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**ENVIRONMENTAL
RESTORATION
PROGRAM**

**Health and Safety Work Plan for
Sampling Colloids in
Waste Area Grouping 5 at
Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

**J. D. Marsh
J. F. McCarthy**

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Energy Systems Environmental Restoration Program
ORNL Environmental Restoration Program

**Health and Safety Work Plan for Sampling Colloids in Waste Area
Grouping 5 at Oak Ridge National Laboratory, Oak Ridge, Tennessee**

**J. D. Marsh
J. F. McCarthy**

Date Issued—July 1994

Prepared by
Environmental Sciences Division
Oak Ridge National Laboratory

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U.S. Department of Energy
Office of Environmental Restoration and Waste Management
under budget and reporting code EW 20

OAK RIDGE NATIONAL LABORATORY
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**HAZWOPER WORK PLAN
SITE SAFETY AND HEALTH PLAN**

Prepared by: John F. McCarthy and J. Daniel Marsh

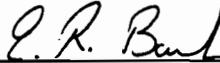
Purpose: The objective will be to sample groundwater for colloids and determine the role of colloids and natural organic matter on the migration of radionuclides at WAG 5.

Reviewed/Approved by:

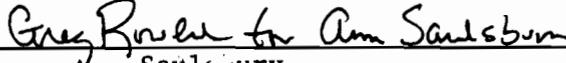
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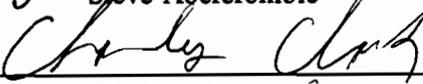
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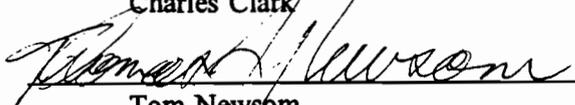
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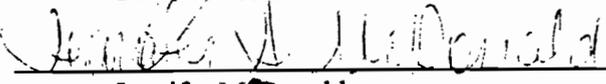
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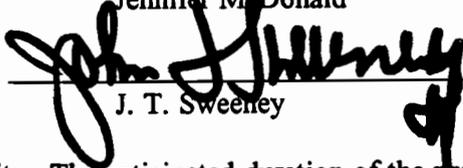
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DOE ORNL Program Manager


J. T. Sweeney

This plan will be kept at the project site. The anticipated duration of the project is 18 months.

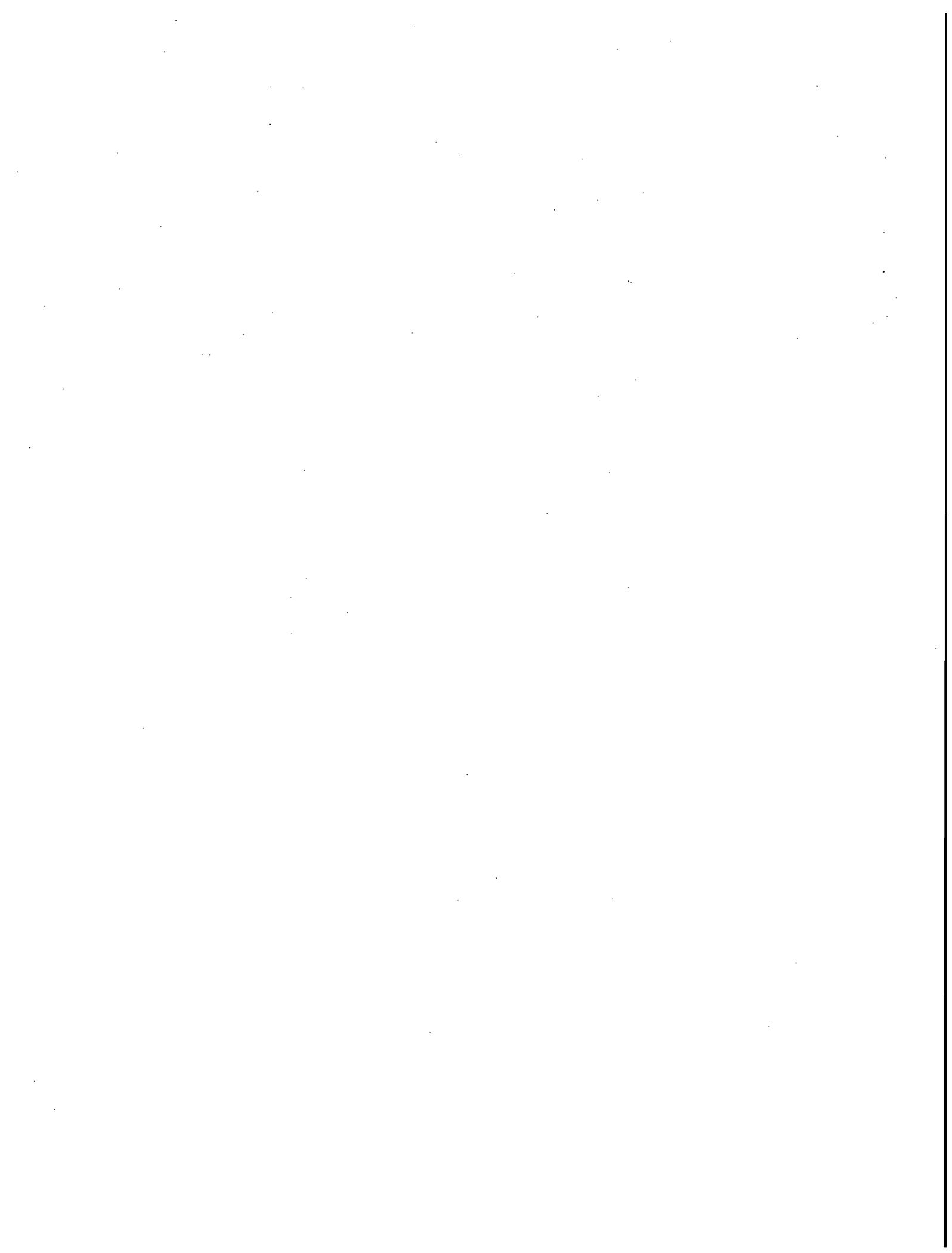
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ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
DOE	U. S. Department of Energy
ESD	Environmental Sciences Division
HAZWOPER	Hazardous Waste Operations and Emergency Response
HP	Health Physics Section
HPC	HAZWOPER Program Coordinator
IH	Industrial Hygiene Section
IS	Industrial Safety Section
LSS	Laboratory Shift Supervisor
MSDS	material safety data sheet
OHF	Old Hydrofracture Facility
ORNL	Oak Ridge National Laboratory
PM	Project Manager
PPE	personal protective equipment
QA	quality assurance
RI/FS	remedial investigation/feasibility study
RP	Radiation Protection Surveillance Section
RWP	radiation work permit
SI	site investigation
SSHO	site safety and health officer
SSHP	site safety and health plan
STL	Sampling Team Leader
SWSA	solid waste storage area
WAG	waste area grouping
WBG	wet bulb globe temperature



EXECUTIVE SUMMARY

This Work Plan/Site Safety and Health Plan (SSHP) and the attached work plan are for the performance of the colloid sampling project at WAG 5. The work will be conducted by the Oak Ridge National Laboratory (ORNL) Environmental Sciences Division (ESD) and associated ORNL environmental, safety, and health support groups. This activity will fall under the scope of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response (HAZWOPER)*. The purpose of this document is to establish health and safety guidelines to be followed by all personnel involved in conducting work for this project. Work will be conducted in accordance with requirements as stipulated in the ORNL HAZWOPER Program Manual, and applicable ORNL, Martin Marietta Energy Systems, Inc., and U. S. Department of Energy (DOE) policies and procedures.

1. INTRODUCTION

This Work Plan/Site Safety and Health Plan (SSHP) and the attached work plan are for the performance of the colloid sampling project at WAG 5. The work will be conducted by the Oak Ridge National Laboratory (ORNL) Environmental Sciences Division (ESD) and associated ORNL environmental, safety, and health support groups. This activity will fall under the scope of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response (HAZWOPER)*. The purpose of this document is to establish health and safety guidelines to be followed by all personnel involved in conducting work for this project. Work will be conducted in accordance with requirements as stipulated in the ORNL HAZWOPER Program Manual, and applicable ORNL, Martin Marietta Energy Systems, Inc., and U. S. Department of Energy (DOE) policies and procedures.

The levels of protection and the procedures specified in this plan are based on the best information available from historical data and preliminary evaluations of the area. Therefore, these recommendations represent the minimum health and safety requirements to be observed by all personnel engaged in this project. Unforeseeable site conditions or changes in scope of work may warrant a reassessment of protection levels and controls stated. All adjustments to the plan must have prior approval by the safety and health disciplines signing the original plan.

1.1 PROJECT AND SITE DESCRIPTION

The project is located at the WAG 5. WAG 5 is in Melton Valley, south of the main ORNL plant area. Previous sampling results suggest that the primary contaminants of concern will be radiological (^{90}Sr , ^3H , and alpha emitting radioisotopes). The gross beta, which includes ^{90}Sr , ranges from background to 110,000 pCi/L, gross alpha from background to 4,000 pCi/L, and tritium from background to 600,000,000 pCi/L. Tritium will be in the form of tritiated water. A site map and a radiological walkover survey are included in Appendix A. The radiological walkover survey indicates the external exposure around WAG 5. The site map shows the locations of the wells and seeps. However, it should be noted that the activities of this project will not include sampling at the Old Hydrofracture Facility (OHF), the OHF pond, the process waste sludge basin, or in any building or tank. There have been no hazardous volatile chemicals or radioactive gases detected while opening wells for routine monitoring at well sites or at seeps. External and internal exposure to radioactive material will be controlled primarily by administrative controls and personal protective equipment as described below.

The work conducted in this task will be limited to sampling of groundwater and possibly surface water exiting seeps. The goal of the work is to determine if radionuclides in groundwater or exiting seeps are adsorbed to colloidal (submicron-sized) particles or complexed with natural organic matter in the groundwater. Groundwater containing actinides will be sampled and filtered at the well-head. Filters will range from 0.45 μm (450 nm) to 1 nm (3000 dalton molecular weight) in nominal size cut-off. Groundwater will be filtered on-line (before exiting the sample tube) to avoid introduction of artifacts that could produce colloids during sampling. Slow fluid pumping rates will be used to minimize shear forces around the well that could entrain colloids that are normally immobile. Prior to sampling, the chemical and thermodynamic conditions (pH, electrode potential, specific conductance,

dissolved oxygen, alkalinity, temperature) of the groundwater will be measured using in-line flow cells. Purged water will be collected and contained in carboys or barrels for appropriate disposal.

The primary emphasis of this work will be on wells that have elevated levels of actinides, since these radioisotopes are expected to have the greatest affinity for adsorbing to groundwater colloids. Part of this work will involve repeated monitoring at some wells since storm events are expected to mobilize colloid-associated contaminants. However, the location of the wells we will sample is subject to change, depending on results of compliance monitoring.

The work will be limited to collection and filtration of water samples. There will be no excavation, nor will there be any collection of sediments or soil. Prior to sampling of a new well or seep, HP/IH will survey the work area to identify any radiological or contamination hazards and set requirements for zoning and PPE. Already existing wells will be evaluated by previous sampling data. A thin window beta-gamma "pancake" meter will be used to detect low energy beta activity. Groundwater samples will be monitored by HP or, with HP's permission, by the SSHO at the site to determine that the samples do not exceed the action guidelines of >100 cpm above background, based on survey meters; if that guideline is exceeded, HP will be notified immediately for guidance and additional instructions. All personnel will perform a whole body frisk with a hand-held monitor (alpha and beta/gamma) before leaving the sampling site; in addition, personnel will be frisked with the half-body monitor in Building 7831 as a secondary precaution prior to exiting WAG 5.

2. SITE ORGANIZATION AND COORDINATION

The work will be performed by ESD of ORNL. ORNL Industrial Hygiene, Industrial Safety, and Radiation Protection will appropriate monitoring and oversight. Prior to the initial sampling of groundwater at any new location, the site will be evaluated by HP for radiological hazard and by IH for health hazards. Specifically, HP/IH will be present to monitor for site hazards the first time any new sampling well is opened, and will make recommendations for any protective requirements or any additional monitoring that will be required for present or future sampling of that well. IH and RP will decide if monitoring and oversight of sampling activities at any sampling site can be conducted by the SSHO or if the presence of an IH or RP technician is necessary during sampling.

The following section details the organizational structure for this project. Key personnel and their project responsibilities follow. Team members from ESD include J. F. McCarthy, J. D. Marsh, J. McDonald, T. Thomas, T. Knowles, B. Gu, and S. L. Webster. J. McDonald will serve as the Site Team Leader (STL) and SSHO, and J. D. Marsh will serve as back-up STL and SSHO. General responsibilities of all project staff include

- safeguarding record materials including, but not limited to, field note books, raw data sheets, and chain of custody forms;
- maintaining complete, factual, detailed, and objective program notes;
- retaining records of all analyses and procedures used for the WAG 5 RI/FS and SI projects;
- ensuring that proper waste management procedures are followed; and
- ensuring that the requirements of the Sampling and Analysis Plan, QA Plan, Data Management Plan, and the Health and Safety Plan are satisfied.

2.1 PROJECT MANAGER

The PM oversees all efforts of the project and provides guidance to project personnel. Responsibilities of the PM include

- managing the project and overseeing the technical and programmatic activities of the health and safety program,
- assigning sufficient resources to maintain and implement the health and safety program, and
- ensuring that adequate health and safety systems (i.e., policies, plans, procedures, materials) are in place and operational.

2.2 SITE TEAM LEADER

The STL is responsible for oversight of the sampling activities for the project. He/she will be responsible for site accessibility, safety, QA, and waste management and may delegate further responsibilities to other team members. Specific responsibilities of the STL are listed below:

1. coordinates site operations, including logistics;
2. interfaces with plant and project personnel;
3. notifies appropriate personnel of work schedules;
4. maintains and controls all site records;
5. determines in-field procedural variances in response to site conditions;
6. documents and reports unforeseen site changes and corrective actions; and
7. coordinates waste disposal following procedures established by the ORNL-ER-P Waste Management Plan guidance document.

2.3 SITE SAFETY AND HEALTH OFFICER

The project will designate a qualified site-specific SSHO, who must be approved by the HAZWOPER Program Coordinator as well as the alternates, who will implement, monitor, and enforce the site specific Health and Safety plan. The SSHO is the primary on-site contact for safety and health during field activities. They oversee the on-site execution of all field activities regarding safety and health procedures and has the authority to stop all work if conditions are judged to be hazardous to on-site personnel or to the public. The SSHO will remain on-site at all times while workers are performing site activities. Other specific responsibilities follow.

1. Prior to initiation of site activities, a pre-entry briefing will be conducted to ensure that personnel receive a copy of the site specific health and safety plan and are aware of its provisions; are instructed on how the work will be accomplished and how to ensure workers' safety; are familiar with potential hazards, routes of entry, and health effects that could be hazardous during this project; and are familiar with planned emergency procedures;
2. The SSHO Ensures that employees meet the required level of training, medical requirements including respirator fit test (as needed), attend a pre-entry briefing on project and potential site hazards, and review the Work Plan and SSHP. Maintains copies of documentation of the above at the project site and ensures documentation is available for on-site review. Note: the ORNL Special Access Training Badge will be used as verification of training. See Section 8 for site entry requirements
3. Require personnel to obtain immediate medical attention in the case of a work-related injury or illness.

4. Deny access to all or any portion of the work area as warranted.
5. Order work to cease, evacuation of the work area by all personnel, and reestablish safe working conditions, as needed.
6. Control access to the site by visitors and unauthorized personnel. Advise visitors and unauthorized personnel of their responsibilities, and ensure they meet access requirements, before entry is allowed.
7. Ensure the correct field execution of the Work Plan and SSHP.
8. Ensure this Work Plan and SSHP are revised and approved if there are changes.
9. Advise emergency response personnel in an emergency.
10. Coordinate with Industrial Hygiene (IH), Industrial Safety (IS), and Radiation Protection (RP) to establish site work zones and to recommend additional requirements for personnel protection, monitoring, and other controls.
11. Coordinate and minimize the number of personnel and amount of equipment in the work zones.
12. Coordinate accident prevention by oversight of field activities and being aware of all site operations.
13. Ensure that needed work permits (e.g., radiation work permits) are obtained and made available on site.
14. Ensure that IH, IS, and RP are contacted prior to commencement of site work to (1) notify of intent to begin work and (2) request monitoring support, as recommended by IH, IS, or RP during their initial survey of each sampling site.
15. Conduct daily inspection of the work site (See site surveillance check-list, Appendix B).
16. Provide the HAZWOPER Program Coordinator (HPC) a list of personnel participating in site activities to determine the need for inclusion in the hazardous waste worker medical surveillance program.

2.4 FIELD PERSONNEL

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees; being alert to potentially harmful situations.
2. Performing only those tasks that they believe they can do safely and immediately reporting any accidents and/or unsafe conditions to the SSSHO.
3. Notifying the SSSHO of any special medical conditions (i.e., allergies, contact lenses, diabetes and medication use). Although highly recommended, it is not mandatory to report pregnancies, per Energy Systems policy under the Reproductive Hazards Program.

4. Preventing spillage to the extent possible. If a spill occurs, contain the spill, notify the SSHO, and clean up immediately using safe cleanup measures as directed by the SSHO. Note: Do not engage in spill containment or cleanup if conditions are not safe and if the cleanup cannot be accomplished with supplies available at the site. Evacuate the area. All spills must be reported to the ORNL Environmental Interface (4-8770).
5. Avoid splashing materials to the extent possible.
6. Practice good housekeeping by keeping the work area neat, clean, and orderly to the extent possible.
7. Reporting all injuries, no matter how minor.

2.5 RADIATION PROTECTION

ORNL Radiation Protection will be responsible for oversight and approval of personnel protection requirements related to radiation protection. Mitch Conner, Office of Radiation Protection, will review and approve the Work Plan and SSHP prior to commencement of field activities. The Office of Radiation Protection representative will authorize a return to work after any on-site hazard has been resolved related to radiation protection. ORNL Radiation Protection will be consulted prior to entry into any posted Radiological Area and will instruct field participants on requirements for that area, including the need for a Radiation Work Permit, appropriate monitoring, dosimetry, and personal protective equipment.

2.6 INDUSTRIAL HYGIENE

The ORNL Industrial Hygiene Section and the HAZWOPER Program Coordinator (HPC) will be responsible for the oversight and approval of personnel protection related to industrial hygiene and the requirements of 29 CFR 1910.120. Ray Barham, the IH Divisional Representative for the Environmental Sciences Division, and Ann Saulsbury, the HAZWOPER Program Coordinator will approve the Work Plan and SSHP prior to commencement of field activities. A representative from the Industrial Hygiene Section will accompany the group during the initial activities to determine potential IH hazards. In addition, the IH representative will have stop-work authority and will provide guidance regarding personal protective equipment, and industrial hygiene monitoring and sampling requirements.

The SSHO will provide the HPC a list of ORNL individuals who may be participating in site activities. Based on program requirements, work history, and potential for exposure of the worker, the HPC will determine which individuals must be placed on the hazardous waste worker medical surveillance program. The HPC will then provide the ORNL medical facility with a list of individuals who are to be included in the hazardous waste worker medical surveillance program.

2.7 INDUSTRIAL SAFETY

The ORNL Industrial Safety Section will be responsible for oversight and approval of personnel protection related to safety. Industrial Safety will review and approve the Work Plan and SSHP prior to commencement of field activities. Industrial Safety will have stop-work authority and will provide guidance regarding potential safety hazards, personal protective equipment and safety requirements.

3. PROJECT HAZARD EVALUATION

3.1 SPECIAL HAZARDS

In addition to the expected hazards associated with sites other potentially harmful hazards must be identified. Examples of some of these hazards are; physical, chemical, radiological, underground and overhead hazards as well as heat or cold stress, noise, illumination, ergonomics, and biological factors.

All site investigative and excavative personnel may be exposed to the hazards outlined below.

3.2 HEAT STRESS

Activities being conducted at sites may be physically demanding during some of the site activities, possibly compounded through the use of protective clothing and equipment, moderate to heavy work loads, ambient air temperatures, relative humidity, and exposure to nonionizing radiation.

Two important factors will help personnel function in hot environments: acclimatization and consumption of fluids. Acclimation is a physical and psychological adjustment that workers experience during the first one or two weeks of work in hot environmental conditions. Especially during this period, workers should concentrate on maintaining a balanced diet, consuming plenty of fluids throughout the day, and remaining aware of telltale signs of heat-related stress, such as headaches, dizziness, high body temperature, and increased heart rate. It is imperative that the SSHO be informed of these conditions if a worker experiences these signs.

All activities that take place at the sites require the use of a "buddy" system. As field activities continue, all personnel should be aware of their buddy's condition and of signs of heat-related stress. The SSHO will institute a work and rest regimen when conditions become difficult to combat heat-related disorders, according to his or her best professional judgement and guidelines published by the American Conference of Governmental Industrial Hygienists (ACGIH)².

3.3 COLD STRESS

Activities being conducted at site may be physically demanding during winter months compounded through the use of protective clothing and equipment, moderate to heavy work loads, ambient air temperatures, relative humidity, wet or rainy conditions, wind speed, and exposure to nonionizing radiation.

Two important factors will help personnel function in cold environments: acclimatization and proper clothing. Acclimatization is a physical and psychological adjustment that workers experience during the first one or two weeks of work in cold environmental conditions. Especially during this period, workers should concentrate on maintaining a balanced diet, consuming plenty of fluids throughout the day, and remaining aware of telltale signs of cold-

related stress, such as headaches, numbness in digits or extremities, dizziness, low body temperature, and decreased heart rate. It is imperative that the SSHO be informed of this condition if a worker experiences these symptoms.

All activities that take place at the sites require the use of a buddy system. As field activities continue, all personnel should be aware of their buddy's condition and of signs of cold-related stress. The SSHO will institute a work and rest regimen to combat cold-related disorders, according to his or her best professional judgement and guidelines published by the American Conference of Governmental Industrial Hygienists,² when those conditions arise.

3.4 BIOLOGICAL STRESS

Field conditions may present a variety of biological stresses, and it is the responsibility of personnel to inform the SSHO of health conditions they have that may be affected by site conditions. Examples of these stresses may be, but are not limited to, insect bites, or stings, ticks, poison ivy, pollens and grasses, snakes, etc.

3.5 ILLUMINATION

Activities at any sites normally will be conducted during daylight hours. A conservative guideline may be that work will commence 15 minutes after sunrise and conclude 15 minutes prior to sunset.

3.6 DUST

The generation of respirable dust shall be kept to a minimal amount. A rule of thumb is that a visible cloud of dust will constitute an action limit. An engineering control may be employed, such as wetting the area with deionized or potable water, sprayed as a fine mist from a garden sprayer. In the unlikely event that engineering controls are unsuccessful, the IH department will be summoned to assess the situation and provide guidance.

3.7 ERGONOMICS

The interaction of personnel with the working environment may also present potential hazards at this site, such as incorrectly lifting heavy loads, equipment vibrations, improper body positioning, and negotiating physical obstacles when traversing ditches and brush. Personnel should always position themselves properly and lift from the legs when lifting equipment or heavy objects and should rely on the buddy system to assist in lifting loads greater than 50 pounds. *Back strain, the most common ergonomic hazard in the field, may be easily avoided, provided that the site workers ask for assistance when they need it.*

3.8 TRIPPING AND FALLING

Tripping and falling hazards will be present in all areas having uneven surface and wet grass. Rubber boots will be worn to improve traction on wet surfaces. Personnel will be

warned of those hazards and proper PPE requirements during daily briefings. Specific Hazards and controls are described below. An X in each indicates existing conditions or those that may be a result of site operations.

Task: **Sampling Groundwater**

3.9 PHYSICAL HAZARDS

- | | | |
|--|---|--|
| <input checked="" type="checkbox"/> Heat Stress | <input checked="" type="checkbox"/> Cold Stress | <input type="checkbox"/> Noise |
| <input type="checkbox"/> Confined Space | <input type="checkbox"/> Enclosed Space | <input type="checkbox"/> Heavy Lifting |
| <input checked="" type="checkbox"/> Tripping/Falling | <input type="checkbox"/> High Voltage | <input type="checkbox"/> High Pressure Water |
| <input type="checkbox"/> Oxygen Deficient | <input checked="" type="checkbox"/> Explosive/Flammable | <input type="checkbox"/> Vibration |

3.10 CONSTRUCTION HAZARDS

- | | | |
|-------------------------------------|-------------------------------------|--|
| <input type="checkbox"/> Trenching | <input type="checkbox"/> Excavating | <input type="checkbox"/> Heavy Equipment Op. |
| <input type="checkbox"/> Demolition | <input type="checkbox"/> High Work | <input type="checkbox"/> Welding/Cutting |
| <input type="checkbox"/> Ladders | <input type="checkbox"/> _____ | |

3.11 CHEMICAL HAZARDS

- | | | |
|---|--|---|
| <input type="checkbox"/> Organic Chemical | <input checked="" type="checkbox"/> Inorganic Chemical | <input type="checkbox"/> Carcinogen |
| <input checked="" type="checkbox"/> Corrosive | <input type="checkbox"/> Reactive | <input type="checkbox"/> OSHA Specific Substances |
| <input type="checkbox"/> Mutagen | <input type="checkbox"/> Teratogen | |

3.12 IONIZING RADIOLOGICAL HAZARDS

- | | |
|--|---|
| <input type="checkbox"/> Internal Exposure | <input checked="" type="checkbox"/> External Exposure |
|--|---|

3.13 NON-IONIZING RADIOLOGICAL HAZARDS

- | | | |
|--------------------------------|-----------------------------|------------------------------------|
| <input type="checkbox"/> UV | <input type="checkbox"/> RF | <input type="checkbox"/> Microwave |
| <input type="checkbox"/> Laser | | |

3.14 BIOLOGICAL/VECTOR HAZARDS

- | | | |
|--|---|--|
| <input checked="" type="checkbox"/> Wildlife | <input type="checkbox"/> Plants | <input type="checkbox"/> Medical Waste |
| <input type="checkbox"/> Bacterial | <input checked="" type="checkbox"/> Parasites | |

Location on site

Containment/Storage method: rad waste stored in carboy or barrelRadiation type: Alpha/Beta/GammaDose rate (maximum) * <3 mrem/h @ 30 cm
(average) * 0.1 mrem/hWorker dose limit: 20 mrem/dayContamination level: (fixed) * will be surveyed by HP prior to work beginning
(removable) * will be surveyed by HP prior to work beginningAirborne contamination concentration: * 0 μ Ci/mi

Water contamination potential?

* Yes No

Unrestricted airborne contamination release potential?

 Yes NoRadiation work permit required? A RWP may be required for sampling at some locations, as advised by Health PhysicsHealth Physics coverage: * Conditional

Special task operation requirements: Not Applicable (N/A)

Welding/cutting/grazing	<u>N/A</u>
Grinding/chipping	<u>N/A</u>
Hydraulic/air hammer operation	<u>N/A</u>
Dusty conditions (sweeping, vacuuming, etc.)	<u>N/A</u>
Equipment decontamination/free release	<u>N/A</u>

* **NOTE:** Area HP and IH shall survey the work area before initiation of new work area and set any additional requirements for zoning and PPE. Controls for tritium contamination will include the use of 2 pairs of latex (surgical) gloves and might include Tyvek suits as determined necessary to prevent skin contact. A splash shield will be present at the site but its need is not anticipated due to the low splash potential of the sampling operation.

3.15.5 Nonionizing Radiation

Tasks: Sampling groundwater

High-Voltage electrical transmission lines nearby?

 Yes NoLocation, distance and voltage: No overhead lines or underground utilities are present at sampling sites

Radio frequency radiation sources (AM and/or FM broadcast: towers, r-f sealers) nearby?

 Yes No

Location and distance: _____

Microwave sources in use on site? Yes No

Location and distance: _____

Lasers in use nearby? Yes No

Location and laser class: _____

Are workers potentially exposed to sunlight (ultraviolet radiation)? Yes No

Are ultrasound sources in use on site? Yes No

Location: _____

3.15.6 Electrical Hazards

Tasks: Sampling groundwater

Electrical shock hazard? Yes No

120 V Voltage
8 amps Current

Location of hazard: Portable generator

Precautions: A Ground-Fault Interrupter circuit will be used in conjunction with well-insulated electrical cord for all electrical connections.

3.15.7 Temperature Extremes

Tasks: Sampling groundwater

Temperature extremes (Hot/Cold)? Yes No

95 Average daily high temperature (during work shift) °F/°C

30 Average daily low temperature (during work shift) °F/°C

 Temperature WBGT °C (obtain from IH prior to daily activities, as necessary)

Work load:

- Light
- Moderate
- Heavy

Precautions (specify): The SSHO will contact IH for guidance/requirements. For hot conditions, the SSHO will establish appropriate work/rest regime. For cold weather, appropriate clothing and work schedules will be utilized

Cooling/heating equipment needed: As required by weather conditions

3.15.8 Noise

Tasks Sampling groundwater

Noise extremes?

 Yes No

Sound level: _____ dB(A)

Noise source(s): gasoline generator

Noise above 85 dB(A) (hearing protection required):

 Yes No

Precautions (specify): Monitoring by IH demonstrated noise is not a problem at distances greater than 1-foot from the generator. Personnel will be approximately 5 ft from the generator during routine operation

3.15.9 Vibration (not applicable)

Tasks _____

Precautions (specify): _____

3.15.10 SanitationTasks Sampling groundwater

Potable water required? Yes.

Non-potable water used? No.

Decontamination: buckets and water will be present at the sampling site for decontamination. Any materials in contact with groundwater (e.g., sampling tubing or pH electrodes) will be rinsed with water, wiped and frisked. Any contamination on personnel identified by frisking will be decontaminated using buckets and water. Because of the history of the site, the risk of chemical contamination is minute.

Eating, drinking, and smoking permitted? Drinking only.

Location: In areas designated by area HP

Toilet facilities required? Yes.

Location and number: In building 7831

Washing facilities required? No.

Location: _____

Change rooms required? No.

Specify: _____

3.15.11 IlluminationTasks Groundwater sampling

All tasks will be conducted during daylight hours.

Additional illumination needed?

 Yes No NA

3.15.12 Safety Hazards

Site posted information/notification required? Yes No NA

Site posting required? Yes No

Site guard required? Yes No NA

Access control required? Yes No

Entry/exit logs required? Yes No

Note: logging in by badge reader at entrance to SWSA, as well as additional logging as required by any RWP

Escape routing/posting required (include site map)? Yes No

Compressed gas cylinders? Yes No

Location: _____

Storage: _____

3.15.13 Biological Hazards

Insect and tick repellent will be used as appropriate. Cans of wasp spray will also be available in case needed.

Protective Clothing: () Encapsulating Suit (X) Tyvek*
 () Saranex () Splash suit
 () C-zone (X) Company Clothing (khakis)
 () Other

Head/eye/ear: () Hard Hat (X) Safety Glasses () Goggles
 (X) Splash Shield** () Ear Plugs () Other

Gloves: () Nitrile () Neoprene () PVC
 (X) Latex*** () Vinyl () Leather
 () Other

Footwear: (X) Steel-toed leather () Chemical overboots
 () Steel-toed rubber (X) Other rubber boots

Additional comments: Each new seep and each new well shall be initially evaluated by the HP/IH before sampling activities occur. Groundwater sample containers will be monitored at the HP office prior to leaving WAG 5 to determine that the samples do not exceed guidelines.

Modifications allowed: In accordance with RWP, if required.

* Tyvek suits might be required to work in known or suspected areas of tritium contamination.

** A splash shield will only be worn when dispensing acid as a sample preservative.

*** Latex surgical gloves will be worn in layers when working in areas of suspected radiological contamination.

5. MONITORING REQUIREMENTS

5.1 DIRECT READING INSTRUMENTS

	<u>Task(s)</u>	<u>Monitoring Frequency</u>	<u>Action Guidelines</u>
LEL Meter	<u>see note 1</u>	<u>prior to sampling</u>	<u>10% LEL</u>
O ₂ Meter	<u>_____</u>	<u>prior to sampling</u>	<u>> 22% O₂</u>
Colorimetric Indicator Tubes	<u>_____</u>	<u>prior to sampling</u>	<u>1/2 PEL</u>
Photoionization Detector (PID)	<u>see note 1</u>	<u>prior to sampling</u>	<u>5 ppm</u>
Flame Ionization Detector (FID)	<u>see note 1</u>	<u>prior to sampling</u>	<u>5 ppm</u>

Alpha and Beta/Gamma meters will be the primary monitoring instruments. Personnel and equipment will be frisked prior to exiting the sampling site and controlled access area. Radiological hazards are the only hazards anticipated, based on the history of the site and the results of previous sampling as noted in Sect. 1. Those hazards will be assessed using alpha and beta/gamma meters. Frisking will be conducted during sampling if there is reason to suspect contamination (e.g., a splash). If an activity of >100 cpm above background for beta-gamma and >20 dpm/100 cm² for alpha is detected, the HP will be contacted for further instructions.

Area Radiation Monitors	<u>_____</u>	<u>_____</u>	<u>_____</u>
Noise Meter	<u>_____</u>	<u>_____</u>	<u>85 dB(A)</u>
Other (PCM-113)	<u>_____</u>	<u>upon exiting</u>	<u>alarm</u>

5.2 PERSONAL MONITORING

Whole-body Dosimetry	<u>Sampling</u>	<u>at all times in field</u>	<u>_____</u>
Extremity Dosimetry	<u>_____</u>	<u>_____</u>	<u>_____</u>
Whole-body Count	<u>Sampling</u>	<u>prior to starting</u>	<u>IAW HP Manual</u>
Urinalysis/Bioassay	<u>Sampling</u>	<u>prior to starting</u>	<u>IAW HP Manual</u>
Chemical Air Sampling	<u>_____</u>	<u>Not required</u>	<u>_____</u>
Radiation Air Sampling	<u>_____</u>	<u>Not required</u>	<u>_____</u>

Instruments used by IH representative will be calibrated and maintained in accordance with IH Standard Operating Procedure, SOP-IH-25.1, Administration of the Instrument Calibration Program. Instruments used by the Office of Radiation Protection are calibrated and source checked in accordance with the ORNL Health Physics Manual, RP-1.6, Health Physics Instruments.

Note 1: Due to the history of the site and based on the results of previous monitoring of the groundwater at the site, the risk of chemical contamination is minute. Combustible gases have not been found when any of the wells were opened during previous samplings. If any other contaminants are detected by IH, sampling of that well will not occur until IH has evaluated the hazard by collecting a sample and identifying the chemical hazard.

NOTE: All persons exiting WAG 5 shall perform a half body frisk with the half-body monitor (PCM-113) in Building 7831.

6. DECONTAMINATION

The purpose of decontamination is to prevent contaminants that may be present on protective clothing and equipment from coming into contact with personnel as they un-suit. Also, decontamination protects workers from hazardous substances that may contaminate and eventually permeate the PPE used on site; it protects personnel by minimizing the transfer of harmful materials into clean areas. Combining decontamination with the correct sequential method of removing personal protective equipment will prevent exposure to personnel leaving the work areas as well as off-site migration of contaminants. Generally, decontamination is accomplished by starting with the most heavily contaminated item and progressing to the least contaminated item.

Personnel will remove any disposable PPE and dispose it in provided containers before leaving the radiological area. The Radiation Protection representative will assist the SSHO in establishing stations and sequence for doffing of PPE. Monitoring (frisking) of personnel and equipment prior to exiting contaminated areas will be conducted by the SSHO.

Upon job completion, all equipment will be surveyed by ORNL Radiation Protection and tagged accordingly. If contamination is detected on equipment, the equipment will be cleaned with a paper towel. Equipment that cannot be decontaminated will be bagged and disposed of in accordance with instructions from the Office of Radiation Protection representative.

Decontamination will also include contamination avoidance, which will include measures such as the use of disposable plastic to protect instrument surfaces and avoiding contact with contaminated equipment to the degree practical. Also the tubing in the well will be dedicated to that well and will not need decontamination. The hollow fiber filters used for the particle size separation will be placed in a plastic bag and brought back to the lab for cleaning and decontamination. All electrochemical probes such as pH meter probes, water level probes, etc. will be rinsed with DI water. This waste water will be collected in an appropriate container and disposed of as low level radioactive waste.

7. EMERGENCY PREPAREDNESS

A list of potential hazards is described in Section 3, and the controls for, and response to, those hazards attached as Appendix B.

The responsibility of day-to-day implementation of this information primarily lies with the SSHO. During an actual emergency response situation, the SSHO will serve as the Emergency Coordinator until the Laboratory Shift Superintendent or emergency response team arrives.

Medical assistance will be provided by the Health Division, which is located at Building 4500-North. The LSS will provide emergency response personnel and coordinate emergency assistance. The radio number for the LSS is Station 103. The telephone number for the LSS is 574-6606. In the event that the LSS is not available, emergency services may be reached at the telephone numbers shown below.

The SSHO will perform the following pre-emergency tasks before starting field activities and will coordinate emergency response with the LSS:

1. Locate nearest telephone and alarm station.
2. Confirm and post emergency telephone numbers.
3. Post site map of work areas marked with evacuation routes.
4. Inventory and check out on-site emergency equipment and supplies, as warranted.

In the event of an emergency that requires evacuation of the site, a verbal instruction will be given by the SSHO to evacuate the area. Personnel will exit to a predesignated support area. At this point, the SSHO will account for all personnel, ascertain information about the emergency, and advise further instructions to the on-site personnel. In all situations that require evacuation, personnel shall not reenter the work area until the conditions causing the emergency have been corrected, the hazard reassessed, the Work Plan and SSHP revised, approved, and reviewed with on-site personnel, and instructions given for re-entry.

The project personnel at the site will have a radio or cellular telephone available at the site to contact emergency personnel.

Emergency Personnel	Phone	Radio Number
ORNL Emergency Response	911	
Laboratory Shift Superintendent	574-6606	103
Fire Department	574-5678	
Medical Center	574-7431	
Security		
Industrial Hygiene	576-5064/576-1367	
Industrial Safety		
Radiation Protection	574-6700	
Environmental Compliance	574-8770	
Waste Management and Remedial Action	574-1779	

Name: Jennifer McDonaldBadge number: 623975Assigned tasks: sampling groundwater/ STL and SSHO

	<u>YES</u>	<u>NO</u>	<u>DATE</u>
40 hr. training:	X	<input type="checkbox"/>	<u>7/30/93</u>
24 hr. training:	X	<input type="checkbox"/>	<u>5/14/93</u>
Annual Refresher Training:	<input type="checkbox"/>	X	_____
Supervisor training:	X	<input type="checkbox"/>	<u>7/27/93</u>
Confined space entry training:	<input type="checkbox"/>	X	_____
Radiation worker:	X	<input type="checkbox"/>	<u>7/2/93</u>
Respirator fit tested/trained:	X	<input type="checkbox"/>	<u>7/30/93</u>
Medical Surveillance Program:	X	<input type="checkbox"/>	<u>8/1/93</u>
Other training:	<u>Site Safety and Health Officer Training (2/2/94)</u>		

Name: Lynn WebsterBadge number: 625335Assigned tasks: sampling groundwater

	<u>YES</u>	<u>NO</u>	<u>DATE</u>
40 hr. training:	<input type="checkbox"/>	X	_____
24 hr. training:	X	<input type="checkbox"/>	<u>5/14/93</u>
Annual Refresher Training:	<input type="checkbox"/>	X	_____
Supervisor training:	<input type="checkbox"/>	X	_____
Confined space entry training:	<input type="checkbox"/>	X	_____
Radiation worker:	X	<input type="checkbox"/>	<u>7/2/93</u>
Respirator fit tested/trained:	<input type="checkbox"/>	X	_____
Medical Surveillance Program:	X	<input type="checkbox"/>	<u>8/1/93</u>
Other training:	_____		

Name: Traci KnowlesBadge number: 624135Assigned tasks: sampling groundwater

	<u>YES</u>	<u>NO</u>	<u>DATE</u>
40 hr. training:	X	<input type="checkbox"/>	<u>2/17/94</u>
24 hr. training:	X	<input type="checkbox"/>	<u>5/14/93</u>
Annual Refresher Training:	<input type="checkbox"/>	X	_____
Supervisor training:	X	<input type="checkbox"/>	<u>12/13/94</u>
Confined space entry training:	<input type="checkbox"/>	X	_____
Radiation worker:	X	<input type="checkbox"/>	<u>5/21/93</u>
Respirator fit tested/trained:	X	<input type="checkbox"/>	<u>2/4/94</u>
Medical Surveillance Program:	X	<input type="checkbox"/>	<u>8/1/93</u>
Other training:	_____		

Name: Tony Thomas Badge number: 17401Assigned tasks: sampling groundwater

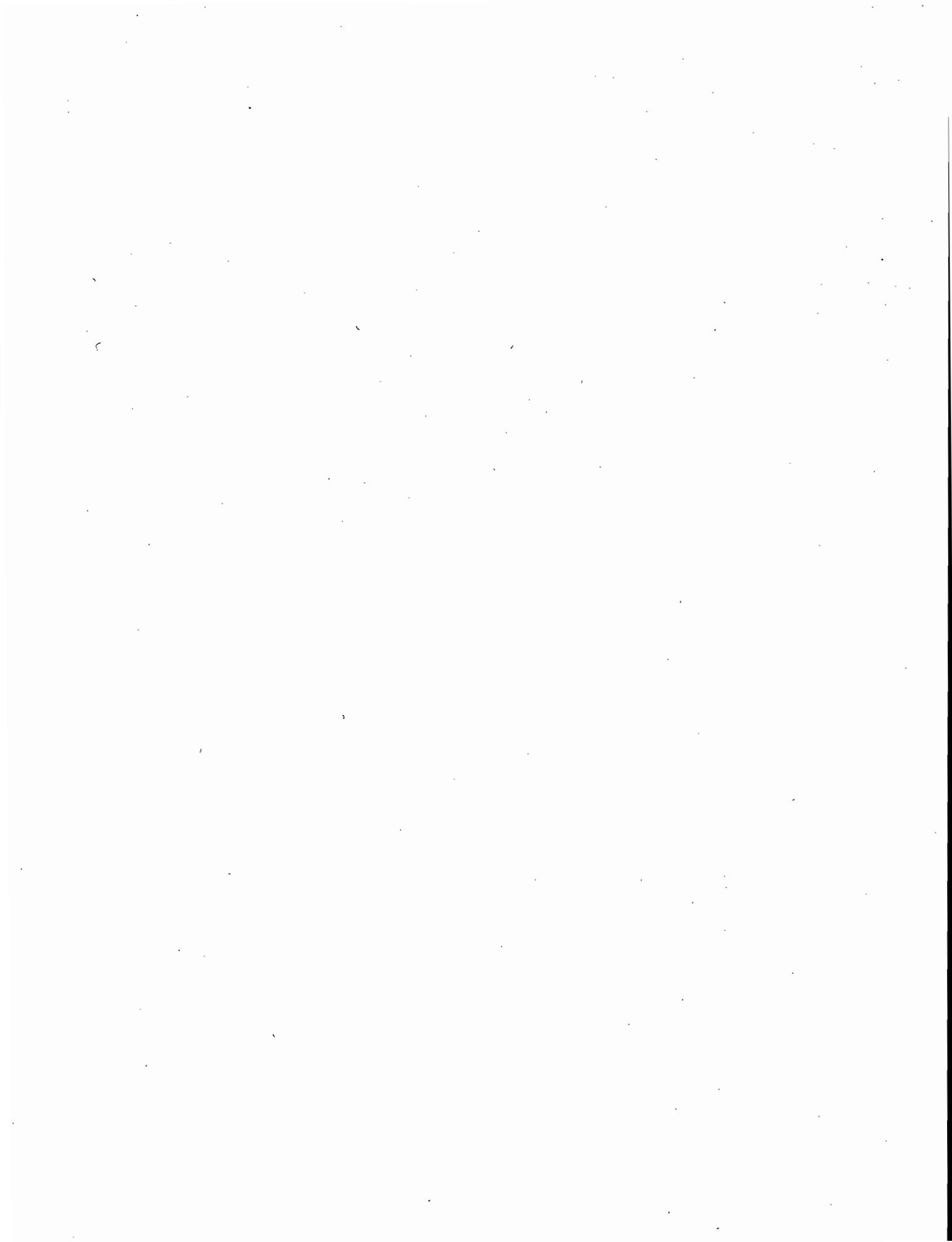
	<u>YES</u>	<u>NO</u>	<u>DATE</u>
40 hr. training:	X	<input type="checkbox"/>	<u>2/3/89</u>
24 hr. training:	X	<input type="checkbox"/>	<u>5/10/88</u>
Annual Refresher Training:	X	<input type="checkbox"/>	<u>7/19/93</u>
Supervisor training:	<input type="checkbox"/>	X	_____
Confined space entry training:	<input type="checkbox"/>	X	_____
Radiation worker:	X	<input type="checkbox"/>	<u>5/4/93</u>
Respirator fit tested/trained:	<input type="checkbox"/>	X	_____
Medical Surveillance Program:	X	<input type="checkbox"/>	<u>8/1/93</u>
Other training:	_____		

Name: Baohua Gu Badge number: 35300Assigned tasks: sampling groundwater

	<u>YES</u>	<u>NO</u>	<u>DATE</u>
40 hr. training:	<input type="checkbox"/>	<input type="checkbox"/>	_____
24 hr. training:	X	<input type="checkbox"/>	<u>5/14/93</u>
Annual Refresher Training:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Supervisor training:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Confined space entry training:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Radiation worker:	X	<input type="checkbox"/>	<u>7/30/93</u>
Respirator fit tested/trained:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Medical Surveillance Program:	X	<input type="checkbox"/>	<u>8/1/93</u>
Other training:	_____		

NOTE: All workers are on the ORNL Medical Surveillance Program. The HAZWOPER Program Coordinator will determine if workers need to be placed on the ORNL HAZWOPER Medical Surveillance Program.

APPENDIX A
WAG 5 Existing Data



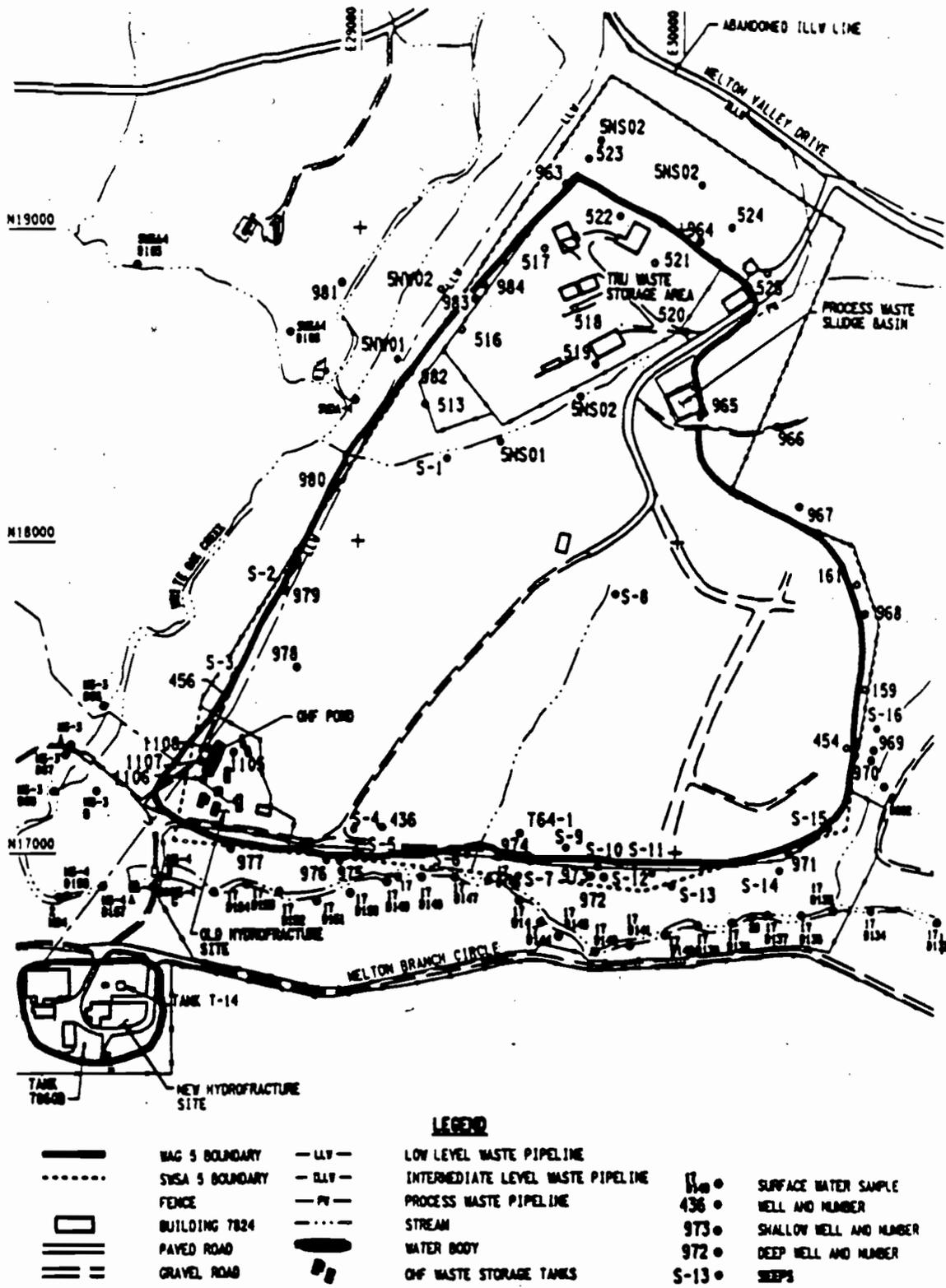


Fig. A-1. WAG 5 existing data locations.

APPENDIX B
Tasks, Hazards, and Controls

Table B-1. List of tasks, hazards, and controls

Task	Hazard	Control(s)
	Entry by unauthorized personnel	<ul style="list-style-type: none"> • Work-control zones.
	Ticks/chiggers	<ul style="list-style-type: none"> • Apply tick repellent in hot weather. • Visual inspection after site work.
	Snake bites	<ul style="list-style-type: none"> • Make noise. • Do not reach under objects. • Snake-bite kit.
	Sunburn	<ul style="list-style-type: none"> • Apply sunblock to exposed skin areas. • Use long sleeved clothing to cover other areas. • Limit exposure time.
	Slip, trip and fall	<ul style="list-style-type: none"> • Buddy system. • Visual observation. • Avoid uneven or slippery surfaces to the degree possible.
	Heat stress	<ul style="list-style-type: none"> • Fluid intake. • WBGT monitoring/work-rest cycles. • Rotate personnel. • Cool vests. • Core temperature monitoring. • Work during cooler times of day. • Visual observations.
	Cold stress	<ul style="list-style-type: none"> • Work-rest cycles. • Layering clothing. • Do not leave skin exposed to wind. • Observe buddy for signs of frostbite.
	Lighting	<ul style="list-style-type: none"> • Work during daylight hours.
GW sampling	Splash	<ul style="list-style-type: none"> • Turn off pump when changing filters. • Use plastic dispenser for acids.

Table B-1 (continued)

Task	Hazard	Control(s)
	Direct contact with acids or contaminated water	<ul style="list-style-type: none"> •Wear gloves and clothing resistant to the materials being handled.
	Inhalation of vapors	<ul style="list-style-type: none"> •Vent well for 5 min before sampling (if volatiles are present). •Monitor for contaminants and use respiratory protection as necessary.
	Lightning	<ul style="list-style-type: none"> •Visual observation. •Audible thunder. •Terminate field activities.
	Traffic	<ul style="list-style-type: none"> •Not a problem since the work is on controlled government property.
Filtering sample	Shock hazard from generator	<ul style="list-style-type: none"> •Use GFI pigtail or GFI circuit. •Avoid work in wet areas.
	Dripping hazardous liquids	<ul style="list-style-type: none"> •Place absorbent pads in area where drips are anticipated.
	Fire (gasoline)	<ul style="list-style-type: none"> •Fill generator before initial use. Let generator cool before refilling tank. •Use funnel to avoid direct contact between engine and fuel. •Bond gas can to engine. •Use safety can for gasoline.
	Manual lifting	<ul style="list-style-type: none"> •Seek help over 50 lb. •Use mechanical aids such as hand trucks or forklifts.

Table B-1 (continued)

Task	Hazard	Control(s)
Exiting site	Contamination spread from exclusion area	<ul style="list-style-type: none"> •Contamination avoidance measures. •Frisk before exiting. •Decontaminate if frisk indicates contamination is present. •Seal contaminated items in plastic bag if decontamination is not acceptable.
Emergencies	Splash to eyes	<ul style="list-style-type: none"> •Flush for 15 min (eyewash unit). •Seek medical assistance.
	Incipient stage fire	<ul style="list-style-type: none"> •Extinguish using fire extinguisher. •Extinguish using water or sand.
	Larger fire	<ul style="list-style-type: none"> •Withdraw and call fire department.
	Cuts	<ul style="list-style-type: none"> •Apply first aid to stabilize. Report to clinic. •Dispose of blood soaked items at clinic.
	Broken bones	<ul style="list-style-type: none"> •Stabilize with first aid and seek medical assistance.
	Spill of acid or gasoline	<ul style="list-style-type: none"> •Call emergency response team.

APPENDIX C
Material Safety Data Sheets

Martin Marietta Energy Systems, Inc.
Material Safety Data Sheet

----- 1. IDENTIFICATION -----

RECID: 00870 Version No: 3
CAS No: 007647-01-0 Version Date: 09/24/1993
Material Name: HYDROCHLORIC ACID

Synonyms:

- 1) AQUEOUS HYDROGEN CHLORIDE
- 2) EM SCIENCE CATALOG NUMBERS: HX0603, HX0603I, HX0603P, HX0603Y, HX0603T
- 3) EM SCIENCE CATALOG NUMBERS: HX0603TP, 314, 315, 317
- 4) EM SCIENCE HCL (APPROX. 37% IN WATER)
- 5) FISHER SCIENTIFIC CATALOG NUMBER: A144S212
- 6) FISHER SCIENTIFIC HYDROCHLORIC ACID, CONCENTRATED (36-37%)
- 7) HYDROCHLORIC ACID GAS
- 8) HYDROCHLORIC ACID, ANHYDROUS
- 9) JT BAKER PRODUCT CODES: 5800, 5214, 5575, 9543, 9530
- 10) JT BAKER PRODUCT CODES: 9538, 9537, 9535, 4800, 9542, 9534, 5537, 9549, 9529
- 11) JT BAKER PRODUCT CODES: 9547, 9546, 6900, 9536, 9540, 9539, 9548, 5367, 9544
- 12) LIQUID AIR CATALOG NUMBERS: 0039-3900, 0040-4000
- 13) MALLINCKRODT HYDROCHLORIC ACID, 37%
- 14) MURIATIC ACID
- 15) MURIATIC ACID, 23 DEG. BE

Status Information:	MSDS Type	MSDS Status	MSDS Available	Request Outstanding
	-----	-----	-----	-----
	D	A	Yes	No

Modification History:	Date of Entry	Date of Change	Last Modifier
	-----	-----	-----
	09/24/1993	09/24/1993	THI

Special Condition: N
HM Group Code: C
MMES Carcinogen: No or Not Yet Determined
RTECS Reproductive/
Developmental Effector: Yes

AVID No:	GSC0039-3900	GSC0040-4000
	LBCJT6900-5	LBCJT9530-33
	LBCMRJT9535-33	LBCMRJT 9535-33
	LBC6900-05	LBCJT9535-03
	LBCJT9530-0	LBCJT9534-6
	LBCJT9535-5	LBCJT9535-33

Stores No: 030011324 030011354 039507115 030011325

Pure Chemical: Yes
Chemical Formula: H-CL

Health Hazard Rating: 3, <HIGH HEALTH HAZARD>
CORROSIVE, IRRITANT

Fire Hazard Rating: 0, <NONCOMBUSTIBLE>

Reactivity Hazard Rating: 0, <NONREACTIVE>

EPA ID No: NISS

Physical Form: LIQUID, GAS

Use: ANALYTICAL REAGENT, CHEMICAL INTERMEDIATE
ACIDIFYING AGENT

RTECS No: MW4025000

Manufacturers:

- (Name, Address, Phone, FAX No, Contact)
- 1) ALDRICH CHEMICAL CO., INC.
P.O. BOX 355, MILWAUKEE, WI 53201
Phone: (414)273-3850, FAX: (414)273-4979
 - 2) E.M. SCIENCE, INC.
DIVISION OF EM INDUSTRIES
P.O. BOX 70, 480 DEMOCRAT RD
GIBBSTOWN, NJ 08027
Phone: (609)354-9200
Phone: (800)424-9300
 - 3) FISHER SCIENTIFIC CHEMICAL COMPANY
P.O. BOX 4829, 5775 PACIFIC DRIVE, NORCROSS, GA
30091
Phone: (404)449-5050
 - 4) J.T. BAKER CHEMICAL COMPANY
222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
Phone: EMERGENCY: (908)859-2151
Phone: 1-800-582-2537
 - 5) LIQUID AIR CORP.
ONE CALIFORNIA PLAZA, SUITE 350, 2121 N.
CALIFORNIA BLVD.,
WALNUT CREEK, CA 94596
Phone: (800)231-1366
 - 6) MATHESON CO.
P.O. BOX 85, EAST RUTHERFORD, NJ 07073
Phone: (201)933-2400
 - 7) MALLINCKRODT, INC.
PARIS BY-PASS, P.O. BOX M, PARIS, KY 40361-0305
Phone: (606)987-7000, EMERGENCY: (314)982-5000
 - 8) INFORMATION SUPPLIED BY ONCOR(R) MATERIAL SAFETY
DATA SHEETS.FOR ADDITIONAL DA

MSDS Listing:

MFR MSDS

MSDS

Used
To Modify

MFR No	Manufacturer Name	Prep Date	Rcvd Date	Tech Data
ALD	ALDRICH CHEMICAL CO., INC.	11/02/1989	03/19/1992	Yes
EMS	E.M. SCIENCE, INC.	10/27/1987	03/19/1992	Yes
FSCO	FISHER SCIENTIFIC CHEMICAL COMPANY	04/12/1991	06/25/1991	Yes
JTB	J.T. BAKER CHEMICAL COMPANY	03/09/1992	01/14/1993	No
LIQ	LIQUID AIR CORP.	10/01/1985	03/19/1992	Yes
MATH	MATHESON CO.	10/01/1985	03/19/1992	Yes
MKDT	MALLINCKRODT, INC.	09/10/1986	03/19/1992	Yes
ONCOR	ADDITIONAL DA	03/01/1989	03/19/1992	Yes

----- 2. PHYSICAL DATA -----

Material Description: COLORLESS, FUMING GAS OR CLEAR, COLORLESS FUMING LIQUID. SHARP, PUNGENT, SUFFOCATING ODOR. ANHYDROUS HCL GAS HYDROLYZES RAPIDLY TO LIQUID HCL.

Molecular Weight: 36.46

Density/Specific Gravity: 1.187 G/CC AT -121 DEG F, -85 DEG C FOR LIQUID; 1.00045 G/L FOR GAS

Vapor Density: 1.3 (AIR=1)

Vapor Pressure: 4 ATM AT 65 DEG F, 18 DEG C

Boiling Point: -121 DEG F, -85 DEG C

Melting Point: -173 DEG F, -114 DEG C

Freezing Point: NISS

Percent Volatiles: NISS

Solubility in Water: SOLUBLE

Evaporation Rate: NISS

----- 3. INGREDIENTS -----

Name: PURE CHEMICAL

RECID: CAS No: RTECS No:

Percent Comments:

RTECS Reprod Effector: No or Not Yet Determined

MMES Carcinogen:

Hazard Evaluation:

----- 4. FIRE AND EXPLOSION HAZARD DATA -----

Flash Point: NONFLAMMABLE

Autoignition: NONFLAMMABLE

Lower Flammability Limit: NONFLAMMABLE

Upper Flammability Limit: NONFLAMMABLE

Extinguishing Media: WATER SPRAY/FOG, DRY CHEMICAL, CARBON DIOXIDE, OR EXTINGUISHING MEDIA SUITABLE FOR SURROUNDING MATERIAL.

Firefighting Procedures: COOL CONTAINERS EXPOSED TO HEAT OR FLAMES WITH WATER FROM THE SIDES UNTIL WELL AFTER THE FIRE HAS BEEN EXTINGUISHED.
STAY AWAY FROM ENDS OF CONTAINERS.
REMOVE CONTAINERS FROM FIRE AREA IF POSSIBLE.
WEAR PRESSURE-DEMAND, SELF-CONTAINED BREATHING APPARATUS AND PROVIDE FULL FIRE DEPARTMENT PROTECTIVE GEAR AND CLOTHING.

Fire and Explosion Hazards: CLOSED CONTAINERS MAY EXPLODE WHEN EXPOSED TO EXTREME HEAT.
DO NOT GET WATER INSIDE CONTAINERS.
CONTACT WITH COMMON METALS PRODUCES HYDROGEN WHICH MAY FORM EXPLOSIVE MIXTURES IN AIR. HAZARDOUS DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, HYDROGEN, CHLORINE, OXIDES OF CHLORINE

----- 5. REACTIVITY DATA -----

Stability: STABLE
Shelf Life In Days:
Shelf Life Comments: NISS
Conditions to Avoid: AVOID EXPOSURE TO MOISTURE OR HEAT

Incompatible Materials:

CALCIUM CARBIDE
CESIUM ACETYLENE CARBIDE
CESIUM CARBIDE
DOWICIL 100
LITHIUM SILICIDE
MAGNESIUM BORIDE
MERCURIC SULFATE
RUBIDIUM ACETYLENE CARBIDE
RUBIDIUM CARBIDE
SODIUM
WATER
GASES, OXIDANTS, BASE METALS
IN THE PRESENCE OF MOISTURE, HYDROGEN CHLORIDE WILL CORRODE MOST METALS AND FORM FLAMMABLE HYDROGEN GAS. REACTS VIOLENTLY WITH ALKALIES.

Incompatible Materials Comments:

Hazardous Polymerization: WILL NOT OCCUR

Combustion and Decomposition Products:

HYDROGEN CHLORIDE, HYDROGEN GAS, CHLORINE, OXIDES OF CHLORINE

Combustion and Decomposition Products Comments:

----- 6. HEALTH HAZARD DATA -----

OSHA Standards: CEILING 5 PPM OR 7 MG/CU M

ACGIH TLV: CEILING 5 PPM OR 7.5 MG/CU M (1992-93)

NIOSH Recommendation: NE

Immediately Dangerous to Life & Health: 100 PPM

Other Exposure Limits: NISS

Acute Inhalation: SEVERE IRRITATION AND/OR CHEMICAL BURNS TO NOSE AND UPPER AND LOWER RESPIRATORY TRACT, LACRIMATION, COUGH, LABORED BREATHING. NECROSIS OF RESPIRATORY TRACT TISSUES, LUNG INJURY, CHEMICAL PNEUMONITIS, PULMONARY EDEMA. CIRCULATORY SYSTEM COLLAPSE.

Acute Swallowing: HARMFUL AND MAY BE FATAL. CAUSES SEVERE CHEMICAL BURNS TO MOUTH AND STOMACH. MAY CAUSE NAUSEA AND VOMITING.

Acute Skin Absorption: NISS

Acute Skin Contact: RAPIDLY CAUSES CHEMICAL BURNS, LESIONS, SCARRING, EARLY NECROSIS.

Acute Eye Contact: RAPIDLY CAUSES CHEMICAL BURNS, LESIONS, POSSIBLE LOSS OF VISION.

Chronic Effects: CORROSION OF TEETH.

Target Organs/Systems: NISS

Inhalation Emergency: REMOVE TO FRESH AIR AND GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL AID.

Swallowing Emergency: DO NOT INDUCE VOMITING. DILUTE STOMACH CONTENT WITH LARGE AMOUNT OF WATER OR MILK. GET MEDICAL AID.

Skin Contact Emergency: REMOVE CONTAMINATED CLOTHING AND RINSE SKIN WITH RUNNING WATER FOR AT LEAST 15 MINUTES. GET MEDICAL AID.

Eye Contact Emergency: FLUSH EYES AT ONCE WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL AID.

Physicians Notes: NISS

Aggravated Conditions: PERSONS WITH IMPAIRED PULMONARY FUNCTION OR SKIN DISEASES MAY BE AT AN INCREASED RISK.

Carcinogenicity: NISS

The MMES Carcinogen Control Program includes human, human suspect, and confirmed animal carcinogens. [See MMES Carcinogen: (Yes/No or Not Yet Determined) in Section 1.] Chemicals and compounds in concentration of 0.1% or greater are subject to the guidelines set forth in the MMES Carcinogen Control program. Substitution with a non-carcinogen should be made if feasible.

Genotoxicity: NISS

Reproductive/Developmental
Toxicity: NISS

This section reflects materials listed in the Registry of Toxic Effects of Chemical Substances that have positive reproductive effects data for at least one mammalian species. Such effects may include paternal, maternal, fertility, embryo/fetus, neonatal, developmental abnormalities or tumorigenesis. An entry does not automatically imply that the substance is hazardous for common use. A hazard determination is generally required.

----- 7. SPILL LEAK AND DISPOSAL INFORMATION -----

Spill or Leak Emergency:

SUMMON HELP IMMEDIATELY.
Y-12: SHIFT SUPERINTENDENT, 4-7172 OR 911
X-10: SHIFT SUPERVISOR, 4-6606 OR 911
K-25: SHIFT SUPERVISOR, 4-3282 OR 911
PADUCAH: SHIFT SUPERVISOR, BELL-6211, PAX-511
MINIMIZE THE SPILL OR RELEASE IF YOU CAN DO SO SAFELY.
EVACUATE THE AREA.

Disposal Procedure:

Y-12: TRANSFER STORAGE OR DISPOSAL OF WASTE PROCEDURE 70-903, DISPOSAL OF HAZARDOUS MATERIALS. FOR MORE INFORMATION, CONTACT THE WASTE DISPOSAL DEPARTMENT, 6-7768.
X-10: WASTE, TRANSPORTATION, STORAGE, AND DISPOSAL MANUAL, EPM-8.0, FORM UCN-13696. FOR MORE INFORMATION, CONTACT THE DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, 4-7467.
K-25: SPP-4600, FORM UCN-12463. FOR MORE INFORMATION, CONTACT THE WASTE MANAGEMENT DIVISION, 4-8214.
PADUCAH: ESH-28, FORM UCN-12463A. FOR MORE INFORMATION, CONTACT THE WASTE MANAGEMENT DEPARTMENT, PAX-401 OR BELL-6319.

----- 8. SPECIAL PROTECTION INFORMATION -----

Respirators:

RESPIRATORS MAY BE REQUIRED WHEN USING THIS MATERIAL.
CONTACT THE INDUSTRIAL HYGIENE DEPARTMENT FOR MORE INFORMATION.

Ventilation:

CONDITIONS, QUANTITIES, AND OTHER FACTORS DETERMINE VENTILATION REQUIREMENTS. IF THERE ARE UNCERTAINTIES, CONTACT THE INDUSTRIAL HYGIENE DEPARTMENT.

Gloves:

WEAR CHEMICAL-RESISTANT GLOVES WHEN HANDLING LINES AND EQUIPMENT CONTAINING HYDROGEN CHLORIDE.

Eye Protection:

WEAR FACE SHIELD AND CHEMICAL WORKERS GOGGLES.

Other Protective Equipment:

SAFETY SHOES, SAFETY SHOWER, EYEWASH FOUNTAINS.
HAVE POSITIVE-PRESSURE, SELF-CONTAINED BREATHING

APPARATUS READILY AVAILABLE. HAVE AN EMERGENCY PLAN COVERING STEPS TO BE TAKEN IN THE EVENT OF AN ACCIDENTAL RELEASE. USE ONLY IN WELL-VENTILATED AREAS.

Impurities, By-Products,
Contaminants: NISS

----- 9. SPECIAL HANDLING, STORING, PACKAGING -----

STORE IN COOL, DRY, WELL-VENTILATED AREA. KEEP AWAY FROM INCOMPATIBLES. PROTECT FROM PHYSICAL DAMAGE. DO NOT ALLOW TEMPERATURE WHERE CYLINDERS ARE STORED TO EXCEED 130 DEG F (54 DEG C). USE SUITABLE HAND TRUCK FOR CYLINDER MOVEMENT. SHIPPED AS A LIQUIFIED GAS UNDER ITS OWN VAPOR PRESSURE. BEFORE USING THE GAS: 1. SECURE THE CYLINDER TO PREVENT IT FROM FALLING OR BEING KNOCKED OVER. 2. INSTALL CHECK VALVES OR TRAPS TO PREVENT SUCKBACK INTO THE CYLINDER. 3. LEAK CHECK THE LINES AND EQUIPMENT.

----- 10. TRANSPORTATION DATA -----

DOT Information: (Name, Class, Label, Number)

- 1) HYDROGEN CHLORIDE
NONFLAMMABLE GAS
NONFLAMMABLE GAS; CORROSIVE, SOLUTION
UN1050
- 2) HYDROCHLORIC ACID
CORROSIVE MATERIAL
NONFLAMMABLE GAS; CORROSIVE, SOLUTION
UN1789
- 3) HYDROGEN CHLORIDE, REFRIGERATED LIQUID
CORROSIVE MATERIAL
NONFLAMMABLE GAS; CORROSIVE, SOLUTION
UN1789
- 4) HYDROGEN CHLORIDE, ANHYDROUS
CORROSIVE MATERIAL
NONFLAMMABLE GAS; CORROSIVE, SOLUTION
UN1789

Reportable Quantity: NISS

- References:
- RTECS, REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (DATABASE). NATIONAL LIBRARY OF MEDICINE, BETHESDA MD.
 - FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS, 9TH ED., NATIONAL FIRE PROTECTION ASSOCIATION, BOSTON MA, 1986.
 - MATERIAL SAFETY DATA SHEETS (MSDS) PROVIDED BY MANUFACTURERS.
 - HSDB, HAZARDOUS SUBSTANCES DATA BANK (DATA BASE), NATIONAL LIBRARY OF MEDICINE, BETHESDA MD, 1990.
 - IRVIN N. SAX. DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS; 6TH ED., VAN NOSTRAND REINHOLD COMPANY,

NEW YORK, NY, 1984.

- 1984 EMERGENCY RESPONSE GUIDEBOOK. GUIDEBOOK FOR HAZARDOUS MATERIALS INCIDENTS, DEPARTMENT OF TRANSPORTATION.
- BAKER, C.J. THE FIREFIGHTER'S HANDBOOK OF HAZARDOUS MATERIALS 4TH ED., 1984. MALTESE ENTERPRISES, INC., INDIANAPOLIS IN 46231.
- HANDLING CHEMICALS SAFELY 1980, 2ND ED., DUTCH ASSOCIATION OF SAFETY EXPERTS, THE DUTCH CHEMICAL INDUSTRY ASSOCIATION AND THE DUTCH SAFETY INSTITUTE, 1980.
- SCIENTIFIC REVIEW COMMITTEE FOR MSDS

WARNING: THE INFORMATION CONTAINED HEREON IS INTENDED SOLELY FOR THE USE OF EMPLOYEES OF MARTIN MARIETTA ENERGY SYSTEMS, INC. THE INFORMATION IS NOT INTENDED TO BE A DEFINITIVE STATEMENT OF ALL HAZARDS ASSOCIATED WITH SAID MATERIAL OR ALL METHODS OF COUNTERACTING HUMAN EXPOSURE TO SAME. USERS ARE CAUTIONED TO PROCEED WITH DUE CARE IN THE HANDLING, STORING AND DISPOSAL OF THIS MATERIAL AND TO SEEK FURTHER INFORMATION REGARDING PARTICULAR APPLICATIONS AS REQUIRED.

MARTIN MARIETTA ENERGY SYSTEMS, INC.

P.O. BOX 2008
BLDG. 3550, MS 6291
OAK RIDGE, TENNESSEE 37831
PHONE: 615-574-0784
FAX: 615-576-6087

Martin Marietta Energy Systems, Inc.
Material Safety Data Sheet

----- 1. IDENTIFICATION -----

RECID: 00351 Version No: 3
CAS No: 007664-93-9 Version Date: 09/14/1993
Material Name: SULFURIC ACID, >40%

Synonyms:

- 1) BOV
- 2) CHEMETRICS PHOSPHATE CHEMETS(R) AND VACU-VIALS(R)
- 3) CHEMETRICS SILICA ACTIVATOR SOLUTION
- 4) DIPPING ACID
- 5) DISULFURIC ACID
- 6) EM SCIENCE CATALOG NUMBERS: 14771, 14773
- 7) EM SCIENCE CATALOG NUMBERS: SX1242, SX1244, SX1244I, SX1244PC, SX1244Y, #714
- 8) FISHER SCIENTIFIC CATALOG NUMBER: A300S212
- 9) HARCROS SULFURIC ACID 66BE BDY
- 10) HYDROGEN SULFATE
- 11) IPC MULE KICK LIQUID DRAIN CLEANER
- 12) JT BAKER PRODUCT CODES: 4802, 9691, 9674, 9676, 5340, 5137, 9673, 5432, 9688
- 13) JT BAKER PRODUCT CODES: 9677, 9696, 5253
- 14) JT BAKER PRODUCT CODES: 9684, 9681, 6902, 5643, 9693, 9679, 9680, 9686
- 15) JT BAKER PRODUCT CODES: 9687, 5802, 5374, 9694, 9683, 9675, 5030, 9682, 9685
- 16) JT BAKER PRODUCT CODES: 9705, 9699, 9703, 5691
- 17) LEEMAN LABS CATALOG NUMBER: 602-0006
- 18) MATTING ACID
- 19) MICROQUANT(R) AND SPECTROQUANT(R) NITRATE REAGENT NO. 2
- 20) NORDHAUSEN ACID
- 21) OIL OF VITRIOL
- 22) SPENT SULFURIC ACID
- 23) SULFURIC ACID SOLUTION 19.2N
- 24) SULFURIC ACID, 100%
- 25) SULFURIC ACID, 40-50%
- 26) SULFURIC ACID, 50-70%
- 27) SULFURIC ACID, 60 DEG BE
- 28) SULFURIC ACID, 66 DEG BE
- 29) SULFURIC ACID, 77-99%
- 30) SULFURIC ACID, 93%
- 31) SULFURIC ACID, 95%
- 32) SULFURIC ACID, 96%
- 33) SULFURIC ACID, 98%
- 34) SULFURIC ACID, 99%
- 35) SULFURIC ACID, SPENT
- 36) SULPHURIC ACID
- 37) VITRIOL BROWN OIL

Status Information:	MSDS Type	MSDS Status	MSDS Available	Request Outstanding
	----- D	----- A	----- Yes	----- No

Modification History:	Date of Entry	Date of Change	Last Modifier
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	----- 09/13/1993	----- 09/14/1993	----- THI
Special Condition:	N		
HM Group Code:	D		
MMES Carcinogen:	Yes		In Mist Form Only
RTECS Reproductive/ Developmental Effector:	Yes		
AVID No:	LBC4802-4 LBCMRJT9681-33 LBC9681-33 LBCJT4802-5 LBCEM-SX1244PC-1 LBCJT9681-5	LBCMR-009 LBCJT9673-0 LBC4802 LBC6902-05 LBCJT9681-4 LBC9673-00	
Stores No:	030017212	030017257	330017257 030017258
Pure Chemical:	Yes		
Chemical Formula:	H2-O4-S		
Health Hazard Rating:	4, <EXTREME HEALTH HAZARD> HUMAN CARCINOGEN, CORROSIVE, IRRITANT		
Fire Hazard Rating:	0, <NONCOMBUSTIBLE>		
Reactivity Hazard Rating:	2, <MODERATELY REACTIVE>		
EPA ID No:	NISS		
Physical Form:	LIQUID		
Use:	MANUFACTURE OF FERTILIZERS, EXPLOSIVES, DYESTUFFS; MANUFACTURE OF OTHER ACIDS; PURIFICATION OF PETROLEUM; PICKLING OF METALS; DILUTE ACID IN GASTRIC HYPOACIDITY (MEDICINE)		
RTECS No:	WS5600000		
Manufacturers:	(Name, Address, Phone, FAX No, Contact)		
	1) CHEMETRICS, INC. ROUTE 28 CALVERTON, VIRGINIA 22016 Phone: (703) 788-9026		
	2) E.M. SCIENCE, INC. DIVISION OF EM INDUSTRIES P.O. BOX 70, 480 DEMOCRAT RD GIBBSTOWN, NJ 08027 Phone: (609)354-9200 Phone: (800)424-9300		
	3) FISHER SCIENTIFIC CHEMICAL COMPANY P.O. BOX 4829, 5775 PACIFIC DRIVE, NORCROSS, GA 30091 Phone: (404)449-5050		
	4) INDUSTRIAL PETROLIC CORPORATION		

20-45 128TH STREET
COLLEGE POINT, NY
11356
Phone: 718-445-7900

- 5) J.T. BAKER CHEMICAL COMPANY
222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
Phone: EMERGENCY: (908)859-2151
Phone: 1-800-582-2537
- 6) SIGMA CHEMICAL CO.
P.O. BOX 14508, ST. LOUIS, MO 63178
Phone: (800)325-5832, EMERGENCY: (314)771-5765
(CALL COLLECT)
- 7) TENNESSEE CHEMICAL COMPANY
3475 LENOX RD. NE, SUITE 670, ATLANTA, GA 30326
Phone: (404)233-6811

MSDS Listing:

MFR No	Manufacturer Name	MFR MSDS Prep Date	MSDS Rcvd Date	Used To Modify Tech Data
CHEMET	CHEMETRICS, INC.		02/16/1993	No
EMS	E.M. SCIENCE, INC.	04/14/1988	03/19/1992	Yes
FSCO	FISHER SCIENTIFIC CHEMICAL COMPANY	05/18/1990	03/19/1992	Yes
IPTC	INDUSTRIAL PETROLIC CORPORATION	11/05/1986	03/19/1992	No
JTB	J.T. BAKER CHEMICAL COMPANY	03/09/1992	12/21/1992	No
SIGMA	SIGMA CHEMICAL CO.	07/18/1986	03/19/1992	Yes
TENN	TENNESSEE CHEMICAL COMPANY	07/19/1989	03/19/1992	Yes

----- 2. PHYSICAL DATA -----

Material Description: COLORLESS TO DARK BROWN OILY LIQUID, ODORLESS,
SOUR TASTE. ATTACKS MANY METALS RELEASING
HYDROGEN, VERY HYGROSCOPIC.

Molecular Weight: 98.07

Density/Specific Gravity: 1.84 G/CC FOR CONCENTRATE

Vapor Density: 3.4 FOR CONCENTRATE (AIR=1)

Vapor Pressure: <0.3 AT 77 DEG F, 25 DEG C FOR CONCENTRATE (AIR=1)

Boiling Point: 554 DEG F, 290 DEG C FOR CONCENTRATE

Melting Point: 50 DEG F, 10 DEG C FOR ANHYDROUS ACID

Freezing Point: 37 DEG F, 3 DEG C FOR CONCENTRATE

Percent Volatiles: NISS

Solubility in Water: SOLUBLE

Evaporation Rate: <1 FOR CONCENTRATE (BUTYL ACETATE=1)

----- 3. INGREDIENTS -----

Name: PURE CHEMICAL
 RECID: CAS No: RTECS No:
 Percent Comments:
 RTECS Reprod Effector: No or Not Yet Determined
 MMES Carcinogen:
 Hazard Evaluation:

----- 4. FIRE AND EXPLOSION HAZARD DATA -----

Flash Point: NONFLAMMABLE
 Autoignition: NONFLAMMABLE
 Lower Flammability Limit: NONFLAMMABLE
 Upper Flammability Limit: NONFLAMMABLE
 Extinguishing Media: FIRES INVOLVING SMALL AMOUNT OF COMBUSTIBLES MAY BE SMOTHERED WITH SUITABLE DRY CHEMICAL. USE WATER ON COMBUSTIBLES BURNING IN VICINITY OF THIS MATERIAL BUT USE CARE AS WATER APPLIED DIRECTLY TO THIS ACID RESULTS IN EVOLUTION OF HEAT AND CAUSES SPLATTERING.
 Firefighting Procedures: DO NOT APPLY WATER ON MATERIAL ITSELF, AN ADVERSE REACTION IS POSSIBLE. USE FLOODING QUANTITIES OF WATER AS A FOG TO COOL ALL CONTAINERS INVOLVED IN FIRE. APPLY WATER FROM AS FAR A DISTANCE AS POSSIBLE. WEAR PRESSURE-DEMAND, SELF-CONTAINED BREATHING APPARATUS AND CHEMICAL PROTECTIVE SUIT.
 Fire and Explosion Hazards: NEGLIGIBLE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD. IGNITES COMBUSTIBLE MATERIAL ON CONTACT. REACTS WITH MOST METALS TO PRODUCE HYDROGEN GAS, WHICH CAN FORM AN EXPLOSIVE MIXTURE WITH AIR.

----- 5. REACTIVITY DATA -----

Stability: UNSTABLE
 Shelf Life In Days:
 Shelf Life Comments: NISS
 Conditions to Avoid: VIOLENT REACTION WITH MOISTURE.
 Incompatible Materials:

ACETIC ANHYDRIDE, ACETONE CYANOHYDRIN, ACETONE AND POTASSIUM DICHROMATE, ACETONITRILE, ACROLEIN, ACRYLONITRILE, ALCOHOLS AND HYDROGEN PEROXIDE, ALLYL ALCOHOL, ALLYL CHLORIDE, 2-AMINOETHANOL, AMMONIUM HYDROXIDE, AMMONIUM TRIPERCHROMATE, ANILINE, BROMATES, BROMINE PENTAFLUORIDE, N-BUTYRALDEHYDE, CARBIDES, CESIUM ACETYLENE CARBIDE, CHLORATES, CHLORINE TRIFLUORIDE, CHLOROSULFONIC ACID, CUPROUS NITRIDE, DIISOBUTYLENE, DIMETHYLBENZYL CARBINOL, HYDROGEN PEROXIDE, EPICHLOROHYDRIN, ETHYLENE CYANOHYDRIN, ETHYLENE DIAMINE, ETHYLENE GLYCOL, ETHYLENIMINE, FULMINATES, HYDROFLUORIC ACID, IODINE HEPTAFLUORIDE, INDANE AND NITRIC ACID, IRON, ISOPRENE, LITHIUM SILICIDE, MERCURIC NITRIDE, MESITYL OXIDE, METALS (POWDERED), NITRIC ACID AND GLYCERIDES, P-NITROTOLUENE, PENTASILVER TRIHYDROXYDIAMINOPHOSPHATE, PERCHLORATES,

PERCHLORIC ACID, PERMANGANATES AND BENZENE,
 1-PHENYL-2-METHYL-PROPYL ALCOHOL AND HYDROGEN PEROXIDE, PHOSPHORUS,
 PHOSPHORUS ISOCYANATE, PICRATES, POTASSIUM TERT-BUTOXIDE, POTASSIUM CHLORATE,
 POTASSIUM PERMANGANATE, POTASSIUM CHLORIDE,
 BETA-PROPIOLACTONE, PROPYLENE OXIDE, PYRIDINE, RUBIDIUM ACETYLENE CARBIDE,
 SILVER PERMANGANATE, SODIUM, SODIUM CARBONATE, SODIUM CHLORATE, SODIUM
 HYDROXIDE, STEEL, STYRENE MONOMER, TOLUENE AND NITRIC ACID, VINYL ACETATE,
 ZINC CHLORATE

Incompatible Materials Comments:

NISS

Hazardous Polymerization: WILL NOT OCCUR

Combustion and Decomposition Products:

THERMAL DECOMPOSITION PRODUCTS INCLUDE HIGHLY TOXIC FUMES OF SULFUR OXIDES.

Combustion and Decomposition Products Comments:

NISS

----- 6. HEALTH HAZARD DATA -----

OSHA Standards: TWA 1 MG/CU M

ACGIH TLV: TWA 1 MG/CU M, STEL 3 MG/CU M (1992-93)

NIOSH Recommendation: 10-HR TWA 1 MG/CU M

Immediately Dangerous to
 Life & Health: 80 MG/CU M

Other Exposure Limits: NISS

Acute Inhalation: INHALATION OF MIST OR VAPOR CAUSES NOSE AND THROAT
 IRRITATION, COUGH, AND/OR CHEMICAL BURNS TO
 RESPIRATORY TRACT. DELAYED SYMPTOMS MAY INCLUDE
 PULMONARY EDEMA, TIGHTNESS IN CHEST, CYANOSIS,
 HYPOTENSION, BRONCHITIS, OR EMPHYSEMA.

Acute Swallowing: INGESTION OF CONCENTRATED ACID CAUSES SEVERE
 CHEMICAL BURNS TO MOUTH, THROAT, AND ABDOMEN
 FOLLOWED BY VOMITING AND DIARRHEA OF DARK
 PRECIPITATED BLOOD. ASPHYXIA MAY OCCUR FROM
 SWELLING OF THE THROAT. PERFORATION OF THE
 ESOPHAGUS AND STOMACH MAY OCCUR. MAY HAVE
 ADVERSE EFFECT ON KIDNEY FUNCTION AND MAY BE
 FATAL.

Acute Skin Absorption: NISS

Acute Skin Contact: SKIN CONTACT WITH CONCENTRATED ACID CAUSES SEVERE
 CHEMICAL BURNS.

Acute Eye Contact: DIRECT CONTACT WITH CONCENTRATED ACID CAUSES
 CHEMICAL BURNS WITH POSSIBLE SEVERE DAMAGE,
 OFTEN LEADING TO BLINDNESS. DILUTE SOLUTIONS
 PRODUCE MORE TRANSIENT EFFECTS FROM WHICH

RECOVERY MAY BE COMPLETE.

Chronic Effects: PROLONGED OR REPEATED INHALATION OF MIST OR VAPOR MAY CAUSE BRONCHITIS, IMPAIRMENT OF LUNG FUNCTION AND PERMANENT LUNG DAMAGE WITH EPITHELIAL HYPERPLASIA AND THICKENING OF THE BRONCHIOLAR WALLS. INHALATION OF MIST MAY ALSO PRODUCE ETCHING OF THE DENTAL ENAMEL FOLLOWED BY EROSION OF THE ENAMEL WITH LOSS OF TOOTH SUBSTANCE.

Target Organs/Systems: NISS

Inhalation Emergency: REMOVE TO FRESH AIR AND GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL AID.

Swallowing Emergency: DO NOT INDUCE VOMITING. DILUTE STOMACH CONTENT WITH LARGE AMOUNT OF WATER OR MILK. GET MEDICAL AID.

Skin Contact Emergency: REMOVE CONTAMINATED CLOTHING AND RINSE SKIN WITH RUNNING WATER FOR AT LEAST 15 MINUTES. GET MEDICAL AID.

Eye Contact Emergency: FLUSH EYES AT ONCE WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL AID.

Physicians Notes: NISS

Aggravated Conditions: NISS

Carcinogenicity: SUFFICIENT EVIDENCE FOR CARCINOGENICITY IN HUMANS. (IARC 1992)

The MMES Carcinogen Control Program includes human, human suspect, and confirmed animal carcinogens. [See MMES Carcinogen: (Yes/No or Not Yet Determined) in Section 1.] Chemicals and compounds in concentration of 0.1% or greater are subject to the guidelines set forth in the MMES Carcinogen Control program. Substitution with a non-carcinogen should be made if feasible.

Genotoxicity: NISS

Reproductive/Developmental Toxicity: NISS

This section reflects materials listed in the Registry of Toxic Effects of Chemical Substances that have positive reproductive effects data for at least one mammalian species. Such effects may include paternal, maternal, fertility, embryo/fetus, neonatal, developmental abnormalities or tumorigenesis. An entry does not automatically imply that the substance is hazardous for common use. A hazard determination is generally required.

----- 7. SPILL LEAK AND DISPOSAL INFORMATION -----

Spill or Leak Emergency:

SUMMON HELP IMMEDIATELY.
Y-12: SHIFT SUPERINTENDENT, 4-7172 OR 911

X-10: SHIFT SUPERVISOR, 4-6606 OR 911
 K-25: SHIFT SUPERVISOR, 4-3282 OR 911
 PADUCAH: SHIFT SUPERVISOR, BELL-6211, PAX-511
 MINIMIZE THE SPILL OR RELEASE IF YOU CAN DO SO SAFELY.
 EVACUATE THE AREA.

Disposal Procedure:

Y-12: TRANSFER STORAGE OR DISPOSAL OF WASTE PROCEDURE 70-903, DISPOSAL OF HAZARDOUS MATERIALS. FOR MORE INFORMATION, CONTACT THE WASTE DISPOSAL DEPARTMENT, 6-7768.

X-10: WASTE, TRANSPORTATION, STORAGE, AND DISPOSAL MANUAL, EPM-8.0, FORM UCN-13696. FOR MORE INFORMATION, CONTACT THE DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, 4-7467.

K-25: SPP-4600, FORM UCN-12463. FOR MORE INFORMATION, CONTACT THE WASTE MANAGEMENT DIVISION, 4-8214.

PADUCAH: ESH-28, FORM UCN-12463A. FOR MORE INFORMATION, CONTACT THE WASTE MANAGEMENT DEPARTMENT, PAX-401 OR BELL-6319.

----- 8. SPECIAL PROTECTION INFORMATION -----

Respirators:

RESPIRATORS MAY BE REQUIRED WHEN USING THIS MATERIAL. CONTACT THE INDUSTRIAL HYGIENE DEPARTMENT FOR MORE INFORMATION.

Ventilation:

CONDITIONS, QUANTITIES, AND OTHER FACTORS DETERMINE VENTILATION REQUIREMENTS. IF THERE ARE UNCERTAINTIES, CONTACT THE INDUSTRIAL HYGIENE DEPARTMENT.

Gloves:

WEAR CHEMICAL-RESISTANT GLOVES. CONSULT MANUFACTURER FOR SPECIFIC TYPE OF GLOVE FOR PROTECTION AGAINST THIS SUBSTANCE.

Eye Protection:

WEAR FACESHIELD (8 INCH MINIMUM) AND/OR VENTED SAFETY GOGGLES.

Other Protective Equipment:

DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR OR MIST. DO NOT ADD WATER TO ACID. WEAR RUBBER SUIT, RUBBER BOOTS, AND HARD HAT. DO NOT SMOKE IN AREA OF USE OR IN STORAGE AREA.

Impurities, By-Products,
 Contaminants:

NISS

----- 9. SPECIAL HANDLING, STORING, PACKAGING -----

PROTECT AGAINST PHYSICAL DAMAGE AND WATER. SEPARATE FROM COMBUSTIBLE MATERIAL. PREVENT HYDROGEN GAS BUILD-UP. SMOKING, FLAMES, AND SPARKS SHOULD NOT BE PERMITTED IN STORAGE AREA. DO NOT ALLOW WATER TO ENTER STORAGE CONTAINERS AS A VIOLENT REACTION CAN OCCUR. WHEN DILUTING WITH WATER, ADD ACID TO WATER, NEVER ADD WATER TO ACID.

----- 10. TRANSPORTATION DATA -----

DOT Information:

(Name, Class, Label, Number)

- 1) HYDROGEN SULFATE
CORROSIVE MATERIAL
CORROSIVE
UN1830
- 2) NORDHAUSEN ACID
CORROSIVE MATERIAL
CORROSIVE
UN1832
- 3) OIL OF VITRIOL
CORROSIVE MATERIAL
CORROSIVE
UN1832
- 4) SPENT SULFURIC ACID
CORROSIVE MATERIAL
CORROSIVE
UN1832
- 5) SULFURIC ACID, SPENT
CORROSIVE MATERIAL
CORROSIVE
UN1832

Reportable Quantity: 1000 LB (454 KG)

References:

- NATIONAL FIRE PROTECTION ASSOCIATION. FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS. 7TH ED. BOSTON, MA: NATIONAL FIRE PROTECTION ASSOCIATION, 1978.
- CHEMLINE, CHEMICAL DICTIONARY ONLINE (DATA BASE), NATIONAL LIBRARY OF MEDICINE, BETHESDA MD.
- RTECS, REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (DATABASE). NATIONAL LIBRARY OF MEDICINE, BETHESDA MD.
- THE MERCK INDEX. 10TH ED. RAHWAY NJ, 1983.
- HAWLEY, G.G. THE CONDENSED CHEMICAL DICTIONARY. 10TH ED. NEW YORK: VAN NOSTRAND REINHOLD CO., 1981.
- GOSSELIN, R.E., R.P. SMITH, AND H.C. HODGE. CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS. 5TH ED. WILLIAMS AND WILKINS, BALTIMORE MD, 1984.
- WEAST, R.C., (ED.). HANDBOOK OF CHEMISTRY AND PHYSICS, 67TH ED., BOCA RATON, FL: CRC PRESS INC., 1986-1987.
- CHRIS - HAZARDOUS CHEMICAL DATA. MANUAL TWO. U.S. COAST GUARD, DEPARTMENT OF TRANSPORTATION, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON DC, JUNE 1985.
- AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS. TLV'S THRESHOLD LIMIT VALUES AND BIOLOGICAL EXPOSURE INDICES. CINCINNATI OH: AMERICAN CONFERENCE OF GOVERNMENTAL HYGIENISTS
- THE MERCK INDEX. 11TH ED. RAHWAY NJ, 1989.
- MATERIAL SAFETY DATA SHEETS (MSDS) PROVIDED BY

MANUFACTURERS.

- HSDB, HAZARDOUS SUBSTANCES DATA BANK (DATA BASE),
NATIONAL LIBRARY OF MEDICINE, BETHESDA MD, 1990.
- SCIENTIFIC REVIEW COMMITTEE FOR MSDS

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MARTIN MARIETTA ENERGY SYSTEMS, INC.

P.O. BOX 2008

BLDG. 3550, MS 6291

OAK RIDGE, TENNESSEE 37831

PHONE: 615-574-0784

FAX: 615-576-6087

Martin Marietta Energy Systems, Inc.
Material Safety Data Sheet

----- 1. IDENTIFICATION -----

RECID: 00275 Version No: 5
 CAS No: 007697-37-2 Version Date: 11/02/1992
 Material Name: NITRIC ACID

- Synonyms:
- 1) AQUA FORTIS
 - 2) AZOTIC ACID
 - 3) EM SCIENCE CATALOG NUMBERS: NX0409, NX0409I, NX0411, NX0412, 441
 - 4) EM SCIENCE CATALOG NUMBERS: NX0409P, NX0409T, NX0409TP
 - 5) FISHER SCIENTIFIC CHEMICAL DIVISION CAT NUMBERS: A200500, A202500
 - 6) FUMING HYDROGEN NITRATE
 - 7) HYDROGEN NITRATE
 - 8) JT BAKER PRODUCT CODES: 4801, 9606, 9597, 5113, 9601, 9602, 5371, 9598, 9605, 9600, 9616
 - 9) JT BAKER PRODUCT CODES: 9624, 5600, 6901
 - 10) LEEMAN LABS CATALOG NUMBER: 602-00003
 - 11) LEEMAN LABS MORE THAN 70% NITRIC ACID
 - 12) NITRIC ACID 70% AR IN GLASS BOTTLE
 - 13) NITRIC ACID, FUMING
 - 14) NITRIC ACID, RED FUMING
 - 15) NITROUS FUMES
 - 16) NITRYL HYDROXIDE
 - 17) RFNA
 - 18) SIGMA-ALDRICH PRODUCT NUMBER: Z5523

Status Information:	MSDS Type	MSDS Status	MSDS Available	Request Outstanding
	----- D	----- A	----- Yes	----- No

Modification History:	Date of Entry	Date of Change	Last Modifier
	----- 10/30/1992	----- 05/22/1993	----- HZE

Special Condition: N
 HM Group Code: C
 MMES Carcinogen: No or Not Yet Determined
 RTECS Reproductive/
 Developmental Effector: Yes

AVID No:	LBC9624-2	LBC9624-5
	LBCEM-NX0409-5	LBCEM441-2
	LBCJT6901-5	LBCMFJT9601-33
	LBCMRJT9601-33	LBCMJRT9589-33
	LBCMRJT6901-05	LBCEP6739A-1
	LBCNX0414-1	LBC9598-33
	LBCJT6901-05	LBCMRJT9598-33
	LBCVW4821-4	LBSJT6901-5
	LBCJT5600-2	LBC5639-02
	LBCJT9605-R	LBCH44500-4
	LBCEM-EP60103-1	LBC6901-05

LBCJT9601-33	LBCJT9601-4
LBSMRJT9601-33	*MRJT9598-33
LBCJT9601-5	LBCJT9598-5
LBCJEM-NX0414M-1	LBCJT5639-2

Stores No: 030013200 170013000

Pure Chemical: Yes
Chemical Formula: H-N-O3

Health Hazard Rating: 3, <HIGH HEALTH HAZARD>
CORROSIVE, IRRITANT

Fire Hazard Rating: 0, <NONCOMBUSTIBLE>

Reactivity Hazard Rating: 0, <NONREACTIVE>
OXIDIZER

EPA ID No: D002,
Physical Form: LIQUID

Use: CHEMICAL INTERMEDIATE; IN PRINTING INDUSTRY;
MANUFACTURING OF PHARMACEUTICALS; IN JEWELRY
MANUFACTURING; IN THE ENGINEERING INDUSTRY; IN
MANUFACTURING MANY ORGANIC CHEMICALS

RTECS No: NISS

Manufacturers:

- (Name, Address, Phone, FAX No, Contact)
- 1) E.I. DUPONT DE NEMOURS & CO.
MEDICAL PRODUCTS DEPARTMENT, 331 TREBLE COVE RD.,
NORTH
BILLERICA, MA 01862
Phone: (508)667-9538, EMERGENCY: (800)441-3637
 - 2) E.M. SCIENCE, INC.
DIVISION OF EM INDUSTRIES
P.O. BOX 70, 480 DEMOCRAT RD
GIBBSTOWN, NJ 08027
Phone: (609)354-9200
Phone: (800)424-9300
 - 3) FISHER SCIENTIFIC CHEMICAL COMPANY
P.O. BOX 4829, 5775 PACIFIC DRIVE, NORCROSS, GA
30091
Phone: (404)449-5050
 - 4) J.T. BAKER CHEMICAL COMPANY
222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
Phone: EMERGENCY: (908)859-2151
Phone: 1-800-582-2537
 - 5) MALLINCKRODT, INC.
PARIS BY-PASS, P.O. BOX M, PARIS, KY 40361-0305
Phone: (606)987-7000, EMERGENCY: (314)982-5000

MSDS Listing:

MFR No	Manufacturer Name	MFR MSDS Prep Date	MSDS Rcvd Date	Used To Modify Tech Data
DUPON3	E.I. DUPONT DE NEMOURS & CO.	09/01/1990	03/19/1992	Yes
EMS	E.M. SCIENCE, INC.	11/26/1991	03/12/1993	No
FSCO	FISHER SCIENTIFIC CHEMICAL COMPANY	04/23/1990	03/19/1992	Yes
JTB	J.T. BAKER CHEMICAL COMPANY	08/09/1991	03/19/1992	Yes
MKDT	MALLINCKRODT, INC.	10/21/1986	03/19/1992	Yes

----- 2. PHYSICAL DATA -----

Material Description: COLORLESS OR YELLOW TO BROWNISH LIQUID, FUMES IN AIR. COMMERCIAL NITRIC ACID CONTAINS 68% AND 50% NITRIC ACID IN WATER. RED FUMING NITRIC ACID CONTAINS NOT LESS THAN 85% NITRIC ACID AND LESS THAN 5% WATER.

Molecular Weight: 63.01
 Density/Specific Gravity: 1.50 (WATER=1)
 Vapor Density: 2.2 (AIR=1)
 Vapor Pressure: 47.8 MM HG
 Boiling Point: 181 DEG F, 83 DEG C
 Melting Point: -44 DEG F, -42 DEG C
 Freezing Point: NISS
 Percent Volatiles: 100%
 Solubility in Water: MISCIBLE
 Evaporation Rate: NISS

----- 3. INGREDIENTS -----

Name: PURE CHEMICAL
 RECID: CAS No: RTECS No:
 Percent Comments:
 RTECS Reprod Effector: No or Not Yet Determined
 MMES Carcinogen:
 Hazard Evaluation:

----- 4. FIRE AND EXPLOSION HAZARD DATA -----

Flash Point: NONFLAMMABLE
 Autoignition: NONFLAMMABLE
 Lower Flammability Limit: NONFLAMMABLE
 Upper Flammability Limit: NONFLAMMABLE
 Extinguishing Media: WATER SPRAY/FOG
 DRY CHEMICAL
 SODA ASH
 USE WATER TO DISPERSE VAPORS.

OR USE EXTINGUISHING MEDIA SUITABLE FOR SURROUNDING MATERIAL.

Firefighting Procedures: COOL CONTAINERS EXPOSED TO HEAT OR FLAMES WITH WATER FROM THE SIDES UNTIL WELL AFTER THE FIRE HAS BEEN EXTINGUISHED.
REMOVE CONTAINERS FROM FIRE AREA IF POSSIBLE.
VERY CORROSIVE, MUST BE KEPT OFF SKIN. WEAR PRESSURE-DEMAND, SELF-CONTAINED BREATHING APPARATUS AND CHEMICAL PROTECTIVE SUIT. USE WATER TO DISPERSE VAPORS

Fire and Explosion Hazards: MAY IGNITE WHEN HEATED WITH ORGANIC MATERIAL. TOXIC GASES AND FUMES ARE EMITTED UNDER FIRE CONDITIONS.
CAN REACT EXPLOSIVELY WITH SOME REDUCING AGENTS AND COMBUSTIBLES: METAL POWDERS, CARBIDES, HYDROGEN SULFIDE, TURPENTINE. RED FUMING NITRIC ACID IS A DANGEROUS FIRE HAZARD AND POWERFUL OXIDIZING AGENT.

HAZARDOUS
DECOMPOSITION PRODUCTS: NITROGEN DIOXIDE, NITRIC OXIDE, AND NITRIC ACID FUMES.

----- 5. REACTIVITY DATA -----

Stability: STABLE
Shelf Life In Days:
Shelf Life Comments:

Conditions to Avoid: AVOID HEAT. AVOID EXPOSURE TO MOISTURE. 100% NITRIC ACID CANNOT BE STORED IN THE PRESENCE OF LIGHT WITHOUT FORMATION OF NITRIC OXIDE WHICH CAUSES DISCOLORATION.

Incompatible Materials:

ACETONITRILE, CESIUM CARBIDE, CUPRIC NITRIDE, CYANIDES, 1,2-DIAMINOETHANE BISTRIMETHYL GOLD, DINITROTOLUENE, EPICHLOROHYDRIN, 5-ETHYL-2-METHYL PYRIDINE, CYCLOPENTADIENE
BENZENE, TOLUENE, METALS, METAL CARBIDES, 4-METHYLCYCLOHEXANONE, NITROBENZENE AND WATER, NITROMETHANE, POLYDIBROMO-SILANES, PHOSPHORUS TRICHLORIDE, POTASSIUM HYPOPHOSPHITE (ON EVAPORATION), RUBIDIUM CARBIDE, SELENIUM IODOPHOSPHIDE, SULFUR DIOXIDES, THIOCYANATES, THIOCYANIC ACID, METAL SALTS, THIOPHENES, TETRABORANE,
TRICADMIUM DIPHOSPHIDE, TRITHIOACETONE, ACETONE, ACETIC ACID, SULFURIC ACID, GLYCERIDES, TRIAZINE, TRIFLUORACETIC ANHYDRIDE, I-AMINO THIOAZOLE, CYANATES, FLUORINE, LACTIC ACID, HYDROGEN FLUORIDE, MESITYLENE, PERCHLORATES, PHTHALIC ACID, PHTHALIC ANHYDRIDE, REDUCING AGENTS, TITANIUM ALLOY, ACRYLONITRILE, ALCOHOLS, ARSINE, PHOSPHINE, DIPHENYLDISTIBENE, CARBON, CHLORINE TRIFLUORIDE, TEREPHTHALIC ACID,
THIOALDEHYDES, THIOKETONES, URANIUM, URANIUM ALLOYS, SULFAMIC ACID, BUTANETHIOL, CROTONALDEHYDE, TETRAPHOSPHORUS, ANTIMONY, ANION EXCHANGE RESIN, ACROLEIN, ALLYL ALCOHOL, ALLYL CHLORIDE,
2-AMINOETHANOL, AMMONIUM HYDROXIDE, BISMUTH, N-BUTYRALDEHYDE, CHLOROSULFONIC ACID, CRESOL, CUMENE, DIISOPROPYL ETHER, ETHYLENEDIAMINE, POLYALKENES, GLYOXAL, ISOPRENE, MESITYL OXIDE,
2-METHYL-5-ETHYLPYRIDINE, OLEUM, PROPYLENE OXIDE, PROPIOLACTONE (BETA-), PYRIDENE, SODIUM HYDROXIDE, VINYL ACETATE, VINYL DENE CHLORIDE,
DE, DIETHYLETHER, HYDRAZOIC ACID, P-XYLENE IN THE PRESENCE OF SULFURIC ACID

SELENIUM, SODIUM AZIDE, TRIMETHYLTRIOXANE, HYDROGEN TELLURIDE, ANILINE, BORON PHOSPHIDE, BROMINE PENTAFLUORIDE, N-BUTYLMERCAPTAN, CALCIUM HYPOPHOSPHITE, DIBORANE, DIPHENYL TIN, M-ETHYL ANILINE, ETHYL PHOSPHINE, FURFURYL ALCOHOL, HALOGEN PHOSPHIDES, HYDROGEN IODIDES, LITHIUM, METALS, PHOSPHONIUM IODIDE, PHOSPHORUS, SELENIUM HYDRIDE, SODIUM, TERPENES, TOLUIDINE, TRIETHYLGALLIUM MONOETHYL ETHER COMPLEX, UNS-DIMETHYLHYDRAZINE, AMMONIA, CHROMITES, DICHROMATE, AROMATIC AMINES, DIVINYL ETHER, DIENE OR ACETYLENE DERIVATIVES, WATER

Incompatible Materials Comments:

NITRIC ACID & RED FUMING NITRIC ACID WILL REACT WITH STEAM/WATER TO PRODUCE HEAT & TOXIC & CORROSIVE FUMES. RED FUMING NITRIC ACID PRODUCES FLAMMABLE VAPORS

Hazardous Polymerization: WILL NOT OCCUR

Combustion and Decomposition Products:

NITROGEN DIOXIDE, NITRIC OXIDE, AND NITRIC ACID FUMES

Combustion and Decomposition Products Comments:

----- 6. HEALTH HAZARD DATA -----

OSHA Standards:	TWA 2 PPM OR 5 MG/CU M, STEL 4 PPM OR 10 MG/CU M FOR NITRIC ACID
ACGIH TLV:	TWA 2 PPM OR 5 MG/CU M, STEL 4 PPM OR 10 MG/CU M FOR NITRIC ACID (1991-92)
NIOSH Recommendation:	10-HR TWA 2 PPM OR 5 MG/CU M FOR NITRIC ACID
Immediately Dangerous to Life & Health:	100 PPM
Other Exposure Limits:	NISS
Acute Inhalation:	SEVERE NOSE & THROAT IRRITATION WITH DELAYED FEVER, CYANOSIS & PULMONARY EDEMA, COUGH, BREATHING DIFFICULTY, BRONCHOPNEUMONIA.
Acute Swallowing:	SEVERELY TOXIC, CAUSES CHEMICAL BURNS & CORROSION OF MOUTH, ESOPHAGUS, STOMACH & SMALL INTESTINES, NAUSEA, VOMITING, ABDOMINAL PAIN, DIARRHEA, KIDNEY DAMAGE, CIRCULATORY COLLAPSE, DEATH.
Acute Skin Absorption:	WIDESPREAD OR PROLONGED CONTACT WITH NITRIC ACID MAY RESULT IN THE ABSORPTION OF HARMFUL AMOUNTS OF MATERIALS
Acute Skin Contact:	NITRIC ACID PRODUCES IMMEDIATE CHEMICAL BURNS. CONCENTRATED AQUEOUS SOLUTIONS CAUSE EARLY SENSATION OF PAIN, PAINFUL ULCERS. LIQUID IS MILDLY IRRITATING TO THE SKIN.

Acute Eye Contact: LIQUID OR VAPOR CAUSES SEVERE EYE IRRITATION, DEEP-SEATED CHEMICAL BURNS IF NOT REMOVED AT ONCE. PERMANENT VISUAL DEFECTS OR BLINDNESS MAY RESULT.

Chronic Effects: CHRONIC BRONCHITIS, CHEMICAL PNEUMONITIS DUE TO VAPORS

Target Organs/Systems: RESPIRATORY SYSTEM, KIDNEYS

Inhalation Emergency: REMOVE TO FRESH AIR AND GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL AID.

Swallowing Emergency: DO NOT INDUCE VOMITING. DILUTE STOMACH CONTENT WITH LARGE AMOUNT OF WATER OR MILK. GET MEDICAL AID.

Skin Contact Emergency: REMOVE CONTAMINATED CLOTHING AND RINSE SKIN WITH RUNNING WATER FOR AT LEAST 15 MINUTES. GET MEDICAL AID.

Eye Contact Emergency: FLUSH EYES AT ONCE WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL AID.

Physicians Notes: FOR INHALATION MONITOR PATIENT FOR RESPIRATORY DISTRESS, CHECK FOR CHEMICAL BURNS.

Aggravated Conditions: DAMAGED SKIN, EYE DISORDERS, CARDIOPULMONARY DISEASE

Carcinogenicity: NISS

The MMES Carcinogen Control Program includes human, human suspect, and confirmed animal carcinogens. [See MMES Carcinogen: (Yes/No or Not Yet Determined) in Section 1.] Chemicals and compounds in concentration of 0.1% or greater are subject to the guidelines set forth in the MMES Carcinogen Control program. Substitution with a non-carcinogen should be made if feasible.

Genotoxicity: NISS

Reproductive/Developmental Toxicity: NISS

This section reflects materials listed in the Registry of Toxic Effects of Chemical Substances that have positive reproductive effects data for at least one mammalian species. Such effects may include paternal, maternal, fertility, embryo/fetus, neonatal, developmental abnormalities or tumorigenesis. An entry does not automatically imply that the substance is hazardous for common use. A hazard determination is generally required.

----- 7. SPILL LEAK AND DISPOSAL INFORMATION -----

Spill or Leak Emergency:

SUMMON HELP IMMEDIATELY.
 Y-12: SHIFT SUPERINTENDENT, 4-7172 OR 911
 X-10: SHIFT SUPERVISOR, 4-6606 OR 911

K-25: SHIFT SUPERVISOR, 4-3282 OR 911
PADUCAH: SHIFT SUPERVISOR, BELL-6211, PAX-511
MINIMIZE THE SPILL OR RELEASE IF YOU CAN DO SO SAFELY.
EVACUATE THE AREA.

Disposal Procedure:

Y-12: TRANSFER STORAGE OR DISPOSAL OF WASTE PROCEDURE 70-903, DISPOSAL OF HAZARDOUS MATERIALS. FOR MORE INFORMATION, CONTACT THE WASTE DISPOSAL DEPARTMENT, 6-7768.

X-10: WASTE, TRANSPORTATION, STORAGE, AND DISPOSAL MANUAL, EPM-8.0, FORM UCN-13696. FOR MORE INFORMATION, CONTACT THE DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, 4-7467.

K-25: SPP-4600, FORM UCN-12463. FOR MORE INFORMATION, CONTACT THE WASTE MANAGEMENT DIVISION, 4-8214.

PADUCAH: ESH-28, FORM UCN-12463A. FOR MORE INFORMATION, CONTACT THE WASTE MANAGEMENT DEPARTMENT, PAX-401 OR BELL-6319.

----- 8. SPECIAL PROTECTION INFORMATION -----

Respirators:

RESPIRATORS MAY BE REQUIRED WHEN USING THIS MATERIAL. CONTACT THE INDUSTRIAL HYGIENE DEPARTMENT FOR MORE INFORMATION.

Ventilation:

CONDITIONS, QUANTITIES, AND OTHER FACTORS DETERMINE VENTILATION REQUIREMENTS. IF THERE ARE UNCERTAINTIES, CONTACT THE INDUSTRIAL HYGIENE DEPARTMENT.

Gloves:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT ANY POSSIBILITY OF CONTACT WITH THIS CHEMICAL. PREFERRED MATERIALS: VITO N OR SARANEX.

Eye Protection:

EMPLOYEE MUST WEAR SPLASH-PROOF SAFETY GOGGLES AND A FACESHIELD TO PREVENT ANY POSSIBILITY OF CONTACT WITH THIS CHEMICAL. DO NOT WEAR CONTACT LENSES WHEN WORKING WITH CHEMICALS.

Other Protective Equipment:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (CHEMICAL-RESISTANT) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS CHEMICAL. WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS CHEMICAL, THE EMPLOYER SHALL PROVIDE AN EYE-WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

Impurities, By-Products,
Contaminants:

NISS

----- 9. SPECIAL HANDLING, STORING, PACKAGING -----

STORE IN STAINLESS STEEL, ALUMINUM OR GLASS CONTAINERS. DO NOT STORE NITRIC ACID THAT CONTAINS FLUORINATED COMPOUNDS IN GLASS. KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE AND COMBUSTIBLE MATERIALS.

----- 10. TRANSPORTATION DATA -----

DOT Information: (Name, Class, Label, Number)

- 1) NITRIC ACID
CORROSIVE MATERIAL
CORROSIVE
UN2031
- 2) NITRIC ACID, RED FUMING
CORROSIVE MATERIAL
CORROSIVE, OXIDIZER, POISON
UN2032

Reportable Quantity: 1000 LB (454 KG)

- References:
- CHEMLINE, CHEMICAL DICTIONARY ONLINE (DATA BASE), NATIONAL LIBRARY OF MEDICINE, BETHESDA MD.
 - RTECS, REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (DATABASE). NATIONAL LIBRARY OF MEDICINE, BETHESDA MD.
 - THE MERCK INDEX. 10TH ED. RAHWAY NJ, 1983.
 - HAWLEY, G.G. THE CONDENSED CHEMICAL DICTIONARY. 10TH ED. NEW YORK: VAN NOSTRAND REINHOLD CO., 1981.
 - SAX, N.I. DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS. 6TH ED. VAN NOSTRAND REINHOLD, NEW YORK NY, 1984.
 - FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS, 9TH ED., NATIONAL FIRE PROTECTION ASSOCIATION, BOSTON MA, 1986.
 - AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS. TLV'S THRESHOLD LIMIT VALUES AND BIOLOGICAL EXPOSURE INDICES. CINCINNATI OH: AMERICAN CONFERENCE OF GOVERNMENTAL HYGIENISTS
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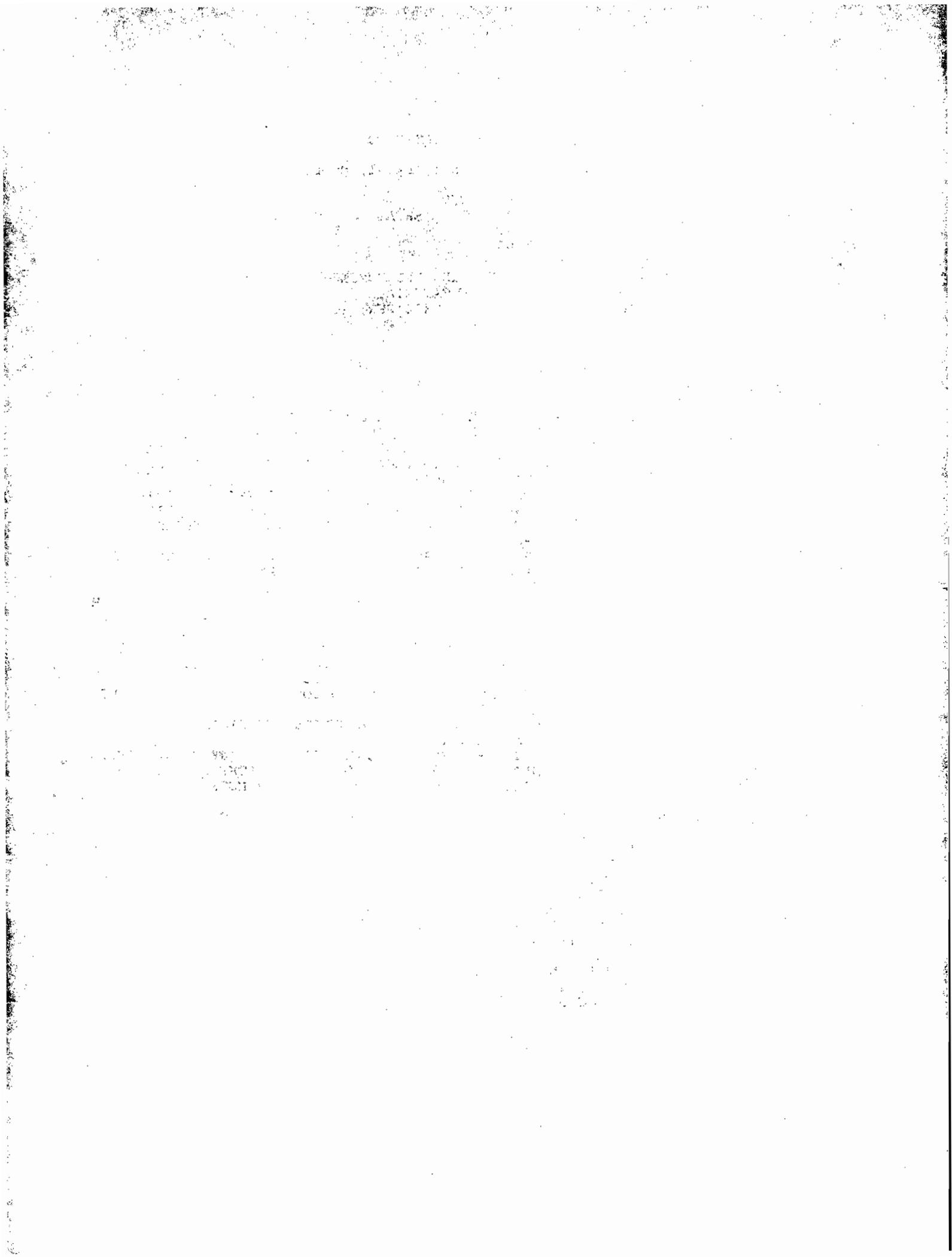
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