
<tr>
<td></td>
<td>inadequate human data but sufficient evidence in animals. Possible</td>
</tr>
<tr>
<td></td>
<td>human carcinogen—limited animal evidence and no human data. Not</td>
</tr>
<tr>
<td></td>
<td>classifiable as to human carcinogenicity—inadequate animal evidence.</td>
</tr>
<tr>
<td>ACGIH Carcinogen Categories</td>
<td></td>
</tr>
<tr>
<td>A1 A2</td>
<td>Confirmed human carcinogens—recognized to have carcinogenic potential.</td>
</tr>
<tr>
<td></td>
<td>Suspected human carcinogens—suspected of inducing cancer, based on limited</td>
</tr>
<tr>
<td></td>
<td>epidemiological evidence or animal studies.</td>
</tr>
</tbody>
</table>
### Table 2 - Project Task Hazard Analysis

<table>
<thead>
<tr>
<th>Facility Activities</th>
<th>Hazards</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handling Hazardous materials during abatement</td>
<td>Inhalation hazards, dermal, and ingestion</td>
<td>Proper Use of PPE, and on-site monitoring, good housekeeping and hygiene</td>
</tr>
<tr>
<td>Ash and coal dust removal</td>
<td>Inhalation and ingestion</td>
<td>Proper Use of PPE, and on-site monitoring</td>
</tr>
<tr>
<td>Boiler and equipment deconstruction</td>
<td>Physical hazards associated with demolition and exposure to hazardous materials</td>
<td>Work in well lighted area, use proper PPE, and safe demolition practices</td>
</tr>
<tr>
<td>Exposure to temperature extremes</td>
<td>Dehydration and hyperthermia</td>
<td>Monitor for heat or cold stress</td>
</tr>
</tbody>
</table>

### Table 3 - Air Monitoring Action Levels

<table>
<thead>
<tr>
<th>Monitoring Instrument1</th>
<th>Hazard</th>
<th>Action Levels</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Vapor Analyzer/Organic Vapor Monitor/HNu</td>
<td>Organic vapors/gases</td>
<td>&lt;2.5 ppm above bckgrd &gt;2.5 ppm above bckgrd for 10 min.</td>
<td>Level D or modified level D Leave area and reassess</td>
</tr>
<tr>
<td>Combustible Gas Indicator</td>
<td>Fire/explosion</td>
<td>&lt;10% LEL</td>
<td>Level D or modified level D</td>
</tr>
<tr>
<td>Hydrogen Sulfide (H2S) Meter</td>
<td>Hydrogen Sulfide</td>
<td>&lt;5 ppm</td>
<td>Level D or modified level D</td>
</tr>
</tbody>
</table>

1APPENDIX SECTION S: AIR MONITORING PROGRAM describes equipment, operating, and calibration procedures, and action level determination. The HASP - Hazard Assessment Documentation form located in Project Safety file discusses any changes to typical action levels.
### Table 4 - Guidelines for Air Monitoring Frequency

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Periodic Monitoring Frequency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Vapor Indicator</td>
<td>unusual or unidentified new odors are encountered</td>
<td>For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM</td>
</tr>
<tr>
<td></td>
<td>discolored soils are encountered</td>
<td></td>
</tr>
<tr>
<td>Combustible Gas Indicator</td>
<td>the organic vapor monitor registers sustained readings above 10% LEL intrusive activity when combustible gases may potentially have accumulated</td>
<td>For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM</td>
</tr>
<tr>
<td>Hydrogen Sulfide (H2S) Meter</td>
<td>intrusive activity where H2S gases may have potentially accumulated</td>
<td>For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM</td>
</tr>
</tbody>
</table>

### Table 5 - Emergency Contacts

<table>
<thead>
<tr>
<th>Agency/Firm</th>
<th>Emergency Telephone Number</th>
<th>Business Telephone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Emergency Services</td>
<td>911</td>
<td></td>
</tr>
<tr>
<td>Fire Department:</td>
<td>911</td>
<td></td>
</tr>
<tr>
<td>Hospital or clinic</td>
<td>911</td>
<td></td>
</tr>
<tr>
<td>U of M Police Department</td>
<td>911</td>
<td>612-624-7828</td>
</tr>
<tr>
<td>Ambulance</td>
<td>911</td>
<td></td>
</tr>
<tr>
<td>National Poison Center</td>
<td></td>
<td>(800) 222-1222</td>
</tr>
<tr>
<td>Minnesota Duty Officer</td>
<td>(651) 649-5451 or (800) 422-0798</td>
<td></td>
</tr>
<tr>
<td>National Response Center</td>
<td>(800) 424-8802</td>
<td></td>
</tr>
<tr>
<td>Supervisor DEHS: (Name)</td>
<td></td>
<td>(Work)(Home)</td>
</tr>
<tr>
<td>Supervisor FM-HMP: (Name)</td>
<td></td>
<td>(Work)(Home)</td>
</tr>
<tr>
<td>Project Field Managers:</td>
<td></td>
<td>(Work)(Cell)</td>
</tr>
<tr>
<td>CPPM Project Manager:</td>
<td></td>
<td>(Work) (Cell)</td>
</tr>
</tbody>
</table>

1Hospital Location Map (Figure 3) provides direct route to nearest hospital.
### Table 6 - General Emergency Procedures to Potential Exposures

<table>
<thead>
<tr>
<th>Hazardous Substance</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Contact:</td>
<td>Flush eyes with eyewash and saline solution and follow with an eye flush for at least</td>
</tr>
<tr>
<td>Skin Contact:</td>
<td>Flush skin with clean water, for at least 15 minutes, if possible. Remove contaminated clothing while flushing skin. Seek emergency medical attention.</td>
</tr>
<tr>
<td>Inhalation:</td>
<td>Remove person to fresh air, away from active work area. Seek emergency medical attention. If breathing has stopped, a qualified medical professional should perform CPR.</td>
</tr>
<tr>
<td>Ingestion:</td>
<td>Do not induce vomiting. Immediately seek emergency medical attention.</td>
</tr>
<tr>
<td>WHOA!</td>
<td>Wounds &amp; Bleeding</td>
</tr>
<tr>
<td>--------</td>
<td>------------------</td>
</tr>
<tr>
<td>What happened? What do you observe?</td>
<td>Direct pressure to control bleeding</td>
</tr>
<tr>
<td># of victims</td>
<td>Ice or cold application. In a pinch?</td>
</tr>
<tr>
<td># of witnesses</td>
<td>Look in the fridge (ice, frozen veggies, pop, frozen juice, frozen rice, etc.)</td>
</tr>
<tr>
<td>Mechanism of Injury</td>
<td>Elevate extremity</td>
</tr>
<tr>
<td>Nature of Illness</td>
<td>Clean with soap &amp; water, then bandage</td>
</tr>
<tr>
<td>Are there any hazards? ABCs/AVTPU</td>
<td></td>
</tr>
</tbody>
</table>

**Nosebleed**

- Squeeze one or both nostrils
- Apply cold directly to the nose
- Patient should lean forward with heat tilted down

- Do not place in milk, mouthwash or alcohol. Milk contains sugar which can destroy tooth tissue
- Or stop, drop, and roll

- Ensure ABCs

**Avulsed Tooth**

- Do place in saline solution, water, or in patient’s saliva
- Time is crucial. See the dentist.

- Stop the burning by using profuse water
- Treat for shock

**Serious Burns**

- Place dry dressing on burn

**Minor Burn**

| Sunburns | Heat Illness |
### Insect Bites & Stings

- **Don’t slap at an insect when it is on you.** It is better to blow or brush off the stinger if possible.

- **Apply ice or cold application** to reduce swelling and pain. If itching, pain, hives, or difficulty breathing occurs, dial 911.

- **Apply ice or cold application** to the area of the bite or sting. This helps reduce swelling and pain.

- **DO NOT** use ointments, creams, lotions, or butter. This will trap heat and increase tissue damage.

- **Check with your physician** before using pain medications or other over-the-counter remedies such as aloe. These should not be used until the burn has been cooled and cleaned.

- **If itching, pain, hives, or difficulty breathing occur**, dial 911 immediately.

### Sunburn Prevention

- **Cool with water until pain stops.**
- **Cover with dressing to prevent contamination.**
- **DO NOT** use ointments, creams, lotions, or butter. This will trap heat and increase tissue damage.
- **Some over-the-counter remedies should not be used until the burn has been cooled and cleaned.**
- **Prevention is the best cure!**

#### Limit Exposure to Sun

- **Limit exposure to sun between 11 AM – 2 PM.**
- **Apply sunscreen with a sun protection factor of 15 SPF.** This should be done 30 minutes before going outside.
- **If sunburn occurs: Remove patient from direct sun. Cool by taking a cool shower or bath.**
- **DO NOT** use ointments, creams, lotions, or butter.
- **Check with your physician** before using pain medications or other over-the-counter remedies such as ibuprofen. These should not be used until the burn has been cooled and cleaned.

#### Other Sunburn Precautions

- **Avoid sunburn.** Sunscreen is not a substitute for sun protection.

#### Symptoms of Heat Exhaustion

- **Pallor, cool, clammy/sweaty skin, nausea, dizziness, weakness, fatigue.** This progresses to heat stroke when the level of consciousness changes.

#### Heat Stroke Treatment

- **Remove to a cool place. Cool rapidly.**
- **Give fluids if tolerated.**
- **Monitor patient’s mental status.**
- **Treat for shock.**
- **The best treatment is prevention!**

### Insect Bites & Stings Prevention

- **Keep hydrated! Drink lots of water.**
- **Avoid sugar treats, pop, & caffeine.** These make it difficult for a person to absorb fluids.
- **Avoid nicotine.**
- **Symptoms of heat exhaustion are pale, cool, clammy/sweaty skin, nausea, dizziness, weakness, fatigue.** This progresses to heat stroke when the level of consciousness changes.

#### Heat Stroke Treatment

- **Remove to a cool place. Cool rapidly.**
- **Give fluids if tolerated.**
- **Monitor patient’s mental status.**
- **Treat for shock.**
- **The best treatment is prevention!**

### Insect Bites & Stings Prevention

- **Keep hydrated! Drink lots of water.**
- **Avoid sugar treats, pop, & caffeine.** These make it difficult for a person to absorb fluids.
- **Avoid nicotine.**
- **Symptoms of heat exhaustion are pale, cool, clammy/sweaty skin, nausea, dizziness, weakness, fatigue.** This progresses to heat stroke when the level of consciousness changes.

#### Heat Stroke Treatment

- **Remove to a cool place. Cool rapidly.**
- **Give fluids if tolerated.**
- **Monitor patient’s mental status.**
- **Treat for shock.**
- **The best treatment is prevention!**
<table>
<thead>
<tr>
<th>Frostbite</th>
<th>Head &amp; Neck Injuries</th>
<th>Seizures</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is preventable. Avoid tobacco use, caffeine, and alcohol. The three stages of frostbite are incipient, superficial, &amp; deep frostbite. Signs &amp; symptoms are tingling and numbness in cold, white or gray skin, &amp; pain. General treatment is: Remove from cold environment. Warm in water 104-108 degree F. Once rewarmed, elevate part. If you can’t go indoors, place hands under armpit (if hands are affected). Do not rub, this may cause tissue damage.</td>
<td>S&amp;S-Altered mental status, any significant mechanism of injury, unconsciousness, unequal pupils, clear fluid or blood coming from ears, unusual sleepiness, confusion, dizziness, severe headache, difficulty with speech or vision, vomiting, difficulty walking, pale, sweaty. General treatment is: Call 9-1-1. Stabilize head. Check for consciousness. Do not move an unconscious person. Treat for shock.</td>
<td>General treatment for tonic-clonic seizure are: Protect the head. Do not place anything in the mouth. Do not restrain the person. If possible, time the seizure. When seizure stops, place in recovery position.</td>
</tr>
</tbody>
</table>

| Diabetic               | Diabetic Emergencies/Hyperglycemia                                                   | Fractures, Sprains, & Hyperglycemia is high blood sugar. Most often this is an undiagnosed diabetic or a diabetic who is not taking proper care of themselves. This is not the emergency that hypoglycemia is. However, if left untreated, this can progress to diabetic coma. Signs and symptoms are excessive thirst, excessive urination, fruity breath odor, flushed and dry skin. If in doubt, give sugar. This will not hurt the patient. |
| Diabetic Emergencies/Hyperglycemia | Hyperglycemia is low blood sugar and is the most common of diabetic emergencies. Signs and symptoms are altered mental status (giddy, sleepy, aggressive, or cranky). The skin will appear pale, cool & clammy. When in doubt, and as long as the patient remains conscious, give sugar in the form of juices, honey, sugar, candy, or soda pop. Do not give diet products such as NutraSweet. Follow up with a sandwich or more substantial meal. | Fractures, Sprains, & Hyperglycemia is high blood sugar. Most often this is an undiagnosed diabetic or a diabetic who is not taking proper care of themselves. This is not the emergency that hypoglycemia is. However, if left untreated, this can progress to diabetic coma. Signs and symptoms are excessive thirst, excessive urination, fruity breath odor, flushed and dry skin. If in doubt, give sugar. This will not hurt the patient. |

| Fractures, Sprains, & Hyperglycemia | Hyperglycemia is high blood sugar. Most often this is an undiagnosed diabetic or a diabetic who is not taking proper care of themselves. This is not the emergency that hypoglycemia is. However, if left untreated, this can progress to diabetic coma. Signs and symptoms are excessive thirst, excessive urination, fruity breath odor, flushed and dry skin. If in doubt, give sugar. This will not hurt the patient. | Fractures, Sprains, & Hyperglycemia is high blood sugar. Most often this is an undiagnosed diabetic or a diabetic who is not taking proper care of themselves. This is not the emergency that hypoglycemia is. However, if left untreated, this can progress to diabetic coma. Signs and symptoms are excessive thirst, excessive urination, fruity breath odor, flushed and dry skin. If in doubt, give sugar. This will not hurt the patient. |

| Signs and symptoms | General treatment guidelines: Stabilize or immobilize the injury site. Apply cold application. Rest. Elevate extremity, if possible. | It is not necessary to know the difference between these three conditions. An x-ray is the only definitive diagnosis. Signs and symptoms are similar and first aid is the same. Some general treatment guidelines are: Stabilize or immobilize the injury site. Apply cold application. Rest. Elevate extremity, if possible. |
17.0 Figures

Figure 1  Location Map - Old Main Steam Plan
Figure 2  Directions to Hospital, University of Minnesota Fairview Emergency Entrance
Figure 3 - Site Decontamination Zones and Procedure
Figure 1 Location Map - Old Main Steam Plan

Figure 1
Location Map
Old Main Steam Plant
University of Minnesota
Figure 2 Directions to University of Minnesota Fairview Emergency Entrance

HOSPITAL - 1.0 mi – about 3 minutes.
Address: 500 Harvard St SE, Minneapolis, MN 55455

Directions to HOSPITAL
1. Go east on UMN access road to the east side of the large oil tanks.
2. Cross the railroad tracks and turn right on access road. Drive toward the Mississippi River
3. Before entering the pedestrian bridge turn left.
4. At top of hill turn right on East River Road.
5. Turn left on Harvard. Follow signs to emergency entrance.
Figure 3 Site Work Decontamination Zones and Procedure

CONTAMINATION REDUCTION ZONE

1. Decontaminate Equipment
2. Remove boot covers
3. Remove outer gloves and Tyvek
4. Remove respirator
5. Place all disposed PPE in garbage bags or drum
6. Remove inner gloves and place in garbage bags or drum
7. Wash hands and face with water, alcohol wipes, other cleaning wipes
B. Shower as soon as possible (Shower is available on Site)
18.0 Forms

Form 1  Health and Safety Plan Amendment
Form 2  Health and Safety Acknowledgement Sheet
Form 3  Work Area Daily Safety Record
Form 4  Pre-Construction Safety Meeting Checklist
Form 5  Work Site Audit Form
Form 6  Visitor Sign-In Sheet
Form 7  UMN First Report of Injury Form
Form 1 - Health and Safety Plan Amendment

Amendment #: Date:

Amendment Section:

Amendment:

Reason for Amendment:

Amendment discussed with Project Manager on __________ and approved.

Amendment discussed with Project Health and Safety Team Leader on ______ and approved.
Form 2 - Health and Safety Acknowledgement Sheet

(By signing your name, you acknowledge that you have attended a pre-work safety meeting for work at _____________ project site and that you have read both the HASP and agree to abide by the requirements of these plans.)

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Date of Pre-Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td></td>
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<td>2)</td>
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<td>25)</td>
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</tbody>
</table>
Form 3 - Work Area Safety Record

**DATE:**                                    **HSTL:**

<table>
<thead>
<tr>
<th>Typical Combustible Gas Monitoring Readout</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Vapor Readout (ppm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide Readout</td>
<td></td>
<td></td>
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</tbody>
</table>

**CHECK THE FOLLOWING AFTER COMPLETION**

Tool-Box Safety Meeting

Time:

Conducted by:

Topic: e.g. Instrument Calibration

Attended:

Topic:

- ☐ Calibration Check
- ☐ Battery Check

Comments (Field Deviations, Incidents, Visitors on Site, Etc.):
**Form 4 Pre-Construction Safety Meeting Checklist**

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Project Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Conducted by:</td>
<td>Date:</td>
</tr>
<tr>
<td>Attendees:</td>
<td>Attach Sign in Sheet</td>
</tr>
</tbody>
</table>

**TOPICS COVERED DURING SAFETY MEETING**

<table>
<thead>
<tr>
<th>ADMINISTRATIVE</th>
<th>PHYSICAL HAZARDS ON SITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>__</td>
<td>Location of telephone and emergency numbers</td>
</tr>
<tr>
<td>__</td>
<td>Smoking and eating areas</td>
</tr>
<tr>
<td>__</td>
<td>Fire extinguisher, eyewash, and First Aid kit on site</td>
</tr>
<tr>
<td>__</td>
<td>Potable water, restrooms on site, or location of nearest facilities</td>
</tr>
<tr>
<td>__</td>
<td>Emergency alarm signals</td>
</tr>
<tr>
<td>__</td>
<td>Emergency evacuation routes and location of posting</td>
</tr>
<tr>
<td>__</td>
<td>Hospital and route to hospital</td>
</tr>
<tr>
<td>__</td>
<td>Accidents/illnesses/injuries/near misses</td>
</tr>
<tr>
<td>__</td>
<td>Work/Break schedule</td>
</tr>
<tr>
<td>__</td>
<td>Location of HASP (including APPENDIX)</td>
</tr>
<tr>
<td>__</td>
<td>Work zones</td>
</tr>
<tr>
<td>__</td>
<td>Buddy system</td>
</tr>
<tr>
<td>__</td>
<td>Site control and/or site security</td>
</tr>
<tr>
<td>__</td>
<td>First Aid/CPR qualified persons on site</td>
</tr>
<tr>
<td>__</td>
<td>Subcontractor’s MSDS collection labeling system and precautionary measures</td>
</tr>
<tr>
<td>Subcontractor’s MSDS collection labeling system and precautionary measures</td>
<td>Oxygen deficient atmosphere</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>PERSONAL PROTECTIVE EQUIPMENT</strong></td>
<td><strong>BIOLOGICAL HAZARDS</strong></td>
</tr>
<tr>
<td>Levels of Personal Protective Equipment (PPE) (D, modified D, C)</td>
<td>Poisonous vegetation (poison ivy, poison oak)</td>
</tr>
<tr>
<td>Respirator protection</td>
<td>Pests (snakes, rodents, bees, wasps)</td>
</tr>
<tr>
<td>PPE limitations</td>
<td>Animals (dogs, bears)</td>
</tr>
<tr>
<td><strong>AIR MONITORING</strong></td>
<td>Biological wastes (hospital wastes, animal wastes)</td>
</tr>
<tr>
<td>Actions taken when action levels exceeded</td>
<td><strong>OTHER HAZARDS</strong></td>
</tr>
<tr>
<td>Air monitoring to be conducted</td>
<td>Cold stress</td>
</tr>
<tr>
<td><strong>DECONTAMINATION (DECON)</strong></td>
<td>Hypothermia</td>
</tr>
<tr>
<td>DECON area and procedures</td>
<td>Frostbite</td>
</tr>
<tr>
<td>Containers for contaminated materials</td>
<td><strong>HEAT STRESS</strong></td>
</tr>
<tr>
<td>Availability of warm fluids</td>
<td>Availability of shade</td>
</tr>
</tbody>
</table>
### Form 5. Pre-Construction Safety Meeting Sign-in Sheet

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
### Form 6 - Work Site Safety Audit Form

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ADMINISTRATIVE-Pre-construction/pre-site entry safety meeting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>HASP on site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Weekly —tool-box safety meeting conducted and documentation on site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Site work zones delineated on site map</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Training documentation on site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Respirator fit-test within last two years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>HASP followed by on-site team member</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>SITE CONTROL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Work zones physically defined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Work zones physically defined</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td>Buddy system implemented</td>
<td></td>
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<tr>
<td>3.</td>
<td>Emergency communication system</td>
<td></td>
<td></td>
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<tr>
<td>4.</td>
<td>Emergency eyewash/first aid kit</td>
<td></td>
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<tr>
<td>C.</td>
<td>PERSONAL PROTECTIVE EQUIPMENT</td>
<td></td>
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<tr>
<td></td>
<td>Properly used/stored</td>
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</tr>
<tr>
<td>1.</td>
<td>Properly used/stored</td>
<td></td>
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<tr>
<td>2.</td>
<td>Daily inspection</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3.</td>
<td>PPE appropriate for on-site hazards</td>
<td></td>
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<tr>
<td>4.</td>
<td>PPE used as written in HASP</td>
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<tr>
<td>5.</td>
<td>PPE limitations known</td>
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<tr>
<td>6.</td>
<td>Eye protection</td>
<td></td>
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<tr>
<td>7.</td>
<td>Head protection</td>
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<tr>
<td>8.</td>
<td>Hand/torso protection</td>
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<tr>
<td>9.</td>
<td>Foot protection</td>
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<tr>
<td>10.</td>
<td>Hearing protection</td>
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<tr>
<td>11.</td>
<td>Respiratory protection</td>
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<tr>
<td>12.</td>
<td>Fall protection</td>
<td></td>
<td></td>
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<tr>
<td>13.</td>
<td>Heat stress procedures</td>
<td></td>
<td></td>
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<tr>
<td>14.</td>
<td>Cold stress procedures</td>
<td></td>
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</tbody>
</table>
1. **DECONTAMINATION**
   - Good work practices to minimize contamination
2. Decon areas situated to minimize contamination
3. Decon procedures properly conducted
4. Decon area delineated
   - Instruments calibrated on-site/calibration logs
2. Noise level monitoring
3. Particulate monitoring
4. Organic vapor monitoring
5. Combustible gas monitoring
6. Documentation of air monitoring results

1. **TOOLS/EQUIPMENT**
   - Tools and equipment right for job
2. Tools and equipment used correctly

G. **UNSAFE CONDITIONS** - Do any of the following conditions exist?
1. Falling
2. Being struck by object
3. Being caught between objects
4. Contact electric current
5. Overhead hazards
6. Overexposure to chemicals/hazardous substances
7. Heat/cold stress
8. Other

1. **PROCEDURES/OTHER**
   - Applicable permits following
2. Completed copies of permits on site
3. Procedures in place and being followed
4. Fire watch. Appropriate and effective
5. Hole watch. Appropriate and effective
6. Are unnecessary materials lying around creating a slip/trip/fall hazard
<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Signature</th>
<th>Affiliation</th>
<th>Purpose of Visit</th>
<th>Time In</th>
<th>Time</th>
</tr>
</thead>
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</table>
Form 8 Incident/Accident Reporting and Investigation Forms

Reporting Workers Compensation Related Injuries

http://www.policy.umn.edu/Policies/hr/Benefits/WORKERSCOMP.html

Reporting and Managing a Workers Compensation Claim

Employee Responsibilities

a) Immediately -
   i) Notify your Supervisor. Your Supervisor will assess the situation, assist with arranging proper medical care and begin the injury reporting process.
   ii) Promptly cooperate with your Supervisor and the Claims Administrator in the completion of all relevant documents.

Supervisor Responsibilities

b) Immediately -
   i) Assess the incident and assist the Employee in seeking appropriate medical care or necessary treatment for any work-related injury. If an injury is a potential life-threatening emergency, call 911.
   ii) Provide the Employee with the Minnesota Workers Compensation Information Sheet, list of Designated Medical Providers, and Temporary Prescription Drug ID Card.

c) Within 8 business hours -
   i) Complete the online First Report of Injury form, or
   ii) Complete the paper First Report of Injury form and fax it to the Claims Administrator.

d) Within 24 business hours -
   i) Complete a Supervisor Incident Investigation Report and email or fax to the Claims Administrator.

If an Employee reports an on-the-job injury which may not be compensable, the First Report of Injury form must still be submitted. Contact the Claims Administrator with any questions regarding claim compensability.

Referring the Employee for Medical Care

When an injury requires medical attention, the University encourages the use of Designated Medical Providers. as these providers specialize in Occupational Medicine and are familiar with the Workers Compensation process. Under Minnesota law, an injured Employee has the right to select his/her own treating physician. At times, the Employee may be required to see a provider selected by the University.

Express Scripts administers the Prescription Drug Program for the University of Minnesota's Workers Compensation program. The Prescription Drug Program will eliminate co-pays and out-of-pocket expenses for medications prescribed for an accepted Workers Compensation claims.

Employees who experience an aggravation or re-injury of a previous work-related injury should be directed for medical treatment.

Forward all medical bills to the Claims Administrator for payment.
Returning the Employee to Work

The Medical Provider must complete a Report of Workability (1) and provide it to the Employee and Claims Administrator. The Report of Workability will indicate when the Employee can return to work and whether job modifications are required to accommodate physical restrictions. The Employee will provide a copy of the Report of Workability to the Supervisor.

- Employees without restrictions can return to their usual work duties.
- If the Medical Provider imposes work restrictions, the Supervisor and Claims Administrator will review the job modifications that are required to comply with the restrictions. Every effort will be made to accommodate the employee's restrictions. If work is available within the restrictions, the Employee will return to suitably modified work. The Supervisor will monitor the Employee’s recovery on a weekly basis and report the Employee’s recovery progress to the Claims Administrator.

(1) Medical Providers will have their own versions of the Report of Workability.

UM 1536: First Report of Injury (Online - Preferred Version)
https://webapps-prd.oit.umn.edu/froi/

UM 1533: Supervisor Incident Investigation Report (DOC)
http://www-policy.umn.edu/prod/groups/president/@pub/@forms/@hr/documents/form/supincidentinv.doc
List of Attachments

Attachment A Safety Data Sheets
Attachment B Heat Stress and Cold Stress Guidelines
Attachment C Severe Weather Emergency Guidelines


**Lead Safety Data Sheet**

**Section 1. Chemical Identification**

Chemical Name: Lead, lead in paint, ceramic glaze, Plumbum

CAS#: 7439-92-1

European Commission Number (EINECS 231-100-4)

Lead in paints or glazes were used for white, yellow, orange or red pigments. Building structures may have lead in concrete blocks, and lead sheeting in walls or ceilings. Leak bricks and lead sheets for personal protection may be found in laboratories or clinical spaces during demolition.

The most common exposure to lead during construction projects is from improper handling of materials covered with paint or other coatings that contains lead. Painted or coated surfaces designated for demolition may have been tested for lead. If data for the paint or coating is not available do not demolish without approval from the general contractor.

Information about health effects is available at the following web sites:

http://www.dehs.umn.edu/msds_sheets.htm


*Call 911 for emergency assistance (on the Twin Cities Campus 911 connects directly to the U of M Public Safety Emergency Communications Center)*

**Section 2. Hazard identification**

Many of the surfaces will be marked to indicate that the item has been tested for lead and the results will be noted. Not all surfaces will be previously tested. All painted surfaces must be tested for lead before removing objects with chipped paint or using a welding torch cut metal objects, pipes or equipment for demolition. Other hazards are lead in dust, lead aerosols formed by heating coatings while removing the coating or cutting metals with a torch.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Signal Words</th>
<th>Hazard Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>Warning</td>
<td>Harmful if swallowed. (H302)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Harmful if inhaled. (H332)</td>
</tr>
<tr>
<td>⚠</td>
<td>Danger</td>
<td>May damage fertility or the unborn child. (H360)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suspected of causing genetic defects. (H341)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suspected of causing cancer. (H351)</td>
</tr>
</tbody>
</table>
Precautionary Statements:
Do not handle until all safety precautions have been read and understood. P202
Avoid breathing dust/fume/gas/mist/vapors/spray. P261
Wash thoroughly after handling. P264
Do not eat, drink or smoke when using this product. P270
Contaminated work clothing should not be allowed out of the workplace. P272
Wear protective gloves/protective clothing/eye protection/face protection. P280
Avoid release to the environment. P273

Response
Collect spillage. P391
If swallowed: Call a poison center/doctor or if you feel unwell. P301 + P312

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations. Contact the Department of Environmental Health and Safety at 612-626-6002 for assistance. P501

Section 3. Composition information
Lead in construction projects is typically associated with lead paint. Lead shields or bricks are sometimes present in laboratory spaces and industrial areas.

Section 4. First Aid measures
After inhalation supply fresh air, and seek immediate medical advice. If patient is not breathing provide artificial respiration, keep patient warm, until emergency personnel arrive.
After skin contact immediately wash with water and soap and rinse thoroughly, and seek immediate medical advice.
After eye contact, rinse opened eye for several minutes under running water, and seek immediate medical advice.
If lead is ingested, seek immediate medical advice

Occupational Medical Resources
HealthPartners Occupational and Environmental Medicine (HPOEM) is the provider of occupational health services for University employees in the Twin Cities.
Riverside Clinic, located at 2220 Riverside Avenue in Minneapolis, offers Occupational Health services as well as Urgent Care/After Hours.
St. Paul Clinic, just outside of downtown St. Paul at 205 S. Wabasha Street, offers Occupational Health services and Urgent Care/After Hours.

Como Avenue Clinic, located at 2500 Como Avenue in St. Paul, will offer Urgent Care/After Hours services near the St. Paul Campus.

St. Luke’s Hospital | Hospital in Duluth, MN is the provider of occupational health services for University employees on the Duluth Campus. It offers Occupational Health services and Urgent Care/After Hours. Hospital is located at 915 E 1st Street, Duluth, MN. Emergency Room: (218) 249-5616 and Urgent Care: (218) 249-6095

**Section 5. Fire Fighting Measures**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash point</td>
<td>N/A</td>
</tr>
<tr>
<td>Flammable limits</td>
<td>N/A</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>N/A</td>
</tr>
<tr>
<td>Fire degradation products</td>
<td>Oxides of lead</td>
</tr>
<tr>
<td>Fire extinguishing procedures</td>
<td>Use DRY chemical, carbon dioxide, or foam. Wear adequate personal protection to prevent contact with material or its combustion products. Self-contained breathing apparatus with a full face piece operated in a pressure demand or other positive pressure mode. Move containing vessels from fire if without risk. Cool containing vessels with flooding quantities of water.</td>
</tr>
</tbody>
</table>

**Fire and Explosion Hazards**

This material is flammable in powder form only. This material in powder form is capable of creating a dust explosion. Expected to be sensitive to mechanical impact. The sensitivity to static discharge is not available. Emits toxic fumes under fire conditions.

**Section 6. Accidental Release Measures**

Restrict access until spill cleaned. Call 911.

Person-related safety precautions:

- Wear protective equipment including respirator.
- Keep unprotected persons away.
- Ensure adequate ventilation

Measures for environmental protection:

- Do not allow material to be released to the environment without proper governmental permits.
- Measures for cleaning/collecting:
  - Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
  - Dispose contaminated material as waste according to item 13.

Additional information:

See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

**Section 7. Handling and Storage**

Safe handling:

- Leaded paint chips, dust, and abrasive debris and chemicals used to remove leaded paint must be totally contained.
- Containment devices include:
  - drop sheets or tarps
  - shrouding or free-hanging enclosures
  - total structure enclosures
  - negative pressure containment

**Storage**

Lead compounds or materials contaminated with lead must be stored in a safe and secure manner. They should be in leak proof containers to prevent release into the environment. Depending on the material, the packaging should be designed to prevent contact with precipitation or it should be stored indoors.

**Section 8. Exposure controls and personal protection**

Occupational standards are based on the lowest observable adverse effect level (LOAEL) in healthy worker after career exposure.

Public exposure limits start with the LOAEL and

- Reduce for sensitive populations - especially fetus and infants
- Reduce for lifetime continuous 24/7 exposure
- Reduce for data uncertainty

**Occupational Standards**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal OSHA PEL-C</td>
<td>0.050 milligram/cubic meter (mg/m³)</td>
</tr>
<tr>
<td>MN OSHA PEL</td>
<td>0.050 milligram/cubic meter (mg/m³)</td>
</tr>
<tr>
<td>ACGIH TLV</td>
<td>0.050 milligram/cubic meter (mg/m³)</td>
</tr>
<tr>
<td>NIOSH IDLH</td>
<td>100 mg/m³</td>
</tr>
</tbody>
</table>

Lead is not classified as a human carcinogen

**Exposure controls**

**Personal hygiene**

- Use good personal hygiene
- Keep away from foodstuffs, beverages and feed.
- Remove all soiled and contaminated clothing immediately.
- Wash hands before breaks and at the end of work.
- Do not take work clothes home, clean separately.
**Personal protective equipment**

Breathing equipment: Use suitable respirator when high dust concentrations may be present. Refer to applicable Respiratory Protection Program.

Protection of hands:
Use impermeable gloves
Check protective gloves prior to each use for their proper condition.
Protect hands and impermeable layer from abrasion

Material of gloves:
Nitrile or other impermeable layer plus an abrasion resistant layer when needed

Eye protection:
Safety glasses, face shield or full face respirator

Body protection:
Tyvek or other protective work clothing
Dispose of work clothes or clean separately after verifying that they are not contaminated

---

**Section 9. Physical and chemical properties**

<table>
<thead>
<tr>
<th><strong>General Information</strong></th>
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<tbody>
<tr>
<td>Molecular weight</td>
<td>207.2</td>
</tr>
<tr>
<td>Form</td>
<td>Solid</td>
</tr>
<tr>
<td>Color</td>
<td>Bluish-gray or silvery-gray</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
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<table>
<thead>
<tr>
<th><strong>Change in condition</strong></th>
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<tbody>
<tr>
<td>Melting point/Melting range</td>
<td>621°F (327.5°C)</td>
</tr>
<tr>
<td>Boiling point/Boiling range</td>
<td>3164°F (1740°C)</td>
</tr>
<tr>
<td>Vapor density</td>
<td>7.1 (Air=1)</td>
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<tr>
<td>Flash point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Danger of explosion</td>
<td>Lead dust can be a powder explosive when mixed with air.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Explosion limits</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Upper</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Vapor pressure at 20°C (68°F)</td>
<td>0 mmHg</td>
</tr>
</tbody>
</table>
Density at 20°C (68°F) | 13.34 g/cm³ (0.49 lb/in³)
Solubility in / Miscibility with water | Insoluble

**Section 10. Stability and reactivity**

| Stability | Unstable. Oxidizes on contact with air. Conditions to avoid: High temperatures, sparks, open flames and all other |
| Hazardous decomposition Products | Lead will not decompose, but will become more concentrated as less stable elements in a mixture degrade. |
| Incompatibility | Oxidizing agents, acids, hydrogen peroxide, chlorine trifluoride, reducing agents, nitric acid, bases, sodium azide, sodium carbide, metals (sodium, potassium, zirconium), sodium acetylide, ammonium nitrate, azides. |
| Reaction Products | Not available. Hazardous polymerization will not occur. |

**Section 11. Toxicological information**

| Routes of entry | Inhalation and ingestion. Eye contact. Skin contact. Skin absorption. |
| Effects of Acute Exposure | May be fatal by ingestion, inhalation or skin absorption. Neurotoxin. May impair the reproductive systems of both men and women. Damage may also be caused to the unborn fetus. Lead is a cumulative poison and even exposures to small amounts can raise the body's content to toxic levels. Target organs: blood, central nervous system, liver, kidneys, gastrointestinal system, male and female reproductive system, peripheral nervous system, skeletal muscle, brain, thyroid, testis, eyes. 100 mg/m³ (Lead) is immediately dangerous to life or health. |
| Eye | This product may cause redness, irritation and possible damage due to abrasiveness. Absorption of lead can occur through eye tissues. |
| Skin | May cause irritation by abrasion. Symptoms of lead poisoning (see ingestion) may occur. May be absorbed through the skin. |
| Inhalation | Local irritation of bronchia and lungs can occur. Prolonged or repeated exposure can lead to lead poisoning and death (see ingestion). |
| Ingestion | Poison! May cause fatigue, disturbance of sleep, abdominal pain, nausea, headache, anorexia, metallic taste in mouth, muscle and joint pain, dizziness, colic, paralysis, hypertension, thirst, vomiting, constipation or diarrhea, muscle weakness, irritability, encephalopathy, parasthesia, convulsions, coma and death. Prolonged overexposure can severely damage red blood cell formation, central and peripheral nervous system, lung, liver and kidney damage with oliguria, hematuria, albuminuria, hemoglobinuria. See chronic overexposure. Estimated lethal dose is 0.5 g lead. |
| Effects of Chronic Overexposure | Symptoms of chronic exposure are like those for ingestion. Lead is a cumulative poison and even exposure to small amounts can raise the body's content to toxic levels. Tiredness, loss of weight, insomnia, blue line on gums, gastrointestinal disorder (constipation and colic), muscle weakness, hypertension with bradycardia, polyneuropathy, nephropathy,
anemia, nephritis, encephalopathy, eye, lung, central nervous system, liver, kidney, blood, thyroid damage. Reproductive toxin, teratogen and carcinogen. Lead compounds may cause testicular damage, sterility, sperm abnormalities, menstrual disorders, adverse effects on general reproductive performance in human. Passes through the placental barrier (can cause birth defects, postnatal development injury, increased fetal lethality and delayed fetal development.).

Mutagenic effects: Not available. To the best of our knowledge, the chemical, physical, and toxicity of this substance has not been fully investigated.

Medical conditions which may be aggravated: Individuals with preexisting nerve or circulatory disorders or with skin or eye problems may be more susceptible to the effects of this product.

Section 12. Ecological information

Ecotoxical effects:

Lead in soils may become soluble from organic acids produced by microorganisms. The more soluble lead is available for plant uptake in the roots and may move into the foliage. Grazing animals may consume lead through consumption of forage and feed contaminated by airborne lead.

Invertebrates may accumulate lead at levels toxic to predators. Lead in water resources is also toxic for fish and water fowl.

General notes:

- Do not allow product to reach ground water, water course or sewage system, even in small quantities.
- Lead in drinking water may become toxic to humans at extremely small concentrations in the groundwater.
- Do not allow lead contaminated material to be released to the environment.

Section 13. Disposal considerations

Contact the Department of Environmental Health and Safety at 612-626-6436 for disposal guidance.

Section 14. Transport information

DOT regulations:

Transportations Hazard class: 6.1: poisonous (toxic) material
UN Number: 3077
Proper shipping name (technical name): LEAD
ARD/RID Transport Hazard Class: 6.1: poisonous (toxic) material
Environmental Hazards:
Maritime transport IMDG Code 6.1:

Section 15. Regulations

National regulations:

- Lead is regulated under the Safe Water Drinking Act
- All components of lead based products are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
- Lead is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

Minnesota Regulations: Minnesota Statutes 144.9501-144.9512 -The Minnesota Lead Poisoning Prevention Act

Section 16 References

1. US Environmental Protection Agency – Lead Regulations
2. Minnesota Department of Health – Environmental Health regulations for lead
5. Anachemia Material Safety Data Sheet, Lead.

Photographs taken in the Old Main Steam Plant prior to Demolition.

“Silver” colored paint on steel beams and result
Damaged lead based paint on ceiling in coal conveyor
Mercury Safety Data Sheet

Section 1. Chemical Identification

Chemical Name: Mercury

Information about health effects is available at
http://www.dehs.umn.edu/msds_sheets.htm
http://www.health.state.mn.us/divs/eh/hazardous/topics/mercury/index.html

Call 911 for emergency assistance (on the Twin Cities Campus 911 connects directly to the U of M Public Safety
Emergency Communications Center)

Section 2. – Hazard identification

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Signal word</th>
<th>Hazard statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger</td>
<td>Danger</td>
<td>Fatal if inhaled. (H330)</td>
</tr>
<tr>
<td></td>
<td>Danger</td>
<td>May damage fertility or the unborn child. (H360) Causes damage to organs through prolonged or repeated exposure. (H372)</td>
</tr>
<tr>
<td></td>
<td>Warning</td>
<td>Very toxic to aquatic life with long lasting effects. (H410)</td>
</tr>
</tbody>
</table>

Precautionary Statements:
Obtain special instructions before use. (P201)
Do not breathe dust/fume/gas/mist/vapors/spray. (P260)
Do not eat, drink or smoke when using this product. (P270)
Wash thoroughly after handling. (P264)
Contaminated work clothing should not be allowed out of the workplace. (P272)
Wear protective gloves/protective clothing/eye protection/face protection. (P280)
In case of inadequate ventilation wear respiratory protection (P284)
Avoid release to the environment. (P273)

Response
Collect spillage. (P391)
If Inhaled: Remove person to fresh air and keep comfortable for breathing. (P304, P340)
Immediately call a poison center – dial 911. (P310)

Storage
Store in a well-ventilated place. Keep containers tightly closed. (P403, P233)
Store locked up (P405)
Disposal
Dispose of contents and container in accordance with regulations. Contact the Department of Environmental Health and Safety at 612-626-6002 for assistance.

Section 3. Composition information
Synonyms: Colloidal mercury; Hydrargyrum; Metallic mercury; Quick silver; Liquid silver
CAS#: 7439-97-6
European Commission Number (EINECS#): 231-106-7

Section 4 – First Aid measures
Immediately remove any clothing soiled by the product.

After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.

After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.

After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.

After swallowing
Seek immediate medical advice.

Occupational Medical Resources
HealthPartners Occupational and Environmental Medicine (HPOEM) is the provider of occupational health services for University employees in the Twin Cities.

Riverside Clinic, located at 2220 Riverside Avenue in Minneapolis, offers Occupational Health services as well as Urgent Care/After Hours.

St. Paul Clinic, just outside of downtown St. Paul at 205 S. Wabasha Street, offers Occupational Health services and Urgent Care/After Hours.

Como Avenue Clinic, located at 2500 Como Avenue in St. Paul, will offer Urgent Care/After Hours services near the St. Paul Campus.

St. Luke’s Hospital is the provider of occupational health services for University employees on the Duluth Campus. It offers Occupational Health services and Urgent Care/After Hours.

Saint Luke’s Hospital, located at 915 E 1st Street, Duluth, MN
Emergency Room: (218) 249-5616
Urgent Care: (218) 249-6095

Section 5. Fire Fighting Measures
Mercury is not flammable. Use firefighting measures that are appropriate for the surrounding fire.

In case of fire, the following can be released:
Toxic metal oxide fume
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

**Section 6. Accidental Release Measures**


Person-related safety precautions:
- Wear protective equipment including respirator.
- Keep unprotected persons away.
- Ensure adequate ventilation

Measures for environmental protection:
- Do not allow material to be released to the environment without proper governmental permits.

Measures for cleaning/collecting:
- Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
- Dispose contaminated material as waste according to item 13.
- Ensure adequate ventilation.

Additional information:
- See Section 7 for information on safe handling
- See Section 8 for information on personal protection equipment.
- See Section 13 for disposal information.

**Section 7. Handling and Storage**

Information for safe handling:
- Store tightly closed, break resistant container in a cool, dry place.
- Ensure good ventilation at the workplace.
- Open in a well-ventilated area and handle the container with care.
- Mercury is not flammable

Storage
- Requirements to be met by storerooms and receptacles: No special requirements.
- Information about storage in one common storage facility: Not required.
- Further information about storage conditions:
  - Keep container tightly sealed.
  - Store in cool, dry conditions in well-sealed containers.

**Section 8. Exposure controls and personal protection**

Milligram (mg) 1/1,000 (thousands)
Microgram (ug) 1/1,000,000 (millions)
Nanogram (ng) 1/1,000,000,000 (billions)
To make comparisons easier we use nanograms / cubic meter (ng/m3) as a reference for concentration in air

Occupational standards are based on the lowest observable adverse effect level (LOAEL) in healthy worker after career exposure.
Public exposure limits start with the LOAEL and
- Reduce for sensitive populations - especially fetus and infants
- Reduce for lifetime continuous24/7 exposure
- Reduce for data uncertainty
**Occupational Standards**
Federal OSHA PEL-C  100,000 nanograms/cubic meter (ng/m3)
MN OSHA PEL  50,000 ng/m
ACGIH TLV  25,000 ng/m3
NIOSH IDLH  10,000,000 ng/m3
Public Exposure Standards
MDH Residential Cleanup  500 ng/m3
EPS RfC  300 ng/m3

Mercury is not classified as a human carcinogen

**Exposure controls**

**Personal hygiene**
- Use good personal hygiene
- Keep away from foodstuffs, beverages and feed.
- Remove all soiled and contaminated clothing immediately.
- Wash hands before breaks and at the end of work.
- Clean and store protective clothing separately.

**Personal protective equipment**

Breathing equipment:
- Use suitable respirator when high concentrations may be present. Refer to applicable Respiratory Protection Program.

Protection of hands:
- Use impermeable gloves
- Check protective gloves prior to each use for their proper condition.
- Protect hands and impermeable layer from abrasion

Material of gloves:
- Nitrile or other impermeable layer plus abrasion resistant layer when needed

Eye protection:
- Safety glasses, face shield or full face respirator

Body protection:
- Tyvek or other protective work clothing
  - Dispose of work clothes or clean separately after verifying that they are not contaminated

**Section 9. Physical and chemical properties**

General Information
Molecular weight 200.6
Conversion factor 1ppm = 8.19 mg/m3 at 25°C
Form: Liquid
Color: Silver-colored
Odor: Odorless
Change in condition
Melting point/Melting range: -38°C (-36°F)
Boiling point/Boiling range: 356°C (673°F)
Sublimation temperature / start: Not determined
Flash point: Not determined
Ignition temperature: Not determined
Decomposition temperature: Not determined
Danger of explosion: Product does not present an explosion hazard.
Explosion limits:
  Lower: Not determined
  Upper: Not determined
Vapor pressure at 20°C (68°F): 17 Pa
Density at 20°C (68°F): 13.534 g/cm³ (0.49 lb/in³)
Solubility in / Miscibility with water: Not miscible or difficult to mix

Section 10. Stability and reactivity
Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.
Materials to be avoided: Alkali metals
Dangerous reactions: Reacts with alkali metals.
Dangerous products of decomposition: Toxic metal oxide fume

Section 11. Toxicological information
LD/LC50 values that are relevant for classification: Inhalation LC50 30,000,000 ng/m3 (rat)
NIOSH IDLH 10,000,000 ng/m3

Primary irritant effect:
  On the skin: No irritant effect.
  On the eye: No irritant effect.

Sensitization: No sensitizing effects known.

Other information (about experimental toxicology):
  Tumorigenic effects have been observed on tests with laboratory animals.
  Reproductive effects have been observed on tests with laboratory animals.

Subacute to chronic toxicity:
  Acute and chronic exposure to inorganic mercury can cause salivation with metallic taste, pain on chewing, gingivitis, colitis, stomatitis, kidney damage, and central nervous system damage. Central nervous system effects include tremors, convulsive or shaking movements and psychic disturbances such as memory loss, insomnia, loss of confidence, irritability and depression.
  Excessive exposure may result in death.

Subacute to chronic toxicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) reports the following effects in laboratory animals:
  Skin and Appendages - dermatitis, allergic (after systemic exposure).
  Skin and Appendages - sweating.
  Cardiac - pulse rate increase, without fall in BP.
  Peripheral Nerve and Sensation - paresthesia.
  Lungs, Thorax, or Respiration - dyspnea.
  Lungs, Thorax, or Respiration - pulmonary emboli.
  Brain and Coverings - other degenerative changes.
  Kidney, Ureter, Bladder - other changes.
  Kidney, Ureter, Bladder - proteinuria.

The Registry of Toxic Effects of Chemical Substances (RTECS) reports the following effects in humans:
  Biochemical - enzyme inhibition, induction, or change in blood or tissue levels – other enzymes.
Behavioral – tremor, muscle weakness, wakefulness, anorexia (human), headache, alteration of classical conditioning, alteration of operant conditioning.
Gastrointestinal - hypermotility, diarrhea.
Sense Organs and Special Senses (Ear) - tinnitus.
Nutritional and Gross Metabolic - body temperature increase.
Liver - jaundice, other, or unclassified.
Reproductive – Paternal - spermatogenesis, Maternal - fertility - post-implantation mortality (e.g. dead/or resorbed implants per total number of implants), Embryo or Fetus - fetotoxicity (e.g., stunted fetus), specific developmental - central nervous system abnormalities.
Tumorigenic - equivocal tumorigenic agent by RTECS criteria, tumors at site of application.

Additional toxicological information:
The acute and chronic toxicity of this substance is not fully known.
EPA-D: Not classifiable as to human carcinogenicity: inadequate human and animal evidence of carcinogenicity or no data are available.
IARC-3: Not classifiable as to carcinogenicity to humans.
ACGIH A4: Not classifiable as a human carcinogen: Inadequate data on which to classify the agent in terms of its carcinogenicity in humans and/or animals.

Section 12. Ecological information
Ecotoxic effects: Very toxic for fish
General notes:
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Poisonous for plankton in water bodies.
Very toxic for aquatic organisms
Do not allow material to be released to the environment without proper governmental permits.

Section 13. Disposal considerations
Contact the Department of Environmental Health and Safety at 612-626-6436 for disposal guidance.

Section 14. Transport information
DOT regulations:
Hazard class: 8
Identification number: UN2809
Packing group: III
Proper shipping name (technical name): MERCURY
Label 8

Land transport ADR/RID (cross-border)
ADR/RID class: 8 (C9) Corrosive substances
Danger code (Kemler): 80
UN-Number: 2809
Packaging group: III
Description of goods: 2809 MERCURY

Maritime transport IMDG:
IMDG Class: 8
UN Number: 2809
Section 15. Regulations

Special labeling of certain preparations:
This product contains a chemical known to the state of California to cause reproductive toxicity.

National regulations:
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
Mercury is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

Section 16. Other information

Mercury containing devices were very common

- Mercury was used in temperature and pressure controls and electrical devices before electronic replacements became common
- Devices include: fluorescent light bulbs, thermometers, light switches and pressure sensing devices.

How we are usually exposed

- Ingestion of mercury
  - All food and water contains trace amounts. Especially, mercury is bioaccumulated in fish.
  - Average dietary intake is about 9,000ng/day for an adult male. (ATSDR)
- Inhalation of vapor
  - Natural degassing of mercury from the earth
  - Release of mercury by burning coal and wood
- Dental amalgams
- Spills

Mercury containing devices have occasionally broken and caused low levels of contamination on floors and walls. In addition, mercury has been spilled as devices were maintained. Demolition debris from old buildings is often contaminated with trace amounts of mercury.

Examples of locations were mercury was discovered:

1) Jones Hall –
   The building was originally part of the medical school.
   Mercury was found on the sub-floor after maple finish flooring was removed. Maple flooring had adsorbed
significant amounts of mercury. Mercury had been spilled into the brick walls under some window ledges and worked its way through the brick infill.

2) Wesbrook Hall
The building had been used as a dental clinic in the early 1900s. Mercury was found in abandoned domestic sewer system as flooring material was demolished.

3) Saint Anthony Falls Laboratory
Mercury was part of the pressure seal for a large hydraulic actuator built after 1930 or 1950 that was usually under water.
Glass ware

Fume Hood
Vacuum pump

Container of mercury

Contaminated masonry
Beads of mercury on floor
Old Main Heating Plant Operating Floor
Asbestos Safety Data Sheet

Section 1. Identification

Name: Asbestos

Asbestos is the name for a group of minerals that occur naturally in the ground. Bundles of fibers make up asbestos minerals. Three types of asbestos were commonly used to manufacture products.

- Chrysotile, sometimes called white asbestos, is composed of wavy, flexible white fibers and comprises 90 to 95 percent of the asbestos used in the U.S.
- Amosite, sometimes called brown asbestos, is composed of straight, light gray or brown fibers.
- Crocidolite, sometimes called blue asbestos, is composed of straight blue fibers.
- Anthophyllite, tremolite and actinolite are three other types of asbestos. They were not commonly used to manufacture products. However, tremolite contamination has been documented in vermiculite attic insulation, and caution should be used when dealing with this material.

Information about health effects is available at:
http://www.dehs.umn.edu/msds_sheets.htm
http://www.health.state.mn.us/divs/eh/hazardous/topics/asbestos/index.html

For emergency information call:
U of M Emergency: Facilities Management Hazardous Material Program or
911 (on the Twin Cities Campus 911 connects directly to the U of M Public Safety Emergency Communications Center)
# Hazardous Materials Program Contacts

<table>
<thead>
<tr>
<th>Twin Cities Campus</th>
<th>Sr. Project Manager</th>
<th>Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FM-HMP Supervisor</strong></td>
<td><strong>Dave Klaustermeier</strong></td>
<td><strong>John Sundsмо</strong></td>
</tr>
<tr>
<td><strong>Sean Gabor</strong></td>
<td><strong>Office: 612-624-6027</strong></td>
<td><strong>Office: 612-626-0313</strong></td>
</tr>
<tr>
<td><strong>Cell: 612-581-5806</strong></td>
<td><strong>Cell: 612-363-6134</strong></td>
<td><strong>Cell: 612-875-1771</strong></td>
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<td><strong>E-mail: <a href="mailto:gabor002@umn.edu">gabor002@umn.edu</a></strong></td>
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<td><strong>E-mail: <a href="mailto:sunds002@umn.edu">sunds002@umn.edu</a></strong></td>
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</table>

<table>
<thead>
<tr>
<th>Abatement Crew General</th>
<th>Project Manager</th>
<th>Project Manager</th>
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<tbody>
<tr>
<td><strong>Foreman</strong></td>
<td><strong>John Allen</strong></td>
<td><strong>Jayd Lindom</strong></td>
</tr>
<tr>
<td><strong>Troy Blanchard</strong></td>
<td><strong>Office: 612-625-6311</strong></td>
<td><strong>Office: 612-625-5052</strong></td>
</tr>
<tr>
<td><strong>Cell: 612-328-1232</strong></td>
<td><strong>Cell: 612-799-0712</strong></td>
<td><strong>Cell: 612-875-1771</strong></td>
</tr>
<tr>
<td><strong>E-mail: <a href="mailto:tblancha@umn.edu">tblancha@umn.edu</a></strong></td>
<td><strong>E-mail: <a href="mailto:allen029@umn.edu">allen029@umn.edu</a></strong></td>
<td><strong>E-mail: <a href="mailto:lindo010@umn.edu">lindo010@umn.edu</a></strong></td>
</tr>
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<thead>
<tr>
<th>Duluth Campus</th>
<th>Morris Campus</th>
<th>Crookston Campus</th>
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<tbody>
<tr>
<td><strong>Facilities Management</strong></td>
<td><strong>Plant Services</strong></td>
<td><strong>Agriculture/Natural Resources</strong></td>
</tr>
<tr>
<td><strong>Principal Environmental Health and Safety Technician</strong></td>
<td><strong>Environmental Health and Safety Specialist</strong></td>
<td><strong>Environmental Health and Safety Specialist</strong></td>
</tr>
<tr>
<td><strong>Mark Liske</strong></td>
<td><strong>Dale Livingston</strong></td>
<td><strong>Tom Feiro</strong></td>
</tr>
<tr>
<td><strong>E-mail: <a href="mailto:mliske@d.umn.edu">mliske@d.umn.edu</a></strong></td>
<td><strong>E-mail: <a href="mailto:livingda@mrs.umn.edu">livingda@mrs.umn.edu</a></strong></td>
<td><strong>E-mail: <a href="mailto:tfeiro@mail.crk.umn.edu">tfeiro@mail.crk.umn.edu</a></strong></td>
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<thead>
<tr>
<th>Lab/Training Specialist</th>
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<tbody>
<tr>
<td><strong>Masoud Mohsenian</strong></td>
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<td><strong>Masoud Mohsenian</strong></td>
</tr>
<tr>
<td><strong>Office: 612-625-4555</strong></td>
<td><strong>Office: 218-726-6332</strong></td>
<td><strong>Office: 612-625-4555</strong></td>
</tr>
<tr>
<td><strong>Cell: 612-209-8807</strong></td>
<td><strong>E-mail: <a href="mailto:mliske@d.umn.edu">mliske@d.umn.edu</a></strong></td>
<td><strong>Cell: 612-209-8807</strong></td>
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<tr>
<td><strong>E-mail: <a href="mailto:mohse003@umn.edu">mohse003@umn.edu</a></strong></td>
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<td><strong>E-mail: <a href="mailto:tfeiro@mail.crk.umn.edu">tfeiro@mail.crk.umn.edu</a></strong></td>
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<tr>
<td><strong>Plant Services</strong></td>
<td><strong>Agriculture/Natural Resources</strong></td>
</tr>
<tr>
<td><strong>Environmental Health and Safety Specialist</strong></td>
<td><strong>Environmental Health and Safety Specialist</strong></td>
</tr>
<tr>
<td><strong>Dale Livingston</strong></td>
<td><strong>Tom Feiro</strong></td>
</tr>
<tr>
<td><strong>E-mail: <a href="mailto:livingda@mrs.umn.edu">livingda@mrs.umn.edu</a></strong></td>
<td><strong>E-mail: <a href="mailto:tfeiro@mail.crk.umn.edu">tfeiro@mail.crk.umn.edu</a></strong></td>
</tr>
</tbody>
</table>
Section 2. – Hazard identification

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Signal word</th>
<th>Hazard statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger</td>
<td>May cause cancer (H350) Causes damage to organs, lungs and respiratory system, through prolonged or repeated exposure by inhalation (H372)</td>
<td></td>
</tr>
</tbody>
</table>

Precautionary Statements:
- P201 Obtain special instructions before use
- P202 Do not handle until all safety precautions have been read and understood
- P280 Wear protective gloves/protective clothing/eye protection/face protection

Disposal
Dispose of contents and container in accordance with regulations. Contact the Department of Environmental Health and Safety at 612-626-6002 for assistance.

Section 3. Composition Information
Asbestos is the name of a group of naturally occurring minerals which include the following: Chrysotile, Amosite, Crocidolite, Tremolite asbestos, Anthophyllite asbestos, Actinolite asbestos, and any form of these materials that have been chemically treated or altered.
CAS#: 1332-21-4; other CAS#: 132207-32-0; 77536-68-6; 77536-67-5; 12001-28-4; 12172-73-5; 12001-29-5; 77536-66-4
European Commission Number (EINECS#): 1999E7SC

Section 4. – First Aid measures
Immediately remove any clothing soiled by the product.

After inhalation
Seek immediate medical advice.

After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.

After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.

After swallowing
Seek immediate medical advice.

Occupational Medical Resources
HealthPartners Occupational and Environmental Medicine (HPOEM) is the provider of occupational health services for University employees in the Twin Cities.

Riverside Clinic, located at 2220 Riverside Avenue in Minneapolis, offers Occupational Health services as well as Urgent Care/After Hours.

St. Paul Clinic, just outside of downtown St. Paul at 205 S. Wabasha Street, offers Occupational Health services and
Urgent Care/After Hours.

**Como Avenue Clinic**, located at 2500 Como Avenue in St. Paul, will offer Urgent Care/After Hours services near the St. Paul Campus.

**St. Luke’s Hospital** is the provider of occupational health services for University employees on the Duluth Campus. It offers Occupational Health services and Urgent Care/After Hours.

Saint Luke’s Hospital, located at 915 E 1st Street, Duluth, MN

*Emergency Room:* (218) 249-5616

*Urgent Care:* (218) 249-6095

**Section 5. Fire Fighting Measures**

Asbestos is not flammable. Use firefighting measures that are appropriate for the surrounding fire.

In case of fire, asbestos fibers can be released.

Protective equipment:
- Wear self-contained respirator.
- Wear fully protective impervious suit.

**Section 6. Accidental Release Measures**


Person-related safety precautions:
- Wear protective equipment including respirator.
- Keep unprotected persons away.

Measures for environmental protection:
- Do not allow material to be released to the environment.

Measures for cleaning/collecting:
- Ensure containment of work area.
- Dispose contaminated material as waste according to item 13.
- Ensure adequate negative air pressure ventilation.

Additional information:
- See Section 7 for information on safe handling
- See Section 8 for information on personal protection equipment.
- See Section 13 for disposal information.

**Section 7. Handling and Storage**

Information for safe handling:
- Only trained personnel should handle asbestos-containing materials
- Asbestos is not flammable

Storage
- Requirements to be met by storerooms and receptacles: No special requirements.
- Information about storage in one common storage facility: Not required.
- Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well-sealed containers.

Section 8. Exposure controls and personal protection

Permissible exposure limits for asbestos must not exceed the following concentrations in air:

**Time weighted Average**: .1 fiber per cubic centimeter of air (f/cc) averaged over an 8-hour work shift
**Excursion Limit**: 1 fiber per cubic centimeter of air (f/cc) averaged over an 8-hour work shift

Occupational standards are based on the lowest observable adverse effect level (LOAEL) in healthy worker after career exposure.
Public exposure limits start with the LOAEL and
- Reduce for sensitive populations - especially fetus and infants
- Reduce for lifetime continuous 24/7 exposure
- Reduce for data uncertainty

**Occupational Standards**
- OSHA PEL 0.1 fiber per cubic centimeter (f/cc)
- OSHA STEL 1.0 fiber per cubic centimeter (f/cc)
- ACGIH TLV 0.1 fiber per cubic centimeter (f/cc)

**Public Exposure Standards**
- MDH Indoor Air Standard 0.01 fiber/cubic centimeter (f/cc)

Asbestos is classified as a Category 1 human carcinogen i.e. carcinogenic to humans

**Exposure controls**

**Personal hygiene**
- Use good personal hygiene
- Keep away from foodstuffs and beverages.
- Remove all soiled and contaminated clothing immediately.
- Wash hands before breaks and at the end of work.
- Clean and store protective clothing separately.

**Personal protective equipment**

**Breathing equipment**
- Use suitable respirator when high concentrations may be present. Refer to applicable Respiratory Protection Program.

**Protection of hands**
- Use impermeable (rubber) gloves
- Check protective gloves prior to each use for their proper condition.
- Protect hands and impermeable layer from abrasion

**Material of gloves**
- Nitrile or other impermeable layer plus abrasion resistant layer when needed

**Eye protection**
- Full face or half face respirator

**Body protection**
- Tyvek or other protective work clothing
- Dispose of work clothes
Section 9. Physical and chemical properties

General Information
Molecular weight: varies
Form: Noncombustible solid
Colors: White, Blue, or Brown
Odor: Odorless
Change in condition
Melting point/Melting range: 1112°F Decomposes
Boiling point/Boiling range: Decomposes
Sublimation temperature / start: Not determined
Flash point: Not determined
Ignition temperature: Not determined
Decomposition temperature: Not determined
Danger of explosion: Product does not present an explosion hazard.
Explosion limits:
   Lower: Not applicable
   Upper: Not applicable
Vapor pressure: 0 mm (approximately)
Density: asbestos: 2.0-2.8 kg/m³ (125-175 lb/ft³)
Density: asbestos shredded: .35 kg/m³ (22 lb/ft³)
Density: asbestos solid: 2.45 kg/m³ (153 lb/ft³)
Solubility in / Miscibility with water: Insoluble

Section 10. Stability and reactivity

Incompatibilities and Reactivities: None reported

Section 11. Toxicological information

Health effects of acute exposure:
   The major route of exposure is through inhalation and to a lesser extent ingestion
   In general, asbestos is not considered acutely toxic.
   Acute high level exposure may cause pleural disorders, mesothelioma or lung cancer after a latency period
Health effects of chronic exposure:
   The major route of exposure is through inhalation and to a lesser extent ingestion
   In general, asbestos is not considered acutely toxic.
   Acute high level exposure may cause pleural disorders, mesothelioma or lung cancer after a latency period
Other information (about experimental toxicology):
   Tumorigenic effects have been observed on tests with laboratory animals.
   Reproductive effects have been observed on tests with laboratory animals.
Additional toxicological information:
   The acute and chronic toxicity of this substance is not fully known.
   EPA-D: Not classifiable as to human carcinogenicity: inadequate human and animal evidence of carcinogenicity or no data are available.
   IARC-3: Not classifiable as to carcinogenicity to humans.
   ACGIH A4: Not classifiable as a human carcinogen: Inadequate data on which to classify the agent in terms of its carcinogenicity in humans and/or animals.

Section 12. Ecological information

Asbestos fibers do not evaporate into air or dissolve in water. However, pieces of fibers can enter the air and water from the weathering of natural deposits and the wearing down of manufactured asbestos products. Small
diameter fibers and fiber-containing particles may remain suspended in the air for a long time and be carried long distances by wind or water currents before settling. Larger diameter fibers and particles tend to settle more quickly. Asbestos fibers are not able to move through soil. They are generally not broken down to other compounds in the environment and will remain virtually unchanged over long periods. However, the most common form of asbestos, chrysotile may have some minor mineral loss in acidic environments. Asbestos fibers may break into shorter pieces or separate into a larger number of individual fibers as a result of physical processes. When asbestos fibers are breathed in, they may get trapped in the lungs. Levels of fibers in lung tissue build up over time, but some fibers, particularly chrysotile fibers, can be removed from or degraded in the lung with time. Please see the toxicological profile for more information on the behavior of asbestos in the environment.

Section 13. Disposal considerations
Contact the Facilities Management – Hazardous Materials Program for disposal guidance.

Section 14. Transport information
DOT regulations:
Hazard class: 9
Identification number: White Asbestos 2590, Brown and Blue Asbestos 2212
Packing group: White Asbestos III, Brown and Blue Asbestos II
Hazchem Code: 2X
Label 9
Note: Packaged dangerous goods only need to be marked with UN number, proper shipping name and Dangerous Goods Class label
Note: OSHA asbestos signs must be posted on waste vehicles when they are being loaded or unloaded

Section 15. Regulations
Special labeling:
EPA requires a label on every waste package with the name of the building owner or contractor (or whoever removed the asbestos) and the location of the job.
EPA requires a manifest (waste shipment form) system for all asbestos waste. After the waste is received and the landfill signs the form, the contractor and the landfill each keep one copy. In addition, the building owner should be given one copy.

Section 16. Other information
It is important to report any damaged asbestos-containing materials to the Facilities Management or DEHS immediately at the numbers noted in Section 1... Debris from damaged asbestos must be cleaned up by licensed asbestos abatement workers.
Do not attempt to clean up or fix the problem yourself! Disturb the material as little as possible. Take measures to prevent others from disturbing the spill until the asbestos abatement crew arrives.
By knowing where asbestos is likely to be located and then taking measures not to disturb it, you will protect yourself and others from exposure to this hazardous substance.
Contact Environmental Health and Safety at 612-626-6002 for regulatory information. There are many federal and state asbestos regulations, all with the goal of minimizing exposure to asbestos. DEHS has copies of these standards including Occupational Safety and Health Administration (OSHA) standard available.
All University buildings constructed prior to July 1, 1989 could have asbestos-containing materials.
- Moos Tower
- Elliott Hall
- Saint Anthony Falls Laboratory
Where does asbestos come from?
Asbestos is mined out of the ground from open pit mines. The mined rock is then taken to asbestos mills where the asbestos is separated from the rock. The raw asbestos is then sold to manufacturers where it has been used in over 3,000 products.

The top asbestos producing countries in 2010 were
1. Russia - 1,000,000 tons
2. China - 400,000 tons
3. Brazil - 270,000 tons
4. Kazakhstan - 214,000 tons
5. Canada - 100,000 tons
6. India - 20,000 tons

The top asbestos consuming countries in 2009 were
1. China - 626,000 tons
2. India - 302,000 tons
3. Russia - 280,000 tons
4. Kazakhstan - 109,000 tons
5. Brazil - 93,800 tons
6. Thailand, Ukraine, Uzbekistan - 86,500 tons

Why was asbestos used?
Asbestos fibers have special characteristics. Heat or chemicals do not affect them and they do not conduct electricity. Asbestos is also very strong. Pound for pound, asbestos is stronger than steel. Asbestos fibers are also very flexible, allowing them to be woven into cloth-like materials. This versatility is why industry has mined and widely used asbestos to make many different products.

Why should I be concerned about asbestos?
In general, the more asbestos a person is exposed to, the greater the risk of developing an asbestos-related disease. Exposure to asbestos occurs through inhalation of airborne microscopic fibers. Airborne asbestos can be present during renovation and demolition of buildings and building products. Residential and nonresidential buildings can contain asbestos materials. Untrained individuals performing asbestos-related work can expose themselves, other individuals in the building, or their own families by having their clothing or skin contaminated with asbestos fibers.
What kinds of products contain asbestos? There are over 3,000 known products that may contain asbestos. The following list identifies some of the commercially available products that may contain asbestos.

<table>
<thead>
<tr>
<th>Acoustical plaster</th>
<th>Adhesives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appliance components</td>
<td>Automotive products</td>
</tr>
<tr>
<td>• Brake linings</td>
<td>• Brake pads</td>
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<tr>
<td>• Clutch plates</td>
<td>• Caulking and putties</td>
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<tr>
<td>Ceilings Products</td>
<td></td>
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<tr>
<td>• Ceiling texture (Popcorn texture)</td>
<td>• Ceiling panels</td>
</tr>
<tr>
<td>• Ceiling tile mastic</td>
<td>• Ceiling tiles</td>
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<tr>
<td>• Chalkboards</td>
<td>• Chimney flue lining</td>
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<tr>
<td>• Ducts</td>
<td>• Pipes</td>
</tr>
<tr>
<td>• Siding</td>
<td>• Wall panels</td>
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<tr>
<td>Electrical products</td>
<td></td>
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<tr>
<td>• Electrical breakers</td>
<td>• Cloth wire insulation</td>
</tr>
<tr>
<td>• Electrical panel partitions</td>
<td>• Electrical panel arc chutes</td>
</tr>
<tr>
<td>• Insulating cloth</td>
<td>• Electrical panels</td>
</tr>
<tr>
<td>Fire blankets</td>
<td>• Stage fire curtains</td>
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<tr>
<td>Fire doors</td>
<td>• Spray-on fireproofing</td>
</tr>
<tr>
<td>Heating and Cooling System products</td>
<td>• Boiler insulation</td>
</tr>
<tr>
<td>• Boiler breeching insulation</td>
<td>• Cooling towers</td>
</tr>
<tr>
<td>• Duct work insulation</td>
<td>• Furnace insulation</td>
</tr>
<tr>
<td>• Gaskets</td>
<td>• Heat shields (paper and corrugated cardboard)</td>
</tr>
<tr>
<td>• HVAC vibration dampeners</td>
<td>• Pipe lagging insulation</td>
</tr>
<tr>
<td>• Pipe elbow insulation</td>
<td>• Tank insulation</td>
</tr>
<tr>
<td>• Tank casings</td>
<td>• Thermal taping compounds</td>
</tr>
<tr>
<td>Elevator equipment</td>
<td>• Elevator car brake shoes</td>
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<tr>
<td>• Elevator equipment panels</td>
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<tr>
<td>• Asphalt floor tiles</td>
<td>• Carpet mastic</td>
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<tr>
<td>• Coving mastic</td>
<td>• Floor tile mastic</td>
</tr>
<tr>
<td>• Vapor barriers</td>
<td>• Vinyl floor tiles</td>
</tr>
<tr>
<td>• Vinyl sheet flooring (linoleum)</td>
<td>• Industrial and laboratory use products</td>
</tr>
<tr>
<td>• Beverage filters</td>
<td>• Friction materials</td>
</tr>
<tr>
<td>• Heat resistant gloves</td>
<td>• Laboratory hoods</td>
</tr>
<tr>
<td>• Laboratory tables and countertops</td>
<td>• Paints and coatings</td>
</tr>
<tr>
<td>Roofing Products</td>
<td></td>
</tr>
<tr>
<td>• Felt</td>
<td>• Base flashing</td>
</tr>
<tr>
<td>• Tar or “Black Jack”</td>
<td>• Shingles</td>
</tr>
<tr>
<td>• Attic insulation</td>
<td>• Vermiculite</td>
</tr>
<tr>
<td>• Gardening products</td>
<td>• Fireplace decoration</td>
</tr>
<tr>
<td>• Wall Products</td>
<td>• Wall insulation</td>
</tr>
<tr>
<td></td>
<td>• Decorative plaster</td>
</tr>
<tr>
<td>Wall covering products</td>
<td>Spackling compounds</td>
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<tr>
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<tr>
<td>• Vinyl wall coverings</td>
<td>• Wall penetration packing materials</td>
</tr>
<tr>
<td>• Wallboard joint compound</td>
<td>• Wallboard or sheetrock</td>
</tr>
<tr>
<td>Window glazing</td>
<td></td>
</tr>
</tbody>
</table>
Attachment B Heat Stress and Cold Stress Guidelines

The purpose of this guideline is to outline procedures and practices designed to help prevent disorders that occur from working in hot work environments. This guideline also is designed to prepare personnel to recognize signs and symptoms of heat related illnesses and provide for prompt and adequate treatment.

Definitions

Acclimatization: The process the body goes through to enable it to function properly in a particular environment. Acclimatization to the environment in this standard refers to high heat conditions.

Heat Cramps: Painful muscle cramps caused by exposure to excessive heat when workers may or may not drink large quantities of water, but fail to replace their body’s salt loss.

Heat Exhaustion: Extreme weakness or fatigue, giddiness, nausea, or headache resulting from loss of fluid and/or salt through sweating.

Heat Rash: Red and inflamed bumps on the skin, usually accompanied by a prickly sensation, caused by a combination of excessive sweating and blocked sweat pores.

Heat Stress: The stress experienced by the body from heat and humidity, and complicated by personal characteristics such as age, weight, fitness, medical condition and lack of acclimatization to heat.

Heat Stroke: The failure of the body’s internal mechanism to regulate its core temperature, resulting in the body becoming overheated to a dangerous degree.

Maximum Internal Body Temperature: It is recommended that the employee’s deep body (core) temperature not exceed 100.4 degrees F (38 degrees C). This temperature is to be used as an overall gauge to determine if a worker is in any danger of having a heat related illness. This deep body temperature is based on the assumption that the employee is nearly acclimatized, fully clothed and is consuming adequate water and salts. On jobs where deep body temperature monitoring is required or being conducted, this temperature, when exceeded, must trigger the removal of the employee from the source of heat. (A reevaluation of the heat stress prevention procedures must be conducted along with an accident investigation to determine why the protective measures did not work or if another unseen factor contributed to the over exposure.)

Procedure Overview

Four environmental factors affect the amount of stress a worker faces in a hot working environment. These factors are temperature, humidity, radiant heat (such as from the sun), and air velocity.

Personal factors affect the ability of the body to resist heat stress illnesses. They include characteristics such as age, weight, fitness, medical condition and acclimatization to the heat. Short-term personal factors include alcohol, medication (prescription and non-prescription), diet, water and salt intake, sleep, and caffeine consumption.

The body reacts to high external temperature by circulating blood to the skin, which increases skin temperature and allows the body to release excess heat through the skin. However, if the muscles are being used for physical labor, less blood is available to flow to the skin and release the heat.

Sweating is another means the body uses to maintain a stable internal body temperature. However, sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost is adequately replaced.

If the body cannot dispose of excess heat, it will store it. When this happens, the body’s core temperature rises, and the heart rate increases. As the body continues to store heat, the individual begins to lose
concentration and has difficulty focusing on a task, may become irritable or sick, and often loses the desire to
drink and eat. The next stage is most often fainting, and death is possible if the person is not removed from
the heat.

A time of the year when heat stress should not be ignored is during spring and fall. During these times of year,
the temperatures often range from below freezing to cool in the same day. The employee's susceptibility to
heat stress occurs when he/she fails to wear sufficient layers of warm clothing. As the day grows warmer, the
employee starts to sweat under his shirt and heavy jacket or insulated coveralls. At this point the employee
takes off his jacket or coveralls and realizes that it still is too cold without it, so they put their jacket or
coveralls back on. With this thick insulation around the body, the body’s sweating mechanism will not work.
The body will sweat, but little heat will dissipate. This stored heat can eventually lead to heat stress.

The key to protecting the employee is multi-layered clothing underneath the heavy jacket or coveralls. As it
gets warmer, remove a layer of clothing. At some point, the jacket or coveralls get too warm and will need to
be removed and replaced with some of the removed layers of clothing.

**Heat Stroke Identification and Treatment**

Heat Stroke: This is the most serious health problem for workers in hot environments and is caused by the
failure of the body’s internal mechanism to regulate its core temperature. Sweating stops and the body can no
longer rid itself of excess heat. Signs may include:

- mental confusion, delirium, loss of consciousness, convulsions or coma
- a body temperature of 106 degrees F (41 degrees C) or higher
- loss of consciousness
- hot dry skin which may be red, mottled, or bluish
- victims of heat stroke may die unless treated promptly

Heat Stroke First Aid: Get the employee suffering from heat stroke to a Doctor/Hospital immediately. While
awaiting medical help, the employee must be moved to a cool area and his or her clothing soaked with cool
water. Place the injured in a comfortable position and fan them vigorously to increase cooling. Prompt first aid
can prevent permanent injury to the brain and other vital organs. Water may be given to a conscious person.
Don’t let the employee drink too quickly. Give the employee 4 ounces of water every 15 minutes. If the
employee begins to vomit, stop giving water and place employee on their side.

**Heat Exhaustion Identification and Treatment**

Heat Exhaustion: Results from the loss of fluid through sweating and when a worker has failed to drink enough
fluids or take in enough salt, or both. The employee with heat exhaustion still sweats but experiences extreme
weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pales or
flushed, and the body temperature is normal or slightly higher.

Heat Exhaustion First Aid: The person should rest in a cool place and drink water or can be given an electrolyte
solution (a beverage used by athletes to quickly restore potassium, calcium, and magnesium salts). These
fluids should be given in 4-ounce portions, every 15 minutes. For severe cases involving victims who vomit or
lose consciousness, medical attention is strongly recommended.

**Heat Cramp Identification and Treatment**

Heat Cramps: Painful muscle spasms are caused when workers are exposed to high heat and may or may not
drink large quantities of water but fail to replace their bodies’ salt loss. Tired muscles, those used for
performing the work, are usually the ones most susceptible to cramps.
Heat Cramp First Aid: Cramps may occur during or after working hours and may be relieved by taking liquids by mouth or saline solutions intravenously for quicker relief if medically determined to be required.

Heat Rash Identification and Treatment

Heat Rash: Also known as prickly heat may occur in hot and humid environments where sweat is not easily evaporated from the surface of the skin. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep, impedes a worker’s performance or even results in temporary total disability. It can be prevented by periodically resting in a cool place and allowing the skin to dry.

Heat Rash First Aid: Keep the rash as dry as possible.

Heat Stress Prevention

Heat-related health problems can be prevented or the risk of developing them reduced. Listed below are a few basic precautions which will help prevent heat stress.

Engineering controls including general ventilation (this can actually create a problem, ventilation with hot air affects the ability of the body to deal with the heat) and spot cooling by local exhaust ventilation at points of high heat production may be helpful. Evaporative cooling and mechanical refrigeration are other ways to reduce heat. Cooling fans can also reduce heat. Personal cooling devices using compressed air, ice packs, special fabrics that cool when wetted or reflective protective clothing are other ways to reduce the hazards of heat exposure for workers.

Recommended Practices

Increased air velocity. Fans are simple way to increase the body’s ability to cool off. Fans become less effective at around 95 degrees F. (35 degrees C.) especially when the humidity is > 70%. A good rule of thumb is that fans don’t cool you off above 98 degrees F. (37 degrees C.) and if air temperature is above body temperature it will increase the heat stress.

Cooling PPE. Ice vest or bandannas, wristlets, and head bands which have crystals contained in fabric which, when soaked for 30 minutes in water, will keep the fabric well below body temperature all day. These products can be reused.

Monitor core temperature of at risk workers with baby ear thermometer. If temperature rises above 100.4 degrees, stop work.

Schedule rest breaks in a cool area when feasible.

Alternating work and rest periods are required where high heat conditions exist. Scheduled rest periods in a cool area can help workers avoid heat stress. If possible, heavy work should be scheduled during the cooler parts of the day and appropriate protective clothing provided, such as bandannas, or ice vest. Extra heavy clothing such as coveralls over street clothes must be avoided.

Training

Training all employees to recognize and treat heat stress disorders is essential to heat stress prevention.
Employee education is vital for all workers to ensure they are aware of the need to replace fluids and salt lost through sweating. Training should include the ability to recognize dehydration, heat cramps, salt deficiency, heat exhaustion, and heat stroke as heat disorders. Training should also include how to avoid heat related disorders and advice to stop work when they appear and seek treatment. Training should be conducted at the beginning of a project, initiated in the hot season and once a month until seasonal conditions change. Training shall be conducted for new employees during the pre-entry safety briefing.

The HSTL will be trained to detect early signs of heat stress and will permit workers to interrupt their work if they are extremely uncomfortable.

**Cold Stress**

Fatal exposures to cold have been reported when persons fail to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F, can be life-threatening. A drop in core temperature to 95°F or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind chill must be considered as it contributes to the effective temperature. The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose (fuel) production, and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold exposures as the body's nerve impulses slow down, individuals react sluggishly and numb extremities make for increased clumsiness. Additional safety hazards include ice, snow blindness, reflections from the snow, and possible skin burns from contact with cold metal.

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the HSTL if any of the predisposing factors listed below apply to that individual. This enables the HSTL to monitor the individual if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold-related illness/disorder.

**Predisposing Factors**

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below.

- **Dehydration** – The use of diuretics and alcohol, and diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.
- **Fatigue during physical activity** – Exhaustion reduces the body’s ability to contract blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.
- **Age** – Some elderly and very young individuals may have an impaired ability to sense cold.
- **Alcohol consumption** – Alcohol dilates the blood vessels near the skin surface resulting in body heat loss.
- **Sedative drugs** – Sedatives may interfere with the transmission of impulses to the brain thereby interfering with the body’s physiological defense against cold.
- **Poor circulation** – Vasoconstriction of peripheral vessels reduces blood flow to skin surface.
- **Heavy workload** – Heavy workloads generate metabolic heat and make an individual perspire. If perspiration is absorbed by the individual’s clothing and is in contact with skin, cooling of the body will occur.
- **The use of PPE** – PPE usage which traps sweat inside the PPE may increase an individual’s susceptibility to cold stress.
• Lack of acclimatization – Acclimatization, the gradual introduction of workers into a cold environment allows the body to physiologically adjust to cold working conditions.

• History of cold injury – Previous injury due to cold exposures may result in increased cold sensitivity.

Preventing Cold Stress

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing cold related illness/disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well-balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules, and employee education.

• Acclimatization: Acclimatization is the gradual introduction of workers into a cold environment to allow their body to physiologically adjust to cold working conditions. However, the physiologic changes are usually minor and require repeated uncomfortably cold exposures to induce them.

• Fluid and Electrolyte Replenishment: Cold, dry air can cause employees to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, nonalcoholic drinks and soup are good sources to replenish body fluids.

• Eating a Well-Balanced Diet: Restricted diets including low-salt diets can deprive the body of elements needed to withstand cold stress. Eat high-energy food throughout the day.

• Warm Clothing: It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.

• Work Schedule Adjustment: Schedule work during the warmest part of the day if possible; rotate personnel; and, adjust the work schedule to enable employees to recover from the effects of cold stress.

The parts of the body most important to keep warm are the feet, hands, head and face. As much as 40% of body heat can be lost when the head is exposed. Recommended Clothing includes:

• Inner layers (t-shirt, shorts, socks) should be of thin, thermal insulating and moisture wicking material such as polypropylene.

• Wool or thermal trousers. Denim is not a good protective fabric since it absorbs moisture very well.

• Felt-lined, rubber-bottomed, leather-topped boots with a removable felt insole is preferred. Wool socks with polypropylene inner socks. Consider winter boots one half size larger than regular size to accommodate thick socks.

• Wool or thermal shirts/sweaters should be worn over inner layer.

• A wool cap is good head protection. Use a liner under a hard hat.

• Mittens are better insulators than gloves. Wool liners for either mittens or gloves.

• Face masks or scarves are good protection against wind.

• Tyvek/polycoated Tyvek provide good wind protection.

• Wear loose fitting clothing, especially footwear. Consider winter boots a half size larger than regular shoes to accommodate thick socks.

• Carry extra clothing in vehicle. Change out of wet clothes or socks.

Provision of Shelter from the Cold: Shelters with heaters should be provided for the employees rest periods if possible. Sitting in a heated vehicle is a viable option. Care should be taken that the exhaust is not blocked and that windows are partially open to provide ventilation.
Thermal Insulation of Metal Surfaces: At temperatures of 30 degrees F or lower, cover metal tool handles with thermal insulating material if possible.

Employee Education: Employees have already been trained to recognize and treat the effects of cold stress during their 40-hour training. Signs, symptoms and treatment of cold stress should be reviewed in project safety meetings where applicable. The Buddy System will help in preventing cold stress once the employees are trained to recognize the signs and symptoms of cold stress.

**Suggested Cold Stress Prevention Guidelines**

It may not be practically or economically feasible to implement all the above prevention measures. Follow the guidelines given below when the ambient air temperature is -5 degrees F or lower:

- Contact the HSTL to determine if the Site worker should continue working in such temperatures.
- Dress warm.
- Replenish fluids and electrolytes at regular intervals.
- Provide shelter from the cold.
- Adjusting work-rest schedules.
- Cold Stress First-Aid Treatment Guidelines

**Table B-1. Cold Stress First-Aid Treatment Guidelines**

<table>
<thead>
<tr>
<th>Frostbite</th>
<th>May be painless. Tips of ears, nose, cheeks, fingers, toes, chin affected. Skin blanched white.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incipient (frost nip)</td>
<td>Superficial Affects skin/tissue just beneath skin; turns purple as it thaws. Skin is firm, waxy; tissue beneath is soft, numb.</td>
</tr>
<tr>
<td>Deep</td>
<td>Tissue beneath skin is solid, waxy, and white purplish tinged. Entire tissue depth is affected.</td>
</tr>
</tbody>
</table>

**First-Aid Treatment Guidelines:**

- **Incipient** Warm by applying firm pressure—no rubbing; or blow warm breath on spot; or submerge in warm water (102-110 deg. F).
- **Superficial** Provide dry coverage, steady warmth; submerge in warm water.
- **Deep** Hospital care is needed. Don’t thaw frostbitten part if needed to walk on. Don’t thaw if there is danger of refreezing. Apply dry clothing over frostbite. Submerge in water; do not rub.

**General Hypothermia**

<table>
<thead>
<tr>
<th>Stages:</th>
<th>Symptoms of Hypothermia:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shivering</td>
<td>Muscle Tension, Coordination Loss</td>
</tr>
<tr>
<td>Indifference</td>
<td>Uncontrollable Shivering, Stumbling Decreased Muscle Function, Fatigue Speech</td>
</tr>
<tr>
<td>Decreased</td>
<td>Distortion, Forgetfulness</td>
</tr>
<tr>
<td>Consciousness</td>
<td>Glassy Stare, Freezing Extremities</td>
</tr>
<tr>
<td>Unconsciousness</td>
<td>Blue, Puffy Skin, Dilated Pupils</td>
</tr>
<tr>
<td>Death</td>
<td>Slow Pulse, Shallow Breathing</td>
</tr>
</tbody>
</table>

**Emergency Response:**

- Keep person dry; replace wet clothing
- Apply external heat to both sides of patient using available heat sources, including other bodies
Give warm liquids—not coffee or alcohol—after shivering stops and if conscious
Handle gently
Transport to medical facility as soon as possible
If more than 30 minutes from a medical facility, warm person with other bodies

**Wind Chill Index**

The human body senses cold as a result of both air temperature and wind velocity. Cooling of exposed flesh increases rapidly as the wind velocity goes up. Frostbite can occur at relatively mild temperatures if wind penetrates the body insulation. For example, when the actual air temperature of the wind is 40°F and its velocity is 30 mph, the exposed skin would perceive this situation as an equivalent still air temperature of 13°F.

If the actual wind speed is not known, the following examples are provided to approximate wind speed. 5 mph = Light flag moves
10 mph = Light flag fully extended
15 mph = Raise newspaper sheet
20 mph = blowing and drifting snow

**Table B-2: Wind Chill Index Chart**

Table B-2. Wind chill Index shows a chart that can help in determining the wind chill index. Site work should be terminated when there is a great danger of freezing exposed flesh.

<table>
<thead>
<tr>
<th>Estimated Wind Speed (in mph)</th>
<th>Actual Temperature Reading (°F)</th>
<th>Equivalent Chill Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calm</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
<td>37</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
<td>28</td>
</tr>
<tr>
<td>20</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>25</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>35</td>
<td>27</td>
<td>11</td>
</tr>
</tbody>
</table>

(Wind speeds greater than 40 mph have little additional effect.)

| Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F) per cold stress TLV. |

From: *Threshold Limit Values and Biological Exposure Indices*, ACGIH 2005. Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.
**ATTACHMENT C SEVERE WEATHER EMERGENCY PROCEDURES**

**Severe Weather**

1.0 **Scope**

When projects are conducted outside, the potential for severe weather must be considered. Thunderstorms, tornadoes, and winter storms can develop quickly, jeopardizing worker safety. The following emergency procedures are to be followed in case of severe weather.

2.0 **Thunderstorms and Lightning**

Monitor weather conditions at all times while working outside. Monitor for a sign of an impending storm such as increased cloudiness, darkened skies, and increased wind. If any of these signs are observed, contact HSTL to get current assessment of weather conditions.

When a thunderstorm accompanied by lightning is in the project area, cease work immediately. All powered equipment, such as drill rigs, is to be shut down. Seek shelter inside nearby buildings or trailers. If there are no buildings nearby, seek shelter inside your vehicle.

If you are caught outside, do not stand beneath tall, isolated trees or telephone poles. Avoid areas projecting above the landscape such as hilltops. In open areas, go to a low place such as a ravine or valley. Stay away from open water, metal equipment, wire fences, and metal pipes. If you are in a group of people in the open, spread out, staying several yards apart.

If you are caught in a level field or open area far from shelter and you feel your hair stand on end, lightning may be about to strike you. Drop to your knees and bend forward, putting your hands on your knees. DO NOT LIE FLAT ON THE GROUND.

If someone has been struck by lightning, monitor life signs and begin administering mouth-to-mouth resuscitation or cardiopulmonary resuscitation as needed. Send for medical assistance. Check conscious victims for burns, especially at the fingers and toes and next to buckles and jewelry. Administer first aid for shock. Do not let the victim walk around.

3.0 **Tornadoes**

Tornadoes usually develop from thunderstorms and normally occur at the trailing edge of the storm. Most tornadoes occur in the months of April, May, June, and July in the late afternoon and early evening hours.

When storms are predicted for the project area, the HSTL will monitor weather conditions. A tornado watch is issued when favorable conditions exist for the development of a tornado. A tornado warning is issued by the local weather service office whenever a tornado has actually been sighted or is strongly indicated by radar.

If a tornado warning is issued, seek shelter immediately. If there are permanent buildings located on Site, go there immediately, moving toward interior hallways or small rooms on the lowest floor.

If a tornado warning is issued and you are in a vehicle, leave and go to the nearest building. If there are no buildings nearby, go in the nearest ditch, ravine, or culvert, with your hands shielding your head.

If a tornado is sighted or a warning issued while you are in open country, lie flat in a ditch or depression. Hold onto something on the ground, such as a bush or wooden fence post, if possible. Once a tornado has passed the site, Site personnel are to assemble at the designated assembly area to determine if anyone is missing. Administer first aid and seek medical attention as needed.

4.0 **Winter Storms**
When snow or ice storms are predicted for the project area, the HSTL will monitor weather conditions. A winter storm watch is issued when a storm has formed and is approaching the area. A winter storm warning is issued when a storm is imminent and immediate action is to be taken.

When a storm watch is issued, monitor weather conditions and prepare to halt Site activities. Notify the project manager of the situation. Seek shelter at Site buildings or leave the Site and seek warm shelter. If you are caught in a severe winter storm while traveling, seek warm shelter if road conditions prevent safe travel.

If you are stranded in a vehicle during a winter storm:

- **STAY IN THE VEHICLE** – disorientation comes quickly in blowing and drifting snow;
- Wait for help;
- Keep a window open an inch or so to avoid carbon monoxide poisoning;
- Run the engine and heater sparingly;
- Keep watch – do not let everyone sleep at the same time; and
- Exercise occasionally.