Radiological Health, Safety and Environmental Services
A USA Environment, L.P. Company

HEALTH AND SAFETY PLAN FOR NON-COMBUSTIBLE COVER INSTALLATION AT WEST LAKE LANDFILL, OPERABLE UNIT 1

BRIDGETON, ST. LOUIS COUNTY, MISSOURI

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1 INTRODUCTION

This Health and Safety Plan (HASP) was developed for the Operable Unit 1 Respondents Group (OUR Group) employees and subcontractors under agreement with OUR Group for subsurface investigations in Operable Unit 1 (OU-1), Radiological Areas 1 and 2 of the West Lake Landfill Superfund site, ("the Site" as pictured in Figure 1). As described in the Work Plan (EMSI 2016), a non-combustible cover will be placed over exposed radiologically-impacted (RIM) deposits within Radiological Areas 1 and 2 of the West Lake Landfill Superfund site (Figure 2 and Figure 3).

The purpose of this HASP is to provide background information and establish standard personal protection standards and health and safety policies/procedures for work practices during surface preparation and installation of the non-combustible cover within Areas 1 and 2. Prior to beginning work, workers will be required to read this HASP and sign the Compliance Agreement included in Appendix A.

The levels of protection and the procedures specified in this HASP are based on information available at this time, and represent the minimum health and safety requirements to be observed by contractor and sub-contractor employees while engaged in this project. Unforeseeable site conditions may warrant the use of higher levels of protection. Subcontractors are required to provide the necessary safety equipment and safety training to their personnel in compliance with the Occupational Safety and Health Administration (OSHA) regulations provided in 29 CFR 1926.

The content of this HASP may change or undergo revision as additional information is obtained during field activities. Any changes to this HASP must be reviewed by the Project Health and Safety Officer and are subject to approval by the Project Manager.

Field personnel must read this document carefully. If you have any questions or concerns that you feel are not adequately addressed, ask your supervisor or the Project Health and Safety Officer. Follow the designated health and safety procedures, be alert to the hazards associated with working on any construction site in close proximity to heavy equipment, and above all else, use common sense and exercise reasonable caution at all times.

The HASP is organized as follows:

- Section 2 describes the project safety personnel;
- Section 3 provides information regarding the West Lake Landfill site;
- Section 4 summarizes the field activities to be conducted as part of the cover installation;
- Section 5 presents an evaluation of the hazards that may be encountered during the performance of the field activities and includes control measures for the hazards;
- Section 6 includes general training requirements;

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- Section 7 describes the general health and safety procedures to be employed during the field activities; and
- Section 8 lists the emergency contacts and the procedures to be implemented in the event of an accident or other emergency.
- Section 9 provides a list of references.

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2 PROJECT SAFETY PERSONNEL

Personnel responsible for project safety during the installation of the non-combustible cover within Areas 1 and 2 are the Project Manager, the Project Health and Safety Officer, the Radiation Safety Officer, and the On-Site Health and Safety Officer for each subcontractor.

The Project Health and Safety Officer has responsibility for establishing appropriate health and safety procedures for the project (as presented in this Health and Safety Plan) and has the authority to implement those procedures including, if necessary, the authority to temporarily pause the project for health and safety reasons. The Radiation Safety Officer will be responsible for radiological safety training to contractor and subcontractor workers and site visitors; radiological surveying of work sites, access roads, equipment, and personnel; gamma walkover surveys and soil sampling; and radiological health and safety monitoring. The On-Site Health and Safety Officer for each subcontractor will be responsible for assuring that the procedures specified in this Health and Safety Plan are implemented in the field and also has the authority to temporarily shut down the project for health and safety reasons. The Project Manager will have overall responsibility for project health and safety and has the authority to take whatever actions may be necessary to provide a safe working environment for FEI and Subcontractor personnel. The personnel fulfilling these responsibilities and their mobile telephone numbers are included in Table 1.

The Site (see description in Section 3) is located on an approximate 200-acre site managed by Bridgeton Landfill, LLC, a subsidiary of Republic Services, Inc. In addition to the project-specific personnel listed above, the on-site Environmental Manager for Republic Services has authority to decide on the continuation or stoppage of all work being conducted on the 200-acre site, including activities in Areas 1 and 2.

The ultimate responsibility for the health and safety of the individual employee rests with the employee. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her own health and safety, and that of fellow employees. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of their fellow employees and the appropriate health and safety personnel.

Should an employee find himself or herself in a potentially hazardous situation, the employee shall immediately discontinue the hazardous procedure(s) and personally take appropriate preventative or corrective action, and immediately notify the Project Health and Safety Officer of the nature of the hazard. Any site personnel may stop any work activity that is assessed to be an imminent safety hazard, emergency situation, or other potentially dangerous situation.

Once work has been halted for any safety reason, the on-site Health and Safety Officer for the specific contractor and the Project Manager must be notified immediately by the party calling

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for the stop. The reasons for the work stoppage will be discussed with the Project Health and Safety Officer and the Project Manager. The Project Manager will make the decision as to whether work may continue or if actions need to be taken to correct an unsafe situation or activity.

Table 1 Project Safety Personnel and Contact Information

Title	Company	Name	Mobile Telephone
Project Manager	EMSI	Paul Rosasco	(217) 836-8842
Project Health and Safety Officer	FEI	Jonathan Wilkinson	(636) 578-8635
Project Radiation Safety Officer	Auxier & Associates	Cecilia Greene	(865) 621-3076
On-Site Radiation Control Officer	Auxier & Associates	Alex Luna	(505) 463-2895
On-site Health and Safety Officer	Kuesel Excavating Co.	Dan Schaefer	(314) 393-2231
On-site Health and Safety Officer	Weaver Consultants (surveying)	Collin Carson	(618) 792-3232
Environmental Manager (EM)	Republic Services	Brian Power	(618) 410-0157

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3 SITE INFORMATION

This section includes discussions on the site location and surrounding areas, historical landfill operations and disposal areas, the West Lake Superfund Site Operable Units 1 and 2, and current site uses. Information regarding climate in the area and surface water runoff drainage patterns are also provided.

3.1 Site Location and Surrounding Area

Radiological Areas 1 and 2 make up OU-1 of the West Lake Landfill Superfund Site. Near-by, landfill related areas include the permitted North and South Quarry Landfills that make up the Bridgeton Sanitary Landfill and the former Demolition Landfill, and the Inactive Sanitary Landfill. The Site is located within the western portion of the St. Louis metropolitan area approximately two miles east of the Missouri River, and approximately one mile north of the intersection of Interstate 70 and Interstate 270 within the city limits of the City of Bridgeton in northwestern St. Louis County.

St. Charles Rock Road (State Highway 180) runs adjacent to the Site along the east and northeast by [Figure 1]. Commercial and industrial properties are found immediately to the north of the Site, across St. Charles Rock Road to the north and east, and to the south of the Site. The Site is bounded on the west by Old St. Charles Rock Road (vacated) and the Earth City Industrial Park stormwater/flood control pond. The Earth City commercial and industrial complex continues to the west and north of the stormwater/flood control pond and extends from the site to the Missouri River. Earth City is separated from the Missouri River by an engineered levee system.

3.2 Historic Landfill Operations and Disposal Areas

The West Lake Landfill is an approximately 200-acre parcel containing multiple areas of past operations. The site was used agriculturally until a limestone quarrying and crushing operation began in 1939 and continued until 1988. Beginning in the early 1950s or perhaps the later 1940s, portions of the quarried areas and adjacent areas were used for landfilling municipal refuse, industrial solid wastes, and construction/demolition debris.

3.3 Superfund Operable Units

Operable Unit 1 is comprised of the solid wastes and radiologically-impacted materials disposed in Areas 1 and 2 and portions of an adjacent property, the Buffer Zone/Crossroad Property.

Area 1 is situated on the northern and western slopes of a topographic high within the overall West Lake landfill property. Ground surface elevation in Area 1 varies from 490 feet above mean sea level (AMSL) on the south to 452 feet AMSL at the roadway near the transfer station entrance (Figure 2).

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Area 2 is situated between a topographic high of landfilled materials on the south and east, and the Buffer Zone/Crossroad Property on the west. The highest topographic level in Area 2 is about 500 feet AMSL on the southwest side of Area 2, sloping to approximately 470 feet AMSL near the top of the landfill berm (Figure 1). The upper surface of the berm along the western edge of Area 2 is located approximately 20 to 30 feet above the adjacent Buffer Zone/Crossroad Property and approximately 30 to 40 feet higher than the water surface in the flood control channel located to the south-west of Area 2. A berm on the northern portions of Area 2 controls runoff to the adjacent properties.

Municipal solid waste, construction and demolition debris, quarry spoil material and possibly other wastes were disposed of in Areas 1 and 2. Reportedly, 39,000 tons of soil mixed with approximately 8,700 tons of leached barium-sulfate residue were sent to West Lake Landfill over the period from July through October 1973 (Nuclear Regulatory Commission [NRC], 1976 and 1988 and RMC, 1982). These radiological constituents in Areas 1 and 2 occur in soil materials that are intermixed with and interspersed within the overall matrix of landfilled refuse, debris and fill materials, and unimpacted soil and quarry spoils. In some portions of Areas 1 and 2, radiologically-impacted materials are present at the surface; however, the majority of the radiological occurrences are present in the subsurface beneath these two areas. At the Buffer Zone/Crossroads properties the radiologically-impacted materials are found in soils reportedly carried by erosion from the Area 2 berm prior to growth of the current on-site vegetation.

In general, the primary radionuclides detected at levels above background concentrations at the West Lake Landfill are part of the uranium-238 and uranium-235 decay series, with thorium-230 and radium-226 being the primary radionuclides of concern at the Site. Thorium-232 and its decay products have also been detected above background levels but at a lesser frequency.

3.4 Current Site Uses

The West Lake Landfill is located in a predominantly industrial area. Areas 1 and 2 of OU-1 are currently inactive. Access to these areas is restricted by fences and locked gates. The entire landfill area, with the exception of the Buffer Zone, has been the site of historic quarry operations to remove limestone, and landfill operations.

3.5 Climate and Meteorology

The climate of the landfill area is typical of the Midwestern United States with a modified continental climate that has four distinct seasons.

Winter temperatures are generally not severe with the first frost usually occurring in October and freezing temperatures generally not persisting past March. Records since 1870 show that temperatures drop to zero °F or below an average of two or three days per year. Temperatures

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remain at or below freezing less than 25 days in most years. Summers in the St. Louis area are hot and humid. The long-term record since 1870 indicates that temperatures of 90 degrees Fahrenheit or higher occur on about 35 to 40 days per year. Extremely hot days of 100 degrees Fahrenheit or more generally occur no more than five days per year.

Normal annual precipitation as measured at nearby Lambert Field International Airport based on records dating back to 1871 is a little less than 34 inches. The three winter months are usually the driest, with an average total of approximately 6 inches of precipitation. Average snowfall per winter season is slightly greater than 18 inches. Snowfall of an inch or more is received on five to ten days in most years. Record snowfall accumulation over the past 30 years was 66.0 inches recorded during the 1977 –78 winter season. The spring months of March through May are the wettest with normal total precipitation of just under 10.5 inches. Thunderstorms normally occur 40 to 50 days per year. During any given year, a few of these storms can be classified as severe with hail and damaging wind. Tornadoes have occurred in the St. Louis area.

Between December and April, the predominant wind direction at Lambert Field is from the northwest and west-northwest. Throughout the remainder of the year, the predominant wind direction is from the south. Considering potential differences in topography between Lambert Field and the West Lake Landfill, the actual wind directions at the landfill may be slightly different, possibly skewed in a northeast-southwest direction parallel to the Missouri River valley.

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4 DESCRIPTION OF WORK

The objective of the interim action is to cover all exposed RIM with a non-combustible cover. This requires identification and delineation of surface soil in Operable Unit 1 containing RIM, improving access within potentially impacted areas of Operable Unit 1 by removing obstructing vegetation and building utility roads, and covering all exposed RIM with non-combustible cover materials. Work activities associated with these activities are discussed in more detail in the following sub-sections.

4.1 Identification and Delineation of RIM

The following description is intended to provide a basis for the hazard analysis that follows this section by identifying and listing the types of work activities performed as part of the investigation designed to locate and delineate the extent of the RIM in Operable Unit 1. It is not intended to describe quantitative details like the numeric criteria used to delineate areas or analytical specifications to be followed by laboratories. Those details may be found in the Surface Rim Identification, Sampling, and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) West Lake Superfund Site Operable Unit 1. (Auxier 2016a).

4.1.1 Overland Gamma Survey

This will be performed by teams of technicians carrying radiation detectors linked to GPS units as they walk along transit lines designed to survey uneven terrain in Areas 1 and 2. Data collected during the overland gamma survey will be plotted on a 2-dimensional (2-D) map of the area using color-coded markings to identify the relative strengths of the gamma fields encountered. This 2-D map will guide land surveyors as they stake the perimeters of areas of exposed RIM containing actionable levels of gamma emitting radionuclides. These stakes will effectively delineate the extent of gamma-emitting RIM like radium-226 on the surface of Operable Unit 1.

Both sets of surveyors will be expected to safely traverse irregular terrain and step over or push through vegetation while carrying equipment. Due to scheduling, these surveyors are likely to be exposed to cold, wet conditions.

4.1.2 Surface Soil Sampling

Once the extent of exposed gamma emitters has been delineated by staking or other suitable marking technique, confirmatory soil samples may be collected adjacent to, and just outside of, the staked perimeter. These surface soil samples will be packaged and sent to an off-site lab for radiological analysis to determine if thorium-230 is present in actionable levels. The locations of these samples will be digitally recorded using GPS technology.

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The sample collectors and property surveyors involved with this activity will be expected to walk over irregular terrain and low vegetation while carrying bulky equipment. Due to scheduling, these surveyors are likely to be exposed to cold, wet conditions.

4.1.3 Flora Sampling

Vegetation samples will be collected using various methods including, but not limited to, tree coring and gathering of small wood chips and branch clippings. The sample collectors will be expected to walk over irregular terrain and low vegetation while carrying bulky equipment. Due to scheduling, these surveyors are likely to be exposed to cold, wet conditions.

4.2 Improving Access

Improved access to the site is required to support the radiological survey work, allow vehicle access to the areas to be capped and to remove obstacles in the area to be capped

4.2.1 Brush Clearing

Vegetation will be cleared by selective woody vegetation removal techniques which allow small, powered equipment such as a skid steer rotary brush and tree cutter to cut and grind the vegetation in place. A chipper may be used to reduce larger pieces if needed. Selective clearing using hand-tools like clippers and saws may also occur as appropriate. Vegetation clearing will involve walking and physical labor while standing on uneven terrain. Use of hand-tools and operation of machines with cutting blades is anticipated.

All operations, but particularly this activity, will be monitored for the presence of visible dust. If an episode of dust generation lasting more than ten minutes is observed, the operation will be paused and activities will be reevaluated and modified until dust generation ceases.

4.2.2 Road Building

Once a path is cleared, geotextile fabric may be rolled over the path before spreading rock aggregate along the cleared alignments to create a utility road. This task is likely to involve using small, powered equipment and dump trucks to spread and haul the aggregate. Some shovel work and physical labor may also be needed at times.

4.3 Surface Preparation and Capping

4.3.1 Surface preparation

If the area of RIM identified in the investigative portion of this Interim Action includes sloped areas or areas that are otherwise unsafe to traverse with heavy equipment, it may be necessary to alter the grade of the inaccessible area or move debris to allow the non-combustible cover to be applied to the surface.

This could involve the use of powered equipment on slopes, as well as machines to lift or push irregularly sized debris on uneven terrain. Some use of hand-tools may also occur.

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4.3.2 Installation of Cap

Depending on the final approved design, a geotextile fabric may be rolled over the area to be covered before using powered equipment to apply the non-combustible cap material over the surface of the RIM. Truck traffic into and across Areas 1 and 2 are expected to increase during capping as the trucks will carry cap material along site roads and into the area to be capped.

This activity will use dump trucks to haul materials, and powered equipment to place and spread the materials, creating the requisite non-combustible cap.

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5 HAZARD EVALUATION AND CONTROLS

There exists a limited potential for radiological, chemical, physical, chemical, and biological hazards during site preparation and non-combustible cap construction at the West Lake Landfill site. A hazard analysis of activities described in Section 4 and the associated control measures to mitigate potential hazards are included in this section.

5.1 Physical Hazards and Controls

Physical hazards that may be encountered include:

☒ Slip/trip/fall hazards	☒ Head hazards	☒ Eye hazards
☒ Cold stresses	☒ Foot hazards	☒ Hand hazards
☒ Mechanical hazards	☒ Electrical hazards	☒ Fire and explosion
☒ Falling objects	☒ Heavy equip hazards	☒ Extreme weather
☒ Excavation hazards	☒ Material handling	☒ Vehicle traffic

Control measures for these physical hazards are provided in Table 1 and in Section 7.

5.2 Radiological Hazards and Controls

The activities described in this Plan will occur, in part, within radiologically controlled areas. Because personnel may encounter RIM in this area, a potential risk exists for these workers to be exposed to radiation. Radiological hazards and controls are described in detail in the project's Radiation Safety Plan, which is summarized in the following sub-sections.

5.2.1 Potential Radiological Hazards

All radiological hazards are associated with the radiologically-impacted soil within Operable Unit 1. The radionuclides are primarily comprised of isotopes of thorium and radium and their decay products. Potential exposures from working with and on top of radiologically-impacted soil include:

- External (Direct) Exposure. The radiologically-impacted soil on the surface will emit penetrating radiation in the form of gamma rays.
- Internal Exposure. Internal exposures occur when a worker ingests impacted soil or inhales dust containing radioactive particles.
- Spreading Contamination. Clothing and tools that contact radiologically-impacted surface soil within the extent of radiologically-impacted material in Areas 1 and 2 could become contaminated.

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5.2.2 Radiological Controls

The purpose of radiological hazard controls is two-fold. First, controls mitigate and monitor exposures to the workers in these areas (designated "Permitted Areas" in the Radiation Safety Plan or "RSP" (Auxier 2016b). Second, controls limit or eliminate the spread of contamination from areas containing RIM. These controls are described in detail in the RSP. An overview of those controls is presented below.

Radiological exposures will be limited by a combination of techniques. The primary method of controlling exposures is by controlling access to radioactive material. Access to radiologically impacted areas will be restricted to properly trained, essential personnel. These workers will wear appropriate personnel protective equipment (e.g., boots, gloves, safety glasses, etc.) and will understand and follow the procedures set forth in the RSP, in particular the frisking and decontamination procedures.

During the initial safety meeting, workers will be apprised of the presence of radiological contamination at the site and are briefed on its extent and the risks of exposure to radiation. The controls to be used to mitigate radiological hazards will then be presented. It is important that all workers understand they may become exposed if they leave the gravel roads/drill pads and enter the area of RIM occurrences within Operable Unit 1 without training and appropriate health and safety equipment and procedures.

Exposures to personnel will be monitored using both Thermoluminescent Dosimeters (TLD's) and by routine radiation surveys in work areas and daily air samples. These results will be reported to project management and to the EPA as described in the RSP.

The spread of contamination will be controlled by monitoring of equipment and personnel as they leave the Permitted Area (as defined by the Radiation Work Permit issued in compliance with the RSP). If a worker suspects that they may have contacted surface soil in a radiologically-impacted area (e.g., soil collected on the bottom of work boots), the potentially contaminated area will be scanned with a radiation ratemeter-scaler coupled to a pancake detector as described in the RSP. If the scan indicates the collected soil is contaminated, the contaminated surface should be washed with water and the soil/water solution collected in a secure container or bag.

5.3 Chemical Hazards and Controls

5.3.1 Potential Landfill Gas Hazards

In the unlikely event that landfill gas is encountered during site preparation or capping activities, workers should be aware that landfill gas may contain methane, carbon monoxide, hydrogen, carbon dioxide, ammonia, organic compounds, and hydrogen sulfide. The potential fire or explosion hazards from common landfill gas components and health effects from oxygen deficient environments are listed in Table 3 and Table 4.

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5.3.2 Potential Hazards Associated with Volatile Organic Compounds

Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) might be encountered during activities that disturb the landfill materials below the ground surface. A hazard assessment of compounds of concern that might be encountered is provided in Table 3.

5.3.3 Controlling Exposures to Gases and Vapors

Exposures to gases and vapors will be controlled by routinely monitoring for their presence. If a potentially unsafe atmosphere is detected in an area, the area will be evacuated until an investigation can determine the cause of the event, and if air quality meets occupation limits.

5.3.4 Potential Hazards and Controls of Fuel

Fuels that will be used during the work activities include diesel fuel and gasoline. Refer to the National Institute for Occupational Safety and Health (NIOSH) Guide to Chemical Hazards for additional information regarding these chemicals.

Small quantities of fuel may be properly stored in approved metal or plastic containers. Larger quantities will be kept in truck-mounted fuel tanks and fuel tanker trucks which will be inspected for leaks before their initial entry into any controlled area on the Site. Storage in alternative containers must be preapproved with the Health and Safety Manager or his designee.

5.3.5 Potential Asbestos Hazards

The inhalation of friable asbestos fibers by workers can cause disease of the lungs and other organs that may not appear until years after the exposure has occurred. In the event that friable asbestos is encountered during soil sampling activities, the on-site personnel will have been appropriately trained regarding asbestos awareness and recognition. Appropriate personnel will be notified as to the location of confirmed or presumed asbestos containing materials.

Any confirmed asbestos containing materials will be handled by personnel with appropriate training to handle such material. Documentation as to the handling procedures and disposition of the friable asbestos-containing material will be maintained in the project files.

5.4 Biological Hazards and Controls

Cold weather conditions will greatly reduce potential exposures to biological hazards such as venomous insects (e.g., bees, wasps, spiders) that can produce allergic reactions; plants such as poison ivy, oak, and sumac that elicit allergic skin reactions in sensitive individuals, and other invertebrates such as fire ants and biting flies which can produce painful irritations. Exposure to these hazards will be minimized with appropriate protective clothing.

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Table 2 Hazard and Control Matrix

Task	Potential Hazard	Control Measures
Driving Safety	• Vehicle traffic • Off-road Hazards (stationary objects, uneven terrain, operating equipment and walking on slopes, etc) • Exposure to unfamiliar vehicle, streets, and/or directions • Changes in weather or traffic conditions	• Inspect car and maps before driving. • Adjust mirrors and seat positions. • Make sure luggage, supplies are secure. • Wear seatbelt. • Pull over to talk on cell phone. • Listen to weather and traffic reports before leaving. • Follow best practices for operating equipment on slopes
Mobilize/Demobilize Equipment to Jobsite	• Insecure loads • Unsafe lifts • Blind spots	• Check load straps and chains after loading and before moving truck. • Use spotter when backing vehicles or equipment. • Notify workers in the area of planned equipment placement. • Have workers move out of path if necessary when spotting equipment. • Make eye contact and exchange signals with operator when moving near load. • Use level, dry area to unload & store equipment and materials. • PPE – Modified Level D, no coveralls required.
General Construction	• Caught between pinch points • Incorrect lifting techniques • Overexertion • Fall, same level • Heat Stress	• Use work gloves if pinch points could be a factor in unloading and loading supplies. • Use proper bending/lifting techniques-use your legs, not your back. • Ask for help if something is too heavy or uncomfortable to lift alone. • Look before you step. • Inspect ties for integrity. • Take necessary breaks. • Consume adequate amounts of fluids. • Access pickup beds from the rear of the truck only. • Do not jump into or out of pickup beds. • PPE – Modified Level D, no coveralls required.

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Hazard and Control Matrix (Cont.)

Task	Potential Hazard	Control Measures
General Construction, continued	• Slipping and Tripping Hazards	• Travel directly to and from permitted work areas. • Walking paths to be kept free of tripping hazards. • Extension cords and hoses should be placed together and marked to increase awareness. • Care to be taken when walking, especially on wet surfaces. • Use three point contact when getting on or off the equipment. • Move equipment to dryer grounds if surface is muddy or has standing water. • Use secondary precautions when walking on slopes with a grade greater than a 1:2 (vertical to horizontal).
	• High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work periods) or whenever you must raise your voice for others to hear. (Double hearing protection when > 90 dba)
	• Struck by/Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic. • Isolate equipment swing areas. • Make eye contact with operators before approaching equipment. • Understand and review hand signals. • Warning vests, hard hat, safety glasses and steel toe work boots.
	• Use of Hand Tools	• All tools should be inspected prior to use. • No damaged equipment should be used until repaired or replaced. • Damaged equipment must be tagged and taken out of service. • Use the proper tool for the task. • Know how to use tools safely. • Utilize non spark tools around flammable chemicals.

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Hazard and Control Matrix (Cont.)

Task	Potential Hazard	Control Measures
General Construction, continued	Fueling of Vehicles	• Put vehicle in park or neutral with parking brake set. • Turn off engine and remove key from ignition. • Smoking is prohibited within 50 feet of fueling operations. • Never leave the nozzle unattended. • Do not overfill vehicle tank or container. • Never use a cell phone or other personal electronic device while refueling. • Upon exiting vehicle always touch a metal part of the vehicle away from the fill point before handling the nozzle to prevent static discharges.
	• Placing Fuel in Portable Containers	• Use only UL approved portable container with vapor -tight cap When filling container, follow same rules as when fueling car: turn off engine; extinguish smoking materials, etc… • Place portable fuel container on the ground during filling, and keep the metal nozzle spout in contact with the container to prevent build up and discharge of static electricity. Never fill a container in the bed of a pickup, in the back of a station wagon, or in the trunk of a car. • Manually control the nozzle valve throughout the filling process. Fill a portable container slowly to decrease the chance of static electricity buildup and minimize spilling or splattering. • Seal contain tightly before loading into vehicle. Secure container in an upright position to prevent sliding or tipping.
	• Horseplay	• Prohibit horseplay anywhere on jobsite. • Review rules about horseplay with workers. • Remind workers not to respond/participate in horseplay started by others
	• Chemical Exposure	• Avoid inhalation of vapors from fuel. • Wash skin with soap and cool water if fuel contacts skin.

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Hazard and Control Matrix (Cont.)

Task	Potential Hazard	Control Measures
General Construction, continued	• Radiologically-impacted Areas 1 and 2	• Untrained workers may not enter radiologically restricted area except during rescue operations. No other access to this area is allowed for any reason. Additional precautions for untrained workers working outside the radiologically restricted area include: • Wear gloves when disturbing or handling soil. • No eating, drinking, smoking or using smokeless tobacco products within 50 feet of proposed fence line. • Radiation workers may enter with proper preparation and monitoring.
Weather Conditions	• Evaluate prevailing weather conditions for the Site. • Contingency plans developed for likely severe weather conditions such as tornado, and extreme thunderstorm. • Provide for daily weather forecast service in extreme weather areas.	• Employees trained in contingency plan for severe weather conditions. • Weather service contacted regularly during storm conditions. • Supervisory personnel cease operations during extreme storm conditions, personnel evacuate to safe assembly area.
	• Heat Stress • Rain	• Workers are encouraged to increase fluid intake while working. • Workers will increase the frequency and duration of rest breaks while working in heat stress situations. • Workers will watch each other for signs and symptoms of heat exhaustion, fatigue. • If necessary, contractors will plan work in heat stress situations for early morning or evening during hot months. • Implement heat stress control program when necessary. • Have proper rain gear available (i.e. Slickers, rubber boots, etc.).

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Hazard and Control Matrix (Cont.)

Task	Potential Hazard	Control Measures
Biological	• Injuries associated with insects, snakes, spiders and poisonous plants NOTE: This type of hazard is greatly reduced in winter conditions.	• Be alert for signs of snakes, insect nests, and hills and poisonous plants when walking. • Use extreme caution when moving or lifting objects that could be used by snakes or spiders as cover. Always wear leather gloves. • Never reach under or behind objects, or into other areas where snakes may hide. • Workers will tuck pants into socks and wear long sleeves and sturdy leather boots when walking in tall grass to protect against bio hazards. • Workers will use insect repellent when necessary. • Workers will use buddy system to check for signs of insect and spider bites, such as redness, swelling, and flu-like symptoms. • Workers will remove ticks immediately with fine tipped tweezers by grasping the tick as close to your skin as possible and gently pulling straight out. Do not squeeze the tick's body as this may inject fluids into you. Wash the bite area of skin and apply antiseptic. • Workers will immediately wash any areas that were exposed to poisonous plants. • Be aware that oil from poisonous plants can be carried on boots.

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Table 3 Potential Fire or Explosion Hazards from Common Landfill Gas Components

Component	Potential to Pose a Fire or Explosion Hazard
Methane	Methane is highly explosive when mixed with air at a volume between its Lower Explosive Limit (LEL) of 5 % and its Upper Explosive Limit (UEL) of 15%. At concentrations below 5% and above 15%, methane is not explosive.
Hydrogen	Hydrogen is highly explosive when mixed with air at a concentration between its LEL of 4 % and UEL of 74.5 %.
Carbon Monoxide	Carbon monoxide is explosive when mixed with air at a concentration between its LEL of 12.5 % and UEL of 57 %.
Carbon dioxide	Carbon dioxide is not flammable or explosive.
Nitrogen	Nitrogen is not flammable or explosive.
Oxygen	Oxygen is not flammable, but is necessary to support combustion.
Ammonia	Ammonia is flammable. Its LEL is 15% and its UEL is 28%. However, ammonia is unlikely to collect at a concentration high enough to pose an explosion hazard.
NMOCs	Potential explosion hazards vary by chemical. For example, the LEL of benzene is 1.2% and its UEL is 7.8%. However, benzene and other non-methane organic compounds (NMOCs) alone are unlikely to collect at concentrations high enough to pose explosion hazards.
Hydrogen sulfide	Hydrogen sulfide is flammable. Its LEL is 4% and its UEL is 44%. However, in most landfills, hydrogen sulfide is unlikely to collect at a concentration high enough to pose an explosion hazard.

Table 4 Health Effects from Oxygen-deficient Environments

Oxygen Concentration	Health Effects
21%	Normal ambient air oxygen concentration
17%	Deteriorated night vision (not noticeable until a normal oxygen concentration is restored), increased breathing volume, and accelerated heartbeat
14% to 16%	Increased breathing volume, accelerated heartbeat, very poor muscular coordination, rapid fatigue, and intermittent respiration
6% to 10%	Nausea, vomiting, inability to perform, and unconsciousness
Less than 6%	Breathing spasms, convulsive movements, and death in minutes

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Table 5 Hazard Assessment for Selected Constituents

Constituent	CAS No.	TLV (ppm)	STEL (ppm)	Toxic Route of Exposure	CARC	Comments
Methylene chloride	75-08-2	50	--	Vapor inhalation, skin absorption of liquid	CSH	Nonflammable; colorless; odorless; can't smell at <300 ppm
Tetrachloroethene	127-18-4	25	100	Vapor inhalation, skin absorption of liquid	CSH	Nonflammable; colorless; odorless; can't smell at <300 ppm
Toluene	108-88-3	50	150	Vapor inhalation, skin absorption of liquid	No	Flammable; colorless; sweet odor at <10 ppm
Xylenes	1330-20-7 (o-xylene)	100	150	Vapor inhalation, skin absorption of liquid	No	Flammable; colorless; sweet odor at <10 ppm
1,2-Dichloroethene	540-59-0	200	--	Vapor inhalation	No	Acrid odor
1,2-Dichloroethane	107-06-2	1	2	Vapor inhalation, skin absorption of liquid	CSH	Flammable; colorless; sweet odor at <10 ppm
Trichloroethene	79-01-6	50	100	Inhalation, skin absorption	CSA	Nonflammable; colorless; odorless; can't smell at <300 ppm
1,1-Dichloroethane	75-34-3	100	250	Vapor inhalation	No	Vapor
Chloroform	67-66-3	10	2*	Vapor inhalation	CSH	Flammable; colorless; sweet odor at <10 ppm
Vinyl chloride	75-01-4	1	5	Vapor inhalation	CH	No data
Acetone	67-64-1	250	1,000	Vapor inhalation, skin absorption of liquid	No	Flammable; sweet odor
1,1,2-Trichloroethane	79-00-5	10	--	Vapor inhalation, skin absorption of liquid	CSH	Combustible; colorless; sweet odor
Trans 1,2-DCE	540-59-0	200		Vapor inhalation, skin absorption of liquid	CSH	Flammable; colorless; pleasant odor
Cis 1,2-DCE	540-59-0	200		Vapor inhalation, skin absorption of liquid	CSH	Flammable; colorless; pleasant odor
1,1,1-TCA	71-55-6	350		Vapor inhalation	No	Nonflammable; colorless
Carbon tetrachloride	56-23-5	5		Vapor inhalation, skin absorption of liquid	CSH	Noncombustible; colorless; sweetish odor
Methyl ethyl ketone	78-93-3	200			No	Flammable; colorless; acetone-like odor
Vinyl acetate	108-05-4	10		Vapor inhalation, skin absorption of liquid	No	Flammable; colorless
Isopropyl alcohol	67-63-0	400		Vapor inhalation, skin absorption of liquid	No	Flammable; colorless; pleasant odor
Chromium	7440-47-3	0.5 mg/m^3		Inhalation; hexavalent chromium carcinogenic and corrosive on tissue	CH	

Notes: CAS No. = Chemical Abstracts Service Number
TLV = Threshold Limit Value; STEL = Short Term Exposure Limit
CARC = Carcinogenicity; CSH = Carcinogenicity suspected for humans; CH = Carcinogenicity established for humans; No = No definite carcinogenicity established.
ppm = parts per million; ug/m^3 and mg/m^3 = micrograms and milligrams per cubic meter, respectively.
--= not listed in reference source.
* NIOSH (based on 60 minute exposure).
**According to 29 CFR 1910.1017, no employee may be exposed to vinyl chloride at a concentration greater than 5 ppm averaged over any period not exceeding 15 minutes, or 1 ppm over an 8-hour workday.

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Table 6 Exposure Limits and Information for Fuels Used

Chemical Name	Routes of Exposure [a]	Exposure Limits REL/PEL (8/10 h/d; 40 h/wk)	IDLH (ppm)	Expected Concentration	MSDS Available?	OSHA Carcinogen? [b]
Diesel fuel	Inh, Abs, con	300 ppm	900	NA	Yes, Appendix B	Yes
Gasoline	Inh, abs, con	300 ppm	900	NA	Yes, Appendix B	No

[a] Routes of Exposure: Inh – Inhalation, Abs – Skin Absorption, Ing – Ingestion, Con – Contact (Skin / Eye)

[b] The Thirteen OSHA –Regulated Carcinogens are found in Appendix B, NIOSH Guide to Chemical Hazards

Notes: NA – not applicable, REL – Recommended Exposure Limit, PEL – Permissible Exposure Limit, IDLH – Immediately Dangerous to Life & Health, ppm – parts per million, MSDS - material safety data sheet

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6 TRAINING

On-site workers will have received hazardous waste operations and emergency response (HAZWOPER) training in accordance with 29 CFR 1910.120. These workers will also have received the radiological safety training required in 10 CFR Part 19 which requires that *"…all individuals who, in the course of their employment, are likely to receive a dose of more than 100 millirem in a year, must receive adequate training to protect themselves against radiation."*. This level of training will be conducted even though exposure, if any, for on-site workers is expected to be much less than 100 millirem.

The radiological safety training will meet typical General Employee Radiological Training (GERT) requirements and include:

- The nature of radioactive materials on the Site;
- Potential routes of exposure;
- Types of controls practiced to minimize exposures; including discussion of any engineering controls, administrative use of time, distance and shielding, and personal protective equipment;
- Types of monitoring used to track potential exposures (periodic area surveys, air monitoring, and use of dosimeters);
- Proper use of instrumentation;
- Incident reporting;
- Availability and use of confidential personal dosimetry records;
- Effects of radiation on humans; and
- Allowable limits (who sets them and what they are).

In addition, on-site workers will have been appropriately trained regarding asbestos awareness and recognition.

All personnel performing work described in this HASP must attend a site/project orientation session, conducted by the Project Health and Safety Officer or Radiation Safety Officer. The session will cover, at a minimum, site restrictions, health and safety regulations, required personal protective equipment, potential site hazards, constituents of concern, decontamination and emergency procedures. All personnel attending the site/project orientation session must sign the Compliance Agreement provided in Appendix A of this HASP.

Visitors who stay at the site for less than one hour or subcontractors performing routine work not directly related to work described in this HASP (e.g., delivery of equipment and materials) will not require a health and safety orientation.

Each subcontractor must designate a qualified person to be responsible for the health and safety of their employees, and will cooperate with FEI in implementing this HASP.

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7 GENERAL HEALTH AND SAFETY PROCEDURES

This section presents general health safety procedures to be followed during the non-combustible cover project activities. The measures contained herein will be supplemented as necessary with standard safe work practices.

7.1 ONSITE CONTROL

Onsite control at Areas 1 and 2 of the West Lake Landfill is currently provided by six-foot high chain-link security fences that surround Areas 1 and 2. Access to locations within these areas will be restricted until such time that it can be demonstrated that the location is not impacted by radiological or chemical hazards.

If it is suspected that a worker or equipment has contacted soil within the radiologically-impacted areas within Area 1, monitoring of the contacted surface will be conducted with a radiation ratemeter-scaler coupled to a pancake detector by the Radiation Safety Officer or his designee.

7.2 COMMUNICATION

A cellular telephone will be carried by the Project Health and Safety Officer and Radiation Safety Officer at all times. The following standard hand signals will be used in the event that verbal communication becomes impossible:

Hand Signal	Explanation
Hand gripping throat	Out of air, can't breathe
Grip partner's wrist or both hands around waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK, I am all right, I understand
Thumbs down	No, negative

7.3 OCCUPATIONAL MONITORING

7.3.1 Radiological Monitoring

Radiological conditions in the work zone will be monitored in accordance with the Radiation Safety Plan.

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7.3.2 Chemical Monitoring

7.3.2.1 Four-gas Monitoring

Occupational levels of landfill gasses in the work zone will be monitored by placing a personal 4-gas meter on a worker in the zone selected by the Project Health and Safety Officer. The meter will be capable of monitoring oxygen, explosive gas levels, carbon monoxide, and hydrogen sulfide. If monitoring detects explosive levels of landfill gas 18 inches to 2 feet above the waste surface, work will be halted until the gas dissipates and/or fans are applied to the work area to ensure the gas dissipates before reaching explosive concentrations.

7.3.2.2 VOC Monitoring

Regular monitoring for the presence of VOCs will be conducted by the Project Health and Safety Officer or Radiation Safety Officer and changes made as necessary to the initial level (Level D; see Section 7.5) of skin and respiratory personal protective equipment (PPE). A photoionization detector (PID) with an 10.6 eV lamp (or equivalent) will be used to monitor for VOCs in the breathing zone and the soil surface where the investigation activities are occurring. Any soil sampling extending below an 18 inch depth will also be monitored upon their retrieval with the PID. PID and multi-gas monitoring (see Section 7.3.2.1) will be conducted every 15 minutes for the first 2 hours of a specific activity and then at least every 120 minutes during active work.

7.4 Personal Protective Equipment – General Work

The minimum level (Level D) of PPE required for activities inside Area 1 or 2 that support the description of work presented in Section 4 will consist of the following:

- Steel-toed boots (mandatory),
- High visibility traffic vest or high visibility work shirt (mandatory);
- Hard hat (mandatory),
- Safety glasses (mandatory),
- Gloves, as necessary based on the specific activity, and
- Hearing protection, as necessary based on the specific activity.

Visitors shall be required to wear PPE equivalent to the above.

7.5 Personal Protective Equipment – Permitted Work

The minimum level (Modified Level D) of PPE required for the description of work presented in Section 4 will consist of the following:

- Steel-toed boots (mandatory) with shoe covers or rubber boots with steel toes,
- Hard hat (mandatory),
- Safety glasses (mandatory),
- Tyvec coveralls,
- Gloves, as necessary based on the specific activity,
- Hearing protection, as necessary based on the specific activity, and

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- High visibility traffic vest worn outside of Tyvek (mandatory).

Respirators for protection from radionuclide exposure will not be routinely required but will be made available to workers. Respirators for protection from dust inhalation may be used if there are continuous plumes of visible dust from exposed soil however this condition is not anticipated to occur. A decision to require use of respirators will be made by the Project Health and Safety Officer or Radiation Safety Officer if conditions are encountered that warrant use of respirators for protection from dust or radionuclides. The employee must be medically qualified to wear respiratory protection and quantitatively fit tested, and the respirator must be properly cleaned, stored and maintained.

To maintain safe working conditions, if vapor concentrations in the breathing zone consistently exceed 5 ppm (instrument gauge units) based on PID measurements, then an upgrade from initial Level D to Level C PPE will be made. Level C PPE will require the addition of a Tyvek suit, disposable nitrile gloves, and a National Institute of Occupational Safety and Health ("NIOSH") approved full-face respirator with organic vapor/acid gas cartridges and dust/mist pre-filters. All personnel performing work in Level C must be fit-tested and trained in the proper use of respirators.

Visitors, with the exception of regulatory personnel will not be allowed inside the permitted area. Regulatory personnel shall be required to wear PPE equivalent to the above.

7.6 Environmental Monitoring

Environmental monitoring of air will be performed by the Site's permanent perimeter monitoring system as described in the Air Monitoring, Sampling, and QA/QC Plan (Auxier 2014).

7.7 Safe Work Practices and Limitations

Routine site activities will be conducted during daylight hours only. The Project Health and Safety Officer must provide permission for field work conducted beyond daylight hours or on weekends and holidays. The Project Manager, Project Health and Safety Officer, or Radiation Safety Officer will review pertinent health and safety matters with onsite personnel in daily health and safety meetings. Additional work practices and limitations are listed as follows:

- All site personnel shall acknowledge in the Compliance Agreement (Appendix A) that they have read, understood, and agree to comply with the HASP.
- In addition to an initial health and safety meeting for the project, daily health and safety meetings may be conducted by the Project Manager, Project Health and Safety Officer, or Radiation Safety Officer at the start of each work day to discuss the day's upcoming activities and to address the health and safety procedures to be followed.
- Applicable OSHA guidelines will be followed for all site activities.
- Dress in accordance with the activity-specific level of protection.
- Smoking will be prohibited except in designated areas.

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- Any person under a physician's care, taking medication, or those who experience allergic reactions must inform the Project Health and Safety Officer.
- If a single individual is working at the site, they must have a cellular phone on their person that is turned on.
- The wearing of contact lenses for onsite personnel is prohibited by best management practice and OSHA.
- Be aware of symptoms of heat or cold stress, exposure to hazardous chemicals or dangerous atmospheres, and work-related injuries. Information for preventing Heat Stress is included in Appendix C.
- If trenching activities are conducted, proper excavation and trenching procedures must be followed as outlined in 29 CFR 1926.650 through .653 (Subpart P. Excavations, Trenching, and Shoring). In particular, the requirements for shoring, sloping, and access/egress must be followed.
- In addition, all underground utilities (gas, electric, water, cable, telephone) at the site must be identified and marked prior to the commencement of any boring, excavation and/or trenching activity. None are expected to be present in Area 1.
- Good personal hygiene practices are especially important when working in the proximity of the potential radiologically-impacted areas within Area 1. Of particular importance is the need to keep fingers away from the face unless they have been carefully washed. Cuts and abrasions should be covered by a band-aid.
- All accidents and hazardous material exposure incidents will be reported on the appropriate forms, included in Appendix A.

7.8 Heavy Equipment

7.8.1 Inspection

Equipment entering the site should be inspected to confirm all safety features are intact and operating as designed. Daily inspections should be conducted to verify the machine is functioning as designed. If equipment fails to operate properly, the Project Health and Safety Officer will be notified to evaluate the effect of this failure on continuing operations onsite. If the failure affects the safety of personnel or prevents completion of the work activities, all personnel will leave the work zone until the situation is evaluated and appropriate actions taken.

7.8.2 Safe Operation

Working with and around heavy equipment can be dangerous because of the size and power of the equipment, the limited operatory field of vision, uneven terrain, and the noise levels that can be produced by the equipment. The following practices shall be followed by operators when using heavy equipment:

- Equipment should be inspected daily by the operator to ensure that the equipment is in safe operating condition.
- When not in use, hydraulic and pneumatic components should be left in down or "dead" position.

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- Roll-over protection shall be provided on uneven terrain sites.
- No riding on vehicles or equipment except in fixed seats.
- Seat belts should be worn at all times.
- Backup alarms, automatically activated and loud enough to be heard above background noise, are required to be operational on all heavy equipment.
- Parking brakes should always be applied on parked equipment.
- Equipment should never be operated closer than 10 feet from utility lines.
- Windshields must be maintained, clean, and free of visual obstructions.

To ensure the safety of personnel in the work area, the following safety procedures regarding heavy equipment must be reviewed prior to and followed during work activities:

- Ensure that equipment operators are trained and/or experienced in the operation of the specific equipment.
- Personnel should never approach a piece of heavy equipment without the operators' acknowledgment and stoppage of work or yielding to the employee.
- Never walk under the load of a bucket or stand beside an opening truck bed.
- Maintain visual contact with the operator when in close proximity to the heavy equipment.
- Wear hearing protection while on or around heavy equipment, when normal conversation cannot be heard above work operations.
- Steel-toed shoes, safety glasses, and a hard hat shall be worn for all work conducted near heavy equipment.

The following are best practices when operating heavy equipment on slopes.

- Before operating on a hill, inspect the slope for voids, pits, newly formed areas and other possible ground deviations. Check for obstructions that could cause a sudden stop or topple when struck.
- Always wear the seat belt or safety harness.
- Don't operate on grades greater than 4:1.
- Always work 90 degrees to the slope face (up and down). Don't operate machines side-to-side along the slope.
- Keep the machine's load properly balanced. Don't overload the equipment. Consult the operator's manual for the machine's maximum operating weight.
- Work only where there is good traction for the wheels or tracks. Avoid slippery, wet, muddy and icy areas.
- Operate in the proper gear, so the machine doesn't jerk or move uncontrollably. Operating the throttle at 2/3 power is recommended for maintaining control of the machine on a slope.
- Never jump out of a tipping or rolling machine. As a rule, stay in the cab if the equipment begins to roll over.
- Operate with the heavy end of the equipment on the uphill side.

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- Operate controls smoothly.
- Do not start, stop, or turn suddenly.

7.9 Heavy Lifting

When lifting objects, use the following proper lifting techniques:

- Keep your feet shoulder width apart to get the best footing possible.
- Bend at the knees, not at the waist.
- Tighten stomach muscles to offset the force of the load.
- Grasp the object at opposite corners.
- Lift with the legs instead of the back muscles.
- Keep the back upright and avoid twisting.
- Most importantly, think before lifting.

7.10 Slip/Trip/Hit/Fall

Slip, trip, hit, and fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but can be minimized by the following prudent practices:

- Spot check the work area to identify hazards.
- Establish and utilize a pathway which is most free of slip and trip hazards.
- Beware of slip hazards such as wet floors, slippery floors, and icy surfaces.
- Beware of uneven surfaces or terrain trip hazards.
- Carry only loads which you can see over.
- Keep work areas clean and free of clutter, especially in storage rooms and walkways.
- Communicate hazards to on-site personnel.
- Secure all loose clothing, ties, and remove jewelry while around machinery.
- Report and/or remove hazards.
- Keep safe buffer zones between workers using equipment and tools.
- Use secondary precautions such as a rope support when walking on a slope with a grade greater than 1:2 (vertical to horizontal).

7.11 Electrical Hazards

No individual shall be permitted to work on any part of an electrical power circuit unless the person is protected against electric shock by de-energizing the circuit and grounding it, or by locking and tagging it out:

- All electrical wiring and equipment shall be intrinsically safe for use in potentially explosive environments and atmospheres.
- All electrical wiring and equipment shall be a type listed by Underwriters' Laboratories (UL) or Factory Mutual (FM) for the specific application.
- All installations shall comply with the National Electric Code (NEC) and the National Electric Safety Code (NESC).

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- All electrical circuits shall be grounded according to NEC and NESC Code. Ground fault circuit interrupters shall be used in the absence of properly grounded circuitry or when portable tools must be used around wet areas.
- All live wiring or equipment shall be guarded to protect all persons or objects from harm.

7.12 Biological Hazards

Biological hazards will be greatly reduced by winter conditions. In warmer weather, biological hazards include tick-borne diseases and poisonous plants.

7.12.1 Tick-borne Diseases

Lyme disease is caused by a bacterial parasite called spirochete, and is spread by infected ticks that live in and near wooded areas, tall grass, and brush. Once the tick deposits the spirochete, it must feed on the host blood for 12 to 24 hours before it can transmit the disease. The ticks that cause the disease in the Northeast and Midwest are often no bigger than a poppy seed or a comma in a newsprint. The peak months for human infection are June through October. There are many other tick borne diseases such as Rocky Mountain Spotted Fever which can be carried by a variety of ticks. The prevention and treatment of these diseases are similar to those of Lyme disease.

7.12.1.1 Prevention.

Ticks hang on blades of grass or shrubs waiting for a host to come by. When a host brushes against the vegetation, the tick grabs on. They typically climb onto an individual's legs and then crawl up looking to attach in a body crevice. Preventative measures include wearing light-colored clothing, keeping clothing buttoned, tucking pant legs into socks, pulling socks up past the knee, pulling the pant waist up above the naval area with a tight belt, and keeping shirt tails tucked in. Periodic checks for ticks should be made during the day, and especially at night. Hair should also be checked by parting it and combing through it to make sure that no ticks have attached to the scalp. Also, check clothing when it is first removed, before ticks have a chance to crawl off. It is common for ticks to be carried home on clothing and attach to others in the household.

The most common repellent recommended for ticks is N,N-dimethyl-m-toluamide, or DEET. It is important to follow the manufacturer's instructions found on the container for use with all insecticides especially those containing DEET. In general, DEET insect repellent should only be applied to clothing, not directly on the skin. Do not apply to sunburns, cuts or abrasions. Use soap and water to remove DEET once indoors.

7.12.1.2 Removal.

The best way to remove a tick is removal by tweezers. If tweezers are not available, cover your fingers (tissue paper) while grasping the tick. It is important to grasp the tick as close as possible to the site of attachment and use a firm steady pull to remove it. When removing the tick, be certain to remove all the mouth parts from your skin so as not to cause irritation or infection.

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Wash hands immediately after with soap and water, and apply antiseptic to the area where tick was removed.

7.12.1.3 Testing and Symptoms of Lyme Disease

A variety of tests exist for determining Lyme Disease infection. However, most of these tests are not exact. The first symptoms of Lyme Disease usually appear from two days to a few weeks after a person is bitten by an infected tick. Symptoms usually consist of a ring-like red rash on the skin where the tick attached. The rash is often bull's eye-like with red on the outside and clear in the center. The rash may be warm, itchy, tender, and/or "doughy". Unfortunately, this rash appears in only 60 to 80 percent of infected persons. An infected person also has flu-like symptoms of fever, fatigue, chills, headaches, a stiff neck, and muscle aches and pains (especially knees). Rashes may be found some distance away from the site of actual attachment. These symptoms often disappear after a few weeks.

7.12.2 Poisonous Plants

Common Poison Ivy (Rhus radicans) grows as a small plant, a vine, and a shrub. Poison Ivy occurs in every state. The leaves always consist of three glossy leaflets. Poison Sumac (Rhus vernix) grows as a woody shrub or small tree 5 to 25 feet tall. It usually contains nine leaves, with eight paired leaves and one on top, and is common in swampy areas. The plants are potent sensitizers and can cause a mild to severe allergic reaction. This reaction is called contact dermatitis.

Dermatitis, in Rhus-sensitive persons, can result from contact with the milky sap found in the roots, stems, leaves, and fruit. The sap may retain its potency for months or years in a dry atmosphere, and can occur during any time of the year. The sap may also be carried by animals, equipment or apparel.

The best form of prevention is to avoid contact. This can occur by wearing long sleeves and gloves if necessary. Disposable clothing, such as Tyvek, is recommended in high risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

7.12.3 Fire Prevention

Proper storage of gasoline and other flammable liquids should be maintained to prevent or avoid spreading of a fire. All flammable and/or combustible liquids (i.e., gasoline) will be stored in approved safety containers that meet the specifications of National Fire Protection Association (NFPA) Code 30 and OSHA 29 CFR 1910.106(a)(29). Smoking or open flames are not permitted within 20 feet of any flammable liquid container.

All personnel performing work must be trained in the proper use of fire extinguishers. OSHA-approved, portable fire extinguishers will be located in every field vehicle. These extinguishers are rated for Class A (wood, paper), B (flammable liquid), and C (electrical) fires, and their locations are clearly identified with signs and/or labels. As required by 29 CFR 1910.157(d), at least one fire extinguisher with the appropriate rating must be located within 75 feet of a class A fire hazard and 50 feet of a Class B or C fire hazard.

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7.13 Authorized Project Field Personnel

Only authorized project personnel will be granted access to active work areas during field activities. Authorized personnel may include designated representatives from FEI, subcontractors, Republic Services, the U.S. Environmental Protection Agency, and the Missouri Department of Natural Resources. A Log Book will be maintained onsite to record the personnel performing work at or visiting the Site.

7.14 Record Keeping and Reporting

The following records and/or logs will be maintained in the field vehicle of the Project Health and Safety Officer and will be available for inspection:

- This Health and Safety Plan;
- A Log Book that documents all personnel entering and exiting the Site;
- Accident Report Forms that document any accidents and/or injuries at the Site, including corrective actions; and
- Safety Data Sheets that provide health and safety and emergency response information on all chemicals and materials used at the site.

All accidents (including vehicular accidents while traveling to/from the Site), injuries, illnesses, chemical exposures, fires, and/or deviations from the HASP will be reported to the Project Health and Safety Officer and Project Manager. The Project Health and Safety Officer must complete an Accident Report Form for all accidents or injuries occurring at the Site. The accident or injury must be reported to the Project Manager and appropriate actions taken.

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8 EMERGENCY CONTACTS, PROCEDURES AND CONTINGENCY PLAN

This section includes the telephone numbers for emergency contacts and the procedures to be implemented in the event of an emergency.

8.1 EMERGENCY CONTACTS

In the event of an emergency related to field activities, notification of the appropriate contacts listed on Table 7 should be made.

8.2 HOSPITAL ROUTE

Should the need for emergency medical care arise, the closest medical facility is:

SSM DePaul Health Center
12303 DePaul Drive
St. Louis, MO 63044-2588

A hospital route map is included as Figure 4. Travel time to the hospital from the West Lake Landfill site is approximately 7 minutes. The direct route to SSM DePaul Health Center is as follows:

- Exit the landfill and head SE on St Charles Rock Road (MO 180) toward Taussig Ave;
- Turn Right at Mareschal Lane;
- Take a slight Left at DePaul Circle; and
- Turn Left to stay on DePaul Drive to the SSM DePaul Health Center.

8.3 STANDARD EMERGENCY PROCEDURES

The following standard emergency procedures will be used by onsite personnel. The Project Health and Safety Officer shall be notified of any onsite emergencies and be responsible for ensuring that the appropriate procedures are followed.

8.3.1 Pre Emergency Planning

The provisions of this section of the HASP will be discussed with onsite field personnel during the health and safety orientation meeting.

8.3.2 Location of Site Resources

The following items will be maintained in the field vehicle of the Project Health and Safety Officer used to support each field activity:

- A cellular telephone;
- A copy of this HASP;

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- A log book;
- Monitoring instrument manuals,
- A copy of the hospital route map and emergency contact list;
- Fire extinguisher;
- Safety supplies, and
- Any other item deemed necessary for personnel health and safety.

8.3.3 Response Sequence for First Arrivals

If you are the first on the scene, respond as follows:

- Evacuate the incident area of non-essential personnel (if necessary). Remember that your safety must be the primary consideration;
- Restrict access to the incident area;
- Restrict the use of ignition sources for incidents involving flammable substances;
- Call the local emergency response organization or Site Health and Safety Officer. Report the following information:
  - Your name
  - Company affiliation
  - Telephone number from which you are calling
  - Location and type of incident
  - Injuries, if any, and the number and type of injuries
  - Details concerning the substances(s) involved (identification, amount, spill rate, size of area involved), if known
  - If a spill, the direction the spill is moving and the direction the wind may be dispersing airborne contaminants
  - Surficial material on which the spill occurred (i.e., asphalt, gravel, etc.)
  - Any first response action that has been taken
  - The time the incident occurred or when you discovered it
  - Any additional pertinent information

- Notify the Project Health and Safety Officer after the emergency response team has been contacted; and
- Coordinate with emergency response personnel (First Responders) such as police, fire, and rescue personnel when they arrive at the scene.

Always Follow Instructions Issued by First Responders.

8.3.4 Site Re-entry

In all situations when an onsite emergency results in evacuation of the work zone, personnel will not re-enter until any of the following conditions have been met, as appropriate:

- The conditions resulting in the emergency have been corrected.
- The hazards have been reassessed by the Project Health and Safety Officer or a person designated by him.

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- The HASP has been reviewed and revised, if necessary.
- Site personnel have been briefed on any changes in the HASP.

8.4 Personnel Injury in the Work Zone

Upon noticing any apparent serious injury, all work must be halted. The Project Health and Safety Officer should immediately evaluate the nature of the injury. If the accident is deemed serious (i.e., bodily harm has occurred), an ambulance should be requested as the first action item.

Region 7 of the US Environmental Protection Agency ("Region 7") will be contacted in the event a worker is injured and requires off-site medical attention, or if there is an unplanned off-site release of hazardous materials.

The EPA emergency response number is:
1-913-281-0991

In the event an individual becomes injured, and the injured person is contaminated with hazardous material, every effort shall be made to decontaminate the individual, except when the decontamination process may interfere with medical attention, treatment or promulgation of the injury. If the injury is life-threatening, emergency response personnel shall not be delayed in their efforts to reach, treat or transport the injured person. They shall be informed prior to entering the area that there is or may be hazardous materials present, but they will be allowed to enter immediately, and without protective clothing, if necessary. These personnel shall be monitored for contamination on their skin and clothing upon exit from the area, and shall be decontaminated as necessary if it does not further interfere with treatment or transport of the injured person.

Contaminated individuals with life threatening injuries shall be allowed to be transported to a medical facility without decontamination, when necessary. The person responsible for the transportation, i.e. the ambulance driver, paramedics, helicopter pilot, etc. shall be informed prior to leaving the scene that the injured person has or may have contamination present on their body or clothing consisting of radioactive materials. If the person being transported was injured in a radiologically controlled area, an individual trained in the use of a contamination survey instrument, and in the hazards associated with radioactive materials and radiation, shall take contamination survey instrumentation and accompany or follow the injured individual. This person shall survey the transportation vehicle, transportation personnel, applicable portions of the medical facility, and medical staff for contamination as soon as possible.

Given the nature of the radioactive material found at the Site, it is extremely unlikely that rescue personnel will become contaminated during their response. If such contamination is dectected, personnel and equipment found to be contaminated shall be decontaminated at the earliest

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opportunity. The surveyor shall describe in writing all surveys performed, their results, and any decontamination required.

8.5 Emergency Response for Severe Weather Conditions

The Environmental Manager for Republic Services shall decide on the continuation or discontinuation of work based on current and pending weather conditions. Electrical storms, strong winds, and tornados are examples of conditions that would call for the discontinuation of work and evacuation of the site. No work will be permitted during any type of electrical storm. This section specifies what should be done in the event of a severe weather emergency, including electrical storms, high winds, heavy rain or hail, and tornados.

8.5.1 Electrical Storms

The procedures include the following:

- Seek shelter in the field vehicles;
- Do not stand near or under high objects.

8.5.2 High Winds

The procedures include the following:

- Seek shelter at the field vehicles;
- Do not drive high profile vehicles at high speeds;
- Park vehicles heading into the wind; and
- Wear safety goggles and a kerchief or dust mask covering your nose and mouth.

8.5.3 Heavy Rain or Hail

The procedures include the following:

- Seek shelter in the field vehicles; and
- Do not attempt to drive a vehicle if you are in an area that is or has the potential for flooding unless you are moving out of a low area.

8.5.4 Tornados

The procedures include the following:

- Seek shelter underground or in a closet, bathroom, or interior wall of a substantial building. Get under something sturdy and cover your head;
- Do not stay in a trailer or vehicle. Leave the trailer or vehicle and lie flat in the nearest ditch if substantial shelter is not available;
- Stay away from large areas of glass; and
- Stay away from large unsupported roofs.

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8.6 Emergency Response for Fires

If a small fire occurs, extinguish it with the fire extinguisher in the field vehicle. Remember to follow these directions to put out the fire:

- Aim at the base of the flame;
- Use the appropriate type of fire extinguisher; and
- Remember that the spray only lasts a few seconds.

If a large fire occurs at the Site, follow these instructions:

- Do not attempt to put out a large fire with the field vehicle fire extinguisher;
- Report the incident to the On-site Health and Safety Officer and Project Manager.
- Call the Fire Department (Table 7) and report the information outlined in Section 8.3.3;
- Ready equipment and be prepared to move flammable and combustible items out of the path of the fire, but do not attempt to approach a large fire unless directed to do so by police or firefighters.

Upon notification of a fire or explosion onsite, all site personnel not involved with emergency response should assemble at a designated meeting place.

8.7 Emergency Response for Explosions

If an explosion occurs, follow these instructions:

- Evacuate the site immediately;
- If feasible, decontaminate yourself and others;
- Do not address medical emergencies until you are out of danger;
- Call the Project Health and Safety Officer or local emergency response organization when you are out of danger to report the incident. Report the information outlined in Section 8.3.3

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Table 7 List of Emergency Telephone Contacts (Copy and Post)

Agency/Facility	Telephone No.	Contact
Police (Bridgeton Police Department)	911 Emergency (314) 739-7557 non-emergency	
Fire Department (Pattonville Fire Protection District)	911 Emergency (314) 291-6072 non-emergency	
Ambulance (Robertson Fire Protection District)	911	
Emergency Medical Facility/Hospital	(314) 344-6000	SSM DePaul Health Center 12303 DePaul Drive St. Louis, MO 63044-2588
Poison Control Center (Chemtrec)	(800) 424-9300	
Republic Services	(314) 744-8165	Office
(On-site Representative and Environmental Manager)	(618) 410-0157	Brian Power (cell)
EMSI (Project Management)	(303) 940-3426	Office
	(303) 808-7227	Paul Rosasco (cell)
	(303) 808-7227	Bob Jelenik (cell)
Feezor Engineering, Inc.	(217) 836-8842	Office
Health and Safety Officer	(636) 578-8635	Jonathan Wilkinson (cell)
	(217) 836-8842	Dan Feezor (cell)
Auxier & Associates	(865) 675-3669	Main Office
On-site Radiation Control Officer	(505) 463-2895	Alex Luna (cell)
Project Radiation Safety Officer	(865) 621-3076	Cecilia Greene (cell)
Certified Health Physicist	(865) 414-0378	Mike Bollenbacher (cell)
Brush Clearing Contractor		
Kuesel Excavating Co.	(314) 393-2231	Dan Schaefer
	(314) 985-4823	Sean Strader
Weaver Consultants (Surveying)	(618) 792-3232 cell	Collin Carson

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9 REFERENCES

Auxier 2016a. Surface Rim Identification, Sampling, and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) West Lake Superfund Site Operable Unit 1. , Auxier & Associates, Knoxville TN. January 4, 2016.

Auxier 2016b. "Radiation Safety Plan for Installation of Non-combustible Cover in Operable Unit 1 of Westlake Landfill", Auxier & Associates, Knoxville TN. January 4, 2016.

Auxier 2015 "Air Monitoring, Sampling, and QA/QC Plan, West Lake Superfund Site Operable Unit 1" Auxier & Associates, Knoxville, TN 37932, and Engineering Management Support, Inc., Lakewood, Co 80235.

EMSI 2015. "Work Plan for Installation of a Non-Combustible Cover over Radiologically-Impacted Material at or near the Ground Surface in Radiological Areas 1 and 2 West Lake Landfill Operable Unit-1," Engineering Management Support, Inc., Lakewood, Colorado 80235 and Feezor Engineering, Inc., Illinois 62629 and Auxier & Associates, Knoxville, Tennessee 37932

NRC 1988. "Radioactive Material in the West Lake Landfill – Summary Report, NUREG 1308 – Rev. 1", Nuclear Regulatory Commission, June 1988.

NRC 1976. "IE Inspection Report No. 76-01." Office of Inspection and Enforcement, NRC Washington, DC 1976.

RMC 1982. "Radiological Survey of the West Lake Landfill, St. Louis County, Missouri, NUREG/CR-2722", Radiation Management Corporation. May, 1982.

Figures

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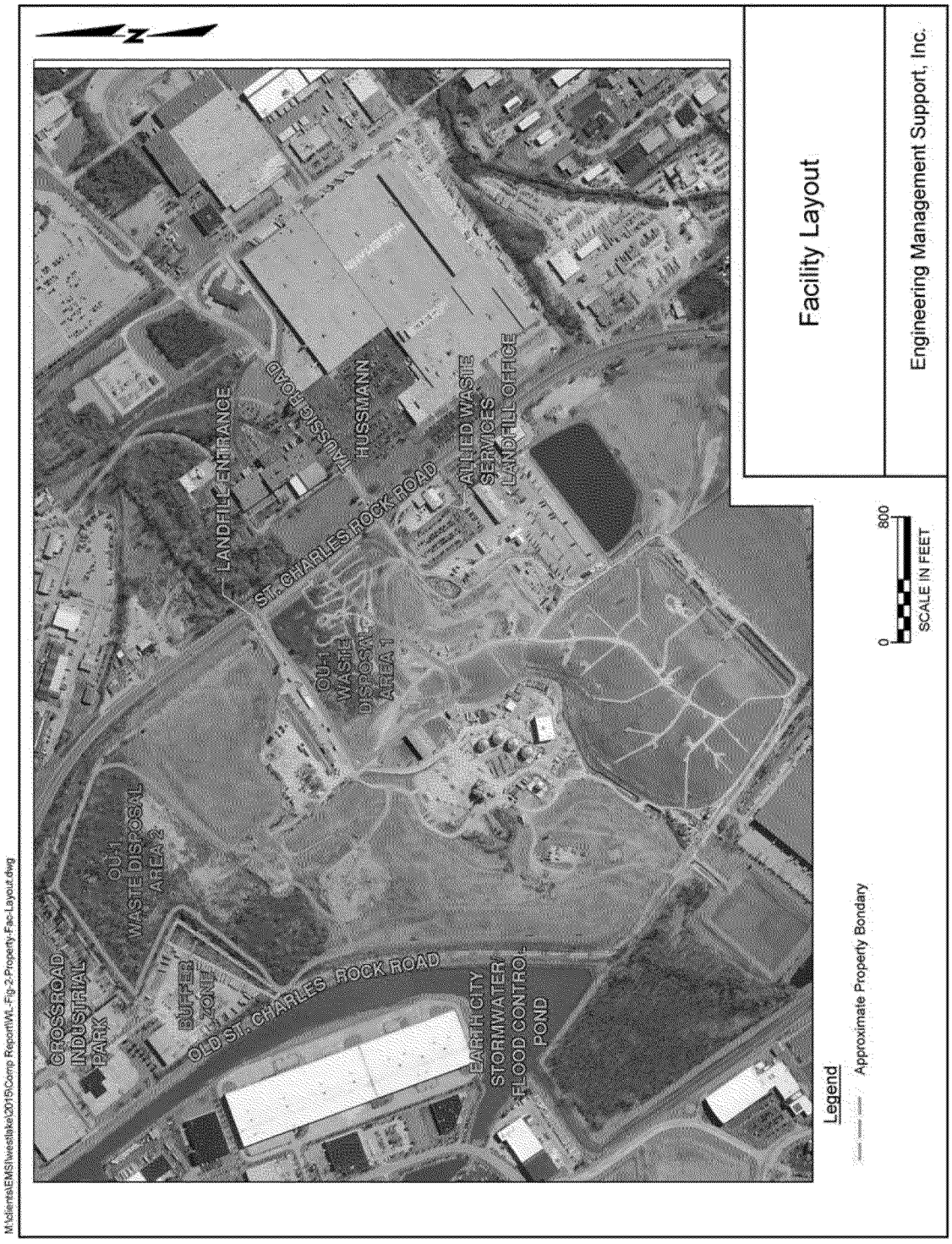

Figure 1 Locations of Areas 1 and 2 within Operable Unit 1

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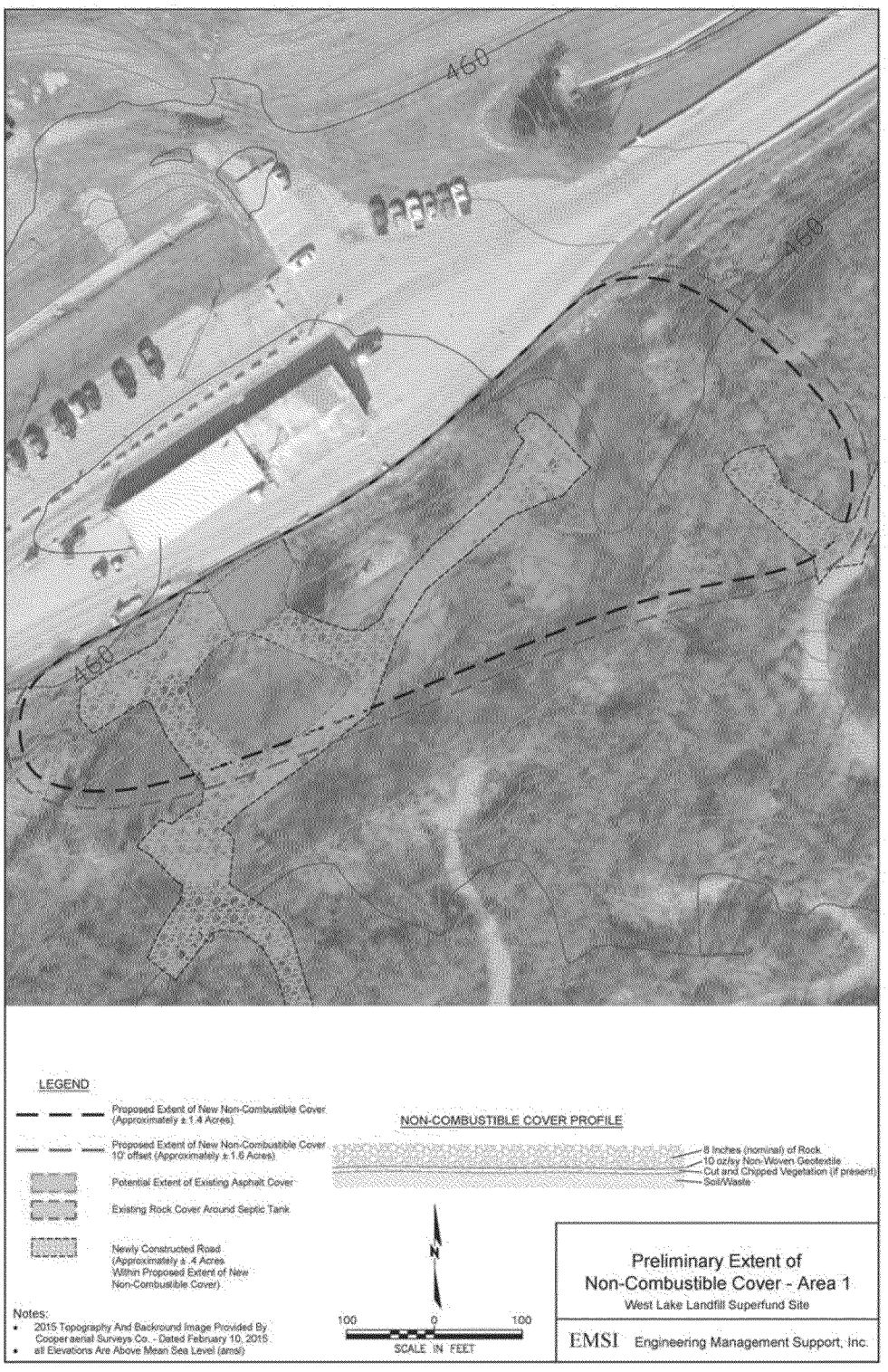
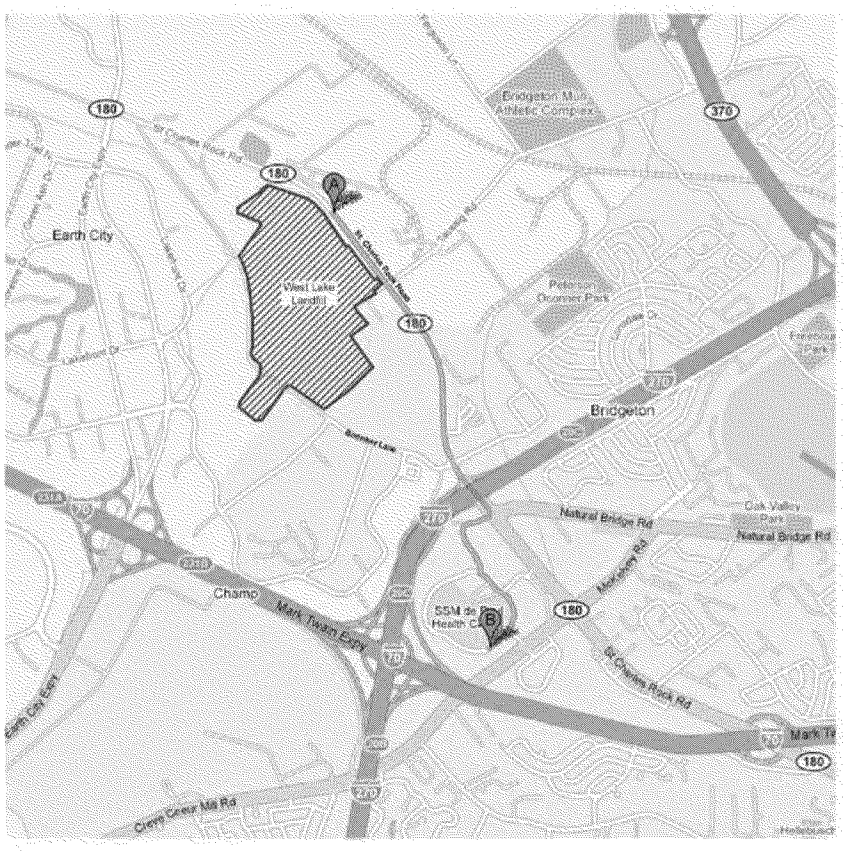


Figure 2 Estimated Location and Extent of Proposed Cap in Area 1

Figure 3 Estimated Location and Extent of Proposed Cap in Area 2



13570 St Charles Rock Rd
Bridgeton, MO 63044

1. Head **southeast** on **MO-180/St Charles Rock Rd** toward **Taussig Ave** — go 1.3 mi (total 1.3 mi)
   About 6 mins
2. Turn **right** at **Mareschal Ln** — go 0.1 mi (total 1.3 mi)
3. Slight **left** at **De Paul Dr** — go 0.2 mi (total 1.7 mi)
4. Turn **left** to stay on **De Paul Dr** — go 0.4 mi (total 2.1 mi)
   Destination will be on the right
   About 2 mins

12303 De Paul Dr
Bridgeton, MO 63044

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

Map data ©2008 Tele Atlas

N

NOT TO SCALE

Directions to Hospital from West Lake Landfill

FEEZOR ENGINEERING, INC.

M:\clients\EMSI\westlake\2013\Fencing\WL-Fig-3-Hospital-Dir-fl.dwg plotted: 12/18/2013

Figure 4 Route to Hospital

Appendices

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Appendix A:

Forms/Logs

Health and Safety Compliance Agreement

I have read, understand, and agree to comply with the health and safety procedures in this Health and Safety Plan (HASP). In addition, I have attended, understand, and agree to comply with the information presented in the health and safety pre-activity meeting. I hereby agree that (1) compliance with the HASP is a condition of entry to the site, and (2) non-compliance with the HASP may result in work stoppage and/or dismissal from the Site.

Printed Name	Organization	Signature	Date

Personnel health and safety pre-activity meeting conducted by:

Name	Organization	Signature	Date

Accident/Incident Report

Date _____ Project Location _____

Description of accident/incident, including injuries, property damage, emergency action taken and personnel involved (use additional sheets if needed):

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Witnesses of Accident/Incident:

_____
_____
_____

Possible or known causes:

_____
_____
_____

What actions are needed to prevent a similar incident?

_____
_____
_____

_____ _____
Reporter Project Health and Safety Officer

_____
Project Manager

Appendix B:

Safety Data Sheets

Safety Data Sheet

Material Name: Diesel Fuel, All Types **SDS No. 9909**
US GHS

Synonyms: Ultra Low Sulfur Diesel; Low Sulfur Diesel; No. 2 Diesel; Motor Vehicle Diesel Fuel; Non-Road Diesel Fuel; Locomotive/Marine Diesel Fuel

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Flammable Liquids - Category 3
Skin Corrosion/Irritation – Category 2
Germ Cell Mutagenicity – Category 2
Carcinogenicity - Category 2
Specific Target Organ Toxicity (Single Exposure) - Category 3 (respiratory irritation, narcosis)
Aspiration Hazard – Category 1
Hazardous to the Aquatic Environment, Acute Hazard – Category 3

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

DANGER

Hazard Statements

Flammable liquid and vapor.
Causes skin irritation.
Suspected of causing genetic defects.
Suspected of causing cancer.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep container tightly closed.
Ground/bond container and receiving equipment.

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Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Wash hands and forearms thoroughly after handling.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing fume/mist/vapours/spray.

Response
In case of fire: Use water spray, fog or foam to extinguish.
IF ON SKIN (or hair): Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell.
If swallowed: Immediately call a poison center or doctor. Do NOT induce vomiting.
IF exposed or concerned: Get medical advice/attention.

Storage
Store in a well-ventilated place. Keep cool.
Keep container tightly closed.
Store locked up.

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
68476-34-6	Fuels, diesel, no. 2	100
91-20-3	Naphthalene	<0.1

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher.

* * * Section 4 - First Aid Measures * * *

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

First Aid: Skin
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or with waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and the area of the body burned.

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

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First Aid: Inhalation

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

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

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

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, and other gaseous agents.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Caution, flammable vapors may accumulate in closed containers.

Emergency Measures

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

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Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

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

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a combustible liquid. Keep away from heat, sparks, excessive temperatures and open flame! No smoking or open flame in storage, use or handling areas. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage Procedures

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

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

Incompatibilities

Keep away from strong oxidizers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Fuels, diesel, no. 2 (68476-34-6)

ACGIH: 100 mg/m3 TWA (inhalable fraction and vapor, as total hydrocarbons, listed under Diesel fuel)
Skin - potential significant contribution to overall exposure by the cutaneous route (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH:	10 ppm TWA
	15 ppm STEL
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA:	10 ppm TWA; 50 mg/m3 TWA
NIOSH:	10 ppm TWA; 50 mg/m3 TWA
	15 ppm STEL; 75 mg/m3 STEL

Engineering Measures

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

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

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

Personal Protective Equipment: Hands

Gloves constructed of nitrile, neoprene, or PVC are recommended.

Personal Protective Equipment: Eyes

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

Personal Protective Equipment: Skin and Body

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Clear, straw-yellow.	**Odor:**	Mild, petroleum distillate odor
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	0.009 psia @ 70 °F (21 °C)	**Vapor Density:**	>1.0
Boiling Point:	320 to 690 °F (160 to 366 °C)	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	0.83-0.876 @ 60°F (16°C)
Evaporation Rate:	Slow; varies with conditions	**VOC:**	ND
Percent Volatile:	100%	**Octanol/H2O Coeff.:**	ND
Flash Point:	>125 °F (>52 °C) minimum	**Flash Point Method:**	PMCC
Upper Flammability Limit (UFL):	7.5	**Lower Flammability Limit (LFL):**	0.6
Burning Rate:	ND	**Auto Ignition:**	494°F (257°C)

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatible Products

Keep away from strong oxidizers.

Hazardous Decomposition Products

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

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B: Component Analysis - LD50/LC50

Naphthalene (91-20-3)

Inhalation LC50 Rat >340 mg/m3 1 h; Oral LD50 Rat 490 mg/kg; Dermal LD50 Rat >2500 mg/kg; Dermal LD50 Rabbit >20 g/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

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

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Contact with eyes may cause mild irritation.

Potential Health Effects: Ingestion

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

Potential Health Effects: Inhalation

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

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

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This material has been positive in a mutagenicity study.

Carcinogenicity

A: General Product Information

Suspected of causing cancer.

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

B: Component Carcinogenicity

Fuels, diesel, no. 2 (68476-34-6)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 82 [2002] (Group 2B (possibly carcinogenic to humans))

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

This product is not reported to have any specific target organ general toxicity repeat exposure effects.

Aspiration Respiratory Organs Hazard

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

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Fuels, diesel, no. 2 (68476-34-6)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	35 mg/L [flow-through]	

Naphthalene (91-20-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	5.74-6.44 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	1.6 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	0.91-2.82 mg/L [static]	
96 Hr LC50 Pimephales promelas	1.99 mg/L [static]	

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96 Hr LC50 Lepomis macrochirus	31.0265 mg/L [static]
72 Hr EC50 Skeletonema costatum	0.4 mg/L
48 Hr LC50 Daphnia magna	2.16 mg/L
48 Hr EC50 Daphnia magna	1.96 mg/L [Flow through]
48 Hr EC50 Daphnia magna	1.09 - 3.4 mg/L [Static]

Persistence/Degradability
No information available.

Bioaccumulation
No information available.

Mobility in Soil
No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions
See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging
Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

DOT Information
Shipping Name: Diesel Fuel
NA #: 1993 **Hazard Class:** 3 **Packing Group:** III
Placard:

* * * Section 15 - Regulatory Information * * *

Regulatory Information

Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Naphthalene (91-20-3)

CERCLA: 100 lb final RQ; 45.4 kg final RQ

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	X	--	--

WLLFOIA4312 - 001 - 0046427

SARA SECTION 313 - SUPPLIER NOTIFICATION

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

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Fuels, diesel, no. 2	68476-34-6	No	No	No	Yes	No	No
Naphthalene	91-20-3	Yes	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

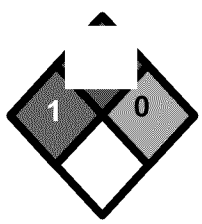
Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Fuels, diesel, no. 2	68476-34-6	Yes	DSL	EINECS
Naphthalene	91-20-3	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	1
Fire	2
Reactivity	0



HMIS® Hazard Rating

Health	1*	Slight
Fire	2	Moderate
Physical	0	Minimal
		*Chronic

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

Literature References

None

Other Information

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

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

End of Sheet

AMERADA HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades **MSDS No. 9950**

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

NFPA 704 (Section 16)

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

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

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

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

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

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

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

See Section 16 for abbreviations and acronyms.

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

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

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

WLLFOIA4312 - 001 - 0046430

3. HAZARDS IDENTIFICATION (rev. Dec-97)

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

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

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

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

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

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

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

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

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

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

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

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

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

5. FIRE FIGHTING MEASURES (rev. Dec-97)

FLAMMABLE PROPERTIES:

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

FIRE AND EXPLOSION HAZARDS

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

EXTINGUISHING MEDIA

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

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

FIRE FIGHTING INSTRUCTIONS

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

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

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

See Section 16 for the NFPA 704 Hazard Rating.

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

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

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

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

vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

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

7. HANDLING and STORAGE (rev. Dec-97)

HANDLING PRECAUTIONS

******USE ONLY AS A MOTOR FUEL******

******DO NOT SIPHON BY MOUTH******

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

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS

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

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

WORK/HYGIENIC PRACTICES

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

8. EXPOSURE CONTROLS and PERSONAL PROTECTION (rev. Jan-04)

EXPOSURE LIMITS

Component (CAS No.)	Exposure Limits			
	Source	TWA (ppm)	STEL (ppm)	Note
Gasoline (86290-81-5)	ACGIH	300	500	A3
Benzene (71-43-2)	OSHA	1	5	Carcinogen
	ACGIH	0.5	2.5	A1, skin
	USCG	1	5	
n-Butane (106-97-8)	ACGIH	800	--	2003 NOIC: 1000 ppm (TWA) Aliphatic Hydrocarbon Gases Alkane (C1-C4)
Ethyl Alcohol (ethanol) (64-17-5)	OSHA	1000	--	
	ACGIH	1000	--	A4
Ethyl benzene (100-41-4)	OSHA	100	--	
	ACGIH	100	125	A3

Component (CAS No.)	Source	TWA (ppm)	STEL (ppm)	Note
		Exposure Limits		
n-Hexane (110-54-3)	OSHA	500	--	
	ACGIH	50	--	skin
Methyl-tertiary butyl ether [MTBE] (1634-04-4)	ACGIH	50		A3
Tertiary-amyl methyl ether [TAME] (994-05-8)				None established
Toluene (108-88-3)	OSHA	200		Ceiling: 300 ppm; Peak: 500 ppm (10 min.)
	ACGIH	50	--	A4 (skin)
1,2,4- Trimethylbenzene (95-63-6)	ACGIH	25	--	
Xylene, mixed isomers (1330-20-7)	OSHA	100	--	
	ACGIH	100	150	A4

ENGINEERING CONTROLS

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

EYE/FACE PROTECTION

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

SKIN PROTECTION

Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as that made of of E.I. DuPont Tychem ®, products or equivalent is recommended based on degree of exposure.

Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations.

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

9. PHYSICAL and CHEMICAL PROPERTIES (rev. Jan-04)

APPEARANCE

A translucent, straw-colored or light yellow liquid

ODOR

A strong, characteristic aromatic hydrocarbon odor. Oxygenated gasoline with MTBE and/or TAME may have a sweet, ether-like odor and is detectable at a lower concentration than non-oxygenated gasoline.

ODOR THRESHOLD

	Odor Detection	Odor Recognition
Non-oxygenated gasoline:	0.5 - 0.6 ppm	0.8 - 1.1 ppm
Gasoline with 15% MTBE:	0.2 - 0.3 ppm	0.4 - 0.7 ppm
Gasoline with 15% TAME:	0.1 ppm	0.2 ppm

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	85 to 437 °F (39 to 200 °C)
VAPOR PRESSURE:	6.4 - 15 RVP @ 100 °F (38 °C) (275-475 mm Hg @ 68 °F (20 °C)
VAPOR DENSITY (air = 1):	AP 3 to 4
SPECIFIC GRAVITY (H_2O = 1):	0.70 – 0.78
EVAPORATION RATE:	10-11 (n-butyl acetate = 1)
PERCENT VOLATILES:	100 %

SOLUBILITY (H_2O): Non-oxygenated gasoline - negligible (< 0.1% @ 77 °F). Gasoline with 15% MTBE - slight (0.1 - 3% @ 77 °F); ethanol is readily soluble in water

10. STABILITY and REACTIVITY (rev. Dec-94)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

INCOMPATIBLE MATERIALS

Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

11. TOXICOLOGICAL PROPERTIES (rev. Dec-97)

ACUTE TOXICITY

Acute Dermal LD50 (rabbits): > 5 ml/kg
Acute Oral LD50 (rat): 18.75 ml/kg
Primary dermal irritation (rabbits): slightly irritating
Draize eye irritation (rabbits): non-irritating
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenicity: OSHA: NO IARC: YES - 2B NTP: NO ACGIH: YES (A3)

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

This product may contain methyl tertiary butyl ether (MTBE): animal and human health effects studies indicate that MTBE may cause eye, skin, and respiratory tract irritation, central nervous system depression and neurotoxicity. MTBE is classified as an animal carcinogen (A3) by the ACGIH.

12. ECOLOGICAL INFORMATION (rev. Jan-04)

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, oxygenates such as ethers and alcohols will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. The API (www.api.org) provides a number of useful references addressing petroleum and oxygenate contamination of groundwater.

13. DISPOSAL CONSIDERATIONS (rev. Dec-97)

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

14. TRANSPORTATION INFORMATION (rev. Jan-04)

DOT PROPER SHIPPING NAME:	Gasoline
DOT HAZARD CLASS and PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 1203
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

PLACARD:

15. REGULATORY INFORMATION (rev. Jan-04)

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

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

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION WT. PERCENT
Benzene (71-43-2)	0.1 to 4.9 (0.1 to 1.3 for reformulated gasoline)
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Toluene (108-88-3)	1 to 15
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 to 15

US EPA guidance documents (www.epa.gov/tri) for reporting Persistent Bioaccumulating Toxics (PBTs) indicate this product may contain the following deminimis levels of toxic chemicals subject to Section 313 reporting:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION - Parts per million (ppm) by weight
Polycyclic aromatic compounds (PACs)	17
Benzo (g,h,i) perylene (191-24-2)	2.55
Lead (7439-92-1)	0.079

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)

Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION (rev. Jan-04)

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
HMIS® HAZARD RATING	HEALTH:	1 *	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
	* CHRONIC		

SUPERSEDES MSDS DATED: 12/30/97

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than

N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212)642-4900
API	American Petroleum Institute (202)682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General Info: (800)467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Workplace Hazardous Materials Information System (Canada)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

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

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

Appendix C:

Understanding and Preventing Heat Stress

UNDERSTANDING AND PREVENTING

HEAT STRESS

HEAT STRESS: IT'S A MATTER OF DEGREE

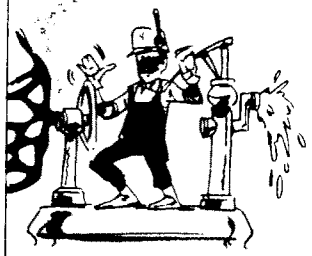
Under certain conditions, your body may have trouble regulating its temperature. As a result, your body overheats and suffers from some degree of heat stress. Whether mild, moderate, or severe, heat stress can come on suddenly and be dangerous to your health. But if you're prepared, you can "keep your cool" and prevent heat-related problems.

When It's Too Hot for You to Handle

Hard work or play can overload your body with extra heat—especially if you're active in a hot, humid, or poorly ventilated environment. These conditions make it harder for your body to handle heat—the sweat pours out, you don't feel well or work well, and you may feel dizzy or faint. If these signs of heat stress go unrecognized and untreated, serious—and sometimes permanent—health problems can occur.

Keep Your Cool

Our bodies vary in their ability to handle heat. But everyone can learn to avoid the adverse health and safety effects of heat stress. Keep your cool by knowing your body and its limitations, by understanding heat stress, and by preventing heat stress in the first place.

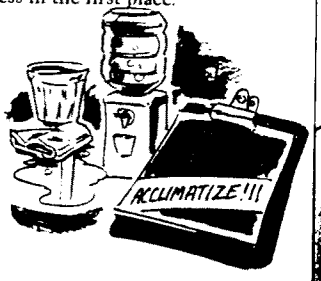


Know Your Body

Your body has a "heat regulator" that controls body temperature. But activity, heat, humidity, or lack of air movement can overwork this mechanism.

Understand Heat Stress

Protect yourself from heat stress. Learn to recognize warning signs—such as heavy sweating, fatigue, and dizziness—and know how heat stress is treated.



Prevent Heat Stress

Take an active role to prevent heat problems. Know the factors that increase your risk and take steps to reduce them, such as drinking water and acclimatizing to the heat.

This booklet is not intended to replace your company's health and safety policies or professional medical care.

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HOW YOUR BODY HANDLES HEAT

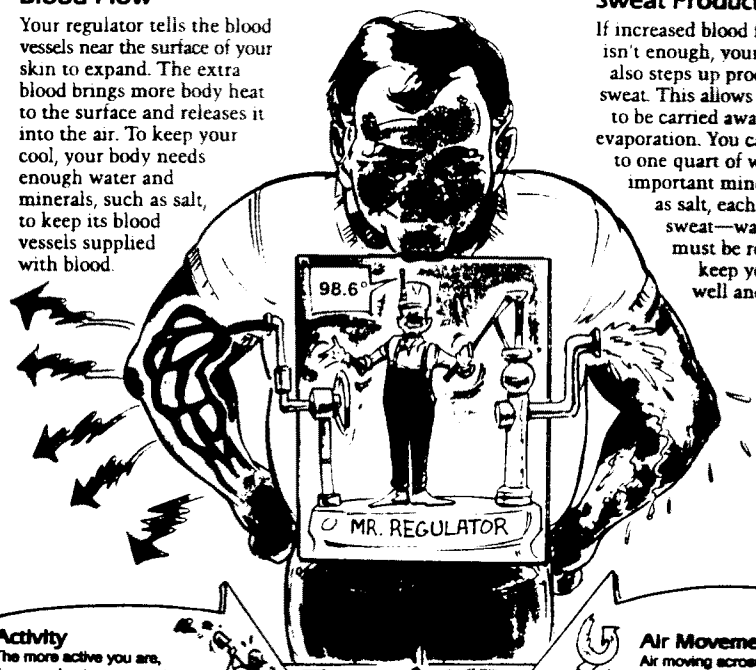
You have a natural mechanism that regulates the **core temperature** deep inside your body. You maintain a normal core temperature of 98.6° F by releasing excess heat into the air. The heat leaves your body through the blood vessels near the skin's surface and through the evaporation of sweat. Your level of activity and certain environmental conditions make the regulator work harder to increase your body's blood flow and sweat production.

Blood Flow

Your regulator tells the blood vessels near the surface of your skin to expand. The extra blood brings more body heat to the surface and releases it into the air. To keep your cool, your body needs enough water and minerals, such as salt, to keep its blood vessels supplied with blood.

Sweat Production

If increased blood flow alone isn't enough, your regulator also steps up production of sweat. This allows more heat to be carried away through evaporation. You can lose up to one quart of water, plus important minerals such as salt, each hour you sweat—water which must be replaced to keep you feeling well and healthy.



Activity

The more active you are, the more heat your muscles generate. Heavy physical activity also sets up competition between your muscles and skin for the blood supply.

Air Movement

Air moving across your skin carries away heat from its surface; it also helps sweat evaporate. But with little air movement, these processes don't work as well.

Environmental Temperature

As the temperature in your environment goes up, so does your body temperature. When it's hot from the sun or other radiant heat source, such as a furnace, your body can't transfer heat to the air as effectively.

Humidity

The higher the humidity, the less sweat evaporates. That's because the moisture content in the air is already high, making it difficult for the air to absorb more moisture.

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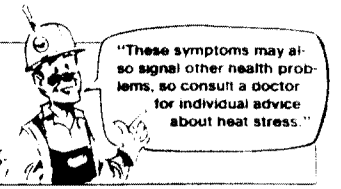
UNDERSTAND HEAT STRESS

When your body's heat regulator is pushed too far and your body overheats, some form of heat stress occurs. It may be mild, moderate, or severe; symptoms may range from excessive sweating to dizziness to unconsciousness. Since even severe heat stress can appear suddenly, learn the warning signs and how they're treated, so you can be more comfortable and productive, and prevent heat problems from occurring.

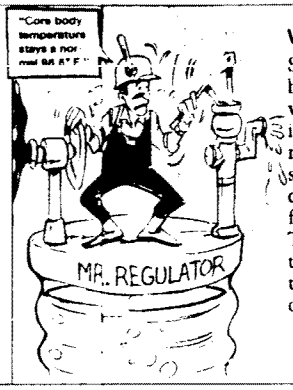


Mild: Minor Heat Problems

This is usually the earliest and least serious form of heat stress. Mild heat stress is always reversible and usually isn't dangerous unless the symptoms persist. Although you usually can continue work soon after treatment, always inform your supervisor if you have symptoms of mild heat stress.

Signs and Symptoms

You may have one or more of these symptoms.
- Excessive sweating.
- Painful spasms in muscles during or several hours after activity **(heat cramps)**.
- Tiny red bumps on skin and a prickling sensation **(called prickly heat)**.
- Irritability, mild dizziness, or weakness.



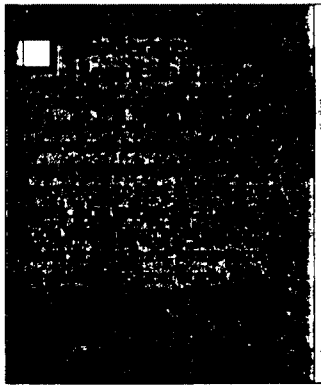
What's Going On

Sweating causes your body to lose too much water and minerals. This imbalance may cause muscles to cramp. Your sweat glands may become blocked and inflamed, causing a rash. Too little blood flowing to the brain causes irritability, dizziness and other symptoms.

Treatment

Follow this self-care:
- Rest in a cool or shady area.
- Drink water or other fluids.
- Use warm, moist compresses over cramping muscles, followed by gentle massage.
- Use a mild drying lotion to relieve the rash; keep skin dry and clean.

Taking additional salt is usually **not** necessary.



Signs and Symptoms

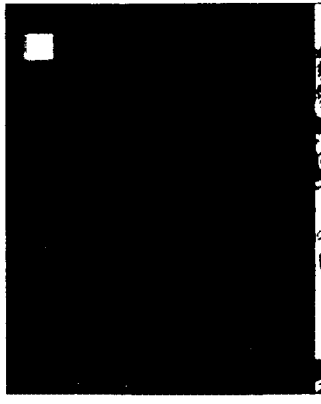
You may have one or more of these symptoms.
- Excessive sweating.
- Cold, moist, pale skin (or flushed skin).
- Thirst.
- Extreme weakness or fatigue.
- Headache, nausea, or loss of appetite.
- Dizziness or giddiness.
- A rapid, weak pulse.

What's Going On

Losing too much water and minerals reduces the blood supply to major organs, such as the brain, muscles, and skin. Your heart works harder to maintain the blood supply, straining your cardiovascular system. Some organs, such as the brain, may not get enough blood.

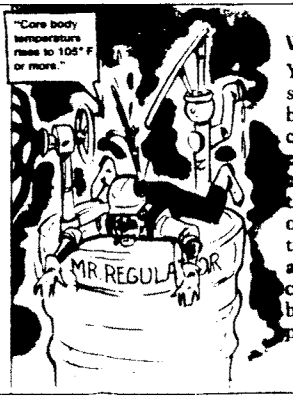
Treatment

You may need medical treatment, as well as this self-care:
- Rest in a cool or shady area.
- Drink water or other fluids.
- Take additional salt only if advised.
- Use cool compresses on forehead, around the neck, and under armpits.



Signs and Symptoms

You may have one or more of these symptoms.
- Lack of sweating.
- Hot, dry, flushed skin.
- Deep, rapid breathing.
- A rapid, weak, and possibly irregular pulse.
- Headache, nausea.
- Dizziness, confusion, or delirium.
- Loss of consciousness.
- Convulsions.



What's Going On

Your regulator becomes so overburdened that blood flow and sweat cannot cool your body enough. Your body becomes so overheated that sweat glands and other organs don't function normally. This can affect vital organs, including your heart and brain, and may cause permanent damage.

Treatment

Call for medical help right away. While waiting for medical treatment, begin first aid:
- Rest in a cool or shady area.
- Remove outer clothing.
- Lower body temperature with cool compresses, increasing air movement, or both.
- Drink water or other fluids (if conscious).

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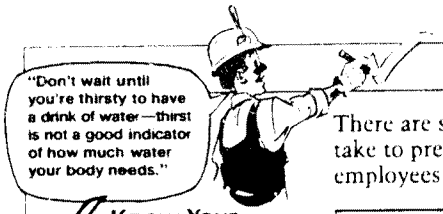
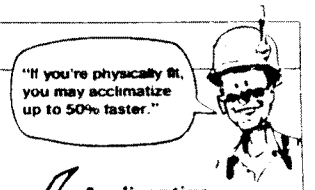
CHECKPOINTS FOR PRE VENTING HEAT STRESS



There are several steps you and your employer can take to prevent heat stress. Both supervisors and employees can recognize risks and follow safety procedures to reduce them. Be sure to inform your employer about any medical conditions you have and discuss whether you might be at increased risk.



Know Your Environment

Your company controls the work environment so it's safe. You can help by knowing which factors increase your risk of heat stress. Talk with your supervisor about ways to reduce them, so you can take special precautions to protect yourself when the risk is especially high, such as on hot, humid days.

Drink Plenty of Water

Increase the water you drink to replenish the water you lose from sweating. Drink more than you need to satisfy your thirst. It's best to replenish regularly by drinking small amounts frequently throughout the day. You may need to drink a glass of water or more every hour.

Take Appropriate Breaks

Whether you need rest breaks depends on conditions such as air temperature, sun exposure, and how hard you're working. Your company monitors these conditions and establishes a safe work/rest regimen for you and your coworkers.

Wear Proper Clothing

Your employer supplies you with heat-protective clothing and equipment, such as heat shields, if needed. When possible, wear loose, lightweight clothing, which encourages heat to be released.

Acclimatize Yourself

Your employer may give you guidelines to help you adapt to the heat. This natural process, called **acclimatization,** takes about 7 to 10 days. It usually consists of short periods of working in the heat, which gradually increase in time and intensity. If you spend time out of the heat due to vacation or reassignment, you may need to acclimatize yourself again.

Stay in Good Shape

Conditioned muscles work more efficiently and generate less body heat, while extra body weight makes you work harder. People in good condition tend to acclimatize better because their cardiovascular systems respond better.

Eat Wisely

Hot, heavy meals add heat to your body and divert blood to your digestive system, so eat lightly during your workday. Remember, too, a normal diet usually supplies all the salt you need to replace the salt lost through sweating.

Know Special Risks

Alcohol (including beer), **caffeine, medications** such as those used to control high blood pressure or allergies, **medical conditions** including diabetes, **recent illnesses** such as flu, and increasing **age** all increase your risk of heat stress.

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"TEAMWORK HELPS YOU BEAT THE HEAT"

In many jobs, heat is a fact of life. Since too much heat can be harmful to your health and be a safety problem, your company wants to help you reduce the risk of heat stress by monitoring and controlling the work environment. Be sure to follow company procedures, such as adjusting gradually to working in the heat and drinking plenty of water. You'll feel better on and off the job knowing what heat stress is and how to prevent it.

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MORE THAN INFORMATION

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