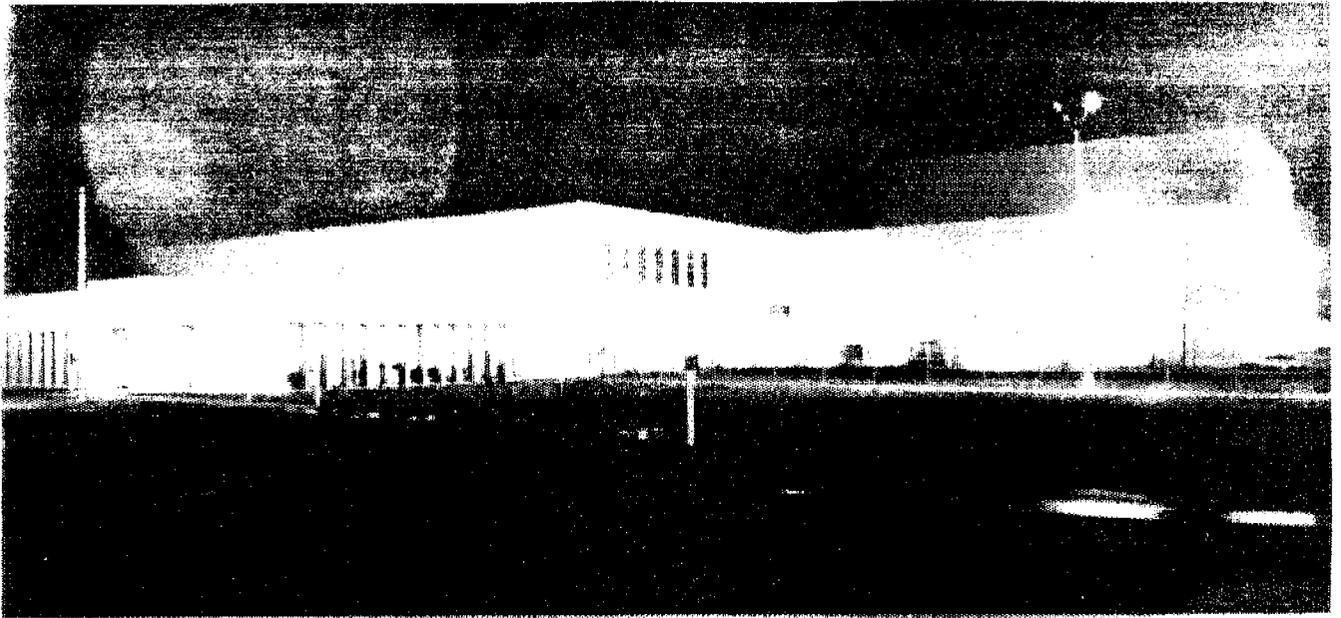


NOTICE

All drawings located at the end of the document.



STARMET
Metallurgical Excellence

Pyrophoric Depleted
Uranium Source
Removal from
Rocky Flats
Environmental
Technology Site
T-1 Trench
(IHSS 108)

Temporary Structure
Health and Safety Plan

March 1998

ADMIN **RECORD**

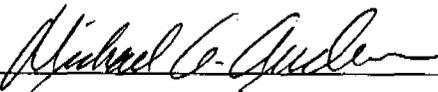
1108-A-00020

ADMINISTRATIVE INFORMATION

Site: Rocky Flats Environmental Technology Site (RFETS), Golden, Colorado
Project Name: Source Removal at Trench 1 – IHSS 108 Temporary Structure Construction.
Date Prepared: February, 1998

Approvals

I have read and approved this HASP with respect to project hazards and regulatory requirements.



Starmet/Stoller Task Manager
Mike Anderson

3/5/98

Date



Starmet/Stoller Site Safety Officer
Steven Aldridge

3/10/98

Date



RMRS Project Manager
Wayne Sproles

3/10/98

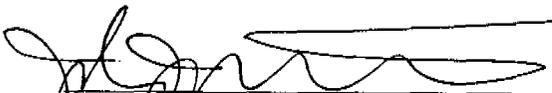
Date



RMRS Health and Safety Supervisor
Skip Chandler

3/10/98

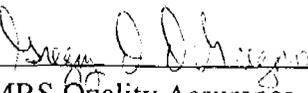
Date



SSOC Radiological Engineer
John Miller

3/10/98

Date



RMRS Quality Assurance
Greg DiGregorio

3/10/98

Date

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List of References

- American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 1995-1996
- American National Standards Institute ANSI A92.5-1980 Boom-Supported Elevating Work Platforms
- American National Standards Institute ANSI A92.6 1979 Self-Propelled Elevated Work Platforms
- Department of Energy (DOE) Order 5480.9A, Construction Project Safety and Health Management
- Department of Energy (DOE) Form F5480.4, Complaint Form
- Department of Energy (DOE) Form 5484.3, Individual Accident/Incident Report
- DOE Title 10 CFR 835 Occupational Radiation Protection
- NIOSH Pocket Guide to Chemical Hazards, 1994
- OSHA Title 29 CFR 1904 Recording and Reporting Occupational Injuries and Illnesses
- OSHA Title 29 CFR 1910 Safety and Health Regulations for General Industry
- OSHA Title 29 CFR 1926 Safety and Health Regulations for Construction
- Rocky Flats Environmental Technologies Site Administrative Procedures Manual
- Sciencetech, Inc. Health and Safety Program(HASP)
- HASP 9 – Personal Protective Equipment

HASP 10 - Fall Protection
HASP 16 - Use and Care of Ladders
HASP 19 - Elevated Work Platforms
HASP 23 - Hazard Communication
HASP 28 - Electrical Safety
HASP 22 – Industrial Hygiene Program
ADM-16.01 Occurrence Reporting Process
Rocky Flats Environmental Technologies Site Conduct of Operations Manual
COOP-006 - Operating Area Logs and Records
Rocky Flats Environmental Technologies Site Field Operations Manual
Rocky Flats Environmental Technologies Site Health and Safety Practices Manual
HSP-2.08 Lockout/Tagout
HSP-Section 4 - Medical Program
HSP-9.06 Powered Industrial Trucks
HSP-12.10 Hand and Portable Power Tools
HSP-21.04 Emergency Response and Spill Control
Rocky Flats Environmental Technologies Site Soil Disturbance Permit #CB0310SD, “Trench T-1 Accelerated Action”
Rocky Mountain Remediation Services - Field Implementation Plan for the Source Removal at the Trench T-1 Site, IHSS 108
Rocky Mountain Remediation Services - Heat Stress Monitoring Procedure (Discussed in letter #RJC-014-96.)
Rocky Mountain Remediation Services - Integrated Work Control Package ??????
Rocky Mountain Remediation Services Proposed Action Memorandum for the Source Removal at the Trench T-1 Site, IHSS 108
Section 01700-1 Subcontractor Health and Safety Requirements (9/23/96)

List of Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
CPM	Counts Per Minute
dB	Decibels
DOE	Department of Energy
FIP	Field Implementation Plan for the Source Removal at the Mound Site, IHSS 113
FO	Field Operations Manual
GFCI	Ground Fault Circuit Interrupter
HASP	Health and Safety Plan or Sciencetech, Inc. Health and Safety Program

HSP	Health and Safety Practices Manual
HSS	Health and Safety Specialist
IH	Industrial Hygiene
IHSS	Individual Hazardous Substance Site
KH	Kaiser-Hill
MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PAM	Proposed Action Memorandum for the Source Removal at the Mound Site, IHSS 113
PPE	Personal Protective Equipment
RCT	Radiological Control Technician
RFETS	Rocky Flats Environmental Technology Site
ROI	Radiological Operating Instructions Manual
RMRS	Rocky Mountain Remediation Services
RWP	Radiological Work Permit
SAP	Sampling and Analysis Plan to Support the Source Removal at the Mound Site, IHSS 113
SEG	Scientific Ecology Group
SSO	Site Safety Officer
SSOC	Safe Site of Colorado
WBG	Wet Bulb Globe Thermometer

1.0 Introduction

This site specific Health and Safety Plan (HASP) establishes guidelines to protect project personnel, collocated workers, the general public, equipment, and the environment during the implementation of field activities associated with the construction of the temporary structure for the Source Removal at Trench 1, Individual Hazardous Substance Site (IHSS) 108, a remediation project to be performed at the Rocky Flats Environmental Technology Site (RFETS). The safety organization, procedures, and protective equipment have been defined based upon an analysis of potential hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential for accident or injury. The HASP is compliant with DOE Order 5480.9A, "Construction Project Safety and Health Management"; OSHA Title 29 CFR 1910, "Safety and Health Regulations for General Industry"; OSHA Title 29 CFR 1926, "Safety and Health Regulations for Construction"; and Starmet Health and Safety Policies.

This HASP prescribes the procedures that must be followed during referenced site activities. HASP changes that could affect the health and safety of personnel, the community, or the environment, will not be made without the prior approval of the Project Manager, the Project Health & Safety Officer, the RMRS Project Manager and the RMRS Health and Safety Supervision. The provisions of this plan are mandatory requirements for all personnel and subcontractors assigned to the project. All visitors to the work site must abide by the requirements of the plan.

RMRS Construction Subcontractors manage and perform work in accordance with a documented Safety Management System that complies with the Kaiser-Hill Integrated Safety Management System (ISMS) Program by utilizing ISMS concepts as outlined in 1-MAN-016-ISM – Integrated Safety Management Systems Manual. Prior to commencement of work, the subcontractor shall develop and implement plans for performing work safely on the construction site by utilizing the five following ISMS guiding principals: Define the Scope of work, Identify and Analyze Hazards, Identify and Implement Controls, Perform the Work, and Provide Feedback.

1.1 Scope of Work

Starmet has been contracted to erect a Sprung Instant Structures, Inc. (70' X 444') freestanding, temporary structure over the T-1 Trench (T-1) environmental remediation site at RFETS. The structure will enclose the T-1 remediation work area. The temporary structure shall provide a controlled environment for excavating and managing the waste materials, as well as provide protection from the high winds and precipitation frequently observed at RFETS between April and August. Starmet will furnish all supervision, labor, equipment, and materials necessary to erect the temporary structure. All engineering designs and construction activities will be conducted in accordance with RMRS-approved health and safety and quality assurance plans. The scope of work includes the mobilization of equipment and material, site preparation, construction of the temporary structure and demobilization of equipment and material from the T-1 site.

The specific activities to be performed are defined in Section 4.0 of this HASP. The health and safety guidelines and requirements presented are based on a review of available information and an evaluation of potential hazards.

2.0 Project Personnel Responsibilities

The responsibilities and authorities of each individual relating to health and safety issues are presented in this section. The project organization is shown in Figure 2.1.

Starmet (Figure 2.1) will manage the T-1 Temporary Enclosure Construction task. Starmet will provide the following key personnel for the project: a Task Manager (TM), a Field Supervisor, a Site Safety Officer, a Health and Safety Specialist, and a Technical Representative. The Field Supervisor and Safety personnel will be full-time during construction activities. The responsibilities of the Starmet Task Manager are described in the Work Plan for the Source Removal at T-1 Trench.

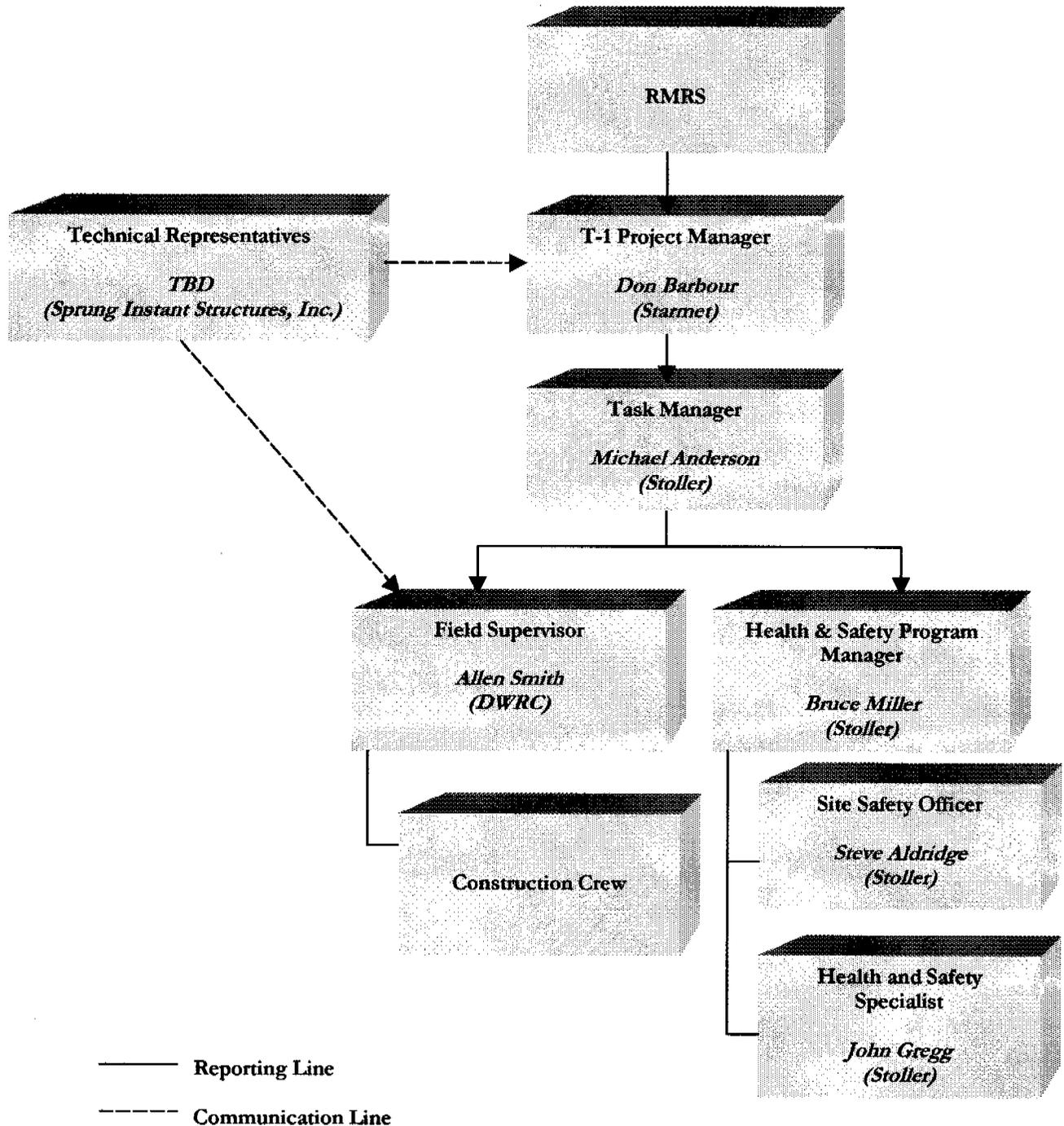
Starmet has contracted directly with Sprung Instant Structures, Inc. (Sprung) for lease of the structure and provision of Sprung Technical Representatives to instruct workers on proper construction techniques for erection of the structure. Starmet has contracted with the S. M. Stoller Corporation (Stoller) to manage this temporary structure task and provide health and safety support. Denver West Remediation and Construction, L.L.C. (DWRC) is under subcontract to Stoller to provide construction supervision and construction workers for the task.

A project personnel telephone list is presented in Appendix D.

All personnel must adhere to the health and safety procedures of the HASP during the performance of their work. Each person is responsible for completing tasks safely, and reporting any unsafe acts or conditions to his or her immediate supervisor or to the Field Supervisor. Line workers and other project personnel are required to work with the site Safety Officer (SSO) to amend the Activity Hazard Analyses (AHAs) when unanticipated and/or unsafe conditions arise. The AHAs are living documents that require worker input to mitigate any health and safety concerns that arise during a specific job or work activity. No person may work in a manner that conflicts with the letter or the intent of, or the safety and environmental precautions expressed in these procedures. After due warnings, the Task Manager will dismiss from the site any person who violates safety procedures. If necessary, employees are subject to progressive discipline and may be terminated for blatant or continued violations.

**Rocky Flats Environmental Technology Site
T-1 Trench Temporary Structure
Organizational Chart**

Figure 2-1



2.1 Project Manager

The Project Manager is responsible for ensuring that all resources are made available to the Task Manager for implementation of the health and safety requirements of the HASP.

2.2 Task Manager

The Task Manager is responsible for overall operations during fieldwork on the site including the health and safety of project personnel during site activities. The Task Manger is responsible for implementation of the HASP and protecting surrounding facilities and any potentially affected communities. The Task Manager shall ensure that work crews have adequate resources to effectively perform the tasks required, proper personal protective equipment is being used (as specified in the HASP), and disciplinary actions are enforced when health and safety requirements are not being followed or unsafe practices occur. Further, the Task Manager's specific health and safety duties include the following:

- Managing the development and implementation of the site specific HASP and Activity Hazard Analyses.
- Performing weekly documented on-site inspections to make certain that the HASP is being followed.
- Coordinating with the Field Safety Officer and Health and Safety Specialist on health and safety matters.
- Preparing monthly and weekly Section 01700 Subcontractor Reporting Submittals and delivering them to the RMRS CTR as required.
- Providing the appropriate monitoring and safety equipment necessary for implementing this HASP.
- Suspending field activities if health and safety of personnel are endangered pending an evaluation by the Site Safety Officer or the Health and Safety Specialist.
- Responsible to provide the Field Supervisor with the equipment, materials and qualified personnel to implement fully all safety requirements in this HASP.
- Escorting employees with injuries or illnesses to RFETS Medical.
- Implementing emergency procedures as required.
- Assisting in accident investigations and implementing corrective actions to any unsafe conditions.

2.3 Health and Safety Program Manager

The Health & Safety Program Manager is responsible for technical health and safety aspects of the project, including review and approval of this HASP. Inquiries regarding Health and Safety Program procedures, project procedures, and other technical or regulatory issues should be addressed to this individual.

2.4 Site Safety Officer

The SSO is responsible for on site compliance with and implementation of the HASP. The SSO and ultimately the Task Manager are responsible for the safe conduct of operations. The specific health and safety duties of the SSO include the following:

- Developing the site specific HASP.
- Working in conjunction with line workers to develop project Activity Hazard Analyses (AHAs); and since AHAs are living documents, work together to mark changes as unanticipated hazards arise.
- Reporting to the Task Manager on health and safety matters.
- Conducting health and safety orientation (or designee).
- Providing a copy of the HASP to all field crews.
- Ensuring that current medical clearance and training documentation is available.
- Obtaining required health and safety equipment and maintaining equipment on the site.
- Conducting daily pre-work health and safety briefings.
- Conducting weekly site health and safety inspections and immediately correcting deficiencies.
- Supervising the Health and Safety Specialist.
- Immediately reporting all safety-related incidents or accidents to the Task Manager.
- Overseeing or conducting required health and safety monitoring such as noise and heat or cold stress monitoring.
- Maintaining a health and safety log including monitoring results and observations.
- Suspending work or otherwise limiting personnel exposure to dangerous situations if this HASP appears to be unsuitable or inadequate.
- Implementing emergency procedures as required.
- Maintaining the health and safety record for the life of the project.

2.5 Health and Safety Specialist

The Health and Safety Specialist (HSS) will assist the SSO in implementation of the HASP. The specific health and safety duties of the HSS include the following:

- Assisting the Site Safety Officer in implementing the HASP.
- Reporting to the Site Safety Officer and the Field Supervisor on health and safety matters.
- Assisting the Site Safety Officer in conducting daily pre-work health and safety briefings.

- Immediately reporting all safety-related incidents or accidents to the Site Safety Officer and the Field Supervisor.
- Conducting required health and safety monitoring such as noise, and heat or cold stress monitoring.
- Maintaining a health and safety log including monitoring results and observations.
- Directing personnel to change work practices if existing practices are deemed hazardous to the health and safety of personnel.
- Implementing emergency procedures as required.

2.6 Field Supervisor

The Field Supervisor, in coordination with the Task Manager and the SSO, will also be responsible for the implementation of this HASP. This will include communicating site requirements to all on site project personnel. The Field Supervisor's specific health and safety duties include the following:

- Enforcing the requirements of the HASP.
- Suspending work, as required, to ensure personal safety and protection of property, or where life or property-threatening non-compliance with safety requirements is found.
- Ensuring site permits are obtained before work begins at each site.
- Notifying the Task Manager of any accidents, spills, or emergencies.
- Informing RFETS personnel of activities that will be carried out on a particular day.
- Communicating with the SSO about the schedule of work at the site.
- Ensuring that all site personnel have been given the proper medical clearance.
- Ensuring that all site personnel have met appropriate training requirements and have the appropriate training documentation at the site.
- Conducting daily site health and safety inspections and reporting all unsafe conditions to the SSO.
- Implementing corrective actions to any unsafe conditions.
- Implementing emergency procedures as required.

2.7 Radiological Control Technician (RCT)

The Radiological Control Technicians (RCTs) will be responsible for implementation of the HASP. This includes communicating site radiological conditions to all onsite project personnel and consultation with the SSO and the Task Manager. The specific duties of the RCTs include the following:

- Implementing radiological guidelines set by the Soil Disturbance Permit.

- Performing contamination surveys on anchor driving equipment.
- Documenting and submitting formalized radiological surveys to the Task Manager or SSO.
- Maintaining a log of pertinent observations.
- Suspending work if health or safety of personnel or the environment is endangered.

2.8 Subcontractors

On-site subcontractors and their personnel must understand and comply with the site requirements established in this HASP. Subcontractors must attend and participate in the daily Tailgate Safety Meetings and all other site safety meetings.

2.9 On-Site Personnel And Visitors

All personnel must read and acknowledge their understanding of this HASP, abide by the requirements of the plan, and cooperate with site supervision in ensuring a safe and healthful work site. Site personnel will immediately report any of the following to the Field Supervisor or SSO:

- Accidents and injuries, no matter how minor.
- Unexpected or uncontrolled release of chemical substances.
- Symptoms of chemical exposure.
- Unsafe or malfunctioning equipment.
- Changes in site conditions that may affect the health and safety of project personnel.

3.0 Site Information

3.1 Rocky Flats Environmental Technology Site (RFETS)

3.1.1 RFETS Location

RFETS is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver. The cities of Boulder, Broomfield, Westminster, and Arvada are located less than 10 miles to the north, northeast, east, and southeast, respectively. RFETS consists of approximately 6,550 acres and occupies Sections 1 through 4 and 9 through 15 of Township 2 South, Range 70 West, 6th Principal Meridian. Major plant buildings are located within an RFETS security area of approximately 400 acres. The security area is surrounded by a buffer zone of approximately 6,150 acres. RFETS is generally bounded on the north by State Highway 128. To the east is Jefferson County Highway 17, also known as Indiana Street; to the south are agricultural and industrial properties and State Highway 72; and to the west is State Highway 93. A RFETS location map is shown in Figure 3.1.

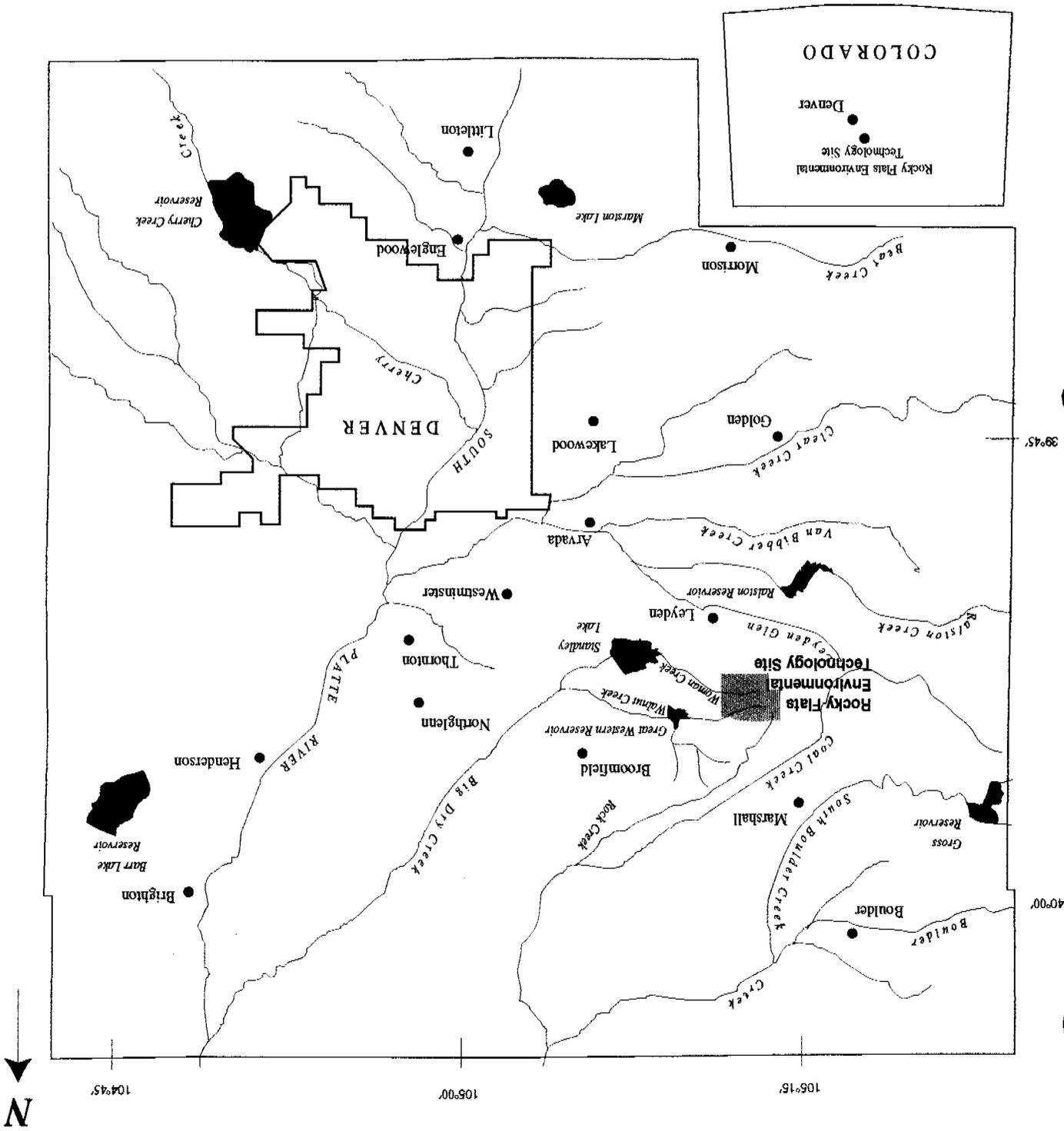
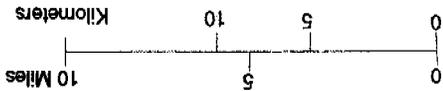
3.1.2 RFETS Background

RFETS is a government-owned and contractor-operated facility that is part of the nationwide nuclear weapons production complex. It was operated for the U. S. Atomic Energy Commission (AEC) from RFETS's inception in 1951, then known as the Rocky Flats Plant (RFP), until the AEC was dissolved in January 1975. Then, responsibility for Rocky Flats Plant was assigned to the Energy Research and Development Administration (ERDA), which was succeeded by the Department of Energy (DOE), in 1977. Dow Chemical USA, an operating unit of the Dow Chemical Company, was the managing and operating contractor of the facility from 1951 until June 30, 1975. Rockwell International succeeded Dow Chemical USA from July 1, 1975 to January 1, 1990. EG&G Rocky Flats, Inc. succeeded Rockwell International and operated the plant from January 1, 1990 to July 1, 1995. The plant name was changed to Rocky Flats Environmental Technologies Site in 1994. The plant has been operated by Kaiser-Hill Company Incorporated since July 1, 1995.

3.1.3 RFETS Operations

Prior to 1992, production activities included fabrication of nuclear weapons components from beryllium, plutonium, stainless steel, and uranium; assembly of components; and chemical recovery and purification of recyclable transuranic radionuclides. Nuclear weapons parts produced at RFP were shipped off-site for assembly. Obsolete weapons parts fabricated at RFP were returned for plutonium recovery processing. Other activities included research and development in metallurgy, machining, nondestructive testing, coatings, remote engineering, chemistry, and physics. The major classes of waste generated include hazardous waste, radioactive waste, and mixed (hazardous and radioactive) waste. Currently, the mission at RFETS is decontaminating, decommissioning, and environmental restoration of the plant.

Pyrophoric Depleted Uranium Source Removal from T-1 Trench (HSS 108) Temporary Structure	Location of the Rocky Flats Environmental Technology Site	February 9, 1998 Figure 3.1
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3.2 Trench 1 Site (IHSS 108)

T-1 is located in the Buffer Zone Operable Unit just northwest of the inner east gate, and about 40 feet south of the southeast corner of the Protected Area (PA) fence. The trench is approximately 250 feet long, 16 to 25 feet wide and 10 feet deep. A map of the site is illustrated in Figures 3.2 and 3.3.

The T-1 Source Removal Project involves excavating drums containing depleted uranium chips and machine turning from T-1. Contaminated soil and other buried wastes and debris will be containerized and shipped to an offsite facility that is permitted to treat these wastes for final disposition. All soil contamination above the Rocky Flats Cleanup Agreement Tier I subsurface soil action levels for radionuclides and volatile organic compounds will be removed from the trench. The debris and other such materials excavated from the trench will be containerized for offsite disposal. Non-contaminated soils and soils containing contamination below the Tier II Subsurface Soil Action levels will be temporarily stockpiled and placed back in T-1 after the excavation is completed. The excavation, materials segregation, stockpiling, and waste containerization/packaging activities associated with the T-1 remediation project will be conducted within the temporary structure. The T-1 project is authorized by the Proposed Action Memorandum (PAM) for the Source Removal at T-1 Trench. The T-1 site is also referred to as Individual Hazardous Substance Site (IHSS) 108.

4.0 Temporary Structure - Construction Tasks

4.1 Task 1: Mobilization

Starmet subcontractors will mobilize required personnel, materials, and equipment to the site prior to erection of the structure. Tasks to be completed during the site mobilization will include:

- Delivery of equipment and supplies to the site on flatbed tractor trailers.
- Delivery of forklift to the site for equipment and supplies unloading.
- RMRS Health and Safety Supervision inspection of forklift prior to use.
- Unloading equipment and supplies with forklift and by project personnel.
- Establish project support office.
- Inventory materials and supplies.

4.2 Task 2: Site Preparation

Starmet subcontractors will prepare the site for structure erection. Site preparation will include, but may not be limited to, the following activities:

- Establishing and marking all site work zone per the HASP.
- Marking the structure footprint and proposed anchor locations (the anchor locations will be a minimum of 3 feet away from utilities and drainage structures).

4.3 Task 3: Construction of Temporary Structure

Starmet subcontractors, directed by Sprung Structure experts, will erect the temporary structure. Construction of the temporary structure will include, but may not be limited to, the following activities:

- Deliver additional heavy equipment (crane w/ 90' boom, hoisting and rigging equipment, scissorlifts and manlifts) to the site and RMRS Health and Safety Supervision will perform inspection of equipment prior to use.
- Use of a pneumatic jackhammer for setting the anchors.
- Assemble structural arches on the ground.
- Raise arches into place with the crane while ground personnel secure each arch to the frame before lifting the next arch.
- Install fabric panels and tension the panel properly.
- Install explosion proof ventilators w/ dampers on the top of the structure with crane and manlifts.

- Install doors and windows on the structure.
- Run electrical utility lines from lighting panel (installed by RMRS) to ventilators.
- Connect lighting panel for the temporary structure to the plant utility supply (RMRS).
- Inspect completed structure and direct final assembly using Sprung Structure experts.

4.4 Task 4: Demobilization of Equipment

Starmet subcontractors will remove equipment, tools, and excess supplies from the site. Demobilization of equipment will include, but may not be limited to, the following activities:

- Cleanup and organize the site.
- Load tools and equipment on to flatbed trucks.
- Finalize documentation and records to be turned over to RMRS.

5.0 Project Orientation and Training

5.1 Site-Specific Health and Safety Orientation

A site-specific Hazard Communication briefing will be conducted for all employees, including subcontractors, prior to commencement of field activities. The following topics will be discussed at this briefing:

- Names of health and safety personnel and alternates responsible for site health and safety.
- Contents of the HASP.
- Work practices by which employees can minimize risks from hazards.
- Medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards.
- Health and safety organization.
- Hazards at the site including chemical, radiological, physical, and biological.
- Location and review of Material Safety Data Sheets (MSDSs) for all hazardous chemicals on site.
- Exposure risk.
- Personal protective equipment to be used.
- Employee rights and responsibilities and location of DOE form F5480.4, "Complaint Form".
- General subcontractor, lower-tier subcontractor and/or vendor responsibilities.
- Location of the approved Health and Safety Plan.
- First aid and medical facilities.
- Emergency response procedures including local warning and evacuation systems.
- Specific occupational health and safety procedures applicable to the project.
- The Hazard Communications Program.
- Employees access to exposure monitoring data and medical records.
- Construction hazard recognition and the procedures for reporting or correcting unsafe conditions.
- Procedures for reporting accidents or incidents.
- Fire prevention and control.
- Alcohol and drug abuse policy.
- Disciplinary actions for safety infractions and violations.

It is the employee's responsibility to ensure he/she is familiar with the HASP contents relating to their specific job tasks. If at anytime, an employee does not feel they understand the contents of the HASP, another briefing shall be administered. Once the briefing is completed and employees understand the contents of the HASP, they will be required to sign the Safety Compliance Agreement form acknowledging they understand and agree to comply with this HASP.

5.2 General Safety and Health Training Requirements

All on-site employees are required to obtain clearance from the Project Manager or the Site Safety Officer before beginning work at this site. Training requirements for specific individuals will depend on the tasks to be performed and associated hazards or risks, and safety requirements.

5.3 Safety Training

OSHA requires that employees engaged in construction activities, such as this project, will be properly trained for specific job responsibilities; all training will be documented. Employees will not participate in field activities until they have been trained to a level required by their job function and responsibility. All training and field experience will be verified and the Site Safety Officer shall maintain records in the Project Support Office. Health and Safety Specialists (HSSs) are required to have current Red Cross first aid, cardiopulmonary resuscitation, and blood borne pathogens training. All other training requirements are summarized in Table 5.1 and must be current.

Table 5.1 Safety Training Summary

Required Training
RFETS General Employee Radiological Training (GERT)
Vehicle and Equipment Operations Training ¹
OSHA 10-hour Construction Safety and Health Outreach Program (with emphasis on Ladder Safety, Hazard Communication, Hearing Conservation, Fall Protection, Hoisting and Rigging and Heavy Equipment Operations)
OSHA 30-hour Construction Outreach Program ²
RFETS Standing Order 24 Briefing ³
Lock Out/Tag Out Briefing (#019-866-02) ³
Buffer Zone Indoctrination ³
Fall Protection Training
HSP-21.04 Emergency Response and Spill Control Briefing ³
¹ For personnel operating heavy equipment and aerial lift equipment. ² For supervisors ³ Training provided at Project Pre-evolution Briefing.

6.0 Personnel Protection Equipment

All personnel will require use of Level D personnel Protective Equipment. The use of Level D personal protective equipment is defined by the following criteria:

- No contaminants are present, or contaminants are present below the action levels established in the HASP for respirator use.
- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

Level D is a fieldwork uniform affording minimal skin protection and no respiratory protection. It consists of the following PPE:

- Approved above the ankle leather work boots/shoes with ANSI Z41.1 toecaps
- Heavy-duty leatherwork gloves.
- Safety glasses (ANSI Z87.1 approved) with side shields.
- Reflective orange vests.
- Hard hat (ANSI Z89.1 approved).

7.0 Exposure Monitoring

Monitoring of the environmental conditions in and around the construction site must occur because of the potential for unsafe conditions to be present. The following sections describe the monitoring program to be implemented and appropriate exposure limits and actions levels. Where feasible, personnel exposures to hazardous conditions shall be maintained within the TLVs adopted by The ACGIH or the PELs adopted by OSHA, whichever is more stringent.

Table 7.1 Monitoring Program Summary

NOISE			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Short term high noise levels	>85 dBA	Don suitable hearing protection. Initiate noise dosimetry	As needed to characterize new equipment and/or operations and confirm adequacy of hearing protection
Continuous high noise levels	>85dBA average over 8-hour shift	Don suitable hearing protection. Participation in a Hearing Conservation Program.	As needed to characterize equipment and/or operations and confirm adequacy of hearing protection

WIND SPEED			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Personnel injury	> 15 mph average for two consecutive 15-minute periods.	Suspend or modify crane or personnel highlift operations at the discretion of the Project Manager and the Site Safety Officer.	Continuous during all field activities.
Personnel injury	Any wind speed at which the crane operator feels the crane operation is unsafe.	Suspend or modify crane or personnel highlift operations at the discretion of the Crane operator, Project Manager, and the Site Safety Officer.	Continuous during all field activities
Personnel injury	> 30 mph average for two consecutive 15-minute periods.	Crane operation and personnel high lift equipment operations must be approved by RMRS or Kaiser-Hill safety supervision.	Continuous during all field activities.
Personnel injury	> 45 mph average for two consecutive 15-minute periods.	Secure area and terminate crane operation and personnel high lift operation. Limited ground activities approved by RMRS or Kaiser-Hill Safety Supervision.	Continuous during all field activities
Personnel injury	> 55 mph average for two consecutive 15-minute periods. (Whole Gale Warning)	Suspend all outdoor work except emergency activities.	Continuous during all field activities.

Table 7.1 Monitoring Program Summary (Continued)

HEAT STRESS			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Heat stress	Varies depending on work load and if PPE is worn. ¹	Work-rest regimen, ice vests, or other RMRS approved measures.	Varies depending on work load and if PPE is worn. ¹
¹ Monitoring will be performed when work area temperature exceeds 77°F. See Appendix C for guidance and action levels for work involving the use of personal protective equipment.			
COLD STRESS			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Cold stress	40°F Equivalent chill temperature ¹	Wear adequate insulated dry clothing	Continuous when the equivalent chill temperature is <40°F
Cold stress aggravated by the use of evaporative liquids such as gasoline	39.2°F Equivalent chill temperature	Avoid soaking clothing or gloves with evaporative liquids	Continuous when the equivalent chill temperature is <40°F
Cold stress	19.4°F Equivalent chill temperature	Work-warm regimen will be instituted ²	Continuous when the equivalent chill temperature is <40°F
¹ Equivalent chill temperature is the combined effect of the air temperature and wind speed. See Appendix C for ACGIH table used to calculate equivalent chill temperature.			
² See Appendix C for ACGIH work-warm regimen schedule			

RADIATION			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Equipment and material contamination	Alpha contamination: >20 dpm/100cm ² removable >100 dpm/100cm ² total average. Not to exceed >300 dpm/100cm ² total maximum. Beta/gamma contamination: >1000 dpm/100cm ² removable >5000 dpm/100cm ² total average. Not to exceed >15000dpm/100cm ² total maximum.	Suspend operations, secure area and notify the Project Manager and Radiological Engineering.	Baseline surveys on anchor driving equipment prior to use. Unrestricted release surveys prior to the equipment leaving the site.

Table 7.1 Monitoring Program Summary (Continued)

Respirable Dust Monitoring			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Nuisance dust	1.5 mg/ m ³	Spray water for dust suppression to maintain below 1.5 mg/m ³	Continuous during dust generating activities.

Combustion Gases Monitoring			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Nitrogen Dioxide	1.5 parts-per-million	Suspend operations and notify the Field Supervisor	During all work activities inside the enclosure when necessary, at the discretion of the HSS or SSO.
Sulfur Dioxide	1.0 part-per-million	Suspend operations and notify the Field Supervisor	During all work activities inside the enclosure when necessary, at the discretion of the HSS or SSO.
Carbon Monoxide (Explosion)	12.5 parts-per-million	Suspend operations and notify the Field Supervisor	During all work activities inside the enclosure when necessary, at the discretion of the HSS or SSO.
Nitric Oxide	12.5 parts per million	Suspend operations and notify the Field Supervisor	During all work activities inside the enclosure when necessary, at the discretion of the HSS or SSO.

7.1.1 Noise Monitoring

Noise levels will be monitored to delineate areas or activities where hearing protection and postings are required, the effectiveness of hearing protection, and whether or not personnel need to participate in a Hearing Conservation Program. The instrument used will be an Ametek, Model MK-3, audio dosimeter. The MK-3 is a microprocessor controlled personal monitor that measures noise exposure in the dBA range and displays a variety of results including real time dBA level, exposure time, exposure dose, average dBA level, maximum dBA level, and the 8-hour time weighted exposure dose. The MK-3 is calibrated on a daily basis before and after use. Daily calibrations will be per the manufacturer's specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. Annual calibration and service of the instrument and the calibrator is required.

7.1.2 Wind Speed Monitoring

Wind speed will be monitored continuously throughout all phases of the project to ensure compliance with FO.01, "Air Monitoring and Dust Control." This will be done by the use of a weather station equipped with a R.M. Young Co., Model 05103 Wind Speed Monitor. The monitor is calibrated semi-annually.

A Nielsen – Kellerman Co., Model Kestrel 1000, electronic wind speed monitor will also be used. The Kestrel 1000 uses a turbine that is suspended on sapphire jewel bearings. The turbine rotation is sensed by an infrared light beam whose signal is processed by a large-scale integrated circuit. The Kestrel 1000 is factory calibrated and requires no maintenance except minor cleaning.

7.1.3. Heat Stress Monitoring

Heat stress monitoring will be completed using an Imaging and Sensing Technology, Model RSS 214, Heat Stress Monitor. The instrument is a microprocessor based Wet Bulb Globe Thermometer (WBGT) which accurately measures environmental factors that contribute to heat stress. The WBGT reading displayed by the instrument, in either Fahrenheit or Celsius, is a weighted sum of the dry bulb, wet bulb, and verner globe temperatures. The WBGT is factory calibrated on an annual basis. Maintenance is minimal with only the wet bulb wick requiring periodic replacement. Monitoring frequency will depend on the work area temperature, the type of work being performed, and the type of PPE worn. See Appendix C for guidance and action levels for work involving the use of personal protective equipment. Readings in the field will be logged on the Daily WBGT Log.

7.2.4 Cold Stress Monitoring

Cold stress monitoring will be accomplished by obtaining the air temperature and the wind speed and calculating the equivalent chill temperature using the ACGIH table found in Appendix C. Once in the field, wind speed, temperature, and equivalent chill temperature will be logged on the Daily Wind Speed/Cold Stress Log.

7.2.5 Radiological Monitoring

To ensure that any possible radiological contamination is maintained as low as reasonably achievable (ALARA), equipment will be monitored using the techniques, which are discussed in the following section.

7.2.5.1 Equipment Monitoring

All anchor driving equipment and materials used will be surveyed and released by HSSs in accordance with ROI-3.01, "Performance of Surface Contamination Surveys" and ROI-3.02, "Radiological Requirements for Uncontrolled Release".

Instrumentation to be used for personnel and equipment contamination monitoring are those recommended by RFETS Radiological Safety and consist of the following:

- NE Technology, Model Electra, with dual alpha/beta probe;

- Eberline, Model SAC-4, alpha smear counter;
- Eberline, Model BC-4, beta/gamma smear counter;
- Ludlum, Model 2929, alpha and beta/gamma smear counter;
- Science Applications International Corp., Model AP-2, portable alpha analyzer.

RFETS Radiological Engineering will approve any alternate instruments. All instruments will be maintained, calibrated, performance tested, and used in accordance with the RFETS Radiological Operating Instructions Manual.

7.2.6 Respirable Dust Monitoring

Respirable dust monitoring will be accomplished using a Monitoring Instrument for the Environment, Inc., Model PDM-3, (and/or equivalent) Miniature Real-time Aerosol Monitor (Miniram). The miniram is an airborne particulate monitor whose operating principle is based on the scattered electromagnetic radiation in the near infrared. The miniram continuously senses the particles in the sensing chamber and displays the dust levels in mg/m^3 . Because the miniram is preferential to particles 0.1 to 10 micrometers in size, it is useful in determining the levels of respirable dust, mists, fumes, smokes, and fogs. The instrument will be calibrated using a dust free Z-Bag prior to each use and periodic cleaning of the sensing chamber is required. Calibration on each shift will be per the manufacturer specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. A yearly factory calibration and servicing is recommended. Monitoring will be conducted during all dust generating activities.

7.2.7 Combustion Gases Monitoring

Monitoring for combustion gases will be done using a Mine Safety Appliances, Co., Model Passport equipped with percent oxygen, percent lower explosive limit, carbon monoxide, nitrogen dioxide, and sulfur dioxide sensors. The Passport simultaneously displays real-time gas levels in the following ranges; carbon monoxide 0-1000 ppm, nitrogen dioxide 0-20 ppm, and sulfur dioxide 0-20 ppm. The Passport is calibrated daily prior to use and requires factory calibration and service on a yearly basis. Daily calibration will be per the manufacturer's specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook.

Monitoring for nitric oxide will be accomplished using a Sensidyne Inc. Gas Sampling System equipped with nitric oxide colorimetric tubes. The tubes have a range of 2.5-200 parts-per-million. The hand held sampling pump is leak tested daily prior to use.

8.0 Hazard Assessment

The hazards associated with construction of the temporary structure include biological hazards and physical hazards.

8.1 Biological Hazard

During fieldwork at this site, personnel may encounter a variety of biological hazards such as insects, spiders, reptiles, and mammals. Biological hazards may act as infectious, allergenic, or toxic agents to the workers.

8.1.1 Insects

The most common insects of concern at the RFETS area are bees, wasps, and hornets. Stings of these insects may cause serious allergic reactions in certain individuals. Personnel with known insect allergies or sensitivities should notify the SSO before fieldwork begins. If a person is stung by a bee, wasp, or hornet, resulting in a medical emergency, call extension 2911, notify the Site Safety Officer or Field Supervisor, and immediately transport the person to the RFETS medical center.

8.1.2 Arachnids

Ticks and spiders are the two most common types of arachnid hazards encountered at the RFETS site. Ticks are parasites that feed on the blood of an animal/human host and can carry several severe diseases, the least severe bringing several days of fever and pain and the worst causing brain damage. Ticks are picked up on clothing in grassy areas of the site. Preventative measures include careful inspection of clothing and body parts at the end of each day. In the event that someone is bitten by a tick, it should be reported to the Site Safety Officer or Field Supervisor for medical assistance if required.

Poisonous spiders are also a potential biohazard for field personnel. Black widow spiders are nocturnal hunters and consequently may be present under rocks or other ground debris during daylight hours. Care should be taken when moving or rummaging in such areas and the use of gloves is required. If site personnel encounter a black widow and are bitten call extension 2911, notify the Site Safety Officer or Field Supervisor, and immediately transport the person to the RFETS medical center.

8.1.3 Snakes

Poisonous snakes may also be encountered at the site. Site workers should exercise caution for the presence of rattlesnake at the site. Personnel should visually check before reaching into a covered area and walking through grassy areas. If a person is bitten by, call extension 2911, notify the Site Safety Officer or Field Supervisor, and immediately transport the person to the RFETS medical center.

8.1.4 Mammals

Rodents, coyotes, and foxes are some of the mammals indigenous to the RFETS. They are typically fearful of humans and will try to escape if encountered. These animals may become aggressive when defending their young, their dens, or when they are sick or injured. Personnel should avoid contact with any of these animals and contact Andrea Casillas at Ext. 5302 for disposition. If bitten by an animal exhibiting uncharacteristic behavior, there is the possibility that the animal has rabies. If the animal can be captured or contained safely, it can be tested for the presence of rabies. If a person is bitten, call extension 2911, notify the Site Safety Officer or Field Supervisor, and immediately transport the person to the RFETS medical center.

8.1.5 Poisonous Plants

The most common poisonous plant in this area is poison ivy. Allergic contact dermatitis due to contact with the plant leaves or stems is the most common response reported by field personnel. Contact with this plant should be avoided. In the event that the contact with the plant is unavoidable, protective gloves and clothing shall be worn.

8.2 Physical Hazards

The following sections discuss physical hazards and the measures to be taken to control the hazards.

8.2.1 Heavy Equipment Hazards

The operation of heavy equipment, such as cranes and bobcats, poses a hazard to personnel, equipment, and property. Control measures for the safe operation of heavy equipment will include:

- Heavy equipment from off site vendors will be inspected by RMRS Health and Safety.
- Hoisting equipment from off site vendors will be inspected by RMRS Health and Safety.
- Heavy equipment will have rollover protection systems.
- Operators will be properly trained in the use and limitations of the specific pieces of heavy equipment being operated.
- Heavy equipment will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed.
- Seat belts will be worn by heavy equipment operators at all times, where applicable.
- Establishing heavy equipment roadways and operating areas.
- Crane operator must ensure that the outriggers are properly deployed on wooden pads and the crane is on a stable surface before beginning hoisting and rigging operations.
- Ground personnel will wear orange reflective vests and hard hats when heavy equipment is in use.

- Personnel will stay away from all heavy equipment while they are in operation and maintain line of site with the operator.
- At no time will any personnel position themselves under hydraulically operated equipment or loads.
- Heavy equipment shall have an electronic back-up alarm that will sound continuously while the vehicle is in reverse motion. The backing up of all heavy equipment will require a spotter to ensure that the path of travel is clear.
- The accessible area of the “counterweight swing” of the crane, must be barricaded.

8.2.2 Aerial Manlift Hazards

The operation of aerial lifts, such as scissorlifts and boom lifts, poses a hazard to personnel, equipment, and property. Control measures for the safe operation of aerial lifts will include:

- Aerial Lifts from off site vendors will be inspected by RMRS Health and Safety.
- Only trained and authorized personnel will be allowed to operate the aerial work platform.
- Operators will be properly trained in the use and limitations of the specific pieces of aerial lift equipment being operated.
- Aerial lift equipment will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed.
- Prior to and during operations the site must be checked for hazards such as ditches, drop-offs or holes, bumps, obstruction, debris, overhead obstructions and high voltage conductors, and other possible hazardous conditions.
- Before elevating the work platform the operator must: check for overhead hazards; make sure platform only elevated on a firm and level surface; make sure of proper load distribution on the platform; make sure platform guardrails are properly installed and gates are closed; and check to see that all occupants have the proper fall protection on and properly attached.
- Before and during driving while elevated, the operator must: keep a clear view of the path of travel; maintain distance from obstacle, debris and other hazards in the path; and maintain a safe distance from overhead obstacles (a minimum of 10 feet from power lines).
- Personnel shall maintain a firm footing on the platform and where required, personnel must ONLY attach full body harness and shock absorbing lanyard (or retractable lifeline system with a locking snap hooks) devices to manufacturer approved attachment points.
- Care shall be taken to prevent ropes, or electrical cords from becoming entangled in the work platform when it is being elevated or lowered.
- Operator shall ensure that the area surrounding the platform is clear of personnel and equipment before lowering.
- Operator shall immediately report to Site Supervisor or H&S Supervisor any defects or malfunctions that become evident during operation.

8.2.3 Noise Exposure Hazards

Work at the site will expose personnel to high noise levels from the operation of heavy equipment and hand tools. Excessive noise exposure can cause both temporary and permanent effects on hearing. The temporary effects of excessive noise include ringing in the ears, interference with communication, and hearing threshold changes. The effect of long-term excessive noise includes varying degrees of noise-induced hearing loss. Measures used to control noise exposure hazards will include:

- Noise monitoring to determine employee exposure.
- Hearing protection for exposures of greater than 85 dBA for any length of time.
- Noise monitoring to confirm the effectiveness of the hearing protection worn.
- Noise dosimetry to determine employee exposure and whether participation in the Hearing Conservation Program is required. The Hearing Conservation Program includes both training and audiometric testing.
- Areas where hearing protection is required will be posted accordingly.

8.2.4 Heat and Cold Stress Hazards

During operations, there is a potential for worker exposure to serious temperature extremes. These environmental conditions increase the risk of heat or cold stress during field activities. Measures used to control heat stress exposure will include:

- Briefing employees on the causes, prevention, signs/symptoms, and treatment of heat stress.
- Monitoring for exposure to heat stress using a Wet Bulb Globe Thermometer (WBGT).
- Wearing ice vests or other RMRS approved measures.
- Instituting a work-rest regimen based on the Kaiser-Hill Heat Stress Program (see Appendix C).
- Providing personnel with a shaded break area and cool liquids.
- Providing for proper acclimatization of all workers to new or changing work conditions.

Measures used to control cold stress exposure will include:

- Briefing employees on the causes, prevention, signs/symptoms, and treatment of cold stress.
- Monitoring for exposure to cold stress using a dry bulb thermometer and anemometer.
- Wearing adequate insulating dry clothing when the air speed and temperature result in an equivalent chill temperature of <40EF.
- Changing wet clothing.
- Instituting a work-warming regimen based on the ACGIH guidelines (see Appendix C) when the equivalent chill temperature is <19.4EF.

- Providing personnel with a heated break area and warm sweet drinks.
- Taking special precautions when handling evaporative liquids such as gasoline at equivalent chill temperatures <39.2EF.
- Providing for proper acclimatization of all workers to new or changing work conditions.

8.2.5 Overhead Power Line Hazards

Special precautions must be taken when working or operating heavy equipment near overhead energized power lines. Contact with electrical power lines can cause shock, burns, or death. Measures used to control overhead power line hazards will include:

- Assume that all overhead lines are energized.
- Heavy equipment will be operated with a 10' minimum clearance between power lines and any part of the equipment.
- Strictly adhering to RFETS Health and Safety Practices Manual (HSP) HSP-2.08, "Lock Out/Tag Out" when conducting lock out/tag out operations on overhead lines.

8.2.6 Vehicular Traffic Hazards

Employees shall exhibit special caution when working along active roadways. Measures used to control traffic hazards will include:

- Wearing orange vests.
- Positioning flag persons along active roadways to control traffic.
- Closing roads as needed.
- Placing jersey barriers around regularly occupied work areas.

8.2.7 Portable Electric Generator Hazards

Due to a lack of permanently installed electrical power, portable electric generators will be used extensively during the project. Generators may be used to power portable hand tools. Measures used to control the hazards associated with the use of generators will include:

- Extension cords will be intended for outdoor use, inspected by the user, and protected from unnecessary damage.
- Any extension cords, which show signs of damage or deterioration, will be immediately removed from service.
- Generators will be equipped with GFCI outlets, which will be tested daily by the user.
- Generators will be properly grounded via a ground rod as required.
- A 10-lb. ABC fire extinguisher will be located next to all generators.
- Refueling will be conducted at the beginning of the shift when the generators are cool.

- Refueling will be conducted with the generator on the ground surface or with the generator grounded to the fuel dispenser.
- The RFETS Lock Out/Tag Out Program (HSP 2.08) will be strictly adhered to during the servicing and maintenance of machines or equipment in which the unexpected energization or start up of the machine or equipment, or release of stored energy could cause injury to personnel.

8.2.8 Hand Tool Hazards

The improper use of hand tools can result in injury to personnel and damage to property. Measures used to protect personnel and equipment will include:

- Hand tools will be inspected by the user prior to use.
- Hand tools will be used for their intended use and operated in accordance with HSP-12.10.
- Guards will be in place and no modifications will be made.
- Portable power tools will be plugged into GFCI protected outlets.
- Portable power tools will be UL listed and have a three wire grounded plug or be double insulated.

8.2.9 Fork Truck Hazards

The operation of fork trucks poses a hazard to personnel, equipment, and property. Control measures for the safe operation of fork trucks will include:

- Fork truck operators will be experienced and knowledgeable in the use and limitations of all heavy equipment.
- Fork trucks will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed.
- Fork trucks shall have an electronic back-up alarm that will sound continuously while the vehicle is in reverse motion.
- Ground personnel will wear orange vests and maintain line of site with the operator.
- All loads will be secured.
- Loader mounted fork attachments must be certified by the manufacturer.

8.2.10 Hoisting and Rigging Equipment Hazards

Hoisting and rigging equipment poses a unique hazard due to sudden failure resulting in property damage or personal injury. Measures used to control the use of hoisting and rigging equipment will include:

- Hoisting equipment from off site vendors will be inspected by RMRS Health and Safety.
- Operators will be properly trained in the use and limitations of the specific pieces of hoisting equipment being operated.

- Use of Hoisting and Rigging Checklist as required by HSP 12.02.
- Hoisting equipment will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed.
- Rigging equipment will be properly tagged, if required, and inspected by the user prior to use on a daily basis.
- Any rigging equipment, which shows signs of damage or deterioration, will be immediately removed from service.
- Ensuring that all rigging equipment is properly positioned.
- Where possible ground personnel will use tag lines to stabilize and position suspended loads. Tag lines will not be wrapped around the hand.
- At no time will any personnel position themselves under hoisted loads.
- Ground personnel will wear orange vests and maintain line of site with the operator.
- A Hoisting and Rigging Plan will be developed for all critical lifts.

8.2.11 Ladder Hazards

Work on ladders poses a hazard due to falls and ladder failure. Control measures for the use of ladders will include:

- Ladder users will have current Ladder Safety Awareness training.
- Ladders will be Type 1-A, Industrial Extra Heavy Duty or better.
- Aluminum ladders will not be used in areas where there is electrical power equipment.
- Three legged ladders are strictly prohibited.
- Ladders will be inspected by the user prior to use on a daily basis.
- Ladders, which show signs of damage or deterioration, will be immediately removed from service.
- Ladders will be used for their intended purpose.
- Extension ladders shall be tied-off or otherwise secured while in use.
- Work on ladders at heights greater than six feet will require evaluation from the SSO.

8.2.12 Elevated Work Hazards

Unprotected elevated work at heights greater than six feet poses a hazard due to the potential for falls. Prior to wearing fall arrest equipment, attempts will be made to eliminate the hazard. If, however, the hazard cannot be eliminated and fall arrest equipment must be worn, the following control measures will be followed:

- Personnel shall have current Fall Protection qualification.

- Fall arrest equipment will be inspected by the user prior to use on a daily basis.
- Fall arrest equipment, which shows signs of damage or deterioration, will be immediately removed from service.
- The fall arrest system will consist of a full body harness and shock absorbing lanyard (or retractable lifeline system with a locking snap hooks) and an approved anchorage point.

8.2.13 Flammable or Combustible Liquid Storage Hazards

Hazards associated with improper flammable or combustible liquid storage include fires and spills. Work controls involved with flammable or combustible liquid storage include:

- Gasoline containers will be metal safety cans in good repair.
- Containers will be equipped with spring loaded closing devices and flame arresters.
- Containers will be properly labeled.
- Containers will be stored in approved flammable storage cabinets when not in use.

8.2.14 Hydraulic Powered Tools, Pneumatic Powered Tools and Compressor Hazards

The use of hydraulic and pneumatic powered tools and compressors poses a hazard to personnel. Control measures for the safe operation of pneumatic power tools and compressors will include:

- Hydraulic and pneumatic power tools and compressors will be inspected by the user prior to use.
- Pneumatic and hydraulic powered tools and compressors will be used for their intended use and operated in accordance with HSP-12.10.
- Guards will be in place and no modifications will be made.
- Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.
- The manufacturer's safe operating pressure for hoses, pipes, valves and other fittings shall not be exceeded.
- All pneumatic hoses exceeding ½-inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.
- The use of hoses for hoisting or lowering tools shall not be permitted.

8.2.15 Adverse Weather Conditions

Adverse weather condition may contribute to slip, trip, and fall hazards at the site. Although the majority of the operations will be contained inside a weatherproof structure, support activities outside the structure may lend themselves to slip/fall hazards. All work areas shall be kept free of tripping hazards, free of water, ice or snow to the extent necessary to perform the required work in a safe manner. Slip, trip, and fall control measures include:

- Daily inspection shall be conducted by the HSS to assure the work area is free of trip/fall hazards.
- Ice and snow shall be removed or treated with gravel in work areas to provide a safe walking surface.
- Equipment located in the work area that could present a trip hazard shall be labeled with yellow and black striped caution tape.

8.3 Chemical Hazards

The chemical hazards on this construction project are primarily from gasoline, diesel fuel, and various equipment lubricants. The Material Safety Data Sheets (MSDSs) for these chemicals are located in Appendix B, and they will be reviewed by project personnel periodically throughout the project as part of the Hazard Communication Program. No additional hazardous chemicals shall be brought to the construction site without prior notification and approval of the SSO and the Field Supervisor. MSDSs shall be provided with any additional chemicals brought on to the site.

Exhaust emissions from aerial lift equipment may become a concern as the structure reaches completion. Exhaust gases from equipment inside the tent may potentially build up to toxic levels. The measures to prevent emissions buildup in the tent are as follows:

- Limit emissions by turning off lifts when not moving the platform.
- Creating natural ventilation by opening all of the doors in the structure while using lift equipment inside.
- Use two 4X4 foot box type ventilation fans to enhance natural ventilation.
- When necessary use monitoring equipment to monitor for toxic gas buildup.

8.4 Radiological Hazard

Analytical sample results from soils around the T-1 Trench, including locations where temporary structure anchors will be driven, indicate the existence of Plutonium-239/240, Amerium-241, and Uranium-238 in the soils. The analysis indicates that levels of these radioactive isotopes in the soils are well below the Rocky Flats Cleanup Agreement Tier II subsurface action levels and pose little hazard of personnel contamination.

The radiological hazard associated with anchor driving, and other site construction activities, is the potential contamination of equipment. Radiological controls include the follows aspects:

- Adherence to the radiological requirements of the T-1 Trench Soil Disturbance Permit.
- Baseline and unrestricted radiological release surveys on equipment used for intrusive activities.

9.0 Control of Construction Site Access

9.1 Site Control

Site control is necessary to prevent unauthorized, untrained, or unprotected personnel or visitors from being exposed to the hazards associated with the site. During activities at the construction site, site control measures will include the following:

- All personnel and visitors are required to enter their name, time in, and time out on the sign in sheet located at the access control point.
- A six foot-chain link fence has been installed around the site for security and site control.
- Posting signage that communicates information such as required personal protective equipment and work zone boundaries.
- Securing all work areas at the end of each workday.

T-1 is posted as an Underground Radioactive Material Area (URMA) and access into the posted area is limited trained personnel only. The minimum training requirements for entry into the URMA is General Employee Radiological Training (GERT) or Radiological Worker Training I (Rad Worker I) and if ever a time arises that project personnel need to enter the posted area the Site Safety Officer or the Health and Safety Specialist need to be notified prior to entry. At no time during the project will any piece of heavy equipment be driven into the posted area or on to the trench. Construction activities may be performed over the URMA by personnel, without the minimum radiological training, in the platform of a boom type aerial lift.

10.0 Construction Health and Safety Bulletin Board

In order to promote safety and maintain a highly visible safety profile on the project site, a Health and Safety Bulletin Board will be posted in the office trailer break area. Postings will provide related information, such as:

- Project Information card.
- Required OSHA postings, Worker's Compensation posters, DOE informational and complaint postings, etc.
- Relevant safety posters and safety information (i.e., PPE requirements of the work area).

The project health and safety staff personnel will maintain the bulletin board assisted by other project personnel.

11.0 Sanitation

Potable water washing and toilet facilities, which comply with 29 CFR 1926.65(n) Sanitation at Temporary Work Places, will be available to all on-site personnel.

12.0 Emergency Response

Potential emergencies during work at T-1 include hazardous substance release, employee contamination, accidents, injuries, fire, and natural disasters. Safety precautions will be taken to avoid emergencies. However, if an emergency does arise, the procedures described in this section will be followed. Also, preparatory steps necessary for responding to an emergency are given below and they should be complied with before beginning any work at the site.

The Project Manager, with assistance from the Field Supervisor and the Site Safety Officer, has responsibility and authority for coordinating all evacuations and emergency response activities until proper authorities arrive and assume control.

12.1 Site Evacuation

If an evacuation is necessary at the T-1 construction site, personnel will exit the site via the nearest exit and proceed to the primary assembly area. Three short blasts will indicate an emergency evacuation during which personnel will immediately evacuate the site. All personnel will be accounted for once they reach the assembly area by using the access control point sign-in log.

The assembly area will be located on the east side of the site operations trailers, which are located on the east side of the construction area.

12.2 Emergency Services

12.2.1 Emergency Phone Numbers

In case of an emergency, RFETS emergency services must be notified. Kaiser-Hill maintains an emergency response telephone extension of 2911 at RFETS. Extension 2911 may be reached from any plant site telephone or on Radio Channel 2911 and will immediately connect the caller with the Fire Department, Plant Security, the Central Alarm Station, the Shift Superintendent and, during first shift, Occupational Health. Table 12.1 presents a list of T-1 site project personnel who will be notified in the event of any spill, release, employee contamination, accident, injury, fire, or natural disaster. These telephone, radio and pager numbers will be posted next to telephones and at prominent locations at the site.

Any revisions to the list must be posted and all personnel notified of the changes.

*All Life Threatening Emergencies: Dial Extension 2911

12.2.2 Rocky Flats Occupational Health Medical Facility (Building 122)

The Rocky Flats Medical Facility in Building 122 is to be used for medical injuries and emergencies. Depending on the seriousness of the injury, injured personnel may also require care by an off-site hospital. The need for off-site care will be determined by Occupational Health. Directions to the Rocky Flats Occupational Health Medical Facility from the T-1 site:

A map to Building 122 will be posted next to telephones and at prominent locations at the site. See Figure.

12.2.2.1 Clinic Hours

The medical clinic located in Building 122 is operated during the following business hours:

Monday & Tuesday	6:30 AM - 4:30 PM
Wednesday & Thursday	6:30 AM - 6:00 PM
AWS Fridays	6:30 AM - 3:30 PM

Personnel requiring medical attention outside of clinic hours are to be transported to the Rocky Flats Fire Department in Building 331 on Central Avenue. If the injury or illness requires more than First Aid the Rocky Flats Fire Department should be called at 2911.

Table 12.1 Emergency Telephone Numbers

RFETS EMERGENCY RESPONSE EXTENSION	RFETS Phone: 2911 RFETS Radio: 2911
RFETS SHIFT SUPERINTENDENT	RFETS Phone: 2914 RFETS Radio: 3301
RMRS Emergency Contacts	
Michael Anderson Task Manager	RFETS Phone 546-4346 RFETS Radio RFETS Pager 230-7946
Wayne Sproles RMRS Project Manager	RFETS Phone: 5790 RFETS Radio: 3798 RFETS Pager: 1245
Mark Burmeister RMRS Deputy Project Manager	RFETS Phone: 5891 RFETS Radio RFETS Pager: 4630
Mike Bemski RMRS Field Supervisor	RFETS Phone: 4090 RFETS Radio: 3805 RFETS Pager: 7466
Tom Lindsay RMRS Field Supervisor	RFETS Phone: 5705 RFETS Radio RFETS Pager: 7478
Tracey Spence RMRS Field Supervisor	RFETS Phone: 4322 RFETS Radio RFETS Pager: 6452:
Skip Chandler RMRS Health and Safety Supervisor	RFETS Phone: 6673 RFETS Radio: 3806 RFETS Pager: 1659
Dave Farler RMRS Industrial Hygiene Supervisor	RFETS Phone: 4340 RFETS Radio: 3743 RFETS Pager: 5248
Annette Primrose RMRS Field Operations Manager	RFETS Phone: 4385 RFETS Radio: 3801 RFETS Pager: 4675

12.3 Accident/Injury

In case of an accident or other event that causes injury to personnel present at the T-1 project construction site, immediately notify Site Supervisor and/or SSO. If supervisors are not available, the RFETS emergency extension at 2911 will be notified immediately. The site Fire Department, EMTs, and Security will be dispatched immediately. Details of the emergency and the exact location must be given over the telephone. Once RFETS emergency services have been notified, the RMRS Project Manager and RMRS Health and Safety Supervision personnel must immediately be contacted. Basic first aid may be administered by properly trained personnel until emergency medical personnel arrive. Each shift will have a minimum of one staff member trained in American Red Cross First Aid and CPR. Any non-emergency medical situation such as minor cuts or sprains should be attended to at RFETS Medical - Building 122. A map showing the location of Building 122 is shown in Figure 12.1.

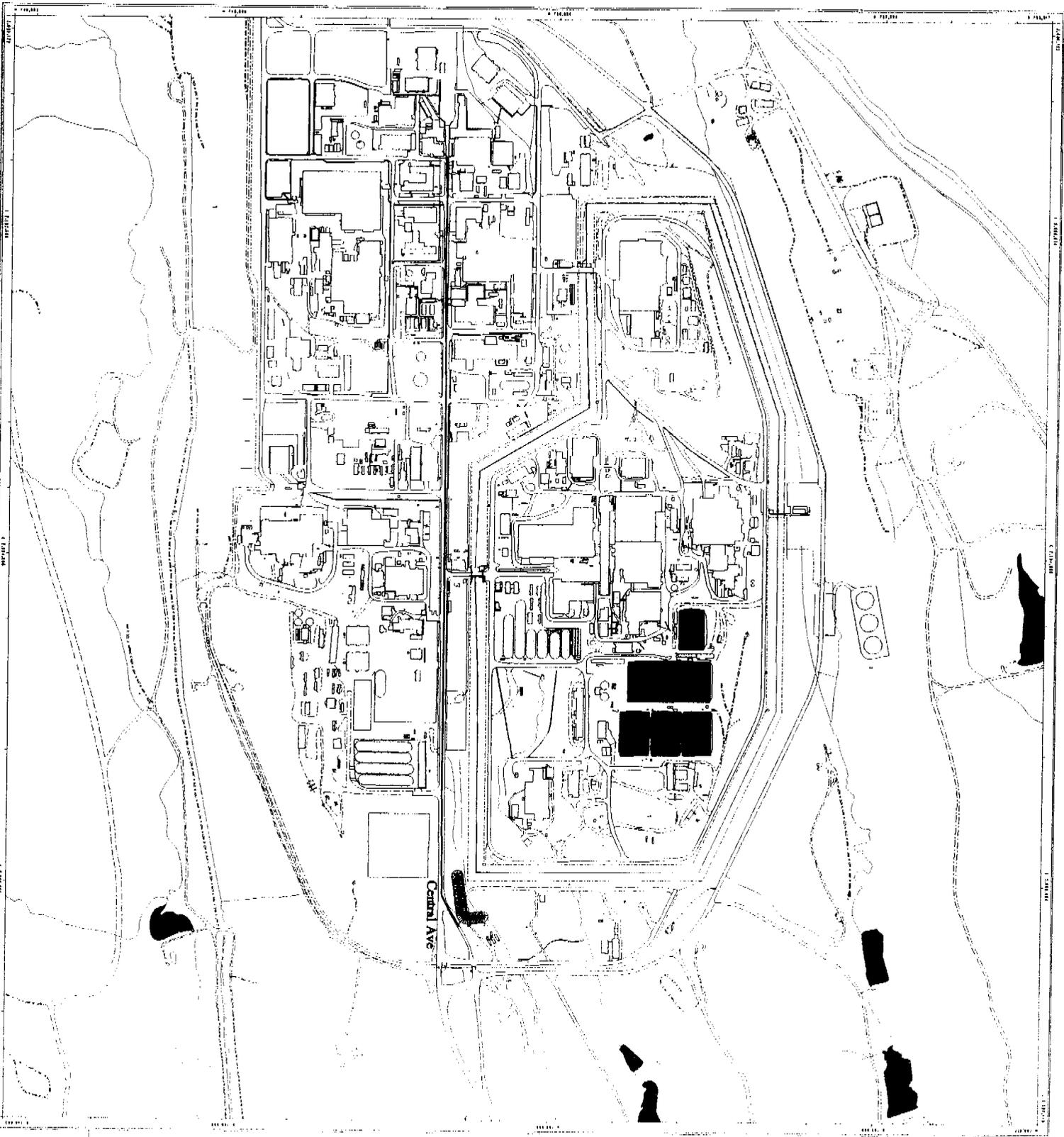


Figure 12.1
Map to RFEETS
Medical - Building 122

- EXPLANATION**
- Emergency Facility
 - Emergency Route
 - Standard Map Features**
 - Building & other structures
 - Lakes and ponds
 - Streams, ditches, or other drainage features
 - Fences
 - Rocky Flats boundary
 - Paved roads
 - Dirt roads

DATA SOURCE:
 Building, fence, vegetation, roads and other features derived from aerial photography, 1988. Digitized from the original photograph, 1988.

Scale = 1:1,000
 1 inch represents approximately 820 feet

State Plane, Contiguous States
 Canadian Geodetic System
 Datum: NAD27

U.S. Department of Energy
 Rocky Flats Environmental Technology Site

RMRS
 Rocky Mountain
 Remediation Services, L.L.C.
 10000 North 10th Street, Suite 100
 Denver, Colorado 80231
 Phone: 303.440.4444
 Fax: 303.440.4444

MAP ID: 95-0008
 February 26, 1998

12.3.1 Emergency Medical Procedures

For severe injuries, illnesses, or overexposures:

- Remove the injured or exposed person(s) from immediate danger if safe to do so.
- Immediately call extension 2911 and provide as much information as possible.
- Render emergency first aid until emergency medical personnel arrive.

12.3.2 Fire/Explosion

The first responsibility of any employee discovering a fire is to warn coworkers and call the Rocky Flats Fire Department at extension 2911.

UNDER NO CIRCUMSTANCES SHOULD ANYONE ATTEMPT TO FIGHT A FIRE ALONE.

Personnel trained as First Responders may then use a fire extinguisher or de-energize small fires in those situations where there is no personal danger in doing so. Fire extinguishers are located next to all generators on-site, and in all pieces of heavy equipment

In case of an explosion, all personnel will be evacuated and the fire department notified. No personnel shall re-enter the area until it has been cleared by the Rocky Flats Fire Department.

12.3.3 Natural Disasters

Natural disasters may occur at the site and include lightning and high winds.

- Lightning - Persons should not work in open areas, near trees or other equipment outside during lightning storms - Stop work and clear the site until storm passes.
- If high winds are forecast, the site should be cleared before the winds become hazardous. Workers should be instructed to go to an appropriate shelter. If winds are sustained at 45 miles per hour, all work will be evaluated and approved on a case-by-case basis.
- Notify the Project Manager or Field Supervisor of any work stoppage due to lightning and high winds.

12.4 Emergency Equipment

A 50-gallon universal spill kit will be located at an appropriate location selected during site mobilization. The universal sorbents contained in the spill kit are effective on a wide range of liquids including acids, bases, solvents, and lubricants eliminating the need for specific sorbents for specific spills. The spill kit contains the following items:

- 5"X10' socks/booms
- one liter pillows
- 18"X18" pads

- disposal bags
- pair SilverShield7 gloves
- pair nitrile gloves
- pair goggles
- pair Tyvek7 QC coveralls, XL
- 1-quart non-sparking scoop
- plastic non-sparking shovel
- floor-stand spill sign
- 2-lb. dry acid neutralizer
- 2-lb. dry base neutralizer
- jumbo pH paper
- repair putty stick
- roll barricade tape
- rolls white vinyl tape
- rolls yellow vinyl tape
- radiological and hazardous waste labels
- spill response guide
- In addition to the items contained in the spill kit, the following items will also be available in the work area:
 - multiple 10 lb. A/B/C); and
 - emergency shower and eyewash stations will maintain in the office trailer.

12.5 Unanticipated Hazards or Conditions

Unanticipated hazards or conditions encountered during this project will be managed in accordance with this RMRS policy statement (Directive-001). "In the event unanticipated hazards or conditions are encountered, the project activities will pause to assess the potential hazard or condition. The potential hazard or condition will be evaluated to determine the severity or significance of the hazard or condition and whether the controls on the project are sufficient to address the hazard or condition. Based on this initial evaluation, a determination will be made whether to proceed with controls currently in place; segregate the hazard or condition from the project activity, if it can be done safely; or curtail operations to address the unexpected hazard or condition. Concurrence to proceed down the selected path must be obtained from the RMRS Environmental Restoration Director or designee. Note: "Unanticipated Hazards or Conditions" do not replace conditions that require emergency response, rather, they

ensure that all work is performed based on an informed approach in regards to all potential hazards.

13.0 Spill Control

13.1 Spill Response Planning

The Spill Response Plan is designed to establish a program/plan to optimize a safe and informed response to incidental and emergency situations with the intent of protecting T-1 construction site project personnel, collocated workers, the public, the environment, and property in the event of spills, fire, or explosion. All spills will be addressed per HSP-21.04, "Emergency Response and Spill Control Program." If applicable, reporting will be conducted in accordance with Administrative Procedures Manual, ADM-16.01, "Occurrence Reporting Process."

13.2 Incidental Spill Operation

Incidental Spill Definition:

Incidental spills are those where the substance can be safely absorbed, neutralized, or otherwise controlled by employees in the immediate release area at the time of the release. In addition, the release does not have the potential to become an emergency within a short time frame.

Spills considered as incidental include diesel fuel, gasoline, hydraulic fluid, or motor oil spills at the T-1 site.

Criteria that must be met prior to incidental release response actions at the T-1 site include:

- Personnel have warned others and isolated the area to prevent vehicle traffic through the area and minimize personnel exposures.
- The RFETS Shift Superintendent and RMRS Project Manager have been notified and provided with the following information.
- Exact location of the spill.
- Type of spill.
- Volume of the spill.
- Time of the spill.
- Response actions to be taken.
- All materials or equipment used during the response is compatible with the substance spilled.
- The Shift Superintendent or a representative from the RFETS emergency response team is at the site to observe the spill response and cleanup.
- Incidental Spill Response Actions:
- In the case of liquid spills such as hydraulic fluid, motor oil, gasoline or diesel fuel, absorbent pads or materials will be used to contain and cleanup the spill. Absorbent materials will be properly packaged and handled in accordance with WO-1027 or WO-1101.

Post incidental spill response will include:

- Ensuring the proper reporting per HSP-21.04 and ADM-16.01.
- Conducting a briefing to address the cause of the spill, methods of preventing future spills, and ways to improve readiness and response.

13.3 Emergency Spill Operation

Emergency Response Definition:

A response effort by personnel from outside the immediate release area, or by other designated responders to a release that results, or is likely to result, in an uncontrolled release of a hazardous substance. An emergency response is required in the following situations:

- The responders are not in the immediate response area.
- The release requires emergency evacuation of employees in the area.
- The material has a NFPA health, fire, or reactivity hazard rating of 3 or 4.
- The release poses a serious threat of fire or explosion (propane or NFPA fire hazard rating of 3 or 4).
- The release may cause high levels of exposure to toxic substances.
- There is uncertainty that the employees in the work area can safely handle the severity of the hazard with the available PPE and equipment.

Emergency Spill Response Actions:

- Personnel should warn others and evacuate the area to a safe upwind location.
- Isolate the area to prevent vehicle traffic through the area and minimize personnel exposures.
- Notify the RFETS Shift Superintendent and RMRS Project Manager and provide them with the following information.
- Exact location of the spill.
- Type of spill.
- Volume of the spill.
- Time of the spill.
- Call 966-2911 or use radio channel 2911 and report the release.

13.0 Spill Control

13.1 Spill Response Planning

The Spill Response Plan is designed to establish a program/plan to optimize a safe and informed response to incidental and emergency situations with the intent of protecting T-1 construction site project personnel, collocated workers, the public, the environment, and property in the event of spills, fire, or explosion. All spills will be addressed per HSP-21.04, "Emergency Response and Spill Control Program." If applicable, reporting will be conducted in accordance with Administrative Procedures Manual, ADM-16.01, "Occurrence Reporting Process."

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- Volume of the spill.
- Time of the spill.
- Response actions to be taken.
- All materials or equipment used during the response is compatible with the substance spilled.
- The Shift Superintendent or a representative from the RFETS emergency response team is at the site to observe the spill response and cleanup.
- Incidental Spill Response Actions:
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- The release may cause high levels of exposure to toxic substances.
- There is uncertainty that the employees in the work area can safely handle the severity of the hazard with the available PPE and equipment.

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- Isolate the area to prevent vehicle traffic through the area and minimize personnel exposures.
- Notify the RFETS Shift Superintendent and RMRS Project Manager and provide them with the following information.
- Exact location of the spill.
- Type of spill.
- Volume of the spill.
- Time of the spill.
- Call 966-2911 or use radio channel 2911 and report the release.

14.0 Record Keeping Requirements

14.1 Orientation and Training Records

All training and field experience will be verified and the Construction Site Safety Officer shall maintain records in the Project Support Trailer.

14.2 Daily Health and Safety Meetings

Daily/shift plan-of-the-day (POD) and safety briefings for site employees will be conducted. The briefings will address the days planned activities, reminders of safety responsibilities; new chemicals brought on site, lessons learned, and any safety concerns. These meetings will be documented by the Site Safety Officer. Documentation will be in a written format that states the subjects covered, the signature and title of the presenter, and signatures of all employees attending the meeting.

14.3 Accident/Incident Reporting

All accidents, incidents, and near misses will be immediately reported to the Field Supervisor and the Project Manager. It is the Project Manager's responsibility to ensure that the appropriate personnel are notified of the accident/incident. In addition, RFETS requires Department of Energy (DOE) form 5484.X, "Individual Accident/Injury Report" to be completed for all first aid incidents and the following "Recordable" occupational injuries or illnesses as defined below.

OCCUPATIONAL INJURY is any injury such as a cut, fracture, sprain, or amputation that results from a work accident or from an exposure involving a single incident in the work environment that requires more than standard first aid.

Note: Conditions resulting from animal or insect bites, or one-time exposure to chemicals, are considered injuries.

OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases that may be caused by inhalation, absorption, ingestion, or direct contact with a toxic material.

PROPERTY DAMAGE LOSSES of \$1,000 or more are reported as follows: Accidents that cause damage to DOE property, regardless of fault, or accident wherein DOE may be liable for damage to a second party, are reportable if damage is \$5,000 or more. Include damage to facilities, inventories, equipment, and properly parked motor vehicles. Exclude damage resulting from a DOE-reportable vehicle accident.

GOVERNMENT MOTOR VEHICLE ACCIDENTS resulting in damages of \$250 or more, or involving injury, are reported unless the government vehicle is not at fault, damage of less than \$250 is sustained by the government vehicle, and no injury is inflicted on the government vehicle occupants.

14.4 Health and Safety Logbooks

Separate health and safety logbooks with control numbers shall be maintained by Field Supervisors, SSO and HSS and will be turned in to the Project Manager once the project is completed. The Project Manager will then turn in the project logbooks and documents to the RMRS Project Manager who will then give them to the environmental records management group. Logged information will meet the requirements of RFETS Conduct of Operations Manual, COOP-006, "Operating Area Logs and Records" and shall include:

- (1) Summary of daily health and safety issues.
- (2) All measurements taken.
- (3) Types of monitoring conducted.
- (4) Description of unforeseen hazards, who the hazard or compensatory measure was mitigated by, how it was mitigated, and the time and date it was mitigated.
- (5) Safety infractions.
- (6) Accidents and injuries.
- (7) Other significant health and safety items.

APPENDIX A
ACTIVITY HAZARD ANALYSIS

**STARMET
TRENCH T-1 TEMPORARY STRUCTURE PROJECT
MOBILIZATION OF EQUIPMENT TO THE T-1 SITE
Activity Hazard Analysis
3/98**

Activity	Hazard	Preventative Measures
All site activities	General work hazards	<ul style="list-style-type: none"> • All personnel will wear steel toed shoes, safety glasses with side shields, hard hats, reflective vests, and hearing protection as applicable in the construction area.
	Heat stress	<ul style="list-style-type: none"> • Heat stress monitoring will be conducted in regards to work load and PPE worn as applicable.
	Cold stress	<ul style="list-style-type: none"> • Cold stress monitoring will be conducted as applicable. • Proper clothing will be available to all personnel and administrative controls will be adhered to.
	Noise	<ul style="list-style-type: none"> • Noise monitoring will be conducted as applicable. • Where necessary personnel will wear hearing protection. • Posting areas where hearing protection is required. • All personnel will participate in the Starmet Hearing Conservation Program if necessary.
Fire	<ul style="list-style-type: none"> • Proper site housekeeping will be required to segregate combustible material. 	

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 MOBILIZATION OF EQUIPMENT TO THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<ul style="list-style-type: none"> • Smoking is only permitted in designated smoking areas. • Flammable and combustible liquids will be stored in approved safety containers and when not in use will be stored in an approved flammable cabinet.
Traversing the site	Slip, trips, falls	<ul style="list-style-type: none"> • Care will be taken when traversing the site especially when carrying equipment. • All trip hazards will be immediately removed or marked when identified.
Lifting equipment and materials	Back injury	<ul style="list-style-type: none"> • Proper lifting techniques will be used and heavy equipment, where feasible, will be utilized to move heavy loads.
Handling equipment and materials	Pinch points and sharp edges	<ul style="list-style-type: none"> • Care will be taken when pinch points and sharp edges exist and heavy duty leather work gloves will be worn.
Using hand tools and power hand tools during construction activities.	Hand tools in unsafe operating condition	<ul style="list-style-type: none"> • The user prior to each use will inspect hand tools. • Defective tools will be tagged and taken out of service.
	Improper use of hand tools	<ul style="list-style-type: none"> • Hand tools will be utilized for their intended use and operated in accordance with HSP-12.10. • Guards will be in place and no modifications will

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 MOBILIZATION OF EQUIPMENT TO THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Electrical shock	<p>be made.</p> <ul style="list-style-type: none"> • Portable power tools will be plugged into a GFCI protected outlet and will be UL listed with three pronged ground plug or double insulated. • Cords will be inspected by the user and protected from unnecessary damage. • Any tool whose cord shows signs of damage or deterioration will be immediately removed from service.
Use of generators to power portable power tools	Electrical shock	<ul style="list-style-type: none"> • Extension cords will be intended for outdoor use, inspected by the user, and protected from unnecessary damage. • Any extension cords, which show signs of damage or deterioration, will be immediately removed from service.
	Electrical shock	<ul style="list-style-type: none"> • Cords will be plugged into a GFCI protected outlet and the generator will be properly grounded. • The user daily prior to the beginning of each shift will test the GFCI.
	Fire	<ul style="list-style-type: none"> • At a minimum, a 10 lb. ABC fire extinguisher will be located in the work area and next to the generator. • All refueling will be conducted at the beginning

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 MOBILIZATION OF EQUIPMENT TO THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<p>of the shift when the light plants and generators are cool.</p> <ul style="list-style-type: none"> Fuel containers will be electrically bonded to the light plants and generators during refueling.
	Use of gasoline	<ul style="list-style-type: none"> Follow recommendations on MSDS (see Appendix B).
Using forklift to unload flat bed trailers	Forklift in poor operating condition	<ul style="list-style-type: none"> Heavy equipment will be inspected prior to entering RFETS. The operators will inspect and document heavy equipment prior to the beginning of each shift.
	Improper operation of forklift	<ul style="list-style-type: none"> Personnel will be experienced and knowledgeable in the use and limitations of all heavy equipment.
	Ground personnel being struck with heavy equipment	<ul style="list-style-type: none"> Ground personnel will wear orange vests, maintain at least a 10' clearance, and maintain line of sight with the equipment operator. Prior to the ground personnel applying or removing load securing devices from the forklift, the operator will lower the load, disengage the hydraulic system, set the parking brake, and give a hand signal indicating that the ground person may approach.

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 MOBILIZATION OF EQUIPMENT TO THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Other equipment being struck with heavy equipment	<ul style="list-style-type: none"> • Equipment operations will be conducted in a safe manner. • Equipment must have a functioning backup alarm.
	Injury resulting from unsecured loads	<ul style="list-style-type: none"> • Loads will be secured and/or will be moved with the forks in the lowest possible position and personnel will stay back a minimum of ten feet.
Driving fence posts, ground rods, or equipment hold downs	Pinch points	<ul style="list-style-type: none"> • Pay particular attention to pinch points when using pneumatic or slide type driving devices
	Improper use of pneumatic and hydraulic power tools and compressor	<ul style="list-style-type: none"> • Pneumatic and hydraulic power tools and compressors will be inspected by the user prior to use; • Pneumatic and hydraulic power tools and compressors will be used for their intended use and operated in accordance with HSP-12.10; • Guards will be in place and no modifications will be made; • Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected; • The manufacturer's safe operating pressure for

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 MOBILIZATION OF EQUIPMENT TO THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<p>hoses, pipes, valves and other fittings shall not be exceeded;</p> <ul style="list-style-type: none"> • All pneumatic hoses exceeding ½-inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure; and • The use of hoses for hoisting or lowering tools shall not be permitted.
	<p>Improper use of Bobcat with hydraulic anchor driving attachment.</p>	<ul style="list-style-type: none"> • Heavy equipment will be inspected prior to entering RFETS. • The operators will inspect and document heavy equipment prior to the beginning of each shift. • Personnel will be experienced and knowledgeable in the use and limitations of all heavy equipment. • Equipment operations will be conducted in a safe manner. • Equipment must have a functioning backup alarm.
	<p>Damage to underground utilities</p>	<ul style="list-style-type: none"> • Kaiser-Hill Excavation Specialists will locate and mark all underground utilities. • A minimum distance of 10 feet from utility line will be maintained.

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 MOBILIZATION OF EQUIPMENT TO THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Radiological contamination of anchor driving equipment.	<ul style="list-style-type: none"> • The radiological requirements of the Soil Disturbance Permit will be followed. • Baseline radiological surveys of anchor driving equipment will be performed prior to use. • Unrestricted release radiological surveys will be conducted prior to the equipment being released from the site.
	Noise	<ul style="list-style-type: none"> • Hearing protection will be worn

Approved:

Signature

Date

Starment/Stoller Task Manager - Michael Anderson

Michael Anderson 3/5/98

RMRS H&S Supervisor- Skip Chandler

Skip Chandler 3/10/98

Starment/Stoller H&S Officer - Steven Aldridge

Steven Aldridge 3/10/98

STARMET
TRENCH T-1 TEMPORARY STRUCTURE PROJECT
SITE PREPARATION OF THE T-1 SITE
Activity Hazard Analysis
3/98

Activity	Hazard	Preventative Measures
All site activities	General work hazards	<ul style="list-style-type: none"> • All personnel will wear steel toed shoes, safety glasses with side shields, hard hats, reflective vests, and hearing protection as applicable in the construction area.
	Heat stress	<ul style="list-style-type: none"> • Heat stress monitoring will be conducted in regards to work load and PPE worn as applicable.
	Cold stress	<ul style="list-style-type: none"> • Cold stress monitoring will be conducted as applicable. • Proper clothing will be available to all personnel and administrative controls will be adhered to.
	Noise	<ul style="list-style-type: none"> • Noise monitoring will be conducted as applicable. • Where necessary personnel will wear hearing protection. • Posting areas where hearing protection is required. • All personnel will participate in the Starmet Hearing Conservation Program if necessary.
	Fire	<ul style="list-style-type: none"> • Proper site housekeeping will be required to segregate combustible material.

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
SITE PREPARATION OF THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<ul style="list-style-type: none"> • Smoking is only permitted in designated smoking areas. • Flammable and combustible liquids will be stored in approved safety containers and when not in use will be stored in an approved flammable cabinet.
Traversing the site	Slip, trips, falls	<ul style="list-style-type: none"> • Care will be taken when traversing the site especially when carrying equipment. • All trip hazards will be immediately removed or marked when identified.
Lifting equipment and materials	Back injury	<ul style="list-style-type: none"> • Proper lifting techniques will be used and heavy equipment, where feasible, will be utilized to move heavy loads.
Handling equipment and materials	Pinch points and sharp edges	<ul style="list-style-type: none"> • Care will be taken when pinch points and sharp edges exist and heavy duty leather work gloves will be worn.
Using hand tools and power hand tools during construction activities.	Hand tools in unsafe operating condition	<ul style="list-style-type: none"> • The user prior to each use will inspect hand tools. • Defective tools will be tagged and taken out of service.
	Improper use of hand tools	<ul style="list-style-type: none"> • Hand tools will be utilized for their intended use and operated in accordance with HSP-12.10. • Guards will be in place and no modifications will

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
SITE PREPARATION OF THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Electrical shock	<p>be made.</p> <ul style="list-style-type: none"> • Portable power tools will be plugged into a GFCI protected outlet and will be UL listed with three pronged ground plug or double insulated. • Cords will be inspected by the user and protected from unnecessary damage. • Any tool whose cord shows signs of damage or deterioration will be immediately removed from service.
Use of generators to power portable power tools	Electrical shock	<ul style="list-style-type: none"> • Extension cords will be intended for outdoor use, inspected by the user, and protected from unnecessary damage. • Any extension cords, which show signs of damage or deterioration, will be immediately removed from service.
	Electrical shock	<ul style="list-style-type: none"> • Cords will be plugged into a GFCI protected outlet and the generator will be properly grounded. • The user daily prior to the beginning of each shift will test the GFCI.
	Fire	<ul style="list-style-type: none"> • At a minimum, a 10 lb. ABC fire extinguisher will be located in the work area and next to the generator. • All refueling will be conducted at the beginning

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
SITE PREPARATION OF THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<p>of the shift when the light plants and generators are cool.</p> <ul style="list-style-type: none"> Fuel containers will be electrically bonded to the light plants and generators during refueling.
	Use of gasoline	<ul style="list-style-type: none"> Follow recommendations on MSDS (see Appendix B).
Using forklift to position materials	Forklift in poor operating condition	<ul style="list-style-type: none"> Heavy equipment will be inspected prior to entering RFETS. The operators will inspect and document heavy equipment prior to the beginning of each shift.
	Improper operation of forklift	<ul style="list-style-type: none"> Personnel will be experienced and knowledgeable in the use and limitations of all heavy equipment.
	Ground personnel being struck with heavy equipment	<ul style="list-style-type: none"> Ground personnel will wear orange vests, maintain at least a 10' clearance, and maintain line of sight with the equipment operator. Prior to the ground personnel applying or removing load securing devices from the forklift, the operator will lower the load, disengage the hydraulic system, set the parking brake, and give a hand signal indicating that the ground person may approach.

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
SITE PREPARATION OF THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Other equipment being struck with heavy equipment	<ul style="list-style-type: none"> • Equipment operations will be conducted in a safe manner. • Equipment must have a functioning backup alarm.
	Injury resulting from unsecured loads	<ul style="list-style-type: none"> • Loads will be secured and/or will be moved with the forks in the lowest possible position and personnel will stay back a minimum of ten feet.
Driving tent anchors	Pinch points	<ul style="list-style-type: none"> • Pay particular attention to pinch points when using pneumatic or slide type driving devices
	Improper use of pneumatic and hydraulic power tools and compressor	<ul style="list-style-type: none"> • Pneumatic and hydraulic power tools and compressors will be inspected by the user prior to use; • Pneumatic and hydraulic power tools and compressors will be used for their intended use and operated in accordance with HSP-12.10; • Guards will be in place and no modifications will be made; • Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected; • The manufacturer's safe operating pressure for

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
SITE PREPARATION OF THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<p>hoses, pipes, valves and other fittings shall not be exceeded;</p> <ul style="list-style-type: none"> • All pneumatic hoses exceeding ½-inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure; and • The use of hoses for hoisting or lowering tools shall not be permitted.
	<p>Improper use of Bobcat with hydraulic anchor driving attachment.</p>	<ul style="list-style-type: none"> • Heavy equipment will be inspected prior to entering RFETS. • The operators will inspect and document heavy equipment prior to the beginning of each shift. • Personnel will be experienced and knowledgeable in the use and limitations of all heavy equipment. • Equipment operations will be conducted in a safe manner. • Equipment must have a functioning backup alarm.
	<p>Damage to underground utilities</p>	<ul style="list-style-type: none"> • Kaiser-Hill Excavation Specialists will locate and mark all underground utilities. • A minimum distance of 10 feet from utility line will be maintained.

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
SITE PREPARATION OF THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Radiological contamination of anchor driving equipment.	<ul style="list-style-type: none"> • The radiological requirements of the Soil Disturbance Permit will be followed. • Baseline radiological surveys of anchor driving equipment will be performed prior to use. • Unrestricted release radiological surveys will be conducted prior to the equipment being released from the site.
	Noise	<ul style="list-style-type: none"> • Hearing protection will be worn

Approved:

Signature

Date

Starment/Stoller Task Manager - Michael Anderson

Michael Anderson | 3/5/98

RMRS H&S Supervisor- Skip Chandler

Skip Chandler | 3/10/98

Starment/Stoller H&S Officer - Steven Aldridge

Steven Aldridge | 3/10/98

STARMET
TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE
Activity Hazard Analysis
3/98

Activity	Hazard	Preventative Measures
All site activities	General work hazards	<ul style="list-style-type: none"> • All personnel will wear steel toed shoes, safety glasses with side shields, hard hats, reflective vests, and hearing protection as applicable in the construction area.
	Heat stress	<ul style="list-style-type: none"> • Heat stress monitoring will be conducted in regards to work load and PPE worn as applicable.
	Cold stress	<ul style="list-style-type: none"> • Cold stress monitoring will be conducted as applicable. • Proper clothing will be available to all personnel and administrative controls will be adhered to.
	Noise	<ul style="list-style-type: none"> • Noise monitoring will be conducted as applicable. • Where necessary personnel will wear hearing protection. • Posting areas where hearing protection is required. • All personnel will participate in the Starmet Hearing Conservation Program if necessary.
	Fire	<ul style="list-style-type: none"> • Proper site housekeeping will be required to segregate combustible material.

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<ul style="list-style-type: none"> • Smoking is only permitted in designated smoking areas. • Flammable and combustible liquids will be stored in approved safety containers and when not in use will be stored in an approved flammable cabinet.
Traversing the site	Slip, trips, falls	<ul style="list-style-type: none"> • Care will be taken when traversing the site especially when carrying equipment. • All trip hazards will be immediately removed or marked when identified.
Lifting equipment and materials	Back injury	<ul style="list-style-type: none"> • Proper lifting techniques will be used and heavy equipment, where feasible, will be utilized to move heavy loads.
Handling equipment and materials	Pinch points and sharp edges	<ul style="list-style-type: none"> • Care will be taken when pinch points and sharp edges exist and heavy duty leather work gloves will be worn.
Using hand tools and power hand tools during construction activities.	Hand tools in unsafe operating condition	<ul style="list-style-type: none"> • The user prior to each use will inspect hand tools. • Defective tools will be tagged and taken out of service.
	Improper use of hand tools	<ul style="list-style-type: none"> • Hand tools will be utilized for their intended use and operated in accordance with HSP-12.10. • Guards will be in place and no modifications will

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Electrical shock	<p>be made.</p> <ul style="list-style-type: none"> • Portable power tools will be plugged into a GFCI protected outlet and will be UL listed with three pronged ground plug or double insulated. • Cords will be inspected by the user and protected from unnecessary damage. • Any tool whose cord shows signs of damage or deterioration will be immediately removed from service.
Use of generators to power portable power tools	Electrical shock	<ul style="list-style-type: none"> • Extension cords will be intended for outdoor use, inspected by the user, and protected from unnecessary damage. • Any extension cords, which show signs of damage or deterioration, will be immediately removed from service.
	Electrical shock	<ul style="list-style-type: none"> • Cords will be plugged into a GFCI protected outlet and the generator will be properly grounded. • The user daily prior to the beginning of each shift will test the GFCI.
	Fire	<ul style="list-style-type: none"> • At a minimum, a 10 lb. ABC fire extinguisher will be located in the work area and next to the generator. • All refueling will be conducted at the beginning

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		of the shift when the light plants and generators are cool. <ul style="list-style-type: none"> • Fuel containers will be electrically bonded to the light plants and generators during refueling.
	Use of gasoline	<ul style="list-style-type: none"> • Follow recommendations on MSDS (see Appendix C).
Hoisting and rigging with a crane for positioning structural arches	Crane and all hoisting and rigging equipment in poor operating condition	<ul style="list-style-type: none"> • Crane and all hoisting and rigging equipment will be inspected prior to entering RFETS. • The operators will inspect and document crane and all hoisting and rigging equipment prior to the beginning of each shift or prior to use. • All hoisting and rigging accessories, where feasible, must have legible tags or labels indicating capacities, if the tags is damaged or not legible or the piece of equipment is damaged in any way, it must be placed out of service immediately. • Hoisting and rigging operation will be performed in accordance with HSP-12.02 and the Hoisting and Rigging Checklist will be completed.
	Improper operation and use of crane and all hoisting and	<ul style="list-style-type: none"> • Personnel will be experienced and knowledgeable in the use

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	rigging equipment	and limitations of the equipment. <ul style="list-style-type: none"> • Any hoisting and rigging operation will be approved and performed in accordance with Hoisting and Rigging Checklist RFETS HSP 12.02, Appendix 2.
	Electrical shock	<ul style="list-style-type: none"> • Crane will be operated with a 10' minimum clearance between the power lines and any part of the equipment.
	Ground personnel being struck with suspended or falling loads	<ul style="list-style-type: none"> • Ground personnel will wear orange vests, stay at least 20' away from crane, and maintain line of sight with the operators. • Loads will be properly secured and ground personnel, while assisting with the positioning arches, will use tag lines. • Tag lines will not be wrapped around the hand. • Ground personnel will never stand directly below a suspended load.
	Other equipment being struck with heavy equipment	<ul style="list-style-type: none"> • Crane operations will be conducted in a safe manner. • A spotter will be required when moving suspended loads.
Using Aerial Man Lifts (Scissor Lifts or Boom Type Lifts)	Scissor Lift or Boom Type Lift equipment in poor operating condition	<ul style="list-style-type: none"> • Aerial Lifts from off site vendors will be inspected by RMRS Health and Safety.

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<ul style="list-style-type: none"> • Aerial lift equipment will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed. • Operator shall immediately report to Site Supervisor or H&S Supervisor any defects or malfunctions which become evident during operation.
	<p>Improper operation and use of Scissor Lift or Boom Type Lift equipment</p>	<ul style="list-style-type: none"> • Only trained and authorized personnel will be allowed to operate the aerial work platform. • Operators will be properly trained in the use and limitations of the specific pieces of aerial lift equipment being operated.
	<p>Aerial Lifts striking obstructions on the ground and overhead</p>	<ul style="list-style-type: none"> • Prior to and during operations the site must be checked for hazards such as ditches, dropoffs or holes, bumps, obstruction, debris, overhead obstructions and high voltage conductors, and other possible hazardous conditions. • Before and during driving while elevated, the operator must: keep a clear view of the path of travel; maintain distance from obstacle, debris and other hazards in the path; and maintain a safe distance from overhead

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		obstacles (a minimum of 10 feet from power lines).
	Electrical Shock	<ul style="list-style-type: none"> • Aerial Lifts will be operated with a 10' minimum clearance between the power lines and any part of the equipment. • Care shall be take to prevent ropes, or electrical cords from becoming entangled in the work platform when it is being elevated or lowered.
	Ground personnel being struck with suspended or falling loads	<ul style="list-style-type: none"> • Ground personnel will wear orange vests and maintain line of sight with the operators. • Operator shall ensure that the area surrounding the platform is clear of personnel and equipment before lowering.
	Work on elevated surfaces	<ul style="list-style-type: none"> • Personnel shall maintain a firm footing on the platform and must ONLY attach full body harness / lanyard devices to manufacturer approved attachment points. • All personnel will have current Fall Protection Training.
Using forklift to position materials	Forklift in poor operating condition	<ul style="list-style-type: none"> • Heavy equipment will be inspected prior to entering RFETS. • The operators will inspect and document heavy equipment prior to the

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		beginning of each shift.
	Improper operation of forklift	<ul style="list-style-type: none"> • Personnel will be experienced and knowledgeable in the use and limitations of all heavy equipment.
	Ground personnel being struck with heavy equipment	<ul style="list-style-type: none"> • Ground personnel will wear orange vests, maintain at least a 10' clearance, and maintain line of sight with the equipment operator. • Prior to the ground personnel applying or removing load securing devices from the forklift, the operator will lower the load, disengage the hydraulic system, set the parking brake, and give a hand signal indicating that the ground person may approach.
	Other equipment being struck with heavy equipment	<ul style="list-style-type: none"> • Equipment operations will be conducted in a safe manner. • Equipment must have a functioning backup alarm.
	Injury resulting from unsecured loads	<ul style="list-style-type: none"> • Loads will be secured and/or will be moved with the forks in the lowest possible position and personnel will stay back a minimum of ten feet.
Using ladders during construction activities	Ladder in poor working condition	<ul style="list-style-type: none"> • Ladders will be inspected by the user prior to each use; • Ladders which show signs of damage or deterioration

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Using ladder improperly	<p>will be immediately removed from service;</p> <ul style="list-style-type: none"> • Ladder users will be trained on ladder safety in accordance with CFR 1926.1060, such as, using both hands when climbing, cleaning boots and ladder rungs, and keeping weight centered in the middle of the ladder; • Ladders will be Type 1-A, Industrial Extra Heavy Duty or better; • Aluminum ladders will not be used in areas where there is electrical power equipment; • Extension ladders will be secured to prevent slipping and the rails will be extended at least 3 feet beyond the landing area; • Work on ladders at heights greater than six feet will require evaluation from the SSO.
Driving tent anchors	Pinch points	<ul style="list-style-type: none"> • Pay particular attention to pinch points when using pneumatic or slide type driving devices
	Improper use of pneumatic and hydraulic power tools and compressor	<ul style="list-style-type: none"> • Pneumatic and hydraulic power tools and compressors will be inspected by the user prior to use; • Pneumatic and hydraulic power tools and

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<p>compressors will be used for their intended use and operated in accordance with HSP-12.10;</p> <ul style="list-style-type: none"> • Guards will be in place and no modifications will be made; • Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected; • The manufacturer's safe operating pressure for hoses, pipes, valves and other fittings shall not be exceeded; • All pneumatic hoses exceeding ½-inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure; and • The use of hoses for hoisting or lowering tools shall not be permitted.
	<p>Improper use of Bobcat with hydraulic anchor driving attachment.</p>	<ul style="list-style-type: none"> • Heavy equipment will be inspected prior to entering RFETS. • The operators will inspect and document heavy equipment prior to the beginning of each shift. • Personnel will be experienced and

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		knowledgeable in the use and limitations of all heavy equipment. <ul style="list-style-type: none"> • Equipment operations will be conducted in a safe manner. • Equipment must have a functioning backup alarm.
	Damage to underground utilities	<ul style="list-style-type: none"> • Kaiser-Hill Excavation Specialists will locate and mark all underground utilities. • A minimum distance of 10 feet from utility line will be maintained.
	Radiological contamination of anchor driving equipment.	<ul style="list-style-type: none"> • The radiological requirements of the Soil Disturbance Permit will be followed. • Baseline radiological surveys of anchor driving equipment will be performed prior to use. • Unrestricted release radiological surveys will be conducted prior to the equipment being released from the site.
	Noise	<ul style="list-style-type: none"> • Hearing protection will be worn

Approved:

Signature

Date

Starment/Stoller Task Manager - Michael Anderson

 3/5/98

TRENCH T-1 TEMPORARY STRUCTURE PROJECT
CONSTRUCTION OF STRUCTURE AT THE T-1 SITE (Continued)
Activity Hazard Analysis
3/98

Approved:	Signature	Date
RMRS H&S Supervisor- Skip Chandler		3/10/98
Stament/Stoller H&S Officer - Steven Aldridge		3/10/98

**STARMET
TRENCH T-1 TEMPORARY STRUCTURE PROJECT
DEMobilIZATION OF EQUIPMENT FROM THE T-1 SITE
Activity Hazard Analysis
3/98**

Activity	Hazard	Preventative Measures
All site activities	General work hazards	<ul style="list-style-type: none"> • All personnel will wear steel toed shoes, safety glasses with side shields, hard hats, reflective vests, and hearing protection as applicable in the construction area.
	Heat stress	<ul style="list-style-type: none"> • Heat stress monitoring will be conducted in regards to work load and PPE worn as applicable.
	Cold stress	<ul style="list-style-type: none"> • Cold stress monitoring will be conducted as applicable. • Proper clothing will be available to all personnel and administrative controls will be adhered to.
	Noise	<ul style="list-style-type: none"> • Noise monitoring will be conducted as applicable. • Where necessary personnel will wear hearing protection. • Posting areas where hearing protection is required. • All personnel will participate in the Starmet Hearing Conservation Program if necessary.
	Fire	<ul style="list-style-type: none"> • Proper site housekeeping will be required to segregate combustible material.

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 DEMOBILIZATION OF EQUIPMENT FROM THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<ul style="list-style-type: none"> • Smoking is only permitted in designated smoking areas. • Flammable and combustible liquids will be stored in approved safety containers and when not in use will be stored in an approved flammable cabinet.
Traversing the site	Slip, trips, falls	<ul style="list-style-type: none"> • Care will be taken when traversing the site especially when carrying equipment. • All trip hazards will be immediately removed or marked when identified.
Lifting equipment and materials	Back injury	<ul style="list-style-type: none"> • Proper lifting techniques will be used and heavy equipment, where feasible, will be utilized to move heavy loads.
Handling equipment and materials	Pinch points and sharp edges	<ul style="list-style-type: none"> • Care will be taken when pinch points and sharp edges exist and heavy duty leather work gloves will be worn.
Using hand tools and power hand tools during activities.	Hand tools in unsafe operating condition	<ul style="list-style-type: none"> • The user prior to each use will inspect hand tools. • Defective tools will be tagged and taken out of service.
	Improper use of hand tools	<ul style="list-style-type: none"> • Hand tools will be utilized for their intended use and operated in accordance with HSP-12.10. • Guards will be in place and no modifications will

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 DEMOBILIZATION OF EQUIPMENT FROM THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
	Electrical shock	be made. <ul style="list-style-type: none"> • Portable power tools will be plugged into a GFCI protected outlet and will be UL listed with three pronged ground plug or double insulated. • Cords will be inspected by the user and protected from unnecessary damage. • Any tool whose cord shows signs of damage or deterioration will be immediately removed from service.
Use of generators to power portable power tools	Electrical shock	<ul style="list-style-type: none"> • Extension cords will be intended for outdoor use, inspected by the user, and protected from unnecessary damage. • Any extension cords, which show signs of damage or deterioration, will be immediately removed from service.
	Electrical shock	<ul style="list-style-type: none"> • Cords will be plugged into a GFCI protected outlet and the generator will be properly grounded. • The user daily prior to the beginning of each shift will test the GFCI.
	Fire	<ul style="list-style-type: none"> • At a minimum, a 10 lb. ABC fire extinguisher will be located in the work area and next to the generator. • All refueling will be conducted at the beginning

**TRENCH T-1 TEMPORARY STRUCTURE PROJECT
 DEMOBILIZATION OF EQUIPMENT FROM THE T-1 SITE (Continued)**

Activity Hazard Analysis

3/98

Activity	Hazard	Preventative Measures
		<p>of the shift when the light plants and generators are cool.</p> <ul style="list-style-type: none"> Fuel containers will be electrically bonded to the light plants and generators during refueling.
	Use of gasoline	<ul style="list-style-type: none"> Follow recommendations on MSDS (see Appendix B).
Using forklift to load flat bed trailers	Forklift in poor operating condition	<ul style="list-style-type: none"> Heavy equipment will be inspected prior to entering RFETS. The operators will inspect and document heavy equipment prior to the beginning of each shift.
	Improper operation of forklift	<ul style="list-style-type: none"> Personnel will be experienced and knowledgeable in the use and limitations of all heavy equipment.
	Ground personnel being struck with heavy equipment	<ul style="list-style-type: none"> Ground personnel will wear orange vests, maintain at least a 10' clearance, and maintain line of sight with the equipment operator. Prior to the ground personnel applying or removing load securing devices from the forklift, the operator will lower the load, disengage the hydraulic system, set the parking brake, and give a hand signal indicating that the ground person may approach.

TRENCH T-1 TEMPORARY STRUCTURE PROJECT
DEMobilIZATION OF EQUIPMENT FROM THE T-1 SITE (Continued)
Activity Hazard Analysis
3/98

Activity	Hazard	Preventative Measures
	Other equipment being struck with heavy equipment	<ul style="list-style-type: none"> • Equipment operations will be conducted in a safe manner. • Equipment must have a functioning backup alarm.
	Injury resulting from unsecured loads	<ul style="list-style-type: none"> • Loads will be secured and/or will be moved with the forks in the lowest possible position and personnel will stay back a minimum of ten feet.

Approved:

Signature

Date

Starment/Stoller Task Manager - Michael Anderson

Michael Anderson | 3/5/98

RMRS H&S Supervisor- Skip Chandler

Skip Chandler | 3/10/98

Starment/Stoller H&S Officer - Steven Aldridge

Steven Aldridge | 3/10/98

APPENDIX B

MATERIAL SAFETY DATA SHEETS

Carbon Monoxide

Diesel Fuel

Hydraulic Fluid

Hydraulic Oil

Motor Oil

Nitrogen Dioxide

Nitric Oxide

Sulfur Dioxide

Synthetic Grease

Unleaded Gasoline

LIQUID AIR -- CARBON MONOXIDE - CARBON MONOXIDE, TECH
MATERIAL SAFETY DATA SHEET

FSC: 6830

UN: 011038438

Manufacturer's CAGE: 18260

Part No. Indicator: A

Part Number/Trade Name: CARBON MONOXIDE

=====
General Information
=====

Item Name: CARBON MONOXIDE, TECH

Company's Name: LIQUID AIR CORP

Company's Street: 2121 N CALIFORNIA BLVD

Company's City: WALNUT CREEK

Company's State: CA

Company's Country: US

Company's Zip Code: 94596

Company's Emerg Ph #: 800-231-1366; 800-424-9300 (CHEMTREC)

Company's Info Ph #: 415-977-6500

Safety Data Action Code: A

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 002

Status: SMJ

Date MSDS Prepared: 01OCT85

Safety Data Review Date: 11JUL95

MSDS Serial Number: BXXYL
=====

Ingredients/Identity Information
=====

Proprietary: NO

Ingredient: CARBON MONOXIDE

Ingredient Sequence Number: 01

Ingredient Action Code: A

NIOSH (RTECS) Number: FG3500000

CAS Number: 630-08-0

OSHA PEL: 50 PPM

ACGIH TLV: 25 PPM

Proprietary: NO

Ingredient: SUPDAT:AREA & BE GIVEN ARTF RESP & OXYG AT SAME TIME. ADMIN OF OXYG AT ELEVATED PRESS(UP TO 2-2.5 ATMS) HAS SHOWN(ING 3)

Ingredient Sequence Number: 02

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 2:TO BE BENEFICIAL AS HAS TREATMENT IN HYPERBARIC CHAMBER. MD SHOULD BE INFORMED THAT PATIENT HAS INHALED TOX(ING 4)

Ingredient Sequence Number: 03

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 3:QUANTITIES OF CARBON MONOXIDE.

Ingredient Sequence Number: 04

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: WASTE DISP METH:CONTACT THE CLOSEST LIQUID AIR CORPORATION LOCATION.

Ingredient Sequence Number: 05

Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: OTHER PREC:USE CHECK VALVE/TRAP IN DISCHARGE LINE TO PVNT HAZ
BACK FLOW INTO CYL. PROT CYLS FROM PHYSICAL DMG. (ING 7)
Ingredient Sequence Number: 06
Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 6:STORE IN COOL, DRY, WELL-VENTILATED AREA OF NON-COMBUST
CONSTRUCTION AWAY FROM HEAVILY TRAFFICKED AREAS & (ING 8)
Ingredient Sequence Number: 07
Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 7:EMER EXITS. DO NOT ALLOW TEMP WHERE CYLS ARE STORED TO
EXCEED 130F(54C). CYLS SHOULD BE STORED UPRIGHT & (ING 9)
Ingredient Sequence Number: 08
Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 8:FIRMLY SECURED TO PVNT FALLING/BEING KNOCKED OVER. FULL
EMPTY CYLS SHOULD BE SEGREGATED. USE "FIRST IN- (ING 10)
Ingredient Sequence Number: 09
Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 9:FIRST OUT" INVENTORY SYS TO PVNT FULL CYLS BEING STORED
FOR EXCESSIVE PERIODS OF TIME. POST "NO SMOKING/ (ING 11)
Ingredient Sequence Number: 10
Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 10:OPEN FLAMES" SIGNS IN STOR/USE AREAS. THERE SHOULD BE
NO SOURCES OF IGNIT IN STOR/USE AREA. FOR ADDNL (ING 12)
Ingredient Sequence Number: 11
Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 11:HNDLG/STOR RECS CONSULT COMPRESSED GAS ASSOC PAMPHLET
P-1. CARBON MONOXIDE CAN BE HNDLD IN ALL COMMONLY (ING 13)
Ingredient Sequence Number: 12
Ingredient Action Code: A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 12:USED METALS UP TO APPROX 500 PSIG (3450 KPA). ABOVE THAT PRESS IT FORMS TOX & CORR CARBONYL CMPDS W/SOME (ING 14)

Ingredient Sequence Number: 13

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 13:METALS. CONSULT COMPRESSED GAS ASSOC PAMPHLET FOR INFO ON METALS TO USE W/HIGH PRESS CARBON MONOXIDE. (ING 15)

Ingredient Sequence Number: 14

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 14:EARTH-GROUND & BOND ALL LINES & EQUIP ASSOC W/CARBON MONOXIDE SYS. ELEC EQUIP SHOULD BE NON-SPARKING/ (ING 16)

Ingredient Sequence Number: 15

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 15:EXPLO PROOF. COMPRESSED GAS CYLS SHOULD NOT BE REFILLED EXCEPT BY QUALIFIED PRODUCERS OF COMPRESSED (ING 17)

Ingredient Sequence Number: 16

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 16:GASES. SHIPMENT OF COMPRESSED GAS CYL WHICH HAS NOT BEEN FILLED BY OWNER/WITH HIS (WRITTEN) CONSENT IS A (ING 18)

Ingredient Sequence Number: 17

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 17:VIOLATION OF FEDERAL LAW (49CFR).

Ingredient Sequence Number: 18

Ingredient Action Code: A

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

=====
Physical/Chemical Characteristics
=====

Appearance And Odor: COLORLESS, ODORLESS GAS.

Boiling Point: -313F,-192C

Melting Point: -337F,-205C

Specific Gravity: 0.96 (AIR=1)

Solubility In Water: 0.02266 @ 20C
=====

Fire and Explosion Hazard Data
=====

Flash Point: GAS

Lower Explosive Limit: 12.5%

Upper Explosive Limit: 74%

Extinguishing Media: WATER, DRY CHEMICAL, CARBON DIOXIDE.

Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). IF POSS, STOP FLOW OF CARBON MONOXIDE. USE WATER SPRAY TO COOL SURROUNDING CONTAINERS.

Unusual Fire And Expl Hazrds: CARBON MONOXIDE HAS ALMOST SAME DENSITY AS AIR. IT WILL NOT DIFFUSE BY RISING AS W/SOME LIGHTER FLAMMABLES SUCH AS HYDROGEN OR NATURAL GAS (METHANE).

Reactivity Data

Stability: YES

Cond To Avoid (Stability): CARBON MONOXIDE IS FLAMMABLE IN AIR OVER A VERY WIDE RANGE.

Materials To Avoid: IT REACTS VIOLENTLY W/OXYGEN DIFLUORIDE & BARIUM PEROXIDE. OXIDIZERS.

Health Hazard Data

Precautions for Safe Handling and Use

Control Measures

Transportation Data

Transportation Action Code: A
Trans Data Review Date: 95352
DOT PSN Code: CVS
DOT Proper Shipping Name: CARBON MONOIXDE
DOT Class: 2.3
DOT ID Number: UN1016
DOT Label: POISON GAS, FLAMMABLE GAS
IMO PSN Code: DOX
IMO Proper Shipping Name: CARBON MONOXIDE
IMO Regulations Page Number: 2114
IMO UN Number: 1016
IMO UN Class: 2(2.3)
IMO Subsidiary Risk Label: FLAMMABLE GAS
IATA PSN Code: FJA
IATA UN ID Number: 1016
IATA Proper Shipping Name: CARBON MONOXIDE
IATA UN Class: 2.3
IATA Subsidiary Risk Class: 2.1
IATA Label: TOXIC GAS & FLAMMABLE GAS
AFI PSN Code: FJA
AFI Symbols: 0
AFI Prop. Shipping Name: CARBON MONOXIDE
AFI Class: 2.3
AFI ID Number: UN1016
AFI Label: POISON GAS, FLAMMABLE LIQUID
AFI Special Prov: 4
AFI Basic Pac Ref: A6.7

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 11JUL95
Label Date: 07JUL95
Label Status: B
Common Name: CARBON MONOXIDE
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-None: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: CLASS 1 GROUP C GAS. ACUTE:DEPENDING ON LEVELS & DURATION OF EXPOSURE, SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, HEART

PALPITATIONS, WEAKNESS, CONFUSION & NAUSEA TO CONVULSIONS, EVENTUAL UNCONSCIOUSNESS & DEATH. BECAUSE IT IS COLORLESS & ODORLESS POISONOUS GAS, THERE IS NO WARNING OF ITS PRESENCE OTHER THAN ABOVE SYMPTOMS. THE OXYGEN TRANSPORT FUNCTION OF THE HEMOGLOBIN OF BLOOD IS REDUCED. CHRONIC:ALL OF THE DISORDERS ARE DUE TO THE MARKEDLY REDUCED CELLULAR RESPIRATION & MAY INCLUDE CENTRAL NERVOUS SYSTEM IMPAIRMENT, CARDIOVASCULAR COLLAPSE, RENAL INSUFFICIENCY & COMA.

Protect Eye: X

Protect Skin: X

Protect Respiratory: X

Label Name: LIQUID AIR CORP

Label Street: 2121 N CALIFORNIA BLVD

Label City: WALNUT CREEK

Label State: CA

Label Zip Code: 94596

Label Country: US

Label Emergency Number: 800-231-1366;800-424-9300 (CHEMTREC)

=====
URL for this msds <http://hazard.com>. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

MOBIL -- DIESEL FUELS - DIESEL FUEL
MATERIAL SAFETY DATA SHEET
NSN: 9140002865282
Manufacturer's CAGE: 57635
Part No. Indicator: A
Part Number/Trade Name: DIESEL FUELS

=====
General Information
=====

Item Name: DIESEL FUEL
Company's Name: MOBIL CORP
Company's Street: 150 E 42ND ST
Company's City: NEW YORK
Company's State: NY
Company's Country: US
Company's Zip Code: 10017-5612
Company's Emerg Ph #: 609-737-4411 / 800-424-9300CHEMTREC
Company's Info Ph #: 800-662-4525
Distributor/Vendor # 1: MOBIL OIL CORPORATION
Distributor/Vendor # 1 Cage: 3V728
Record No. For Safety Entry: 004
Tot Safety Entries This Stk#: 004
Status: SE
Date MSDS Prepared: 12SEP90
Safety Data Review Date: 28MAR95
Supply Item Manager: KY
MSDS Preparer's Name: ENVIRONMENTAL HEALTH & SA
Preparer's Company: MOBIL OIL CORPORATION
Preparer's City: PRINCETON
Preparer's State: NJ
MSDS Serial Number: BPMFB
Specification Number: VV-F-800
Spec Type, Grade, Class: GRADE DF-A
Hazard Characteristic Code: F4
Unit Of Issue: DR
Unit Of Issue Container Qty: 5 GALLONS
Type Of Container: DRUM
Net Unit Weight: 35.4 LBS

=====
Ingredients/Identity Information
=====

Proprietary: NO
Ingredient: DIESEL FUEL
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: HZ1800000
CAS Number: 68334-30-5
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED

=====
Physical/Chemical Characteristics
=====

Appearance And Odor: CLEAR TO AMBER LIQUID; HYDROCARBON ODOR.
Boiling Point: 350F,177C
Melting Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): 0.5 MM HG
Vapor Density (Air=1): UNKNOWN
Specific Gravity: 0.82-0.87
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: UNKNOWN
Solubility In Water: UNKNOWN
Viscosity: 1.3-4.1 CST
Corrosion Rate (IPY): UNKNOWN

=====
Fire and Explosion Hazard Data
=====

Flash Point: >100F,>38C

Flash Point Method: PMCC
Lower Explosive Limit: UNKNOWN
Upper Explosive Limit: UNKNOWN
Extinguishing Media: WATER FOG, CARBON DIXOIDE, DRY CHEMICAL, FOAM.
Special Fire Fighting Proc: FIREFIGHTERS SHOULD WEAR FULL PROTECTIVE CLOTHING INCLUDING SELF-CONTAINED BREATHING APPARATUS. USE WATER TO COOL FIRE EXPOSED CONTAINERS. CONTAIN RUNOFF.
Unusual Fire And Expl Hazrds: MATERIAL IS COMBUSTIBLE.

=====
Reactivity Data
=====

Stability: YES
Cond To Avoid (Stability): HEAT, SPRAKS, FLAME, AND BUILD-UP OF STATIC ELECTRICITY. DLA-HMIS: AVOID CONTACT WITH INCOMPATIBLE MATERIALS.
Materials To Avoid: HALOGENS, STRONG ACIDS, ALKALIS AND OXIDIZERS.
Hazardous Decomp Products: CARBON MONOXIDE FROM INCOMPLETE COMBUSTION.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): WILL NOT OCCUR.

=====
Health Hazard Data
=====

LD50-LC50 Mixture: ORAL LD50 (RAT) IS UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: HARMFUL IF IN CONTACT WITH OR ABSORBED THROUGH THE SKIN. CONTACT MAY CAUSE SKIN AND EYE IRRITATION. PROLONGED OR REPEATED EXPOSURE MAY CAUSE LIVER OR BLOOD-FORMING ORGAN DAMAGE, EFFECT THE UNBORN. MAY CAUSE SKIN IRRITATION OR DERMATITIS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: PER MANUFACTURER'S MSDS-ANIMAL STUDIES SHOW DIESEL EXHAUST HAS THE POTENTIAL FOR LUNG CANCER.
RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS.
INGESTION-NONE SPECIFIED BY MANUFACTURER.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES-FLUSH WITH WATER. GET MEDICAL ASSISTANCE. SKIN-DRY WIPE. WASH WITH WATERLESS CLEANER, FOLLOWED BY SOAP & WATER. REMOVE CONTAMINATED CLOTHES & SHOES. INHALED-REMOVE FROM EXPOSURE. IF UNCONSCIOUSNESS OCCURS, SEEK IMMEDIATE MEDICAL ASSISTANCE. IF BREATHING STOPPED, GIVE ARTIFICIAL RESPIRATION. INGESTED-DO NOT INDUCE VOMITING! IF CONSCIOUS, GIVE 1-2 GLASSES OF WATER. GET IMMEDIATE MEDICAL HELP.

=====
Precautions for Safe Handling and Use
=====

Steps If Matl Released/Spill: ABSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF IN ACCORDANCE WITH CURRENT LOCAL, STATE AND FEDERAL REGULATIONS. REPORT SPILLS AS REQUIRED TO PROPER AUTHORITIES. IF AFFECTS WATERWAYS-CALL 800-424-8802.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: PRODUCT IS SUITABLE FOR BURNING AS FUEL VALUE IN COMPLIANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS. EPA/RCRA HAZARDOUS WASTE NUMBER D001 (IGNITABLE) (FLASHPOINT



CITGO Petroleum Corporation
P. O. Box 3758
Tulsa, Oklahoma 74102

Material Safety Data Sheet

Generic Name: CITGO Hydraulic Fluids SUS-2 Date: February 20, 1997
Generic Code: HF-002

THIS GENERIC MSDS REPRESENTS THE FOLLOWING CITGO PRODUCTS:

<u>Trade Name</u>	<u>Commodity Code No.</u>
CITGO Pacemaker 32	33-001
CITGO Pacemaker 19	33-013
CITGO A/W Hydraulic Oil 22	33-410
CITGO A/W Hydraulic Oil 32	33-415
CITGO A/W 32 Dover	33-477
CITGO A/W-D Hydraulic Oil 32	33-481
CITGO Pacemaker T-32	33-715
CITGO A/W All Temperature Hydraulic Oil	33-932

Synonyms: Lubricating Oil Technical Contact: (918) 495-5933
CAS No.: Mixture (Refer to Section 1) Medical Emergency: (918) 495-4700
CITGO Index No.: 1965 CHEMTREC Emergency: (800) 424-9300

MATERIAL HAZARD EVALUATION

(Per OSHA Hazard Communication Standard [29 CFR 1910.1200])

Health Precautions: **WARNING:** Oil injected into the skin from high pressure leaks in hydraulic systems can cause severe injury. Most damage occurs during the first few hours. Seek medical attention immediately. Surgical removal of oil may be necessary. Protect exposed skin from repeated or prolonged exposure.

Safety Precautions: Do not store material in open or unmarked containers.

HMIS Rating¹ Health: 0 Flammability: 1 Reactivity: 0

1.0 GENERIC COMPOSITION / COMPONENTS

Components	CAS No.	%	Hazard Data
Refined Petroleum Oil(s)	Refer to Section 11	> 95	Oral LD ₅₀ (rat): > 5 g/kg Dermal and Eye: Mild-irritant Inhalation LC ₅₀ /4H (rat): > 5,000 mg/M ³ Hazard data are based upon similar components.

¹Hazard Rating: least-0, slight-1, moderate-2, high-3, extreme-4.

CITGO assigned these values based upon an evaluation conducted pursuant to NPCA guidelines. Use of an asterisk (*) indicates that the material may present chronic health effects.

NA-Not Applicable

ND-No Data

NE-Not Established

1.0 GENERIC COMPOSITION / COMPONENTS (continued)

Components	CAS No.	%	Hazard Data	
Anti-oxidant/Anti-wear Agent (may contain Zinc Dialkyldithiophosphate)	Mixture	< 2	Oral: Eye: Dermal: Inhalation:	Potential aspiration hazard. Mild to moderate irritant. Mild to moderate irritant. Potential respiratory tract irritant.
VI Improver	Mixture	0 - 5	Oral LD ₅₀ (rat): Dermal LD ₅₀ (rabbit): Dermal: Eye:	> 5 g/kg > 2 g/kg Mild irritant. May be absorbed through the skin. Potential irritant.

2.0 PHYSICAL DATA

PHYSICAL HAZARD CLASSIFICATION (Per 29 CFR 1910.1200)

Combustible	No	Flammable	No	Pyrophoric	No
Compressed Gas	No	Organic Peroxide	No	Reactivity	No
Explosive	No	Oxidizer	No	Stable	Yes

Boiling Point, 760 mm Hg, °C (°F):	- 278 - 390 (~ 533 - 740)
Specific Gravity (60/60 °F) (H ₂ O = 1):	- 0.86 - 0.88
Vapor Density (Air = 1):	> 1
% Volatiles by Volume:	Negligible
Melting Point, °C (°F):	NA
Vapor Pressure, mm Hg (25°C):	- 2x10 ⁻⁵ to 4x10 ⁻⁴
Solubility in Water:	Negligible
Evaporation Rate (n-butyl acetate = 1):	< 1
pH of Undiluted Product:	NA
Appearance and Odor :	Light amber liquid, mild petroleum odor.

3.0 FIRE AND EXPLOSION DATA

Flash Point, OC, °C (°F)	185 - 236 (365 - 453)
Flash Point, CC, °C (°F)	ND
Autoignition Temperature, °C (°F)	ND
NFPA Rating ²	Health: <u>0</u> Flammability: <u>1</u> Reactivity: <u>0</u>
Flammable Limits (% by volume in air)	Lower: <u>ND</u> Upper: <u>ND</u>
Extinguishing Media	CO ₂ , dry chemical, foam, water fog.
Special Fire Fighting Procedure	None.
Unusual Fire or Explosion Hazard	Water may cause frothing. Material may be ignited by sparks or flames.

²Hazard Rating: least-0; slight-1; moderate-2; high-3; extreme-4.

CITGO assigned these values based upon an evaluation conducted pursuant to NFPA guidelines.

4.0 REACTIVITY DATA

Stability:	Stable.
Conditions Contributing to Instability:	None.
Incompatibility:	This material may react with strong oxidants, acids and caustics.
Hazardous Decomposition Products: (thermal, unless otherwise specified)	CO ₂ , (CO with incomplete combustion), and possible trace oxides of nitrogen phosphorus, sulfur and zinc.
Hazardous Polymerization:	Hazardous polymerization is not expected to occur.

5.0 SPILL, LEAK AND DISPOSAL PROCEDURES

Procedure if Material is Spilled:

- Remove all ignition sources.
- Isolate the area of the spill and restrict access to persons wearing protective clothing.
- Ventilate area of release, as necessary, to disperse vapors and mists.
- **Small Spills:** Absorb released material with non-combustible absorbent. Place into containers for later disposal. (See Waste Disposal section below.)
- **Large Spills:** Evacuate area in the event of significant spills. Evaluate exposure potential. Potential exposure may require the use of respiratory protection. Use protective clothing. Contain spill in temporary dikes to avoid product migration and to assist in recovery. Do not allow material to escape into sewers, ground water, drainage ditches or surface waters.
- Administer appropriate first aid.
- Report releases as required to the appropriate federal, state and local authorities.

Waste Disposal:

- It is the responsibility of the user to determine if the material is a hazardous waste at the time of disposal.
- Determine compliance status with all applicable requirements prior to disposal.
- Contact the RCRA/Superfund Hotline at (800) 424-9346 or your regional US EPA office for guidance concerning case specific disposal issues.

Protective Measures During Repair and Maintenance of Contaminated Equipment:

- Refer to Section 7.0 - Special Protection Information.
- Drain and purge equipment, as necessary, to remove material residues.
- Use gloves constructed of impervious materials such as heavy nitrile rubber and protective work clothing if direct contact is anticipated.
- Eliminate heat and ignition sources.
- Do not allow oil to be injected into the skin from high pressure leaks in hydraulic systems.
- Wash exposed skin thoroughly with soap and water.
- Remove contaminated clothing. Launder before reuse.
- Keep unnecessary persons from hazard area.

6.0 HEALTH HAZARD DATA

Health Hazard Classification (Per 29 CFR 1910.1200):

Highly Toxic	No	Sensitizer	No
Toxic	No	Reproductive Effects	No
Corrosive	No	Mutagen	No
Irritant	No	Target Organ	No

Carcinogen:

Product/Component	CAS No.	Conc. (%)	NTP	IARC	OSHA	Other
CITGO Hydraulic Fluids SUS-2	Mixture	100	No	No	No	No

Toxicity Summary: Generally of a low order of toxicity.

Major Route of Entry: Inhalation of incidental mists or vapors, skin contact with liquid.

Acute Exposure Symptoms:

Inhalation: In enclosed spaces or at elevated temperatures, vapors may reach concentrations sufficient to cause drowsiness, dizziness, headache, nausea, or lung irritation. Elevated mist concentrations above applicable workplace exposure levels may cause lung damage.

Dermal Contact: Mild irritant.

Eye Contact: Mild irritation may result from elevated mist concentrations or direct contact with splashing liquid.

Ingestion: The Saybolt viscosity of the materials represented by this MSDS range from 100 to 199 SUS at 100° F. Accordingly, there is a risk of aspirating this material into the lungs when swallowed. Aspiration may result in severe lung damage. Upon ingestion of large quantities, gastrointestinal discomfort, diarrhea, and headache may occur. Small doses may produce irritation, and diarrhea.

Injection: Injection under the skin, in muscle or into the bloodstream may result in irritation, erythema, edema or severe, permanent tissue damage. Most damage occurs during the first few hours.

Chronic Exposure Symptoms:

Prolonged and/or frequent contact may cause drying, cracking (dermatitis) or folliculitis.

Other Special Effects:

None expected.

Medical Conditions Aggravated by Exposure:

None.

First Aid and Emergency Procedures for Acute Effects:

Inhalation: Move victim to fresh air. If victim is not breathing, immediately begin cardiopulmonary resuscitation (CPR). If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately.

Dermal: Wash exposed skin with soap and water. Remove contaminated clothing. Launder before use. Seek medical attention if irritation or pain persists.

6.0 HEALTH HAZARD DATA (continued)

- Eyes:** Flush eyes with large volumes of water. Seek medical attention if irritation, pain or excessive tearing persists.
- Ingestion:** Do not induce vomiting. If spontaneous vomiting is about to occur, place victim's head below knees. Seek medical attention immediately.
- Injection:** Injection under the skin, in muscle or into the blood stream is a medical emergency. Seek medical attention immediately.

Notes to Physician:

The Saybolt viscosity of the products represented by this MSDS range between 100 to 199 SUS at 100° F. Upon ingestion, there is a risk of aspiration into the lungs. Aspiration may result in chemical pneumonitis. Removal by careful gastric lavage may be considered.

Subcutaneous or intramuscular injection requires prompt surgical debridement.

7.0 SPECIAL PROTECTION INFORMATION

Ventilation Requirements:

Use in well ventilated area. In confined space, mechanical ventilation may be required to keep levels of certain components below applicable workplace exposure levels as evaluated by designated and properly trained personnel.

Applicable Workplace Exposure Levels:

Chemical Component	ACGIH TLV TWA (mg/M ³)	ACGIH TLV STEL/ Ceiling (C) (mg/M ³)	ACGIH TLV Skin notation?	OSHA PEL TWA (mg/ M ³)	OSHA PEL STEL/ Ceiling (C) (mg/M ³)	OSHA PEL Skin notation?
Oil Mist, Mineral	(5)	(10)	No	(5)	NE	No

Specific Personal Protective Equipment:

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations.

- Respirator:** At elevated temperatures, vapor or mist concentrations may exceed applicable workplace exposure levels. Use a NIOSH or MSHA approved organic vapor/mist chemical cartridge respirator when elevated airborne concentrations are anticipated.
- Eyes:** Safety glasses or chemical splash goggles if splashing is anticipated.
- Dermal:** Oil impervious gloves if frequent or prolonged contact is expected.
- Other Clothing or Equipment:** Wear body-covering work clothes to avoid prolonged or repeated exposure. Launder contaminated work clothes before reuse.

8.0 TRANSPORTATION AND SPECIAL PRECAUTIONS

- Storage:** Store below 150° F. Do not apply heat or flame to container. Keep separate from strong oxidizing agents.

8.0 TRANSPORTATION AND SPECIAL PRECAUTIONS (continued)

Caution: Empty containers may contain combustible product residues. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product.

DOT Information:

Proper Shipping Name:	Petroleum Lubricating Oil
Hazard Class:	Non hazardous
Hazard Identification No.:	None Assigned
Packaging Group:	None Assigned
Placard:	None
Compatibility Category:	Group 33
CHRIS Code:	OLB

9.0 ENVIRONMENTAL DATA

Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 313 - Toxic Chemicals:

This product is not known to contain any components in concentrations above *de minimis* levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA.

Section 311/312 - Hazard Categories:

This product may meet one or more of the criteria for the hazard categories defined in 40 CFR Part 370 as established by Sections 311 and 312 of SARA as indicated below:

Immediate (Acute) Health Hazard:	<u>No</u>	Sudden Release of Pressure Hazard:	<u>No</u>
Delayed (Chronic) Health Hazard:	<u>No</u>	Reactive Hazard:	<u>No</u>
Fire Hazard:	<u>No</u>		

Section 302 - Extremely Hazardous Substances:

This product is not known to contain any components in concentrations greater than one percent that are listed as Extremely Hazardous Substances in 40 CFR Part 355 pursuant to the requirements of Section 302(a) of SARA.

Clean Water Act (CWA):

Under the CWA, discharges of crude oil and petroleum products to surface water without proper Federal and State permits must be reported immediately to the National Response Center at (800) 424-8802.

Comprehensive Environmental Response, Compensation & Liability Act (CERCLA) Section 102 Hazardous Substances:

As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance.

California Proposition 65 (The Safe Drinking Water and Toxics Enforcement Act):

This material contains components that are known to the State of California to be:

Carcinogenic:	<u>No</u>	Reproductive Hazard:	<u>No</u>
---------------	-----------	----------------------	-----------

Toxic Substances Control Act (TSCA):

Reported in TSCA Inventory as:	Product	Components
CITGO Hydraulic Fluids SUS-2		X

NA-Not Applicable

ND-No Data

NE-Not Established

10.0 LABELING

WARNING: Oil injected into the skin from high pressure leaks in hydraulic systems can cause severe injury. Most damage occurs during the first few hours. Seek medical attention immediately. Surgical removal of oil may be necessary.

11.0 REFINED PETROLEUM OILS

The products listed on page one of this MSDS contains one or more of the following base oils:

<u>Chemical / Common Name</u>	<u>CAS No.</u>
Solvent Refined Heavy Paraffinic Distillate	64741-88-4
Solvent Refined Light Paraffinic Distillate	64741-89-5
Solvent Dewaxed Heavy Paraffinic Distillate	64742-65-0
Hydrotreated Light Paraffinic Distillate	64742-55-8
Hydrotreated Heavy Paraffinic Distillate	64742-54-7
Hydrotreated Heavy Naphthenic Distillate	64742-52-5
Hydrotreated Neutral Oils	72623-87-1

ALL STATEMENTS, INFORMATION, AND DATA PROVIDED IN THIS MATERIAL SAFETY DATA SHEET ARE BELIEVED TO BE ACCURATE AND RELIABLE, BUT ARE PRESENTED WITHOUT GUARANTEE, REPRESENTATION, WARRANTY, OR RESPONSIBILITY OF ANY KIND, EXPRESSED OR IMPLIED. ANY AND ALL REPRESENTATIONS AND/OR WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE SPECIFICALLY DISCLAIMED. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION OR PRODUCTS FOR THEIR PARTICULAR PURPOSE. NOTHING CONTAINED HEREIN IS INTENDED AS PERMISSION, INDUCEMENT OR RECOMMENDATION TO VIOLATE ANY LAWS OR TO PRACTICE ANY INVENTION COVERED BY EXISTING PATENTS, COPYRIGHTS OR INVENTIONS.

NA-Not Applicable

ND-No Data

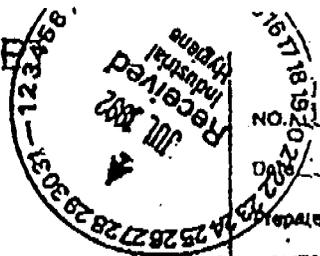
NE-Not Established

CITGO Hydraulic Fluids, SUS-2 (HF-002; February 20, 1997; CIN: 1965)

Page 7 of 7

MATERIAL SAFETY DATA SHEET

MANUFACTURER: MORaine OIL COMPANY
 ADDRESS: 1212 W. Second Street
 Oconomowoc, WI 53066



NO. 3610
 DATE 12-19-85

PHONE:
 EMERGENCY NO. (414) 567-7523 TELEX

SECTION 1 - IDENTIFICATION (GENERAL)

CHEMICAL NAME: NONE
 TRADE NAME: HYDRAULIC OIL, ISO 32AW
 NO SYNONYMS: AW15C, AW300

CHEMICAL FAMILY: HYDROCARBON MIXTURE
 FORMULA: N/A *see ref Ram Pac Hydraulic Oil*

SECTION 2 - INGREDIENTS

INGREDIENT	%	Hazard Data	%	Hazard Data
MINERAL OIL (LIGHT VACUUM DISTILLATE)	98.5	NONE		
ADITIVE PACKAGE CONTAINING ZINC, PHOSPHORUS	1.5	NONE		

MAY 27 1986

SECTION 3 - PHYSICAL & CHEMICAL

Boiling point at 1 atm, deg F	ABOVE 500F	Specific gravity (H ₂ O = 1)	0.9
Vapor pressure at (mm Hg)	NEGLIGIBLE	Evap. Rate (NEGLIGIBLE = 1)	
Vapor density (Air = 1)	ABOVE 5	Volatiles, % by Volume	NONE
Water solubility	NOT SOLUBLE	Molecular weight	VARIES

Appearance & Odor: LIGHT AMBER LIQUID

	LOWER	UPPER
Flash Point and Method		
385F, OPEN CUP		
Autoignition Temp.	NO DATA	
Flammability Limits in Air	NO DATA	NO DATA

Extinguishing media: DRY CHEMICAL, CARBON DIOXIDE, WATER FOG AND FOAM.

Special fire fighting procedures: USE WATER SPRAY TO COOL CONTAINERS EXPOSED TO FLAMES. FIRE FIGHTING PERSONNEL SHOULD WEAR RESPIRATORY PROTECTION.

Unusual fire and explosion hazards: PRODUCT OF COMBUSTION INCLUDE FUMES, SMOKE AND CARBON MONOXIDE.

SECTION 4 - HEALTH HAZARD

Effects of overexposure: TESTS ON SIMILAR MATERIALS SHOW A LOW ORDER OF ACUTE TOXICITY, MAY CAUSE REVERSIBLE EYE AND SKIN IRRITATION. PROLONGED SKIN EXPOSURE MAY CAUSE DERMITITIS OR OIL ACNE.

FIRST AID:
 Eye contact: MAY CAUSE EYE BURNING AND IRRITATION. FLUSH WITH WATER UNTIL IRRITATION SUBSIDES.

Skin contact: WASH WITH SOAP AND WATER. IF IRRITATION OR RASH DEVELOPS, CONSULT A PHYSICIAN.

Inhalation: OSHA PERMISSIBLE EXPOSURE LIMIT (PEL) OF OIL MIST IS 5MG/M³.

Ingestion: DO NOT INDUCE VOMITING, MAY ACT AS A LAXATIVE.

NO. _____

SECTION VI: REACTIVITY DATA

Stability	Stable	<input checked="" type="checkbox"/>	Conditions to avoid:	NONE
	Unstable	<input type="checkbox"/>		

Incompatibility (Materials to Avoid) NONE

Hazardous decomposition products: NONE

Hazardous Polymerization:	May occur	<input type="checkbox"/>	Conditions to avoid:	NONE
	Will not occur	<input checked="" type="checkbox"/>		

SECTION VII: SPECIAL PROCEDURES

SPILLS, LEAKS: (Steps to be taken) CONTAIN SPILL IF POSSIBLE. WIPE UP OR ABSORB ON SUITABLE MATERIAL.

WASTE DISPOSAL METHOD: UNDER RCRA, IT IS THE RESPONSIBILITY OF THE USER OF PRODUCTS TO DETERMINE AT THE TIME OF DISPOSAL, WHETHER PRODUCT MEETS RCRA CRITERIA FOR HAZARDOUS WASTE. THIS IS BECAUSE PHYSICAL TRANSFORMATIONS, MIXTURE, PROCESSES, ETC. MAY RENDER THE RESULTING MATERIAL HAZARDOUS.

SECTION VIII: RESPIRATORY PROTECTION

Respiratory protection (Specify Type) **AVOID BREATHING OIL MIST.**

Ventilation:	Local Exhaust	NORMAL	Special	NONE
	Mechanical (General)	NONE	Other	NONE

Protective gloves: **YES** Eye Protection: **CHEMICAL TYPE, GOGGLES OPTIC**

Other protective equipment and precautions
EXPOSED INDIVIDUALS SHOULD WASH WITH SOAP AND WATER.

SECTION IX: SPECIAL PRECAUTIONS AND RECOMMENDATIONS

Storage & Handling Information MINIMUM FEASIBLE HANDLING TEMPERATURES SHOULD BE MAINTAINED. RECOMMENDED MAX BULK TEMP 160F; MAX HANDLING TEMP 250F; MAX SKIN TEMP 250F. PERIODS OF EXPOSURE TO HIGH TEMPERATURES SHOULD BE MINIMIZED. WATER CONTAMINATION MUST BE AVOIDED.

Other Precautions, WASTE CLASSIFICATION: **PRODUCT HAS BEEN EVALUATED FOR RCRA CHARACTERISTICS AND DOES NOT MEET CRITERIA OF A HAZARDOUS IF DISCARDED IN ITS PURCHASED FORM.**

N.A.

Warranty: As to the suitability of information herein for purchaser's purposes and the accuracy of such information is the purchaser's responsibility. Therefore, although every effort has been taken in the preparation of such information, **Lorraine Oil Co., Inc.** extends no warranties, makes no representations and assumes no responsibility as to accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Signed _____
Title _____

REC'D NOV 13 1988

INDUSTRIAL HYGIENE, TOXICOLOGY, AND MATERIAL SAFETY DATA SHEET



NOTE: NO REPRESENTATION IS MADE AS TO THE ACCURACY OF THE INFORMATION HEREIN. SEE PAGE 7 FOR CONDITIONS UNDER WHICH DATA ARE FURNISHED.

Trade Name and Synonyms	
01691 DIESEL ENGINE OIL 13	
Manufacturer's Name	Emergency Telephone No.
Texaco Inc.	(914) 831-3400 ext. 204
Address	
P.O. Box 509 Beacon, NY 12508	
Chemical Name and/or Family or Description	
Diesel Engine Oil	
THIS PRODUCT IS CLASSIFIED AS: <u> X </u> NOT HAZARDOUS: <u> </u> HAZARDOUS BY DEFINITION NO.(S) <u> </u> ON ATTACHED EXPLANATION SHEETS	
WARNING STATEMENT: WARNING! AVOID SKIN CONTACT WITH USED MOTOR OILS	
OCCUPATIONAL CONTROL PROCEDURES	
Protective Equipment (Type)	
Eyes:	Chemical type goggles or face shield optional.
Skin:	Exposed employes should exercise reasonable personal cleanliness; this includes cleansing exposed skin areas several times daily with soap and water, and laundering or dry cleaning soiled work clothing at least weekly.
Inhalation:	None required if exposures are within permissible concentrations; see below.
Ventilation:	Adequate to meet permissible concentrations.
Permissible Concentrations:	
Air:	5 mg/cubic meter of air for mineral oil mist averaged over an 8 hour daily exposure (ACGIH 1984-85).
EMERGENCY AND FIRST AID PROCEDURES	
First Aid	
Eyes:	As with most foreign materials, should eye contact occur, flush eyes with plenty of water.
Skin:	None considered necessary.
Ingestion:	None considered necessary.
Inhalation:	None considered necessary.
Other Instructions:	None.

N.D. - Not Determined N.A. - Not Applicable
< - Less Than > - Greater Than



PHYSIOLOGICAL EFFECTS:

Code No. 0169

Effects of Exposure

Acute:

Eyes: Believed to be minimally irritating.

Skin: Believed to be minimally irritating.

Respiratory System: Believed to be minimally irritating if not in excess of permissible concentrations; see page 1.

Chronic: N.D.

Other: -

Sensitization Properties:

Skin: Yes No Unknown

Respiratory: Yes No Unknown

Median Lethal Dose (LD₅₀ LC₅₀) (Species)

Oral Believed to be > 5 g/kg (rat); practically non-toxic

Inhalation N.D.

Dermal Believed to be > 3 g/kg (rabbit); practically non-toxic

Other N. D.

Irritation Index, Estimation of Irritation (Species)

Skin Believed to be < 0.5/8.0 (rabbit); no appreciable effect

Eyes Believed to be < 15/110 (rabbit); no appreciable effect

Symptoms of Exposure None expected other than possible minimal irritation

FIRE PROTECTION INFORMATION

Ignition Temp. °F. N.D.

Flash Point °F. (Method) 490° F COC

Flammable Limits (%) Lower N.D.

Upper N.D.

Products Evolved When Subjected to Heat or Combustion:

Carbon monoxide and carbon dioxide may be formed on burning in limited air supply.

Recommended Fire Extinguishing Agents And Special Procedures:

According to the National Fire Protection Association Guide, use water spray, dry chemical, foam, or carbon dioxide.

Water or foam may cause frothing. Use water to cool fire-exposed containers. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for persons attempting to stop the leak.

Unusual or Explosive Hazards:

None.

N.D. - Not Determined

N.A. - Not Applicable

< - Less Than

> - Greater Than

**ENVIRONMENTAL PROTECTION**

Code No. 01691

Waste Disposal Method:

Under RCRA, it is the responsibility of the user of products to determine, at the time of disposal, whether product meets RCRA criteria for hazardous waste. This is because product uses, transformations, mixture, processes, etc. may render the resulting material hazardous. (See Remarks for Waste Classification.)

Procedures in Case of Breakage or Leakage:

(Transportation Spills Call CHEMTREC (800) 424-9300)
Contain spill if possible. Wipe up or absorb on suitable material and shovel up.

Remarks:

Waste Classification: Product has been evaluated for RCRA characteristics and does not meet criteria of a hazardous waste if discarded in its purchased form.

PRECAUTIONS

WARNING! AVOID SKIN CONTACT WITH USED MOTOR OILS

Used gasoline motor oils have caused skin cancer in laboratory animals when repeatedly applied and left in place between applications.
In case of skin contact, promptly wash thoroughly with soap and water.
Oil-soiled clothing should be cleaned before reuse.

Requirements for Transportation, Handling and Storage:

Minimum feasible handling temperatures should be maintained. Periods of exposure to high temperatures should be minimized. Water contamination should be avoided.

DOT Proper Shipping Name: N.A.

DOT Hazard Class (if applicable): N.A.

CHEMICAL AND PHYSICAL PROPERTIESBoiling Point (°F) High Vapor Pressure Low (mmHg)Specific Gravity 0.9129 (H₂O=1) Vapor Density N.D. (Air=1)Appearance and Odor Dark pale liquidpH of undiluted product N.A.Solubility NegligPercent Volatile by Volume NilEvaporation N.D. ()=1Viscosity 198.3 cSt @ 40°COther -Hazardous Polymerizations Occur Do not occur

The Material Reacts Violently With: (If others is checked below, see additional comments on page 6 for further details)

Air	Water	Heat	Strong Oxidizers	Others	None of These
			<input checked="" type="checkbox"/>		

N.D. - Not Determined

N.A. - Not Applicable

< - Less Than

> - Greater Than

**COMPOSITION**

Code

01691

Chemical/Common Name	CAS No.	Exposure Limit	Range
•Adv. Pkg. containing calcium phenolate, alkenyl succinimide			11.00 - 19.90
Solvent-dewaxed heavy paraffinic petroleum distillates	64742650	5.0 mg/m3 TWA	35.00 - 49.90
Severely solvent-refined hydrotreated heavy naphthenic petroleum distillates	64742525	5.0 mg/m3 TWA- ACGIH	35.00 - 49.90

•Hazardous according to OSHA (1910.1200) or one or more state Right-To-Know lists.



PRODUCT SHIPPING LABEL

01691

01691 DIESEL ENGINE OIL 13

WARNING! AVOID SKIN CONTACT WITH USED MOTOR OILS

Used gasoline motor oils have caused skin cancer in laboratory animals when repeatedly applied and left in place between applications.

In case of skin contact, promptly wash thoroughly with soap and water.

Oil-soiled clothing should be cleaned before reuse.

Chemical/Common Name	CAS No.	Range in %
•Adtv. Pkg. containing calcium phenolate, alkenyl succinimide		11.00 - 19.99
Solvent-dewaxed heavy paraffinic petroleum distillates	64742650	35.00 - 49.99
Severely solvent-refined hydrotreated heavy naphthenic petroleum distillates	64742525	35.00 - 49.99

•Hazardous according to OSHA (1910.1200) or one or more state Right-To-Know lists.

HMIS

Health : 0 Reactivity : 0
 Flammability: 1 Special : -

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame or heat. Keep container closed and drum bungs in place.

HEALTH EMERGENCY TELEPHONE: (914) 831-3400 (EXT. 204)

Texaco Inc.
 2000 Westchester Avenue
 White Plains, New York 10650

For Additional Information Concerning:

Fuels/Lubricants/Antifreezes
call (914) 831-3400 (EXT.204)

Chemicals/Additives
call (409) 722-8381

Transportation Spills
call CHEMTREC (800) 424-9300



ADDITIONAL COMMENTS

Code No. 01691

TEXACO INTENDS TO COMPLY FULLY WITH PROVISIONS OF THE TOXIC SUBSTANCES CONTROL ACT STATE OF MICHIGAN CRITICAL MATERIALS ACT (REVISED 1985)

To determine applicability or effect of any law or regulation with respect to the product, users should consult his legal advisor or the appropriate government agency. Texaco does not undertake to furnish advice on such matters.

By R. T. Richards Title Mgr. Env. Conservation & Toxicology
Date 01-10-86 New Revised, Supersedes 11-06-85

N.D. - Not Determined N.A. - Not Applicable
< - Less Than > - Greater Than

SCOTT SPECIALTY GASES -- NITROGEN DIOXIDE
MATERIAL SAFETY DATA SHEET
NSN: 683000N053046
Manufacturer's CAGE: 51847
Part No. Indicator: A
Part Number/Trade Name: NITROGEN DIOXIDE

=====
General Information
=====

Company's Name: SCOTT SPECIALTY GASES
Company's Street: ROUTE 611 NORTH
Company's City: PLUMSTEADVILLE
Company's State: PA
Company's Country: US
Company's Zip Code: 18949
Company's Emerg Ph #: 215-766-8861
Company's Info Ph #: 215-766-8861
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 05JUL89
Safety Data Review Date: 12SEP94
MSDS Serial Number: BVQMP
Hazard Characteristic Code: NK

=====
Ingredients/Identity Information
=====

Proprietary: NO
Ingredient: NITROGEN DIOXIDE (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: QW9800000
OSHA PEL: 10102-44-0
ACGIH TLV: 5 PPM
ACGIH TLV: 3 PPM;5 STEL

Proprietary: NO
Ingredient: HNDLG/STOR: SUITABLE HAND TRUCK TO MOVE CYLINDERS.
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: OTHER PREC: BY OWNER OR WITH HIS WRITTEN CONSENT IS A
VIOLATION OF FEDERAL LAW (49 CFR).
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: EYES: GOGGLES AND FACESHIELD (FP N).
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: DISP METH: TO DRAIN W/MUCH WATER TO MEET DILUTION REQUIREMENTS
FOR NANO*3 DISCHARGE.
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FIRST AID PROC: CALL MD IMMEDIATELY (FP N).

Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: VAP PRESS: 1 ATM @ 21C.
Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: YELLOW LIQUID, COLORLESS SOLID, RED-BROWN GAS,
PUNGENT ODOR.
Boiling Point: 70.0F, 21.1C
Vapor Pressure (MM Hg/70 F): SEE ING 7
Vapor Density (Air=1): 1.58
Specific Gravity: SUPP DATA
Evaporation Rate And Ref: N/A
Solubility In Water: DECOMP(SUPP DATA)
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: DOES NOT BURN. USE WHAT IS APPROPRIATE FOR
SURROUNDING FIRE.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT
EQUIP(FP N). USE WATER SPRAY TO KEEP FIRE EXPOS CYLINDERS COOL. NO*2 IS A
STRONG OXIDIZING AGENT WHICH MAY (SUPP DATA)
Usual Fire And Expl Hazrds: DANGEROUS WHEN HEATED TO DECOMPOSITION. WILL
REACT WITH WATER AND STEAM TO PRODUCE HEAT & CORROSIVE FUMES. CAN REACT
VIOLENTLY WITH REDUCING MATERIALS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): STABLE UNDER NORMAL CONDITIONS.
Materials To Avoid: HYDROCARBONS, ORGANIC DUSTS, CYCLOHEXANE, FLUORINE,
FORMALDEHYDE & ALCOHOLS, CARBON DISULFIDE, NITROBENZENE(SUPP DATA)
Hazardous Decomp Products: WHEN HEATED TO DECOMPOSITION OR REACTED WITH
WATER IT MAY EMIT TOXIC FUMES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE: INHAL: WILL CAUSE CONJECTION OF
THROAT & BRONCHI & EDEMA OF LUNGS. ARTERIAL DILATION, FALLEN BLOOD PRESS,
HEADACHE, DIZZ & POSS FORMATION OF METHEMOGLOBIN, IRRIT OF NOSE & THROAT,
COUGHING, BURNING IN THROAT & CHEST. NO GASES MAY CAUSE IRRIT TO EYE &
MUCOUS MEMBRANE. NITROGEN TETROXIDE IS A (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ: CORROSIVE LIQUID & MAY SEVERELY BURN
BODY TISSUES. NO*2 MAY PRODUCE MALAISE, DYSPNEA & NAUSEA. CHRONIC: @5- 50
PPM CAN CAUSE A SLOWLY EVOLVING PULMONARY EDEMA W/RESPIRATORY TRACT
IRRITATION, COUGH, HEADACHE, WEAKNESS & CORROSION OF TEETH.
Med Cond Aggravated By Exp: NONE.

Emergency/First Aid Proc: INHAL: GIVE VICTIM 100% O₂ IF BRTHG HAS NOT STOPPED, 100% OXYGEN W/ARTF RESP, MANUAL/OTHERWISE, IF BRTHG HAS STOPPED. ANYONE EXPOS TO NITROGEN TETROXIDE SHOULD NOT BE MOVED UNTIL PERMITTED TO DO SO BY ATTENDING MD. SKIN: IMMED FLUSH W/COPIOUS AMTS OF WATER FOR AT LEAST 15 MINS WHILE REMOVING CONTAMD CLTHG. EYES: FLUSH W/POTABLE AMTS OF WATER FOR AT LEAST 15 MINS. CALL MD(FP N). INGEST: (ING 6)

=====
Precautions for Safe Handling and Use
=====

Steps If Matl Released/Spill: EVAC & VENT AREA. REMOVE LEAKING CYLINDER TO CHEM FUME HOOD/OUTSIDE AREA SUCH THAT VAPS ARE BLOWING AWAY FROM ANY OCCUPIED BUILDINGS. CONT GAS SUPPLIER FOR FURTHER STEPS. RED-BROWN COLOR OF NO₂ WILL IDENTIFY LGE LEAKS. COVER LIQ SPILLS W/(SUPP DATA)

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: RETURN CYLINDERS TO SUPPLIER FOR PROPER DISP W/ANY VALVE OUTLET PLUGS/CAPS SECURED & VALVE PROT CAP IN PLACE. WHEN POSS, NO₂ CAN BE NEUTRAL W/AN EXCESS 5-10% AQUEOUS SODIUM HYDROXIDE. DILUTE NEUTRAL, LOW NITRITE WASTE W/MUCH WATER & FLUSH (ING 5)

Precautions-Handling/Storing: STORE IN WELL VENT AREAS ONLY. KEEP VALVE PROT CAP ON CYLINDERS WHEN NOT IN USE & SECURE CYLINDER WHEN USING TO PROT FROM FALLING. USE (ING 2)

Other Precautions: PROT CNTNRS FROM PHYSICAL DMG. DO NOT DEFACE CYLINDERS/ LABELS. MOVE CYLINDER W/ADEQ HAND TRUCK. CYLINDERS SHOULD BE REFILLED BY QUALIFIED PRODUCERS OF COMPRESSED GASES. SHIPMENT OF COMPRESSED GAS CYLINDER WHICH HAS NOT BEEN FILLED (ING 3)

=====
Control Measures
=====

Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATORY APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).

Ventilation: PROVIDE ADEQUATE GENERAL AND LOCAL EXHAUST VENTILATION.

Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPRVD CHEMICAL WORKERS (ING 4)

Other Protective Equipment: WEAR SAFETY GOGGLES, RUBBER GLOVES & SAFETY SHOES. A SAFETY SHOWER & EYEWASH STATION SHOULD BE READILY AVAILABLE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: SOLUB IN H₂O: IN WATER TO FORM NITRIC ACID IN NITROUS ACIDS. SPEC GRAV: 1.45 @ 20C(H₂O=1). FIRE FIGHT: CAUSE FIRE ON CONTACT W/FLAMM/COMBUSTS. MATLS TO AVOID: PETROLEUM, TOLUENE & INCOMPLETELY HALOGENATED HYDROCARBONS. SPILL PROC: EXCESS NAHCO₃; MIX; SPRAY W/H₂O FROM ATOMIZER, FLUSH TO HOLDING TANK FOR DISP.

=====
Transportation Data
=====

=====
Disposal Data
=====

=====
Label Data
=====

Label Required: YES

Technical Review Date: 12SEP94

Label Date: 12SEP94

Label Status: G

Common Name: NITROGEN DIOXIDE

Chronic Hazard: YES

Signal Word: DANGER!

Acute Health Hazard-Severe: X

Contact Hazard-Severe: X

Fire Hazard-None: X

Reactivity Hazard-None: X

Special Hazard Precautions: CORROSIVE. ACUTE: INHAL: WILL CAUSE CONJECTION OF THROAT & BRONCHI & EDEMA OF LUNGS. ARTERIAL DILATION, FALLEN BLOOD PRESS, HEADACHE, DIZZ & POSS FORMATION OF METHEMOGLOBIN, IRRIT OF NOSE & THROAT, COUGHING, BURNING IN THROAT & CHEST. NO GASES MAY CAUSE IRRIT TO EYE & MUCOUS MEMBRANE. NITROGEN TETROXIDE IS A CORROSIVE LIQUID AND MAY SEVERELY BURN BODY TISSUES. NITROGEN DIOXIDE MAY PRODUCT MALAISE, DYSPEMA AND NAUSEA. CHRONIC: AT 5-50 PPM CAN CAUSE A SLOWLY EVOLVING PULMONARY EDEMA WITH RESPIRATORY TRACT IRRITATION, COUGH, HEADACHE, WEAKNESS &

CORROSION OF TEETH.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: SCOTT SPECIALTY GASES

Label Street: ROUTE 611 NORTH

Label City: PLUMSTEADVILLE

Label State: PA

Label Zip Code: 18949

Label Country: US

Label Emergency Number: 215-766-8861

=====
URL for this msds <http://siri.org>. If you wish to change, add to, or delete information in this archive please sent updates to dan@siri.org.

LIQUID AIR -- NITRIC OXIDE
MATERIAL SAFETY DATA SHEET

FSC: 6810

UN: 00F002677

Manufacturer's CAGE: 18260

Part No. Indicator: A

Part Number/Trade Name: NITRIC OXIDE

=====
General Information
=====

Company's Name: LIQUID AIR CORPORATION

Company's Emerg Ph #: (800) 231-1366

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Date MSDS Prepared: 01JAN87

Safety Data Review Date: 28FEB86

MSDS Serial Number: BBLMD
=====

=====
Ingredients/Identity Information
=====

Proprietary: YES

Ingredient: PROPRIETARY

Ingredient Sequence Number: 01
=====

=====
Physical/Chemical Characteristics
=====

Appearance And Odor: COLORLESS GAS/BLUISH LIQ/SOLID/ACID-SUFFOCATING

Boiling Point: -241.2F

Vapor Density (Air=1): .077

Specific Gravity: 1.04

Solubility In Water: .047
=====

=====
Fire and Explosion Hazard Data
=====

Flash Point: N/A

Lower Explosive Limit: N/A

Upper Explosive Limit: N/A

Extinguishing Media: NONFLAMMABLE

Special Fire Fighting Proc: N/A

Unusual Fire And Expl Hazrds: NITRIC OXIDE IS NONFLAMMABLE BUT IT WILL SUPPORT COMBUSTION.
=====

=====
Reactivity Data
=====

Stability: YES

Cond To Avoid (Stability): MOISTURE AND OXYGEN

Materials To Avoid: OXIDIZING AGENTS/HALIDES/HYDROCARBONS/OXYGEN

Hazardous Decomp Products: NITROGEN DIOXIDE/NITROUS ACIDS

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NONE
=====

=====
Health Hazard Data
=====

Signs/Symptoms Of Overexp: INHALATION: IRRITATION OF THE EYES/THROAT/
TIGHTNESS OF CHEST/HEADACHE/NAUSEA/LOSS OF STRENGTH.

Emergency/First Aid Proc: INHALATION: UNCONSCIOUS PERSONS SHOULD BE MOVED
TO AN UNCONTAMINATED AREA/BREATH FRESH AIR/GIVEN OXYGEN. KEEP WARM/ QUIET.
=====

=====
Precautions for Safe Handling and Use
=====

Steps If Matl Released/Spill: EVACUATE ALL PERSONNEL FROM AFFECTED AREA.

USE APPROPRIATE PROTECTIVE EQUIPMENT. IF AK IS IN USER'S EQUIPMENT, BE
CAUTIOUS TO PURGE PIPING WITH AN INERT GAS IOR TO ATTEMPTING REPAIRS.

Waste Disposal Method: DON'T ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED
QUANTITIES. RETURN IN THE SHIPPING CONTAINER PROPERLY LABELED, WITH ANY
VALVE OUTLET PLUGS OR CAPS SECURED AND VALVED PROTECTION CAP IN PLACE TO
LIQUID AIR CORPORATION FOR PROPER DISPOSAL.

Precautions-Handling/Storing: PROTECT CYLINDERS FROM PHYSICAL DAMAGE.

STORE IN COOL, DRY, WELL-VENTILATED AREA AWAY FROM HEAVY TRAFFICKED AREAS.
DON'T STORE ABOVE 130F.

Other Precautions: USE ONLY IN WELL-VENTILATED AREAS. VALVE PROTECTION
CAPS AND VALVE OUTLET THREADED PLUGS MUST REMAIN IN PLACE UNLESS CONTAINER
IS SECURED WITH VALVE OUTLET PIPED TO USE POINT.

=====
Control Measures
=====

Respiratory Protection: POSITIVE PRESSURE AIR LINE WITH MASK, SCBA FOR
EMERGENCY USE.

Ventilation: HOOD WITH FORCED VENTILATION

Protective Gloves: RUBBER OR TEFLO

Eye Protection: GOGGLES/GLASSES/FACESHIELD

Other Protective Equipment: SAFETY SHOES/SHOWER/EYEWASH.

Suppl. Safety & Health Data: ONE CALIFORNIA PLAZA, SUITE 350/2121 N.

CALIFORNIA BLVD/WALNUT CREEK, CALIFORNIA 94596. MOLECULAR WEIGHT: 30.0
=====

Transportation Data
=====

Disposal Data
=====

Disposal Data Review Date: 88292

Rec # For This Disp Entry: 01

Tot Disp Entries Per NSN: 001

Landfill Ban Item: YES

Disposal Supplemental Data: ONE CALIFORNIA PLAZA, SUITE 350/2121 N.

CALIFORNIA BLVD/WALNUT CREEK, CALIFORNIA 94596. MOLECULAR WEIGHT: 30.0 IN
CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE
FOR PRECAUTIONS.

1st EPA Haz Wst Code New: P076

1st EPA Haz Wst Name New: NITRIC OXIDE; NITROGEN(II) OXIDE

1st EPA Haz Wst Char New: ACUTELY TOXIC (H)

1st EPA Acute Hazard New: YES
=====

Label Data
=====

Label Required: YES

Label Status: G

Common Name: NITRIC OXIDE

Special Hazard Precautions: INHALATION: IRRITATION OF THE
EYES/THROAT/TIGHTNESS OF CHEST/HEADACHE/NAUSEA/LOSS OF STRENGTH.

Label Name: LIQUID AIR CORPORATION

Label Emergency Number: (800) 231-1366
=====

URL for this msds <http://hazard.com>. If you wish to change, add to, or
delete information in this archive please send updates to dan@hazard.com.

STAUFFER CHEMICAL -- SULFUR DIOXIDE (SULFUROUS ACID ANHYDRIDE) - SULFUROUS ACID, ACS
MATERIAL SAFETY DATA SHEET

FSC: 6810

UN: 003006128

Manufacturer's CAGE: OGAK8

Part No. Indicator: A

Part Number/Trade Name: SULFUR DIOXIDE (SULFUROUS ACID ANHYDRIDE)

=====
General Information
=====

Item Name: SULFUROUS ACID, ACS
Company's Name: STAUFFER CHEMICAL CO
Company's Street: ONE CORPORATE DR
Company's City: SHELTON
Company's State: CT
Company's Country: US
Company's Zip Code: 06484
Company's Emerg Ph #: 203-226-6602;800-424-9300 (CHEMTREC)
Company's Info Ph #: 203-226-6602
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Status: SMJ
Date MSDS Prepared: 01JUN89
Safety Data Review Date: 07OCT92
MSDS Serial Number: BQGMS
Hazard Characteristic Code: NK

=====
Ingredients/Identity Information
=====

Proprietary: NO
Ingredient: SULFUR DIOXIDE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: WS4550000
OSHA PEL: 5 PPM/5 STEL
ACGIH TLV: 2 PPM/5 STEL; 9293

Proprietary: NO
Ingredient: SUPP DATA:ATTEMPT TO NEUT W/CHEM AGENTS. OBTAIN MD ASAP. OIL/
OINTMENTS SHOULD NOT BE USED. CONTINUE FLUSHING FOR (ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 2:AN ADDNL 15 MINS IF MD IS NOT IMMED AVAIL. INHAL:REMOVE
FROM CONTAMD ATM. IF BRTHG HAS CEASED, CLEAR (ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 3:VICTIM'S AIRWAY & START MOUTH-TO-MOUTH ARTF RESP, WHICH
MAY BE SUPPLEMENTED BY USE OF A NIOSH/MSHA APPRVD (ING 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 4:BAG-MASK RESPIRATOR OR A MANUALLY TRIGGERED, O*2 SUPPLY
CAPABLE OF DELIVERING ONE LITER/SECOND OR MORE. IF (ING 6)
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 5:VICTIM IS BRTHG, O*2 MAY BE DELIVERED FROM A DEMAND-TYPE OR CONTINUOUS-FLOW INHALATOR, PREF W/A MD'S ADVICE.

Ingredient Sequence Number: 06

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: SPILL PROC:EQUIP. PROT CLTHG SHOULD BE WORN TO PVNT SKIN/EYE CONT. OCCASNLY CONTRS MAY DEVELOP LEAKS. IN SUCH (ING 8)

Ingredient Sequence Number: 07

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 7:CASES, IMMED STEPS SHOULD BE TAKEN TO OVERCOME TROUBLE AS SULFUR DIOXIDE LEAKS BECOME PROGRESSIVELY WORSE (ING 9)

Ingredient Sequence Number: 08

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 8:IF NOT CORRECTED PROMPTLY. SMALL LEAKS MAY BE LOCATED BY SPRAYING POTNTL LEAK AREAS W/AMMONIA HYDROXIDE (ING 10)

Ingredient Sequence Number: 09

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 9:SOLN. A DENSE WHITE FUME WILL FORM IF SULFUR DIOXIDE IS PRESENT. NEVER APPLY WATER TO A SULFUR DIOXIDE (ING 11)

Ingredient Sequence Number: 10

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 10:LEAK. THE APPLICATN OF WATER MAKES SULFUR DIOXIDE MUCH MORE CORR. IF A LEAK DEVELOPS IN A CONTR W/IN A (ING 12)

Ingredient Sequence Number: 11

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 11:CONGESTED AREA, EVERY EFFORT SHOULD BE MADE TO TRANSFER LEAKING CONTR TO A PLACE WHERE FEWER PEOPLE WILL (ING 13)

Ingredient Sequence Number: 12

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 12:BE EXPOSED. A LEAKING SULFUR DIOXIDE CONTR SHOULD BE SO SHIFTED THAT GASEOUS RATHER THAN LIQ SULFUR (ING 14)

Ingredient Sequence Number: 13

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Other Recommended Limit: NONE SPECIFIED

Proprietary: NO

Ingredient: ING 13:DIOXIDE WILL ESCAPE. SMALL LIQUIFIED SULFUR DIOXIDE SPILL/LEAK CAN BE HNDLD ROUTINELY BY PASSING SULFUR (ING 15)

Ingredient Sequence Number: 14
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 14:DIOXIDE THRU AN ALKALINE NEUT SOLN. ONE LB OF SULFUR
DIOXIDE IS EQUIV TO ABOVE 2 LBS OF LIME OR 1-1/2 OF (ING 16)
Ingredient Sequence Number: 15
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 15:CAUSTIC SODA. FLUSH SMALL SPILLS W/COPIOUS AMTS OF
WATER & NEUT W/ALKALI. LGE SPILLS SHOULD BE HNDLD (ING 17)
Ingredient Sequence Number: 16
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: ING 16:ACCORDING TO A PREDETERMINED PLAN. FOR ASSIST IN
DEVELOPING A PLAN, CONT THE TECHNICAL SERVICE DEPT, (ING 18)
Ingredient Sequence Number: 17
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 17:BASIC PRODUCTS GROUP, STAUFFER CHEMICAL COMPANY.
Ingredient Sequence Number: 18
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: HYGIENE PRACT:PROHIBITED IN AREAS WHERE THERE IS A POTNTL FOR
SIGNIFICANT EXPOS TO THIS MATL. BEFORE EATING, (ING 20)
Ingredient Sequence Number: 19
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 19:HANDS & FACE SHOULD BE THOROUGHLY WASHED.
Ingredient Sequence Number: 20
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

=====
Physical/Chemical Characteristics
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Appearance And Odor: COLORLESS, COMPRESSED LIQUIFIED GAS; PUNGENT ODOR.
Boiling Point: 14F, -10C
Melting Point: 168F, 76C
Vapor Pressure (MM Hg/70 F): SUPP DATA
Vapor Density (Air=1): 2.26
Specific Gravity: 1.36 @ 25C
Solubility In Water: 11G/100G H*2O @ 20C
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=====
Fire and Explosion Hazard Data
=====

Flash Point: NON-FLAMMABLE
Extinguishing Media: USE WATER SPRAY OR FOG, DRY CHEMICAL, FOAM, CARBON
DIOXIDE OR OTHER SUITABLE SUFFOCATION AGENTS.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP
(FP N). KEEP CONTRS COOL W/A WATER SPRAY TO PVNT RELIEF VALVE FROM POPPING,
=====

THEREBY RELSG SULFUR DIOXIDE GAS.

Unusual Fire And Expl Hazrds: POSS RELS OF SULFUR DIOXIDE GAS. AS IN ANY FIRE, PVNT HUMAN EXPOS FOR FIRE, SMOKE, FUMES OR PRODS OF COMBUST. EVACUATE NONESSENTIAL PERS FROM THE FIRE AREA.

=====
Reactivity Data
=====

Stability: YES

Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.

Materials To Avoid: REACTS VIOLENTY W/ALKALIES & ACTS AS AN ACID IN THE PRESENCE OF CHLORATES. IT REACTS TO FORM UNSTABLE CHLORINE DIOXIDE.

Hazardous Decomp Products: NONE SPECIFIED BY MANUFACTURER.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT.
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=====
Health Hazard Data
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LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: INGEST:INGEST OF LIQ SULFUR DIOXIDE WILL RSLT IN BURNS OF MOUTH & GI TRACT DUE TO FREEZING EFT OF LIQ. SKIN:CONT OF SULFUR DIOXIDE WILL RSLT IN BURNS. EYE:CONT OF SULFUR DIOXIDE WILL RSLT IN BURNS. SULFUR DIOXIDE GAS IS INTENSELY IRRITATING. INHAL:INHAL OF SULFUR DIOXIDE GAS WILL RSLT IN IRRIT OF (EFTS OF OVEREXP)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT.

Signs/Symptoms Of Overexp: HLTH HAZ:EYES, THROAT & UPPER RESP SYS. INHAL EXPOS TO CONC OF 8-12 PPM SULFUR DIOXIDE GAS CAUSES THROAT IRRIT, COUGHING, CONSTRICTION OF CHEST, TEARING & IRRIT OF EYES. INHAL EXPOS TO CONC OF 150 PPM SULFUR DIOXIDE GAS IS SO IRRITATING IT CAN BE ENDURED ONLY A FEW MINS. INHAL EXPOS TO CONC OF 500 PPM SULFUR (SUP DAT)

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: INGEST:DO NOT INDUCE VOM. IMMED GIVE LGE QTYS OF WATER. IF VOM DOES OCCUR, GIVE FLUIDS AGAIN. NEVER GIVE ANYTHING BY MOUTH TO AN UNCON PERS. CALL MD OR POIS CTL CTR IMMED. SKIN:IMMED REMOVE CONTAMD CLTHG WIPING AWAY EXCESS MATL. UNDER SFTY SHOWER, FLUSH ALL AFFECTED AREAS W/LGE AMTS OF WATER FOR AT LEAST 15 MINS. DO NOT ATTEMPT TO NEUT W/CHEM AGENTS. OBTAIN MD IMMED. EYE:IMMED FLUSH (SUPP DATA)
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Precautions for Safe Handling and Use
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Steps If Matl Released/Spill: MAKE SURE ALL PERS INVOLVED IN SPILL CLEANUP ARE AWARE OF HAZ ASSOC W/SULFUR DIOXIDE & FOLLOW GOOD INDUS HYGIENE PRACT. ONLY TRAINED PERS EQUIPPED W/NIOSH/MSHA APPRVD GAS MASKS &/OR SCBA SHOULD ATTEMPT REPAIRS ON LEAKING SULFUR DIOXIDE (ING 7)

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: FOR ASSISTANCE IN DISPOSING OF UNUSED MATERIAL, CONTACT THE TECHNICAL SERVICE DEPARTMENT, BASIC PRODUCTS GROUP, STAUFFER CHEMICAL COMPANY. DISPOSAL MUST BE IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS (FP N).

Precautions-Handling/Storing: SULFUR DIOXIDE SHOULD BE STORED IN PROPERLY DESIGNED PRESS VESSELS. BULK QTYS MAY BE STORED IN OUTDOOR STOR TANKS EQUIPPED PROPERLY FOR THIS SERVICE.

Other Precautions: NONE SPECIFIED BY MANUFACTURER.
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Control Measures
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Respiratory Protection: WHERE ADEQ VENT IS NOT AVAIL & THERE IS A POSSIBILITY OF GAS OR LIQUID RELS, CONTROL OF LOW-LEVEL INHAL EXPOS CAN BE ACHIEVED THRU USE OF A NIOSH/MSHA APPROVED FULL-FACE PIECE, ACID-GAS CARTRIDGE, AIR-PURIFYING RESPIRATOR.

Ventilation: THIS MATERIAL SHOULD ONLY BE HANDLED IN WELL-VENTILATED OR OPEN AREAS.

Protective Gloves: IMPERVIOUS GLOVES.

Eye Protection: CHEM WORK GOGGS/FULL LENGTH FSHLD (FP N)

Other Protective Equipment: SKIN CONTACT SHOULD BE PREVENTED THRU USE OF IMPERVIOUS CLOTHING & FOOTWEAR.

Work Hygienic Practices: ALL FOOD SHOULD BE KEPT IN A SEPARATE AREA AWAY FROM WORKING LOCATION. EATING/DRINKING/SMKNG SHOULD BE (ING 19)

Suppl. Safety & Health Data: VP:22.4 PSIA @ 32F; 49.1 PSIA @ 70F; 84.1 PSIA @ 100F. EFTS OF OVEREXP:DIOXIDE GAS IS SO INTENSELY IRRITATING THAT IT CAUSES A SENSE OF SUFFOCATION. FIRST AID PROC:W/LGE QTYS OF RUNNING WATER FOR AT LEAST 15 MINS. HOLD EYELIDS APART DURING FLUSHING TO ENSURE RINSING OF ENTIRE SURF OF EYE & LIDS W/WATER. DO NOT (ING 2)

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Transportation Data
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Trans Data Review Date: 93105
DOT PSN Code: NSY
DOT Proper Shipping Name: SULFUR DIOXIDE, LIQUEFIED
DOT Class: 2.3
DOT ID Number: UN1079
DOT Label: POISON GAS, CORROSIVE *
IMO PSN Code: OET
IMO Proper Shipping Name: SULPHUR DIOXIDE, LIQUEFIED
IMO Regulations Page Number: 2179
IMO UN Number: 1079
IMO UN Class: 2(2.3)
IMO Subsidiary Risk Label: CORROSIVE *
IATA PSN Code: XID
IATA UN ID Number: 1079
IATA Proper Shipping Name: SULPHUR DIOXIDE, LIQUEFIED
IATA UN Class: 2.3
IATA Subsidiary Risk Class: 8 *
IATA Label: TOXIC GAS & CORROSIVE *
AFI PSN Code: XID
AFI Symbols: 0
AFI Prop. Shipping Name: SULPHUR DIOXIDE LIQUEFIED
AFI Class: 2.3
AFI ID Number: UN1079
AFI Label: POISON GAS
AFI Special Prov: 3
AFI Basic Pac Ref: 6-8

=====
Disposal Data
=====

=====
Label Data
=====

Label Required: YES
Technical Review Date: 21SEP92
Label Status: G
Common Name: SULFUR DIOXIDE (SULFUROUS ACID ANHYDRIDE)
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: SWALLOWING OF LIQUID SULFUR DIOXIDE WILL RESULT IN BURNS OF THE MOUTH AND GASTROINTESTINAL TRACT. INHALATION CAN IRRIATE THE EYES, THROAT AND UPPER RESPIRATORY SYSTEM. CONTACT WITH SKIN AND EYES WILL RESULT IN BURNS. CHRONIC: NONE LISTED BY MFR.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: STAUFFER CHEMICAL CO
Label Street: ONE CORPORATE DR
Label City: SHELTON
Label State: CT
Label Zip Code: 06484
Label Country: US
Label Emergency Number: 203-226-6602;800-424-9300(CHEMTREC)

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MATERIAL SAFETY DATA BULLETIN

1. PRODUCT AND COMPANY IDENTIFICATION

APPROVAL DATE: 01/01/95

PRODUCT NAME: MOBIL 1 SYNTHETIC GREASE
SUPPLIER: MOBIL OIL CORP.
PRODUCTS AND TECHNOLOGY DEPT.
3225 GALLOWS RD.
FAIRFAX, VA 22037

24 - Hour Emergency (call collect): 609-737-4411
Product and MSDS Information: 800-662-4525 703-849-3265
CHEMTREC: 800-424-9300 202-483-7616

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENTS CONSIDERED HAZARDOUS TO HEALTH:

This product is not formulated to contain ingredients which have exposure limits established by regulatory agencies. It is not hazardous to health as defined by the European Union Dangerous Substances/Preparations Directives. See Section 15 for a regulatory analysis of the ingredients.

See Section 8 for exposure limits (if applicable).

3. HAZARDS IDENTIFICATION

US OSHA HAZARD COMMUNICATION STANDARD: Product assessed in accordance with OSHA 29 CFR 1910.1200 and determined not to be hazardous.

EFFECTS OF OVEREXPOSURE: No significant effects expected.

EMERGENCY RESPONSE DATA: Red Grease. DOT ERG No. - NA

4. FIRST AID MEASURES

EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT: Wash contact areas with soap and water. High pressure accidental injection through the skin requires immediate medical attention for possible incision, irrigation and/or debridement.

INHALATION: Not expected to be a problem.

INGESTION: Not expected to be a problem. However, if greater than 1/2 liter (pint) ingested, immediately give 1 to 2 glasses of water and call a physician, hospital emergency room or poison control center for assistance. Do not induce vomiting or give anything by mouth to an unconscious person.

5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA: Carbon dioxide, foam, dry chemical and water fog.

SPECIAL FIRE FIGHTING PROCEDURES: Water or foam may cause frothing.

Use water to keep fire exposed containers cool. Water spray may be used to flush spills away from exposure. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None. Flash Point C(F): > 204(400) (ASTM D-93). Flammable limits - LEL: NA, UEL: NA.

NFPA HAZARD ID: Health: 0, Flammability: 1, Reactivity: 0

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide. Metal oxides. Elemental oxides.

6. ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES: Report spills as required to appropriate authorities. U. S. Coast Guard regulations require immediate reporting of spills that could reach any waterway including intermittent dry creeks. Report spill to Coast Guard toll free number (800) 424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED: Shovel up and dispose of at an appropriate waste disposal facility in accordance with current applicable laws and regulations, and product characteristics at time of disposal.

ENVIRONMENTAL PRECAUTIONS: Prevent spills from entering storm sewers or drains and contact with soil.

PERSONAL PRECAUTIONS: See Section 8

7. HANDLING AND STORAGE

HANDLING: High pressure injection under the skin may occur due to the rupture of pressurized lines. Always seek medical attention.

STORAGE: Do not store in open or unlabelled containers. Store away from strong oxidizing agents or combustible material.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

VENTILATION: No special requirements under ordinary conditions of use and with adequate ventilation.

RESPIRATORY PROTECTION: No special requirements under ordinary conditions of use and with adequate ventilation.

EYE PROTECTION: Generally eye contact is unlikely with this type material. If eye contact is likely, safety glasses with side shields or chemical type goggles should be worn.

SKIN PROTECTION: If prolonged or repeated skin contact is likely, oil impervious gloves should be worn. Good personal hygiene practices should always be followed.

EXPOSURE LIMITS: This product does not contain any components which have recognized exposure limits.

9. PHYSICAL AND CHEMICAL PROPERTIES

Typical physical properties are given below. Consult Product Data Sheet for specific details.

APPEARANCE: Grease

COLOR: Red

ODOR: Mild

ODOR THRESHOLD: NA

pH: NA

BOILING POINT C(F): NA

DROP POINT C(F): NA

FLASH POINT C(F): > 204(400) (ASTM D-93)

FLAMMABILITY: NA

AUTO FLAMMABILITY: NE

EXPLOSIVE PROPERTIES: NA

OXIDIZING PROPERTIES: NA

VAPOR PRESSURE-mmHg 20 C: NA

VAPOR DENSITY: NA

EVAPORATION RATE: NA

RELATIVE DENSITY, 15/4 C: 0.89

SOLUBILITY IN WATER: Negligible

PARTITION COEFFICIENT: > 3.5

VISCOSITY AT 40 C, cSt: 220.0

VISCOSITY AT 100 C, cSt: NE

POUR POINT C(F): NA

FREEZING POINT C(F): NE

VOC: < 1.00 (Wt. %); 0.083 lbs/gal

NOTE: MOST PHYSICAL PROPERTIES FOR OIL COMPONENT.

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

FOR FURTHER TECHNICAL INFORMATION, CONTACT YOUR MARKETING REPRESENTATIVE

10. STABILITY AND REACTIVITY

STABILITY (THERMAL, LIGHT, ETC.): Stable.

CONDITIONS TO AVOID: Extreme heat.

INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide. Metal oxides.

Elemental oxides.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL DATA

---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

DERMAL TOXICITY (RABBITS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

INHALATION TOXICITY (RATS): Not applicable ---Harmful concentrations of mists and/or vapors are unlikely to be encountered through any customary or reasonably foreseeable handling, use, or misuse of this product.

EYE IRRITATION (RABBITS): Practically non-irritating. (Draize score: greater than 6 but 15 or less). ---Based on testing of similar products and/or the components.

SKIN IRRITATION (RABBITS): Practically non-irritating. (Primary Irritation Index: greater than 0.5 but less than 3). ---Based on testing of similar products and/or the components.

OTHER ACUTE TOXICITY DATA: The acute toxicological results summarized above are based on testing of representative Mobil products.

---SUBCHRONIC TOXICOLOGY (SUMMARY)---

Representative Mobil formulations have been tested at the Mobil Environmental and Health Sciences Laboratory by dermal applications to rats 5 days/week for 90 days at doses significantly higher than those expected during normal industrial exposure. Extensive evaluations, including microscopic examination of internal organs and clinical chemistry of body fluids, showed no adverse effects.

---REPRODUCTIVE TOXICOLOGY (SUMMARY)---

Dermal exposure of pregnant rats to representative formulations did not cause adverse effects in either the mothers or their offspring.

---SENSITIZATION (SUMMARY)---

Representative Mobil formulations have not caused skin sensitization in guinea pigs.

---OTHER TOXICOLOGY DATA---

This product is formulated with a synthetic hydrocarbon as the base stock. The Mobil Environmental and Health Sciences Laboratory has tested representative synthetic base stocks to assess their potential adverse effects on human health. Assessment of human health effects was based on acute oral, dermal, and inhalation toxicity; eye and skin irritation; subchronic dermal toxicity and reproductive studies; guinea pig sensitization; and mutagenicity and chromosomal damage assays. None of these base stocks appears to pose a health hazard to humans under conditions of expected use.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE AND EFFECTS:

Acute LC/EC50 Fish: Juvenile Rainbow Trout: Practically non-toxic ---Based on testing of similar products.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Product is suitable for burning in an enclosed, controlled burner for fuel value or disposal by supervised incineration. Such burning may be limited pursuant to the Resource Conservation and Recovery Act. In addition, the product is suitable for processing by an approved recycling facility or can be disposed of at any government approved waste disposal facility. Use of these methods is subject to user compliance with applicable laws and regulations and consideration of product characteristics at time of disposal.

RCRA INFORMATION: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity, or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

14. TRANSPORT INFORMATION

USA DOT: NOT REGULATED BY USA DOT.

RID/ADR: NOT REGULATED BY RID/ADR.

IMO: NOT REGULATED BY IMO.

IATA: NOT REGULATED BY IATA.

15. REGULATORY INFORMATION

Governmental Inventory Status: All components comply with TSCA.

EU Classification and Labeling: EU labeling not required.

U.S. Superfund Amendments and Reauthorization Act (SARA) Title III:

(Section continued next page)

This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

This product contains no chemicals reportable under SARA (313) toxic release program.

The following product ingredients are cited on the lists below:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS
LITHIUM HYDROXIDE MONOHYDRATE (0.07%)	1310-66-3	22
LITHIUM-SOAP THICKENER (3.86%)	7620-77-1	22
HEXANEDIOIC ACID, MONOMETHYL ESTER, LITHIUM SALT (1.10%)	64601-11-2	22
PENTANEDIOIC ACID, MONOMETHYL ESTER, LITHIUM SALT (0.12%)	64601-12-3	22
FATTY ACIDS, C16-22, LITHIUM SALTS (1.12%)	68783-36-8	22

--- REGULATORY LISTS SEARCHED ---

1 = ACGIH ALL	6 = IARC 1	11 = TSCA 4	17 = CA P65	22 = MI 293
2 = ACGIH A1	7 = IARC 2A	12 = TSCA 5a2	18 = CA RTK	23 = MN RTK
3 = ACGIH A2	8 = IARC 2B	13 = TSCA 5e	19 = FL RTK	24 = NJ RTK
4 = NTP CARC	9 = OSHA CARC	14 = TSCA 6	20 = IL RTK	25 = PA RTK
5 = NTP SUS	10 = OSHA Z	15 = TSCA 12b	21 = LA RTK	26 = RI RTK

Code key: CARC = Carcinogen; SUS = Suspected Carcinogen

16. OTHER INFORMATION

CHEMICAL NAMES AND SYNONYMS: SYN. HYDROCARBONS AND ADDITIVES

USE: MULTISERVICE GREASE

NOTE: MOBIL PRODUCTS ARE NOT FORMULATED TO CONTAIN PCBS.

See container label for ingredient information.

For Mobil Use Only: MHC: 1* 1* NA 1* 1*, MPPEC: A, REQ: US -
MARKETING, SAFE USE: L

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

Prepared by: Mobil Oil Corporation
Environmental Health and Safety Department, Princeton, NJ



USA and WORLDWIDE

September 29, 1995

Material Safety Data Sheet

UNLEADED REGULAR GASOLINE (Including Reformulated)

PHONE NUMBERS

PHILLIPS 66 COMPANY
A Division of Phillips Petroleum Company
Bartlesville, Oklahoma 74004

Emergency: (918) 661-8118
General MSDS Information:
(918) 661-3709
For Additional MSDSs: (918) 661-3709

A. Product Identification

Synonyms: Motor Fuel; Petrol
Chemical Name: Mixture
Chemical Family: Hydrocarbon
Chemical Formula: Mixture
CAS Reg. No.: Mixture
Product No.: 12050, 12051, 12750, 12751, 12080, 12081, 11050, 11051,
12180, 12181, 12170, 12171, 12280, 12281, 12270, 12271,
12380, 12381, 12370, 12371

Product and/or Components Entered on EPA's TSCA Inventory: YES

This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

B. Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV
Gasoline, including:	8006-61-9	100	300 ppm	300 ppm
Benzene	71-43-2	<5	10 ppm (1)	10 ppm
Toluene	108-88-3	1-35	100 ppm	50 ppm
Ethyl Benzene	100-41-4	0-4	100 ppm	100 ppm
Xylenes (mixed isomers)	1330-20-7	1-10	100 ppm	100 ppm
Methyl-tert-Butyl Ether	1634-04-4	<16	NE	NE
1,2,4-Trimethyl Benzene	95-63-6	0.5-2.5	25 ppm (2)	25 ppm (2)
Isopentane	78-78-4	<20	NE	NE
n-Butane	106-97-8	<10	800 ppm	800 ppm

- (1) Areas covered by the Benzene Standard, 29 CFR 1910.1028, will have a 1 ppm 8 hour TWA and 5 ppm STEL.
- (2) For Trimethylbenzene

NA - Not Applicable NE - Not Established

C. Personal Protection Information

Ventilation: Use adequate ventilation to control concentration below recommended exposure limits.

Respiratory Protection: For concentrations exceeding the recommended exposure limit, use appropriate NIOSH/MSHA approved air purifying respirator. When entry into or exit from concentrations of unknown exposure, use NIOSH/MSHA approved self-contained breathing apparatus (SCBA).

Eye Protection: Use safety glasses with side shields and face shield for splash protection.

Skin Protection: Use gloves resistant to the material being used. (Viton, nitrile, neoprene). Use full-body, long sleeved garments to prevent skin contact.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Do not get in eyes, on skin or on clothing. Do not breathe vapors, mist, fume or dust. Do not swallow. May be aspirated into lungs. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use only with adequate ventilation.

Keep away from heat, sparks, and flames. Store in a well-ventilated area. Store in tightly closed container. Bond and ground during transfer.

E. Reactivity Data

Stability: Stable

Conditions to Avoid: Not Applicable

Incompatibility (Materials to Avoid): Oxygen and strong oxidizing agents

Hazardous Polymerization: Will Not Occur

Conditions to Avoid: Not Applicable

Hazardous Decomposition Products: Carbon oxides and various hydrocarbons when burned.

F. Health Hazard Data

Recommended Exposure Limits:

See Section B.

Acute Effects of Overexposure:

- Eye:** May cause mild irritation, with stinging and redness of the eyes.
- Skin:** May cause mild irritation. Repeated or prolonged contact may cause defatting of the skin, resulting in dermatitis.
- Inhalation:** May cause headache, nausea, weakness, sedation, and unconsciousness at high concentrations (>300 ppm).
- Ingestion:** May be slightly irritating to intestines. May cause nausea. If swallowed, may be aspirated resulting in inflammation and possible fluid accumulation in the lungs. The oral LD50, rat, for unleaded gasoline is 18.8 ml/kg.

Subchronic and Chronic Effects of Overexposure:

Unleaded gasoline has produced kidney cancer in male rats only. No comparable kidney disease is known to occur in humans.

Gasolines generally contain benzene which has been designated a carcinogen by the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), and the Occupational Safety and Health Administration (OSHA). Benzene may produce blood changes which include reduced platelets, red blood cells, and white blood cells. Also, aplastic anemia, and acute nonlymphocytic leukemia. Benzene has produced fetal death in laboratory animals and caused chromosome changes in humans and mutation changes in cells of other organisms.

Isopentane did not produce kidney damage in a subchronic oral laboratory study or in a subchronic inhalation exposure to 4500 ppm isopentane alone or 1000 ppm of a 50/50 mixture of isobutane and isopentane.

Exposure of pregnant rats during gestation to toluene at levels 250 ppm and higher produced some maternal toxicity and embryo/fetotoxicity. A lifetime inhalation study in rats did not show any toxic effects even at the high dose of 300 ppm.

Behavioural signs of hearing loss were observed in rats exposed to toluene subchronically at levels of 1000 ppm or more. Comparable effects have not been reported in humans.

Methyl-tert-butyl Ether (MTBE) is not readily absorbed through the skin and inhaled MTBE is rapidly eliminated from the body. Inhalation studies determined MTBE is not a neurotoxin, however, high concentrations (8000 ppm) can cause central nervous system depression. Inhalation of MTBE does not cause fetal malformations nor does it interfere with the reproductive capacity.

Ethylbenzene has caused fetotoxicity and liver and kidney injury in laboratory animals. No comparable injury has been reported in humans.

Liver and kidney changes have been noted in long term studies in animals exposed to xylenes. Fetotoxicity has been observed in animals with subchronic exposure to mixed xylenes at concentrations approximately five times the permissible exposure limit.

An epidemiology study of workers exposed to two isomers of trimethylbenzene had symptoms of nervousness, tension and anxiety, and asthmatic bronchitis. In addition, after inhalation of 60 ppm measured as hydrocarbon vapor, the workers' peripheral blood showed a tendency to hypochromic anemia and a deviation from normal in the coagulability of the blood.

Other Health Effects:

Combustion, a normal use of gasoline, results in an exhaust that has been associated with skin cancer in laboratory animals. Skin cancer was observed in these animals when exhaust was concentrated and repeatedly applied to the skin. This is not a normal route of exposure relevant to humans.

Combustion (burning) of most carbon-containing material forms carbon monoxide. Carbon monoxide inhalation may cause carboxyhemoglobinemia. Chronic exposure to carbon monoxide causes fatigue, poor memory, loss of sensation in fingers, visual disturbances and insomnia. Carboxyhemoglobinemia is frequently misdiagnosed as flu.

Sensitive sub-populations to the inhalation of carbon monoxide exist. ~~Carbon monoxide displaces oxygen in the bloodstream and therefore, can~~ adversely effect people with pre-existing heart disease, pregnant women and smokers.

A Toxicity Study Summary for Toluene is available upon request.

A Toxicity Study Summary for Isopentane, Commercial Grade, is available upon request.

Health Hazard Categories:

	Animal	Human		Animal	Human
Known Carcinogen	<u> X </u>	<u> X </u>	Toxic	—	—
Suspect Carcinogen	—	—	Corrosive	—	—
Mutagen	<u> X </u>	—	Irritant	—	—
Teratogen	—	—	Target Organ Toxin	<u> X </u>	<u> X </u>
Allergic Sensitizer	—	—	Specify - Blood Toxin; Reproductive		
Highly Toxic	—	—	Toxin-Embryo/Fetotoxin;		
			Lung-Aspiration Hazard		
			Kidney Toxin; Liver Toxin		

First Aid and Emergency Procedures:

- Eye:** Flush eyes with running water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.
 - Skin:** Wash skin with soap and water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.
 - Inhalation:** Remove from exposure. If breathing is difficult, give oxygen. If breathing ceases, administer artificial respiration followed by oxygen. Seek immediate medical attention.
 - Ingestion:** Do not induce vomiting. Seek immediate medical attention.
- Note to Physician:** Gastric lavage using a cuffed endotracheal tube may be performed at your discretion.

APPENDIX C

HEAT AND COLD STRESS GUIDELINES



INTEROFFICE MEMORANDUM

DATE: July 8, 1996
TO: Distribution
FROM: Ricky J. Carr, Environmental Safety & Health, Bldg. T664A, X2970
SUBJECT: HEAT STRESS - RJC-014-96
Action: None Required

The purpose of this memo is to provide guidance regarding the prevention and monitoring of heat stress conditions. It should be noted that heat stress related conditions or disorders (i.e. heat stroke, heat exhaustion) are considered to be occupational illnesses by OSHA and therefore are recordable cases. It is incumbent to prevent, monitor and mitigate conditions which may lead to heat stress among employees.

There is a draft Heat Stress Program that has been written by Kaiser-Hill L.L.C. (K-H) Industrial Hygiene and Safety and reviewed by the Industrial Hygiene and Safety organizations of the major subcontractors. This Heat Stress Program describes the responsibilities of various personnel regarding implementation of the Program and contains instructions for monitoring heat stress and provides guidelines for Threshold Limit Values (TLVs) and work/rest regimens. DOE Order 440.1, Worker Protection Management for DOE Federal and Contractor Employees requires compliance with the most recent edition of the ACGIH "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices" when TLVs are more protective than OSHA Permissible Exposure Limit (PELs) (there is no OSHA PEL for heat stress). The work/rest regimens specified in the Heat Stress Program are based upon the ACGIH TLVs modified by professional judgment for the use of impermeable personal protective clothing (PPE). These TLVs assume that the workers exposed to heat stress conditions are acclimatized.

It is (will be) Rocky Mountain Remediation Services (RMRS) policy to adhere the requirements of the Heat Stress Program including the work/rest regimens contained as Appendix 1 of the Program (attached). Prevention of potential heat stress conditions is the first method to be considered when heat stress is identified as a potential hazard associated with any activity or task. Prevention methods to be considered include work schedule, modification of task/activity, and provision for rest areas. The Heat Stress Program provides instructions for monitoring heat stress conditions using the Wet Bulb Globe Temperature (WBGT) Index. WBGT accounts for air temperature, relative humidity, and solar load and provides a mechanism for correlating environmental conditions with body temperature and other physiological responses to heat stress. The Heat Stress Program contains a Table for work/rest regimens based upon the WBGT Index, work activities, and level of Personal Protective Equipment (PPE). Work/rest regimens shall be established in accordance with guidelines in the Table with the following interpretations. Physiological monitoring (i.e. body temperatures, pulse rates) will be performed whenever practical and feasible in order to verify the work/rest regimens are appropriate considering the WBGT Index. The use of personal cooling devices such as ice
to provide cooling can be used to modify the WBGT Index

Distribution
RJC-014-96
July 8, 1996
Page 2

for a particular work activity and level of PPE. The WBGT Index can be lowered by 3°F if a personal cooling device is employed and physiological monitoring is performed to confirm that the personal cooling devices are effective (using the monitoring guidance provided on page 8-21 in the NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Activities). Additional modification to the WBGT Index when personal cooling devices are employed when be evaluated on a case-by-case basis. Column 2 will be employed if permeable protective clothing (regardless of respiratory protection) is utilized. Permeable protective clothing includes cotton and Kleenguard™ coveralls. Column 3 will be employed if semi-permeable protective clothing (Tyvek) is utilized. Column 4 will be employed if impermeable protective clothing (Saranex) is utilized.

Please distribute this guidance to all personnel that have operations affected by heat stress considerations. Please don not hesitate to call if you have questions or comments.

RJC:clh

Attachment:
As Stated

Distribution

R. E. Bates
G. W. Beers
R. J. Carr
M. E. Findley
K. D. Jenkins
O. McAfee
R. A. McCafferty
A. W. Medina
T. T. Sangaline
M. D. Schrenkengast
T. N. Timmons

cc:

G. Aguero
C. A. Benson
C. Boardman
J. Chapin
J. A. Cuicci
C. S. Evans
R. C. Fitz
T. D. Gray
L. F. Johnson
J. E. Law
D. E. Steffen
M. R. Wagner
M. Wheeler
ESH&Q File
RMRS Records Center

RFETS HEAT STRESS PROGRAM

HEAT STRESS GUIDELINES FOR LIGHT WORK

	(1)	(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	86	76	72	68
75/25%	87	77	73	69
50/50%	89	78.5	74.5	70.5
25/75%	90	79.9	75.9	71.9

HEAT STRESS GUIDELINES FOR MODERATE WORK

	(1)	(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	80	70	66	62
75/25%	82	72.4	68.4	64.4
50/50%	85	74.9	70.9	66.9
25/75%	88	77.9	73.9	69.9

HEAT STRESS GUIDELINES FOR HEAVY WORK

	(1)	(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	77	67	63	59
75/25%	78	68.6	64.6	60.6
50/50%	82	72.2	68.2	64.2
25/75%	86	76	72	68

(1) No Personal Protective Equipment

(2) One pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers.... (Level D Haz Mat PPE)

(3) Two pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers....

or

One pair coveralls (Anti C), modesty garments, gloves, hood, respirator. (Level C Haz Mat PPE)

(4) Two pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers, respirator. (Level A&B Haz Mat PPE)

Threshold Limit Values Work/Warm-up Schedule for Four-Hour Shifts

Air Temperature—Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F (approx.)	Max. Work Period	No. of Breaks								
-26° to -28°	-15° to -19°	(Norm. Breaks) 1	1	(Norm. Breaks) 1	1	75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	(Norm. Breaks) 1	1	(Norm. Breaks) 1	1	75 min	2	55 min	3	40 min	4
-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	30 min	5
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease	
-38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

- Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up periods of ten (10) minutes in a warm location and with an extended break (e.g., lunch) at the end of the 4-hour work period in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule one step lower. For example, at -35°C (-30°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
- The following is suggested as a guide for estimating wind velocity if accurate information is not available:
5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.
- If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1.750 W/m²; 2) all non-emergency work should have ceased at or before a wind chill of 2230 W/m². In general, the warmup schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder ranges because windy conditions rarely prevail at extremely low temperatures.
- TLVs apply only for workers in dry clothing.

Adapted from Occupational Health & Safety Division, Saskatchewan Department of Labour

Windchill Index

Wind Speed in mph	ACTUAL THERMOMETER READING (F)										
	50	40	30	20	10	0	-10	-20	-30	-40	
calm	50	40	30	20	10	0	-10	-20	-30	-40	
5	48	37	27	16	6	-5	-15	-26	-36	-47	
10	40	28	16	4	-9	-21	-33	-46	-58	-70	
15	36	22	9	-5	-18	-36	-45	-58	-72	-85	
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113	
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	
Over 40 mph (little added effect)	LITTLE DANGER (for properly clothed person)					INCREASING DANGER (Danger from freezing of exposed flesh)					GREAT DANGER

**APPENDIX D
PROJECT PHONE LIST**

Name	Company/Title	Phone	Pager	Radio	Pager
Aldridge, Steven	Stoller - SSO	4183	508-2137	3719	543-2221
Anderson, Michael	Stoller - Task Manager	546-4346	230-7946		
Barbour, Don	Starnet - Project Manager	423-220-8300			
Barroso, Jeff	KH - Radiological Engineering	8451	5888		
Bemski, Mike	RMRS - Field Supervisor	4090	7466	3805	278-2697
Blea, Ronnie	Stoller - Health and Safety Specialist	4183	560-1850	3726	452-7844
Boyle, Jim	DOE - Facility Representative	9742	8128		
Burmister, Mark	RMRS - Deputy Project Manager	5891	4630		
Casteneda, Norma	DOE - ER Projects	4226	4466		
Chandler, Skip	RMRS - Health and Safety Supervisor	6673	1659	3806	452-4199
Cygnarowicz, Robert	RMRS - Project Support	7916	6143		4494696
Cirillo, Russ	RMRS - Bldg. 891 Water Treatment	5876	4011	3765	431-6389
DiGregorio, Greg	RMRS - Quality Assurance	5688	1732		
Farler, David	RMRS - Industrial Hygiene Supervisor	4340	5248	3743	530-2768
Findley, Michael	RMRS - Vice President	2653	5978	3763	438-9834
Garland, Kevin	SSOC - Radiological Operations	4310	7074		
Gillespie, Ken	RMRS - Health and Safety Supervisor	3439	4007	3733	665-7607
Hapke, Paul	SSOC - RMRS Rad Safety Sec. Mnger.	6836	7336	3296	
Hughes, Fred	RMRS - Vice President of Operations	5841	7458		
Hull, Kurt	Stoller - T-1 Remediation Ops Mnger.	546-4314			
Jenkins, Ken	RMRS - H&S Team Leader	5374	7455	4505	543-1545
Law, John	RMRS - Director of ER	4842	4564		
Lindsey, Tom	RMRS - Field Supervisor	5705	7478	3776	
Miller, John	SSOC - Radiological Engineer	2454	7981		
Mobley, Steve	KH - Excavation Specialist	2538	1895		
Mote, Kathy	KH - RCT	2397			
Parson, Gary	KH - Excavation Specialist	4197	1899	4533	
Pepping, Mike	RMRS - Waste Generator	3075	7464	3808	278-8095
Primose, Annette	RMRS - Field Operation Manager	4385	4675	3801	
Smith, Allen	Stoller - DWRC Field Supervisor	6598	212-5407	4510	
Sproles, Wayne	RMRS - Project Manager	5790	1245	3798	
Wagner, Rick	RMRS - Project Operations	3102	1164		

APPENDIX E

HEALTH AND SAFETY DOCUMENTATION FORMS

Starmet / Stoller

TRENCH T-1 TEMPORARY STRUCTURE CONSTRUCTION PROJECT

Operator's Daily Aerial Lift Inspection Checklist

Equipment Number: _____ Make: _____ Date: _____
 Hour Meter Reading: Start _____ End _____ Hours on Shift _____

Check Each Item Listed Below	Item OK	Item Not OK	N/A	Date Corrected	Person Making Correction
AERIAL LIFT EQUIPMENT					
Records					
1. Is manufacture data available?					
2. Are maintenance, repair and test readily available?					
Platform					
1. Is the rated load-capacity posted?					
2. Are electrical warnings posted?					
3. Are all controls marked and legible?					
4. Are carriers front and rear marked?					
5. Is aerial device insulated?					
6. Is the chassis - suspension locking device working properly?					
7. Are boom pins and other parts in good working order?					
8. Is a means for securing a fall protection provided?					
9. Are hydraulic systems in good repair?					
10. Are electrical systems in good repair?					
Moving Parts					
1. Do exposed moving parts such as gears, setscrews, chains, sprockets, etc., have securely fastened and adequate guards?					
Outriggers					
1. Are means provided for securing outriggers in both retracted and extended positions?					
2. Are all outriggers in good working condition?					
Prime Mover					
1. Is a fire extinguisher provided?					
2. Are all head, tail, directional, clearance and brake lights operable and have broken lenses?					
3. Are the service and emergency parking lights operable and have no broken lenses?					
4. Are the horn, backup alarm, normal gages and lights, and other primary and secondary controls in operable condition?					
Remarks: _____					

Operator _____ / _____ Date _____
 (print) (signature)

Supervisor: _____ / _____ Date: _____
 (print) (signature)

HSS: _____ / _____ Date: _____
 (print) (signature)

Starmet / Stoller
TRENCH T-1 TEMPORARY STRUCTURE
CONSTRUCTION PROJECT

Operator's Daily Powered Industrial Truck Inspection Checklist

Truck Number: _____ Make: _____ Date: _____

Hour Meter Reading: Start _____ End _____ Hours on Shift _____

Check Each Item Listed Below	Item OK	Item Not OK	Explain Below If Not OK Or Any Other Action Taken
ALL TRUCKS			
Steering			
Horn			
Lights			
Backup Alarm			
Brakes			
Tires			
Hoist Cylinder			
Tilt Cylinder			
Hydraulic Oil Level			
Hydraulic Controls			
Forks			
Limit Switches			
Supplied Air Tank & Mount			
Safety Belts			
Fire Extinguisher			
GASOLINE, DIESEL, OR PROPANE TRUCKS			
Battery			
Fuel			
Water/Antifreeze			
Engine Oil Level			
Oil Pressure			
Remarks:			

Logbook Control Number: ER-IHSS108-LB-98-335

Operator: _____ / _____ Date: _____
 (print) (signature)

Supervisor: _____ / _____ Date: _____
 (print) (signature)

HSS: _____ / _____ Date: _____
 (print) (signature)

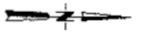


Figure 3.2
Trench 1
Site Location Map

EXPLANATION

- Contour (5' intervals)
- Trench 1
- Standard Map Features**
- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Paved roads
- Dirt roads

DATA SOURCE:
 Aerotriangulation, photogrammetry, and other
 methods were used to derive the
 contours for this map. The data
 were derived from the following sources:
 1985



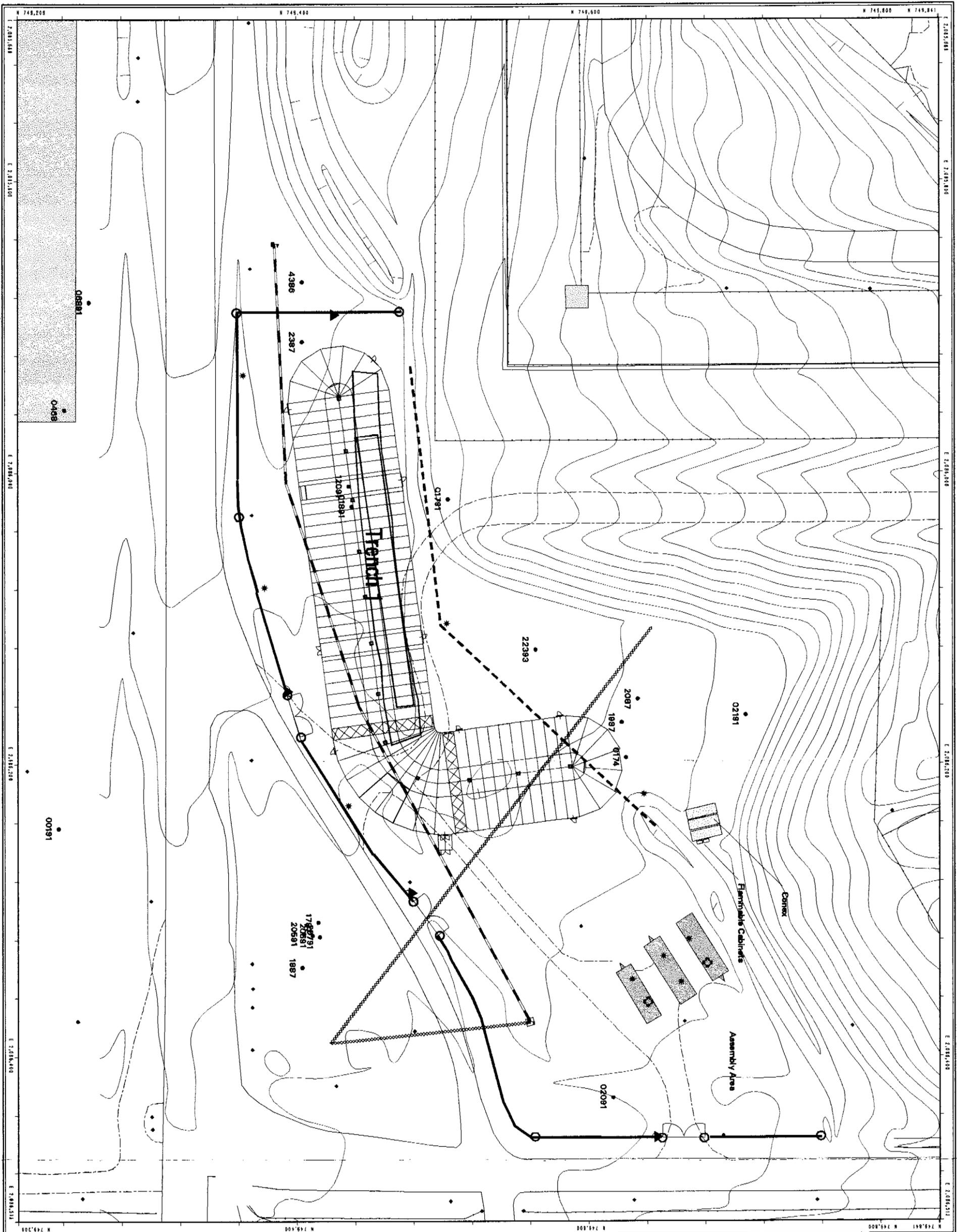
Scale = 1 : 5430
 1 inch represents approximately 453 feet



State Plane Coordinate Projection
 Colorado Central Zone
 Datum: NAD27

U.S. Department of Energy
 Rocky Flats Environmental Technology Site

Prepared by
FMRS
 Rocky Mountain
 Remediation Services, L.L.C.
 One Poudre Environmental Services Group
 P.O. Box 48
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 MAP ID: 97-0065 February 26, 1994



Trench 1 Temporary Structure Construction Site

Figure 3.3

EXPLANATION

- Underground utility lines
- Culvert
- Water lines
- Temporary Chain Link Fence
- 2 Foot Contours
- Driven Fence Post
- 3 foot Wide Personnel Gates
- Groundwater well Locations
- Power poles
- Utility vaults
- Fire Extinguishers
- Eye Wash Stations

Standard Map Features

- Buildings and other structures
- Fences and other barriers
- Paved roads
- Dirt roads

Scale = 1 : 770
1 inch represents approximately 64 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

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