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R-023-204 .10

**FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT
CORPORATION PROJECT SPECIFIC HEALTH AND SAFETY PLAN FOR
UNH TRANSFER, NEUTRALIZATION, AND DISPOSAL OPERATIONAL
PROCEDURE - AUGUST 1994**

08/01/94

DOE-FN/FERMCO
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RESTORATION MANAGEMENT CORPORATION

PROJECT SPECIFIC HEALTH AND SAFETY PLAN

FOR

UNH TRANSFER, NEUTRALIZATION, AND DISPOSAL

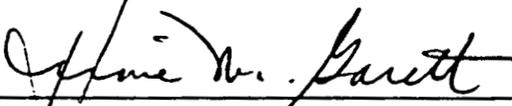
OPERATIONAL PROCEDURE

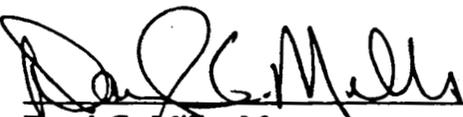
EMERGENCY PHONE: 738-6511

RADIO: "CONTROL" (202)

AUGUST 1994

APPROVAL:

 8/19/94
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**HEALTH AND SAFETY PLAN
FOR
UNH TRANSFER, NEUTRALIZATION, AND DISPOSAL
OPERATIONAL PROCEDURE**

1.0 INTRODUCTION

The provisions of this Project Specific Health and Safety Plan (PSHSP) are to be used during the UNH Transfer, Neutralization, and Disposal project.

All personnel entering the area will be required to be briefed on the requirements of this Project Specific Health and Safety Plan. In addition, all personnel will be required to be briefed on the Project Specific Health and Safety Requirements Matrix (PSHSRM) (Attachment A). All personnel must sign an acknowledgement log stating they have been oriented on the requirements of this plan, understand, and will abide by the provisions of this plan as well as the requirements of the Project Manager's standing Orders M-111.

1.1 PROJECT AREA

Plant 2/3 - Digestion Area

A portion of this project will be conducted on the first and second floors in the Digestion Area of Plant 2/3. Plant 2/3 is located south of 2nd Street, east of "A" Street and west of "B" Street.

The Digestion Area is within a radiological contamination area. There is one central control point for personnel entry and exit into Plant 2/3 (and surrounding outdoor tank sump areas - NFS Area, CD Blend, Extraction, & Digestion) located at the south door of extraction. Access, egress, and all work performed in this area will be controlled by the operations supervisor. The Digestion Area in Plant 2/3 is also regulated for asbestos.

Plant 8

The filtration operation will take place in Plant 8. Plant 8 is located on the south side of 101st Street between "A" and "B" Streets. A portion of Plant 8 (where the filtration operation will take place) is located within a radiological contamination area. There is one central control point for personnel entry and egress from the filtration area. Access, egress, and all work performed in this area will be controlled by the operations supervisor.

Hot Raffinate

Building 3E (Hot Raffinate) houses a system of tanks, pumps, and filters that were used to filter insolubles from uranyl nitrate solutions (UNH). The Hot Raffinate Building is located north of 101st Street and within a radiological contamination area. Access, egress, and all work performed in the area will be controlled by the operation supervisor.

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1.2 PROJECT DESCRIPTION

- Transfer UNH to tank F1-25 or tank F1-26
- Dilute/neutralize UNH
- Transfer neutralized UNH slurry to Plant 8
- Filter neutralized UNH slurry
- Drum solids and pump treated filtrate to BDN facility (Biodenitrification) prior to discharge

1.2.1 Project Objective

The objective of the Uranyl Nitrate Hexahydrate (UNH) Neutralization project is to safely neutralize and dispose of approximately 200,000 gallons of uranium dissolved in nitric acid. The solutions will be diluted, neutralized, and filtered. The solid filter cake is expected to meet acceptance criteria for shipment to the Nevada Test Site (NTS) for burial as low-level radioactive waste, while the liquid filtrate will be treated and tested to confirm its acceptability for discharge under the present National Pollutant Discharge Elimination System (NPDES) permit.

1.2.2 General Process Description

To achieve the project's objectives, it is planned to neutralize the existing inventory of UNH solution with Magnesium Hydroxide. This will cause the uranium and other heavy metals in the solution to precipitate out of the solution. The precipitate will be separated from the slurry in a vacuum filter. The remaining neutralized liquid will be processed into an effluent suitable for release under the existing site NPDES permit.

The FEMP has approximately 200,000 gallons of UNH that is stored in 19 tanks. The UNH will be pumped in batches to a dilution/neutralization tank in Plant 2A where it will be mixed with warm water to make a solution containing less than 1N free acid and less than 100 grams per liter of uranium. Each dilute batch will then be neutralized to form soluble magnesium nitrates and the UNH will react to form a magnesium diuranate precipitate. Other metal contaminant such as chromium and barium also will be precipitated in the process. The neutralized UNH slurry will be transferred to existing filter feed tanks and filtered on the existing rotary vacuum filters (East and West EIMCO filters) in Plant 8. The filter cake will be collected in drums, sampled, and staged for shipment to NTS, while the high-nitrate filtrate will be discharged for treatment in the Biodenitrification (BDN) facility.

2.0 ORGANIZATION STRUCTURE AND KEY PERSONNEL RESPONSIBILITIES

- 2.1 **MANAGER, OCCUPATIONAL SAFETY AND HEALTH COMPLIANCE - Daryl Mills.** Responsible for the oversight of all safety and health compliance. Rick Maurer is Daryl Mills' alternate.

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- 2.2 **MANAGER, RSO HEALTH AND SAFETY** - Richard E. Maurer. Responsible for auditing RSO health and safety programs. Acts as the single point of contact for all environmental, safety, industrial hygiene, fire, and radiological issues/concerns. Wayne Mallory is Richard Maurer's alternate.
- 2.3 **UNH PROJECT MANAGER** - Diane Garrett. Responsible for all aspects of the safe transfer, neutralization and disposal of the uranyl nitrate hexahydrate (UNH) at the FEMP. Stan Frank is Diane Garrett's alternate.
- 2.4 **OPERATIONS MANAGER** - Tim Huey. Responsible to the Project Manager for the day-to-day operation of staff. Provide technical advice, coordination and progress, planning and scheduling. Billy Bowling is Tim Huey's alternate.
- 3.0 **SITE CONTROL**
- 3.1 **WORK AREA REQUIREMENTS**

During the conduct of activities, various work areas will be established. The following sections provide a brief description of these areas.

At the entrance to Digestion (Plant 2/3), "Asbestos Area" signs are posted. This is due to asbestos contamination throughout this section of the building. This contamination is a result of deteriorating transite panels overhead. When asbestos is the only safety concern, this area requires a minimum of shoe covers, smocks, gloves, and a half-face respirator equipped with magenta cartridges, but this only applies for "hands off" work or general entries. Additional requirements will be dictated by the RSO supervisor-in-charge, Radiological Control, and Industrial Hygiene and will be documented on updated and posted FERMCO Work Permits. Additional barriers (which could be temporary or permanent) for restricting non-essential and unauthorized entries will be put in place (as appropriate) by RSO, Radiological Control, and Industrial Hygiene.

3.1.1 Radiological Areas

Entrances to and perimeters of radiological control areas will be defined by yellow and magenta rope or, where practical, by physical structures, such as fences or buildings. All radiological areas will be identified by signs having the standard radiation magenta symbol, the trifoil, on a yellow background.

The following lists the types of radiological areas to be encountered during the performance of activities covered by this Project Specific Health and Safety Plan (PSHSP):

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3.1 WORK AREA REQUIREMENTS (Continued)

Controlled Area - a controlled area is any area, room, or enclosure to which access is controlled to protect individuals from exposure to radiation or radioactive materials, or where radioactive materials may be present. Surface contamination, radiation, and airborne contaminants are less than applicable limits for further posting. Personnel exposure is not expected to exceed 100 mRem in one year while working in a Controlled Area. The following radiological areas are found within Controlled Areas.

Airborne Radioactivity Area - any area, room, or enclosure where airborne radioactivity exceeds 10% of the applicable Derived Air Concentration (DAC) averaged over 8 hours or peak concentration of 1 DAC.

Radiation Area - any area, room, or enclosure where radiation exposure rates are greater than 5 mRem/hour, but are less than or equal to 100 mRem/hour.

Fixed Contamination Area - any area, room, or enclosure where fixed contamination exists greater than limits, but removable contamination is less than the limits. These areas may be outside of a Controlled Area.

Contamination Area - any area, room, or enclosure where removable contamination levels exceeds applicable limits, but are less than 100 times these values.

4.0 TRAINING

Training requirements specific to each task to be performed are outlined in the Health and Safety Requirements Matrix provided as Attachment A to the PSHSP.

4.1 HAZARD COMMUNICATION

4.1.1 Material Safety Data Sheets (MSDSs)

MSDSs, for all products or chemicals to be used on the job shall be provided by FERMCO (Industrial Hygiene).

A complete set of MSDS sheets for all chemicals used on this project shall be maintained by the Facility Owner at the control point in Plant 2/3.

4.1 HAZARD COMMUNICATION (Continued)

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4.1.2 Job Briefings / Safety Meetings

All personnel involved in this project shall be given a safety briefing prior to receiving authorization to begin work. This safety briefing shall include review of this Project Specific Health and Safety Plan. A prework/kick off safety meeting will be conducted by the RSO Health and Safety Manager (HSM) with the UNH Operations Manager, and will satisfy the requirements for this safety briefing.

As a minimum, safety meetings shall be held weekly. The safety meetings will be conducted by the Operations Manager or designee. Written documentation of the briefings and attendance sheets will be maintained as part of the project by the Project Manager and Designee.

4.2 RECORDS

Documentation of training classes attended shall be maintained by the Centralized Training Department. Training requirement identified on the Health and Safety Matrix Requirement.

4.3 VISITORS

Anyone coming to the work site (who is not a site employee) with the sole purpose of observation or viewing the activity in progress (hands-off inspections) is considered a "visitor". Visitors cannot operate any equipment or supervise/oversee any work activity.

Visitors shall be briefed to the hazards of the site and the control measures through the same means as all other project personnel.

Visitors will comply with the training requirements specified for the activities in progress. Visitors who are not Radiological Worker II trained and need to enter the contamination area (or Radiation or Airborne Radioactivity Areas) must receive authorization from the Manager of Radiological Control and the UNH Project Manager and must be escorted on-site.

5.0 MEDICAL MONITORING AND SURVEILLANCE

5.1 REQUIREMENTS

All personnel will be required to participate in the FEMP medical monitoring program as described in the Project Specific Health and Safety Requirements Matrix.

5.2 RECORDS

The FERMCO Medical Services Department will maintain a copy of all medical records.

6.0 HAZARD ASSESSMENT

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This section addresses the identified health and safety hazards associated with the conduct of activities covered by this PSHSP.

6.1 RADIOLOGICAL ISSUES

Work activities which involve the disturbance of existing asbestos containing materials or fixed radioactive surface contamination or which may introduce other hazards (outside the scope of this operation), will require additional evaluations, planning, and controls. Survey frequency will be in compliance with RC-RDA-009 (routine radiation surveys) guidelines.

6.1.1 Uranium

Uranium can be found in most buildings, in the soil surface, and most nonpotable water on-site. Uranium is a radioactive material and in its soluble form is highly toxic. Soluble uranium can be absorbed through the skin and affects the kidneys and can be an ingestion and inhalation hazard.

<u>Contaminant:</u>	<u>Exposure- Potential Mode:</u>	<u>Exposure Limit:</u>	<u>Action Level:</u>
Uranium	Inhalation	2×10^{-11} uCi/cc 0.05 mgU/m ³	5×10^{-12} uCi/cc 0.025 mgU/m ³ (UNH)

Notes:

- Limit is based on a daily 8-hr time weighted average (TWA) (5 Rem Annual Effective Dose Equivalent @ 2000 hrs/yr).
- Full face air purifying respirator to be worn with magenta filter cartridges (or other respiratory protection as designated by Industrial Hygiene and/or Radiological Control) as required by the RWP or GWP.
- This is the OSHA limit for soluble uranium, which is more restrictive than the radiological DAC value in DOE Order 5480.11.
- Any circumstance involving the possibility of an intake of radioactive materials by inhalation, ingestion, or absorption shall immediately be reported to the process supervisor. The Supervisor shall immediately report the circumstances of possible radioactive materials intake to the ES&H Radiological Control Department for evaluation. When the suspect material is uranium, the involved personnel shall report to the Urine Sampling station at the end of their shift to complete an Incident Investigation Report (IIR) (Form NO. FS-F-1458), and submit an incident urine sample. The involved personnel shall also report to the Urine Sampling Station at the start of their next shift to submit a follow up urine sample. When the suspect material is other than uranium, the involved personnel shall report to the Dosimetry Group of the Radiological Control Department for further determination of actions. Employees are responsible for complying with additional requirements as specified by the Radiological Control Department.

6.1 RADIOLOGICAL ISSUES (Continued)

6.1.2 Radiation

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Plant 2/3

In Plant 2/3 Digestion, radiation dose-rates have been measured to be between less than 0.5 and 2.0 mRem/hour or less (gamma) in all areas of the project, at 30 cm to 1 meter from all surfaces. General area (average) dose-rates are less than 0.5 (gamma). Maximum contact levels have not been measured to greater than 5 mRem/hour. The assignment of stay-times are not anticipated for most work associated with this project; however, stay-times based on elevated beta dose-rates are possible in some localized areas of the project. A maximum beta dose-rate (on contact) of 40 mRem/hour was measured on an exterior surface of F1-26, near the top of the tank facing the window, but access to that area is not anticipated, per the scope of this project. General area beta dose-rates have been measured to be less than 2 mRem/hour, at 30 cm to 1 meter from all sources.

Plant 8

In Plant 8, at 30 centimeters from neutralized UNH slurries and filtered residues, dose-rates were less than 10.0 mRem/hour (whole-body skin) and 2.0 mRem/hour (whole-body penetrating) during periods of processing in 1992 and 1993. General area dose-rates are less than 0.5 mRem/hour (whole-body penetrating) at 30 centimeters in all areas of the plant, with exceptions being Tank 25A and the surrounding area, and Tank D105 which falls in the range of 3 to 4 mRem/hour (whole-body penetrating). A maximum beta dose-rate of 30 mRem/hour (at contact) was measured at the base of Tank 203A, with a reading of 9 mRem/hour (beta) at 1 foot. Contact beta levels fall in the range of 2 to 10 mRem/hour on all other surfaces, with most readings at 1 foot measuring below 2 mRem/hour.

6.1.3 Airborne Radioactivity

Uranyl Nitrate Hexahydrate (UNH) is a soluble form of uranium (Class D). The airborne occupational exposure limit (expressed as a DAC in DOE 5480.11) is higher for this form of uranium than the insoluble forms (Classes W and Y). Because airborne concentrations cannot be properly characterized as to the fractions of soluble and insoluble uranium that may be present, the most restrictive DAC (applicable to insoluble Class Y, uranium) will be applied for controlling worker exposure and for ensuring proper controls and postings are in place. The DAC for Class D uranium is 6×10^{-10} , where as the DAC for Class Y uranium is 2×10^{-11} .

6.1 RADIOLOGICAL ISSUES (Continued)

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6.1.4 Radiological Survey

Survey Locations Within Plants 2/3 & 8 Project Area	Dose-Rate (mRem/hr. at 30 cm to from all external surfaces)	Contamination (dpm/100 cm ² , removable)
NFS tanks F2-605, 606, 607, and 608, within a posted Contamination Area	< 0.5	< 200 on all surfaces except on the N. end of F2-605, which was 8,000
CD Blend area (N. outside of Plant 2/3), tanks F2E-5, 6, and 8, and 2/3 Digestion all within a posted Contamination Area	2.0 (max.) < 0.5 (general area)	< 1,000 on most surfaces with maximum levels in the 30,000 to 50,000 range
OK Liquor area, SW corner (outside) of Plant 2/3, tank F3E-223, within a posted Contamination Area	0.5 (max.) < 0.5 (general area)	< 1,000 on most surfaces with maximum levels in the 10,000 to 12,000 range
Hot Raffinate Building, tanks F1-301, 302, 303, and 308, within a posted Contamination Area	0.5 (max.) < 0.5 (general area)	< 1,000 on most equipment surfaces, but not in excess of 100,000
Tanks 203 and 203A in Plant 8, within a posted Contamination Area	1.0 (max.) < 0.5 (general area)	< 1,000 on most surfaces; exception being tops of tanks near manways and agitator boxes
Digestion and Filtrate tank areas on 1 st floor and at tops of tanks in Plant 8, within a posted Contamination Area	1.0 (max.) < 0.5 (general area) Tank 25A: 4.0 (max., contact) & in range of 2.0 - 3.0 at 1 foot	< 1,000 on most surfaces; exception being surfaces on and around T-25A. Maximum levels are 6,000 at T-25A
EIMCO filter area, 2 nd floor in Plant 8, within a posted Contamination Area	1.0 (max.) < 0.5 (general area)	> 1,000 on most surfaces. < 1,000 on floors and isle ways
EIMCO drumming station, 1 st floor in Plant 8, within a posted Contamination Area	1.0 (max.) < 0.5 (general area)	> 1,000 on most surfaces. < 1,000 on floors and isleways

6.2 INDUSTRIAL HYGIENE ISSUES

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6.2.1 Uranyl Nitrate Hexahydrate (UNH)

The primary chemical hazard associated with this work is uranyl nitrate hexahydrate (UNH). UNH is a solution containing uranium compounds dissolved in nitric acid. Nitric acid is a strong acid which is capable of causing severe irritation to the skin, eyes, and mucous membranes. Inhalation may result in irritation of the upper respiratory tract, pneumonitis, or bronchitis.

6.2.2 Nitrogen Dioxide (NO₂)

When nitric acid is heated or exposed to metals, nitrogen dioxide (NO₂) may be present in the vapors. Health effects related to inhalation of NO₂ are dependent on the time and level of exposure. Contact with NO₂ is irritating to the eyes, nose, throat, and wet skin. The discomfort or slight pain occurring at exposure may go unnoticed. Serious results may not be felt until hours or days after exposure, even though heavy damage may have occurred. The cyanosis and pulmonary edema resulting from damaged lung tissue becomes disabling and can be fatal, especially if not promptly treated. The short term exposure limit (STEL) for NO₂ is 1 ppm.

6.2.3 Heat Stress

Heat stress is a concern and may limit work for employees in anti-C clothing and respirators when outdoor dry bulb temperatures exceed 80°F, which may occur anytime from May through September. Time limits may be extended if an air-cooled vest, ice vest, or vortex cooled hooded airline respirator is used. Personnel will interface with IH to determine the appropriate means of heat stress mitigation.

Personnel should become aware of the symptoms of heat stress and be able to recognize these symptoms in themselves and in other workers. Symptoms of heat stress include muscle cramps, fatigue, weakness, loss of coordination, nausea; and in later stages, hot/dry skin (absence of sweating), delirium and seizures. The best way to maintain hydration and prevent heat-related illnesses is the frequent consumption of water.

6.2.4 Asbestos

Asbestos can be found in the building siding (transite) and pipe insulation. The transite siding inside the Digestion Area is in very poor condition and asbestos contamination is present in these areas. Asbestos is a human carcinogen which mainly affects the respiratory system, where it may cause lung cancer, mesothelioma cancer, or asbestosis. When working in areas where exposure to asbestos is possible, proper PPE and respiratory protection will be specified on the posted FERMCO Work Permit. The short term exposure limit (STEL) for asbestos is 0.02 f/cc per 8 hour time weighted average (TWA).

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6.2 INDUSTRIAL HYGIENE ISSUES (Continued)

6.2.5 Dicalite Dust (crystalline silica)

Calcined diatomaceous earth, brand named "Dicalite", is used to pre-coat the EIMCO rotary vacuum filter drums. This white dust contains up to 75% crystalline silica which has an OSHA PEL of 0.1 mg/m³. During the dumping of bags of Dicalite and during changes of the EIMCO filter cuttings drums, silica dust may become airborne in work areas. Both these jobs require air-purifying respirators equipped with HEPA filter cartridges, and the dumping station has local exhaust ventilation. Inhalation of large amounts of crystalline silica over time can cause silicosis, a progressive, irreversible fibrotic lung disease.

6.2.6 Cold Stress

Tasks may be conducted when temperatures could present a potential cold stress hazard. Personnel shall become aware of symptoms of cold stress and be able to recognize these symptoms in oneself and in other workers. Cold stress recognition and prevention shall be reviewed at regularly scheduled safety meetings.

During cold weather, special care should be taken to dress appropriately for anticipated weather conditions. Specific attention will be given to the hands and feet and other exposed body parts to prevent frostbite. When equivalent chill temperature drops below 0°F, Industrial Hygiene shall be contacted to review and/or add control measures to minimize cold stress.

When a worker desires to wear a coat (or other type of cold weather gear), and anti-contamination clothing is required, the cold weather gear must be worn under anti-contamination clothing.

6.3 SAFETY ISSUES

The following safety issues have been evaluated during the preparation of the PSHSP.

6.3.1 Illumination

Areas accessible to employees shall be lighted to not less than the minimum illumination intensities listed in the following table while any work is in progress:

<u>Foot Candles</u>	<u>Area of Operation</u>
5	General site areas
5	Indoors: Warehouses, corridors, hallways, and exitways
10	General shops - mechanical and electrical areas

6.3.2 Sanitation

An adequate supply of potable water shall be provided. The containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap. Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not be used for any other purpose. A supply of disposable conical shaped cups shall be available at the water container as well as a refuse container to dispose of them.

6.3.3 Lifting

Personnel should know their lifting limits and the object to be lifted should be lifted by such factors as; the rate and distance to be traveled, the amount of time required, and the center of gravity necessary to handle the load safely. A employee shall NOT lift more than 50 pounds without another person or mechanical help.

7.0 HAZARD CONTROL

7.1 ENGINEERING / ADMINISTRATIVE CONTROLS

Engineering controls have been implemented in the modification of the UNH Process to control physical, chemical, and radiological hazards. Administrative controls required to be used during the work covered by this Project Specific Health and Safety Plan (PSHSP) include:

- UNH Neutralization Project Managers Standing Orders, M-111
- Comprehensive Environmental Occupational Safety and Health Procedures (ESH-1-1000)
- Lockout/Tagout (Hazardous Energy and Material Control) Procedure SSOP-0719
- FERMCO Work Permit
- Radiological Work Permit (RWP) to control changing radiological hazards
- Project Specific Health & Safety Requirement Matrix (PSHSRM)

Administrative controls (used to address potential hazards) include: this PSHSP, all FERMCO requirements, and operational procedures.

7.2 PERSONAL PROTECTIVE EQUIPMENT/RESPIRATORY PROTECTION

The level of personal protective equipment (PPE) and respiratory protection to be worn by field personnel involved with task activities is defined on an activity basis in the Health and Safety Requirements Matrix and the Radiological Work Permit (RWP) posted at the Plant 2/3 Control Point.

7.2 PERSONAL PROTECTIVE EQUIPMENT/RESPIRATORY PROTECTION (Continued)

Modification to the protective equipment ensembles may be necessary for specific operations or when unexpected conditions arise. In these cases, changes will be made based on review of specific hazards, weather, work conditions, operating requirements, and air monitoring at the work area. In addition, respiratory protection may be upgraded or downgraded, as deemed appropriate by the RSO Health and Safety Manager or designee within the constraints of this PSHSP. With the written approval of the RSO Health and Safety Manager, substitution of some PPE items may be appropriate. Approved written revisions will be made in the PSHSP and PSHSRM.

8.0 DECONTAMINATION

8.1 SITE DECONTAMINATION REQUIREMENTS

Area decontamination of radiological and some chemical contaminants shall be done with a combination of HEPA-filtered vacuum units, wet wiping techniques, approved detergents or soaps, and the use of sealants or fixatives when immediate decontamination is not feasible or practical.

8.1.1 Personal

Personal contamination on the skin, or on the inner personal company-issued clothing shall require contact with a Radiological Control Technician (RCT) immediately. Detection of a count rate above background with a field portable monitoring instrument ("frisker") should alert personnel of possible contamination. The ambient background count rate is not to exceed 300 counts per minute (CPM) in the location of the personnel monitoring. If background levels exceed 300 CPM, proceed to an area of lower background to perform the personal monitoring of the potentially contaminated individual. Contaminated skin or clothing is to be limited to 1000 dpm/100 cm². Ideal background levels in the monitoring area are less than 100 CPM.

Responding RCTs are to follow appropriate FEMP requirements for personnel decontamination, event notification and reporting of radiological control occurrences. Contaminated personnel are to initiate a bioassay analysis for assessing potential internal radiation dose from possible inhalation, ingestion, or absorption of radioactive materials.

8.1.2 Equipment

Equipment for decontamination of asbestos and radiological hazards shall be kept available in the area surrounding the controlled areas (asbestos regulated area or Contamination Zone).

Equipment must be monitored by a RCT prior to the removal from a radiologically controlled area. Equipment found to be contaminated when exiting a controlled point will be bagged and taken to the FEMP Decontamination Facility for decontamination.

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9.0 EMERGENCY / CONTINGENCY PLANS

9.1 REPORTING

9.1.1 Emergency Numbers

9.1.1.1 On-Site (FEMP) Emergencies

NAME	FEMP TELEPHONE NO.	RADIO*
Ambulance	738-6511	CONTROL
Hospital	738-6511	CONTROL
Fire	738-6511	CONTROL
Security	738-6511	CONTROL
Emergency Response	738-6511	CONTROL
RSO Health & Safety Manager	738-6405	Pager 554-5516
Industrial Hygiene	738-6207	357
Radiological Control	738-6257/6577	355
Fire and Safety Inspectors	738-6235	303
Assistant Emergency - Duty Officer (AEDO)	738-6295/6431	202/CONTROL
Accountability Center	738-6202	

- Call numbers listed are for FERMCO frequency 2.

9.1.2 Site Notification Procedures

All on-site (FEMP) emergencies shall be reported to the FERMCO "Communication Center" to ensure rapid response. A means to report an emergency shall be available at all work locations whenever personnel are working. This may be accomplished by one of the following methods:

- Phone 738-6511
- Activate a local site fire alarm station
- Radio to "Control"

9.1 REPORTING (Continued)

Any injury, no matter how minor, shall be reported immediately to FEMP Medical for evaluation or treatment. The injured employee shall be accompanied to medical by the supervisor in charge or designee. The FERMCO RSO Health & Safety Manager shall be notified as soon as possible after the injury/accident has occurred.

Employees working on-site will be notified of emergency or abnormal conditions by the plant wide alarm system and radio announcements. This announcement follows the sounding of the site alarm horn signal, 3-3.

9.1.3 What to Report

The following are examples of emergencies that would justify calling and reporting an emergency:

- Serious Injury
- Injury Complicated by Contamination
- Chemical/Radiation Release
- Chemical Splash (Eye and Skin)
- Any Fire
- Major Property Damage
- Detrimental Weather Conditions
- Property Damage
- Unusual Occurrence(s)

When an emergency or abnormal condition is observed, personnel shall contact the Communications Center at extension 6511 or via radio (CONTROL) for on-site emergencies. Stay on the phone line until the dispatcher hangs up.

The following information must be given to the Communication Center operator:

- Name
- Badge number
- Location where emergency has occurred
- Nature of the emergency
- Number of personnel with injuries
- Unusual conditions (odors, symptoms, vapors, smoke)
- Current status of the emergency

9.2 EVACUATION ROUTES / ACCOUNTABILITY

9.2.1 Rally Point Accountability

Should a situation require an emergency evacuation of the work area, all mechanical process equipment should be turned off (if possible) and left in place. On-site personnel should immediately proceed to the nearest established rally point as identified on the map found in Attachment C. The primary rally point is no. 8 and the alternate rally point is no. 6.

9.2.2 In-Place Accountability

When in-place accountability is required, employees shall contact his or her supervisor and report their current position. The supervisor in charge shall report the names of any unaccounted personnel to the Project Manager within 10 minutes.

9.3 EMERGENCY EQUIPMENT

9.3.1 FEMP Site Equipment

The FEMP Medical Facility is staffed and equipped to handle most types of medical emergencies that would occur during a task. The medical facility is staffed with Emergency Medical Technicians (EMT) and is equipped with an ambulance to transport the injured person to the nearest off-site hospital should extended or specialized treatment be necessary.

The FEMP Medical Facility is located at the East end of the first floor of the ES&H Building (Building 53). The location of the FEMP Medical Facility can be seen in Attachment D.

9.4 EMERGENCY RESPONSE

The FEMP Emergency Services will handle all on-site emergencies. Any request for emergency help should be requested by telephone (738-6511) or on any FEMP radio frequency by calling "CONTROL".

9.4.1 Medical Emergencies

The FEMP medical department personnel shall serve as the first aid response team. The Emergency Medical Technicians (EMT) shall serve as the first-aid person, as they can respond within 3-4 minutes to FEMP site emergencies.

9.4.2 Fire Emergencies

All work sites shall maintain effective communication to summon fire fighting assistance. Access to the work area shall be maintained at all times to permit fire trucks and fire fighting crews to safely approach the fire emergency.

9.4 EMERGENCY RESPONSE (Continued)

Only trained personnel shall attempt to operate any fire fighting equipment and only when the fire is clearly within the capability of the fire fighting equipment.

The FEMP Emergency Response Team (ERT) will also respond to all on-site fire emergencies. For any fire emergency at FEMP, call (738-6511).

9.4.3 Explosion Emergency

When an explosion has occurred the following actions are to be taken:

- Activate nearest fire alarm if possible. Note: Notify other employees by alternate method if fire alarm is not available
- Evacuate building or work area
- Proceed to an appointed rally point
- If qualified, render first aid to any injured personnel
- Instruct all persons in transit to avoid the work area and surrounding area
- Contact CONTROL by radio or phone (6511)
- Call for medical assistance if necessary
- Report to supervisor for accountability

9.4.4 Chemical Emergency

9.4.4.1 Splashes

Flush the affected area with clean water at nearest portable eyewash or safety shower for 15 minutes. Report to FERMCO Medical Services.

9.4.4.2 Personal Contamination

When contaminated with a corrosive material, flush the affected area with clean water for 15 minutes. Report to FERMCO Medical Services.

When contaminated with other materials, contact Industrial Hygiene and remain at the work location until a representative of Industrial Hygiene arrives and provides further instructions.

9.4.5 Radiological Emergencies

9.4.5.1 Releases

The release area shall be evacuated. The supervisor in charge, Assistant Emergency Duty Officer, Radiological Control Technicians, and RSO HSM shall be notified of the release.

9.4 EMERGENCY RESPONSE (Continued)**9.4.5.2 Personal Contamination****8037**

Contamination should be avoided, where possible, by making minimum contact with the contaminant. All instances of personnel radiological contamination must be reported to Radiological Controls, RSO Health & Safety Manager, and the Assistant Emergency Duty Officer. All instances of personnel chemical contamination shall be reported to Industrial Hygiene, RSO Health and Safety Manager, and the Assistant Emergency Duty Officer.

9.4.6 Accident Investigation

Any injury or accident shall require the supervisor to complete an accident report. This report shall be completed within 24 hours of the event and forwarded to the FERMCOWorker's Compensation Coordinator at site Mail Stop 31. Should a serious accident/injury occur, the involved area should not be disturbed until approved by the RSO Health & Safety Manager.

10.0 CHANGES TO THE PSHSP

This Health & Safety Plan for RSO activities is based on information available at the time of preparation. It is important that personnel protective measures be routinely reassessed by supervision, project management, and the RSO Health & Safety Manager. In addition, unexpected conditions/events may arise which require reassessment of the health & safety issues. Upgrading or downgrading of precautions, personal protective equipment, etc. identified in this plan must be approved in writing by the RSO Health and Safety Manager or designee upon consultation with Subject Matter Experts (SMEs) (i.e. Industrial Hygiene, Rad Engineering). Amendments to this plan are not required for such changes in activity; however, formal documentation of the change must be made.

Unplanned operations and/or changes in work scope shall require a review and may require an amendment to the Project Specific Health & Safety Plan. All amendments must be approved by the RSO Health and Safety Manager and the Manager of Occupational Safety & Health Compliance.

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10.1 CONTROL OF HEALTH AND SAFETY PLAN

For the purpose of ensuring that all personnel are informed of any changes in the scope of this Health and Safety Plan, CONTROLLED copies of this document shall be maintained by ES&H Document Control. Only essential personnel shall maintain controlled copies of this document. The following is the list of personnel with the controlled copies of this PSHSP.

Project Manager, Diane Garrett
Operations Manager, Tim Huey
Health & Safety Manager, Richard E. Maurer
Occupational Safety & Health Compliance Manager, Daryl Mills
Radiological Engineering (RSO Support), Kevin Tschaenn
Medical Services, Doran Christensen
DOE, John Simak
Industrial Hygiene Technician Manager, Jack Patrick
Industrial Hygiene, Walt Mengel

Changes, corrections, and/or additions not directed through ES&H Document Control will not be considered "controlled and approved".

10.2 REVIEW OF CONTENTS

This Project Specific Health and Safety Plan will be reviewed on a quarterly basis, as a minimum, by the RSO Health and Safety Manager for accuracy and applicability to the job task. Required revisions (revisited pages only) will be submitted to ES&H Document Control for update and distribution.

**ATTACHMENT A
PROJECT SPECIFIC
HEALTH & SAFETY REQUIREMENTS MATRIX**

HEALTH AND SAFETY REQUIREMENTS MATRIX
PROJECT: UNH Transfer, Neutralization, and Disposal Operation Procedure

The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix.

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONAL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE & ENGINEERING CONTROL MEASURES	PERMIT(S)	DECONTAMINATION & DISPOSAL PROCEDURES
1.0) General Project Pre-mobilization	<ul style="list-style-type: none"> ● Uranium contamination ● General industrial safety hazards ● Not all hazards are specified on the summary 	<ul style="list-style-type: none"> ● TLD required for entry into the controlled area ● All personnel must monitor for uranium contamination prior to leaving the controlled area 	<ul style="list-style-type: none"> ● FERMCO issued clothing ● Safety glasses w/rigid side shields ● Steel toed safety shoes ● Hard hats ● Entry into contamination area requires a minimum of smock, shoe covers, and gloves 	<ul style="list-style-type: none"> ● Site GET Training ● Site Worker Training ● RW II for work in the controlled area ● 24 Hour Supervised Field Experience ● 8 Hour Supervised Training for Supervisory Personnel ● Orientation on Project H&S Requirements Matrix ● Orientation on Project Specific MSDSs 	<ul style="list-style-type: none"> ● FERMCO must have proof of physical examination signed by a physician ● Initial, bi-monthly, and termination urinalysis ● Initial, annual, and termination in-vivo 			<ul style="list-style-type: none"> ● FERMCO supplies respirator cleaning facility ● FERMCO supplies bags and drums for disposition of contaminated waste ● All tools, equipment, and materials must be monitored for uranium contamination prior to leaving the controlled/contaminated area ● Unpack as much material as possible prior to entering the controlled area

000023

The requirements of this document are based upon current conditions and/or operations in areas near the planned work zone. This document is to be used as an aid to assist in understanding the requirements of the project. This document does not relieve the project of planning for or providing a safe work site. This document does not relieve the project from recognizing and complying with other appropriate state, federal and FEMP regulations.

August 19, 1994

REV.0

HEALTH AND SAFETY REQUIREMENTS MATRIX
PROJECT: UNH Transfer, Neutralization, and Disposal Operation Procedure

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The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix.

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONAL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE & ENGINEERING CONTROL MEASURES	PERMIT(S)	DECONTAMINATION & DISPOSAL PROCEDURES
2.0) Verify the operating conditions of tanks and equipment in Plant 2/3 (Continued on the next page)	Contact with contaminated surfaces or getting splashed with acid/uranium bearing liquids	<ul style="list-style-type: none"> ● FERMCO to conduct periodic monitoring ● UNH area monitoring in digestion and at clothing area in extraction 	<ul style="list-style-type: none"> ● Full anti-C coveralls, shoe covers, nitrile gloves, hood ● For work involving liquid material wear saranex protective clothing ● Full-face air purified respirator & APR if monitoring results warrant 	<ul style="list-style-type: none"> ● Respirator training and fit-testing for workers required to wear full-face respirator ● Trained to the requirements and procedures in the UNH Neutralization Project Managers Standing Orders M-111 	Documentation of respirator medical certification provided to FERMCO Medical Services	<ul style="list-style-type: none"> ● The FERMCO work permit (PPE Section) will be used to amend PPE changes ● UNH Neutralization Project - Managers Standing Orders M-111 	<ul style="list-style-type: none"> ● Radiation Work Permit ● FERMCO Work Permit with hazardous chemical requirements 	<ul style="list-style-type: none"> ● Respirators and shoe covers are laundered by site laundry. Containers at extraction change area for contaminated trash ● FERMCO supplies bags and drums for disposition of contaminated waste
	Heat stress when wearing additional PPE	Physiological monitoring of workers for control of heat stress	Cool ice vests for heat stress control			<ul style="list-style-type: none"> ● Work/rest regimen for heat stress control ● Contact IH when temp is > 80°F 		
	Potential for asbestos fiber inhalation from falling transite in Hot Raffinate and Digestion Areas	Asbestos monitoring not required because fiber levels are < 0.01 f/cc	Half-mask with magenta cartridges for asbestos in Digestion Area	Respirator training & fit-test if to enter asbestos areas	Respirator medical approval if to enter asbestos areas			

HEALTH AND SAFETY REQUIREMENTS MATRIX
PROJECT: UNH Transfer, Neutralization, and Disposal Operation Procedure

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The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix.

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONAL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE & ENGINEERING CONTROL MEASURES	PERMIT(S)	DECONTAMINATION & DISPOSAL PROCEDURES
2.0) Verify the operating conditions of tanks and equipment in Plant 2/3 (Continued)	Airborne radiation	Monitoring as required by the routine radiation survey guidelines RC-RDA-009	<ul style="list-style-type: none"> ● Full-face APR as determined if monitoring results warrant ● Full anti-C coveralls, shoe covers, nitrile gloves, hood 	<ul style="list-style-type: none"> ● Respirator training and fit-testing for workers required to wear full-face respirator ● Trained to the requirements and procedures in the UNH Neutralization Project Managers Standing Orders M-111 	Documentation of respirator medical certification provided to FERMCO Medical Services		RWP continuous monitoring	<ul style="list-style-type: none"> ● Respirators and shoecovers are laundered by site laundry. Containers at extraction change area for contaminated trash ● FERMCO supplies bags and drums for disposition of contaminated waste
	Potential for release of NO ₂ from UNH tanks	NO ₂ area monitoring in digestion and at clothing area in extraction	Airline respirators if NO ₂ levels >0.5 ppm					
3.0) Transfer UNH to Tank F1-25 or Tank F1-26 (Plant 2/3) (Continued on the next page)	<ul style="list-style-type: none"> ● NO₂ gas evolution from unventilated receiving tank F1-26 or F1-25. ● Little uranium aerosol (due to submerged dip leg) skin contact with soluble uranium and acid ● UNH is 13 to 202 gU/L and HNO₃ is 0.2 to 4.0 Normal 	<ul style="list-style-type: none"> ● FERMCO to conduct periodic monitoring ● UNH area NO₂ monitoring in digestion and at the clothing area in extraction ● Personnel alarming NO₂ monitors for workers in the digestion area ● OSHA type BZ sampling for NO₂ and soluble uranium for 25% of the workers in the digestion area 	<ul style="list-style-type: none"> ● Full face continuous flow or personnel demand air lines for workers in digestion if NO₂ levels > 0.5 ppm ● full anti-C, coveralls, shoe cover, and 2 pairs of chemical resistant gloves 	Respirator training and quantitative fit test	Documentation of respirator medical certification provided to FERMCO Medical Services	<ul style="list-style-type: none"> ● Follow the work plan and double certification of valve lineups ● UNH Neutralization Project - Managers Standing Orders, M-111 	<ul style="list-style-type: none"> ● Radiological Work Permit with hazardous chemical requirements 	<ul style="list-style-type: none"> ● Respirators and shoecovers are laundered by site laundry. Containers at extraction change area for contaminated trash ● FERMCO supplies bags and drums for disposition of contaminated waste

HEALTH AND SAFETY REQUIREMENTS MATRIX
PROJECT: UNH Transfer, Neutralization, and Disposal Operation Procedure

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The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix.

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONAL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE & ENGINEERING CONTROL MEASURES	PERMIT(S)	DECONTAMINATION & DISPOSAL PROCEDURES
3.0) Transfer UNH to Tank F1-25 or Tank F1-26 (Plant 2/3) (Continued)	Heat Stress when wearing additional PPE	Physiological monitoring of workers for control of heat stress	Cool ice vest for heat stress control			Work/rest regimen for heat stress control - contact IH when temperature exceeds 80°F		
	Asbestos regulated area	Asbestos monitoring not required if fiber levels > 0.1 f/cc	Half mask with magenta cartridges for asbestos in digestion area	Respirator training and fit-testing if to enter asbestos areas	Documentation of respirator medical certification provided to FERMCO Medical Services	Asbestos awareness training		
4.0) Dilute and neutralize the UNH (in Plant 2/3) Transfer neutralized UNH slurry to Plant 8 (Continued on the next page)	<ul style="list-style-type: none"> NO₂ gas evaluation from unventilated neutralization tanks F1-26, F1-25. Little uranium aerosol (due to submerged dip leg) skin contact with soluble uranium and acid UNH is 13 - 202 gU/L and HNO₃ is 0.2 to 4.0 Normal 	<ul style="list-style-type: none"> FERMCO to conduct periodic monitoring UNH area NO₂ monitoring in digestion and at clothing area in extraction Personal alarming NO₂ monitors for workers in Digestion Area. OSHA type BZ sampling for NO₂ and soluble uranium for 25% of the workers in Digestion Area 	Full-face continuous flow or pressure demand airline for workers in Digestion if plus full anti-C coveralls, shoe covers, 2 pair of chemical resistant gloves, and safety shoes	Respirator training and quantitative fit test	Documentation of respirator medical certification provided to FERMCO Medical Services	<ul style="list-style-type: none"> Follow work plan and double certification of valve lineups UNH Neutralization Project - Manager Standing Orders, M-111 	<ul style="list-style-type: none"> Radiological work permit with hazardous chemical requirements 	<ul style="list-style-type: none"> Respirators and shoe covers are laundered by site Laundry. Containers at Extraction Change Area for contaminated trash.
	Heat Stress when wearing additional PPE	Physiological monitoring of workers for control of heat stress	Cool ice vests for heat stress control				Work/rest regimen for heat stress control - contact IH when temperature exceeds 80°F	

HEALTH AND SAFETY REQUIREMENTS MATRIX
PROJECT: UNH Transfer, Neutralization, and Disposal Operations Procedure

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The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix.

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONAL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE & ENGINEERING CONTROL MEASURES	PERMIT(S)	DECONTAMINATION & DISPOSAL PROCEDURES
4.) Dilute and neutralize the UNH (in Plant 2/3) Transfer neutralized UNH slurry to Plant 8 (Continued)	Asbestos regulated area	Asbestos monitoring not required if fiber levels > 0.01 f/cc	Half mask with magenta cartridges for asbestos in digestion area and Hot Raffinate	Respirator training and fit-testing if to enter asbestos areas	Documentation of respirator medical certification provided to FERMCO Medical Services	Asbestos awareness training		
	Airborne radiation hazards	Monitoring as required by the routine radiation survey guidelines RC-RDA-009	<ul style="list-style-type: none"> • Full anti-C coveralls, shoe covers, nitrile gloves, hood • For work involving liquid material wear saranex protective clothing • Full-face air purified respirator & APR if monitoring results warrant 	<ul style="list-style-type: none"> • Respirator training and fit-testing for workers required to wear full-face respirator • Trained to the requirements and procedures in the UNH Neutralization Project Managers Standing Orders M-111 	Documentation of respirator medical certification provided to FERMCO Medical Services		RWP continuous monitoring	<ul style="list-style-type: none"> • Respirators and shoecovers are laundered by site laundry. Containers at extraction change area for contaminated trash • FERMCO supplies bags and drums for disposition of contaminated waste
	Dust and dicalite	FERMCO IH to conduct initial real-time dust monitoring to ensure the proper level of respirator protection and collect respirable silica dust samples	Full face air-purifying respirator until real-time monitoring indicates that respirators are not required		Documentation of respirator medical certification provided to FERMCO Medical Services	UNH Neutralization Project - Manager Standing Order M-111		

HEALTH AND SAFETY REQUIREMENTS MATRIX
PROJECT: UNH Transfer, Neutralization, and Disposal Operation Procedure

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5.0) Filter (EIMCO) Neutralized UNH slurry (Plant 8)	Nuisance dust and crystalline silica	FERMCO to conduct initial real-time dust monitoring to ensure the proper level of respirator protection and collect respirable crystalline silica sampling	Half mask respirator until real-time monitoring indicates that respirators are not required	Respirator training for workers required to wear respirators	Documentation of respirator medical certification provided to FERMCO Medical Services	UNH Neutralization Project - Managers Standing Orders M-111		FERMCO supplies respirator cleaning facility
	Airborne radiation hazards	Monitoring as required by the routine radiation survey guidelines RC-RDA-009	<ul style="list-style-type: none"> ● Full anti-C coveralls, shoe covers, nitrile gloves, hood ● For work involving liquid material wear saranex protective clothing ● Full-face air purified respirator & APR if monitoring results warrant 	<ul style="list-style-type: none"> ● Respirator training and fit-testing for workers required to wear full-face respirator ● Trained to the requirements and procedures in the UNH Neutralization Project Managers standing Orders M-111 	Documentation of respirator medical certification provided to FERMCO Medical Services		RWP continuous monitoring	<ul style="list-style-type: none"> ● Respirators and shoecovers are laundered by site laundry. Containers at extraction change area for contaminated trash ● FERMCO supplies bags and drums for disposition of contaminated waste
	Lifting hazards (sprains and strains)					Use mechanical assistance when moving skids of filtrate		
	Spill/exposure				Hazardous Energy and Material Control (Lock and Tag) Procedure SSOP-0719 course #1622	Lock and Tag procedure SSOP-0719		

HEALTH AND SAFETY REQUIREMENTS MATRIX
PROJECT: UNH Transfer, Neutralization, and Disposal Operation Procedure

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The requirements listed in Section 1.0 of this matrix apply to all activities addressed on this matrix.

ACTIVITY (TASKS)	HAZARD IDENTIFICATION	FREQUENCY & TYPE OF AIR AND PERSONNEL MONITORING REQUIRED	PERSONAL PROTECTIVE EQUIPMENT	TRAINING REQUIREMENTS	MEDICAL MONITORING & SURVEILLANCE REQUIREMENTS	ADMINISTRATIVE & ENGINEERING CONTROL MEASURES	PERMIT(S)	DECONTAMINATION & DISPOSAL PROCEDURES
6.0) Dispose of solids in drums and filtrate to BDN (Plant 8)	Lifting hazards (sprains and strains)					Use mechanical assistance when moving 55 gallon drums		
	Spill/exposure			Hazardous Energy and Material Control (Lock and Tag) Procedure SSOP-0719 course #1622		Lock and Tag procedure SSOP-0719		

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**ATTACHMENT B
PERSONNEL AND ENVIRONMENTAL
MONITORING AND ACTION LEVELS**

000030

Industrial Hygiene Sampling / Monitoring Protocol

UNH Neutralization

I. Purpose / Description

Building / Area:

Plant 2/3 (Refinery), Hot Raffinate Building, NFS Tanks, Plant 8 (Scrap Plant)

Job Classifications:

FERMCO RSO Maintenance (electricians, millwrights, pipefitters) employees will first isolate the existing system. Then subcontractors will install new dedicated piping for transferring UNH solutions to the neutralization tanks and EIMCO filters. Then WEMCO RSO Operations personnel (chemical operators / Hazwats) will perform the neutralization and filtration.

Project / Operation

This project will neutralize 200,000 gallons of uranyl nitrate (UNH) solution now contained in 19 tanks in the Refinery area on a batch basis using Magnesium hydroxide slurry. UNH solution will be pumped from each of the storage tanks into either neutralization tank F1-25 or F1-26 in the Plant 2/3 Digestion Area. The neutralized slurry of Magnesium diuranate then will be pumped over to Plant 8 where it will be filtered on the west EIMCO rotary vacuum filters. The filter cuttings of damp Magnesium diuranate will be drummed and sent to storage. The filtrate will be sent to the BioDenitrification Facility.

Requestor / Date / Charge No:

Diane Garrett
08/16/94
38PE1

II. Professional Hypothesis

The expectations for chemical air contaminant levels are based on previous sampling at the UNH project during the Production Test Authorization in 1992-1993 when 20,000 gallons of UNH were neutralized and filtered.

Past Soluble / Insoluble Uranium Results:

Letter M:ES&H:(IH):93-031 summarizes these results for high volume filter samples collected by Radiological Controls in Plant 8. Results as summarized in the table below, show that the highest results were only less than 2% of their applicable limits for both soluble and insoluble uranium. Surprisingly on average 22% of the total uranium detected was soluble, even though the UNH had already been neutralized in Plant 8 to a slurry of supposedly insoluble magnesium diuranate. Comparison of direct chemical gravimetric uranium results with the same

results predicted from activity concentrations by the following formula will produce a gravimetric concentration that over-estimates the total chemically determined uranium by an average of 40%. Specific activity is 1.8 dpm/ μ g U for 1.0% enrichment.

$$\text{Total U } (\mu\text{g}) = \left(\frac{\mu\text{Ci}}{\text{cc}} \right) \times \frac{2.22 \times 10^{12} \text{ (dpm/Ci)} \times \text{Vol (m}^3\text{)}}{1.8 \text{ (dpm}/\mu\text{g)}}$$

1992 PLt. 8 Soluble / Insoluble Uranium Results

Uranium Type	Applicable Limit μ g U / m ³	Highest Result as Percent of Applicable Limit	Uranium Type as Percent of Total Uranium Found on Filter
Soluble	50	1.5% (0.73 μ gU/m ³)	22%
Insoluble	200	1.3% 2.58 μ gU/m ³	68%

Past Nitrogen Dioxide Results:

III. Sampling and Analytical Information

The attached table 3 summarizes sampling and monitoring 1) methods, 2) laboratory analyses, 3) pertinent SOPs, 4) sample storage shipment requirements, 5) QA samples, 6) approximate number of samples, 7) estimated sample collection dates, 8) estimated analysis costs, and 9) estimated survey costs

IV. Study Support Personnel

Technologist time is estimated to be 80 hours.
Program Coordinator (IH technician supervisor) time is estimated to be 80 hours.
IH Technician time is estimated to be 200 hours.

V. Special Safety and Other Considerations

IH technologists and technicians will have to observe requirements on the combined Radiological and Chemical Work Permit.

IH technicians will:

- Provide coverage of project, calibrating/issuing/unloading data from personal NO₂ monitors
- Maintain/calibrate/collect data (if using data logger or chart)

- recorder from MDA NO2 monitors
- Provide periodic updates on air sample results to UNH project support staff and workers
- Provide immediate notification of any direct-reading results exceeding STEL or TWA limits to UNH project supervision and IH
- Maintain IH UNH Logbook as follows:
 - name of technician and signature at end of days entry
 - time and date on (at UNH work area), time and day off
 - all monitoring performed and results
 - name and function to whom results reported
 - issues/problems arising and how resolved
 - new requests for IH services from UNH supervision
 - details of anything reported to AEDO
 - turnover information: sampling/monitoring equipment needs, additional tasks, etc.

sp. → IH Technician Supervisor will:

- Ensure that IH technician coverage is scheduled as needed to support UNH activities
- Ensure IH technicians complete paperwork and logbook entries and initials off
- Ensure that air samples for off-site analysis are promptly submitted and processed
- Ensure that problematic information is passed to IH Lead Technologist, IH Manager, OS&H Manager, UNH Project Manager, CRU-3 H&S Team Leader, AEDO, or DOE as appropriate

sp. → IH technologist will:

- Review and initial off IH technician entries in IH UNH logbook
- ensure all air samples and monitoring results entered into air sample database and data sheets properly
- Provide spot check reports to UNH project support staff
- write exposure notification letters to employees who wore BZ samples
- Provide an overall summary report of all monitoring and sampling results and interpretation at conclusion of project
- Ensure IH field services are being conducted as specified in this protocol
- Followup up on any problematic information relating to UNH
- Informs IH Manager, CRU-3 H&S Team Leader, UNH Project Manager, or AEDO or DOE representatives as appropriate

VI. Signatures

Walt Mengel, Lead UNH Technologist

Dave Jackson, IH Manager

Jack Patrick, IH Technician Supervisor

TABLE 3 - Sampling and Analytic Information for UNH Neutralization

Contaminant	Method	Pertinent SOPs	Sample Storage / Shipment Requirements	QA Samples	Approximate Number of Samples	Estimated Sample Collection Dates	Estimated Analysis Cost	Estimated Survey Cost
Nitrogen dioxide NO2 STEL limit 1 ppm	Triethanolamine (TEA) coated molecular sieve solid sorbent tube, extracted by TEA, then analyzed by nitrite ion chromatography Sample at 200 cc/min for 15 to 30 minutes, 0.2 ppm Detection Level	OSHA ID-182	Don't use TEA tubes over 3 years old. Keep sampled tubes out of sunlight and at room temper. store not more than 30 days after collection	1 field blank for every 10 samples				
Soluble uranium TWA limit 50 µg/m3	Pre-weighed PVC filter, reweighed, extracted in water (ID-121), analyzed by inductively coupled plasma atomic absorption (NIOSH 7300)	OSHA ID-121	cap filters ship upright with packing material to prevent jostling or damage	ditto				
Crystalline silica TWA limit 0.1 mg/m3	Respirable dust cyclone using pre-weighed PVC filter, then reweighed, and crystalline silica content by X-ray diffraction High volume cyclone to determine % crystalline silica in case insufficient catch on respirable dust filter	OSHA ID-142	cap filters ship upright with packing to prevent jostling or damage and do not use plastic packing materials due to electrostatic effects	ditto				
Asbestos fibers TWA limit 0.2 f/cc	Mixed cellulose ester filters in QA samplers at 5 L/min for 4 to 8 hours analyzed by phase contrast microscopy (7400) or transmission electron microscopy (7402)	NIOSH 7402	ditto	ditto				

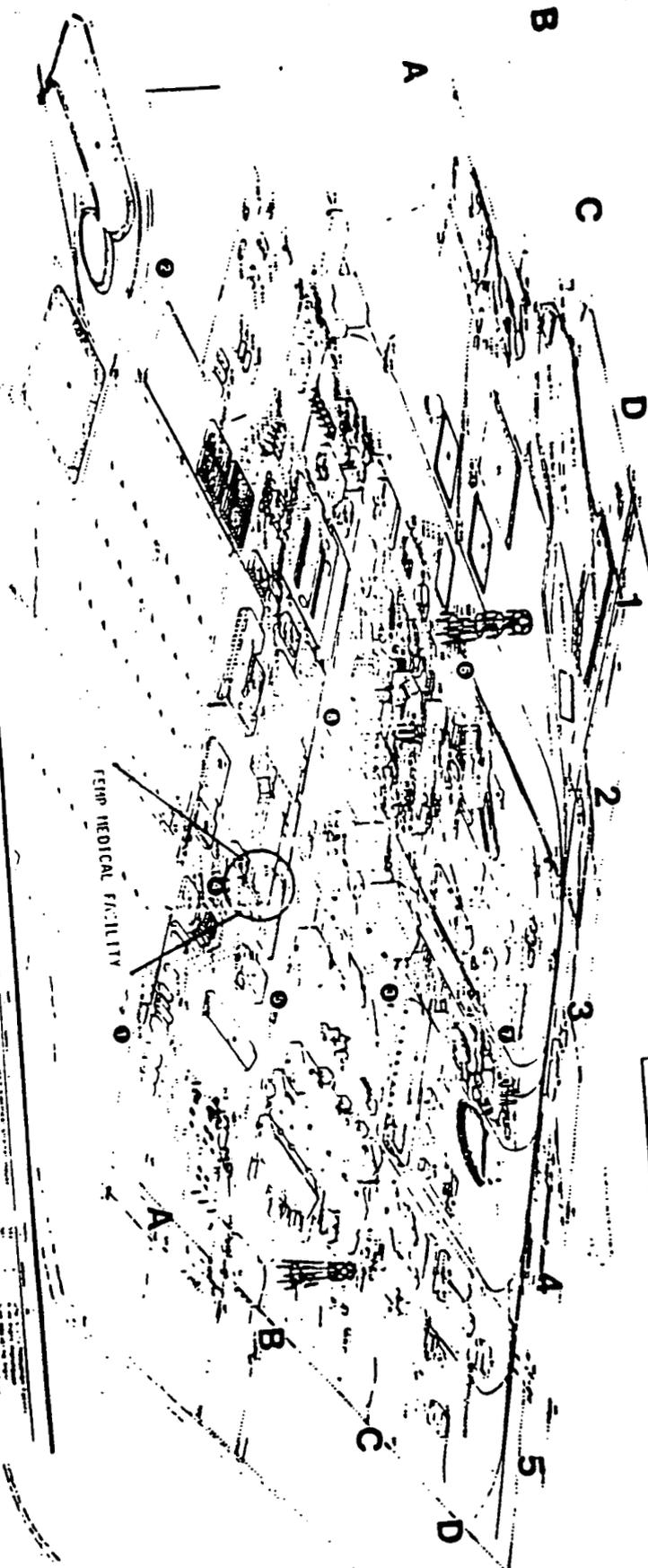
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**ATTACHMENT C
FEMP RALLY POINTS**

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6037

Fernald Environmental
Management Project



QUALITY ASSURANCE

NO.	DESCRIPTION	DATE	STATUS
1
2
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4
5
6
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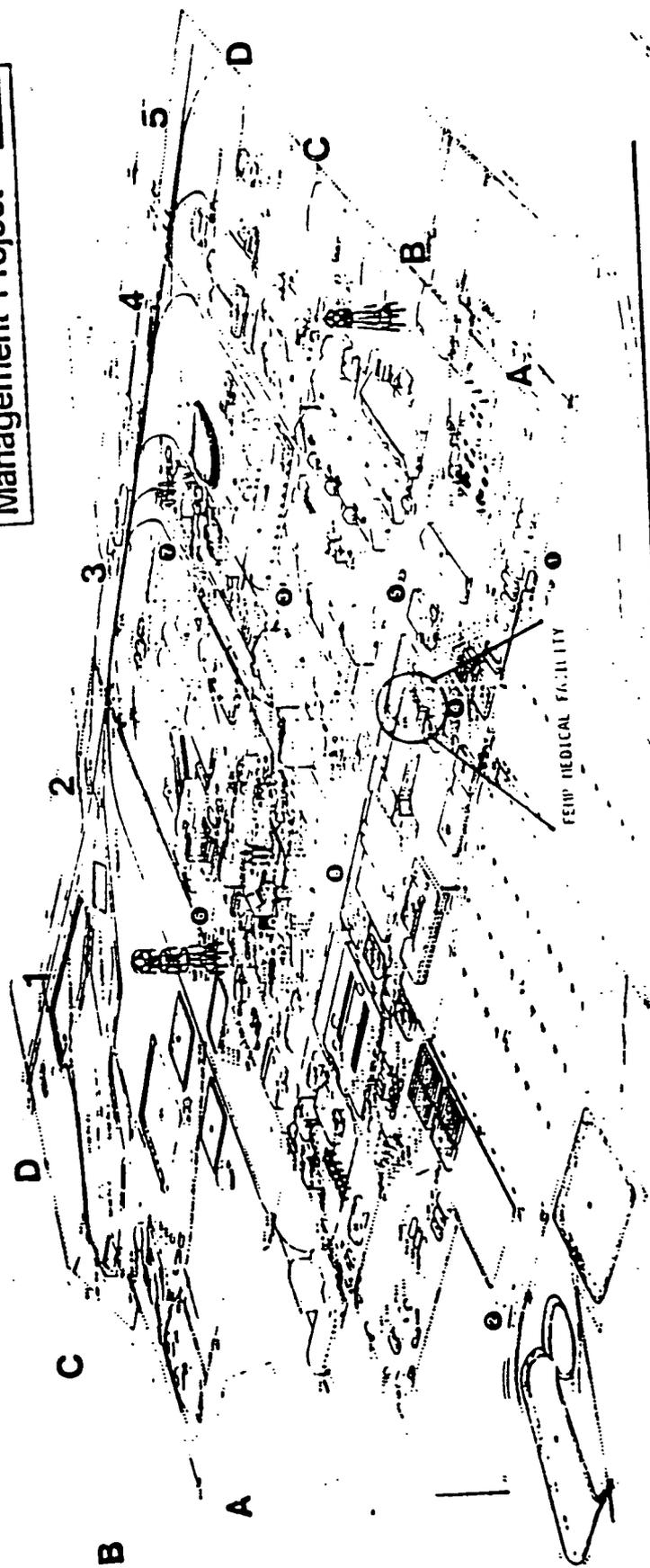
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**ATTACHMENT D
LOCATION OF FEMP MEDICAL FACILITY**

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 **Fernald Environmental Management Project**



INSTRUMENT IDENTIFICATION

Instrument ID	Instrument Description	Location	Notes
1
2
3
4
5

● SALLY POINTS

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**ATTACHMENT E
WORK AREA MATERIAL
SAFETY DATA SHEETS
(MSDSs)**

10132

MAGNESIUM OXIDE

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MAGNESIUM OXIDE
MAGNESIUM OXIDE
MAGNESIUM OXIDE

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY CONTACTS
GASTON L. PILLORI
(201) 796-7100

DATE: 10/25/86
PO NBR: 80580-R
ACCT: 878202-02
INDEX: 12-8629-60004
CAT NO: M683

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 1309-48-4

SUBSTANCE: ***MAGNESIUM OXIDE***

TRADE NAMES/SYNONYMS: CALCINED BRUCITE; MAGNESIA; MAGNESIA FUME; MAGLITE; PERICLASE; MAGCAL; SEAWATER MAGNESIUM; M-51; M-68; M-300; M-349

CHEMICAL FAMILY:
INORGANIC ACID

BCI 15

MOLECULAR FORMULA: MG-O MOL WT: 40

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=0 REACTIVITY=0 PERSISTENCE=3

COMPONENTS AND CONTAMINANTS

PERCENT: 97 COMPONENT: MAGNESIUM OXIDE

EXPOSURE LIMITS:
15 MG/M3 OSHA TWA; 10 MG/M3 ACGIH TWA (VAPOR).

PHYSICAL DATA

DESCRIPTION: ODORLESS WHITE POWDER BOILING POINT: 6512 F (3600 C)

MELTING POINT: 5072 F (2800 C) SPECIFIC GRAVITY: 3.7

SOLUBILITY IN WATER: INSOLUBLE SOLVENT SOLUBILITY: AQUEOUS ACIDS. 057 15 001

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

6037

FLASH POINT: NON-FLAMMABLE

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM
(1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FIREFIGHTING:

TOXICITY

400 MG/M3 INHALATION-HUMAN TCLO; CARCINOGEN STATUS: NONE.
MAGNESIUM OXIDE IS AN EYE AND MUCOUS MEMBRANE IRRITANT. PERSONS WITH A
HISTORY OF CHRONIC RESPIRATORY DISEASE MAY BE AT AN INCREASED RISK FROM
EXPOSURE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
IRRITANT.

ACUTE EXPOSURE- INHALATION OF FRESHLY GENERATED MAGNESIUM FUMES (MAGNESIUM
OXIDE) MAY CAUSE METAL FUME FEVER WITH NASAL IRRITATION, FEVER, CHILLS,
PERSPIRATION, NAUSEA, VOMITING, CHEST PAIN, MUSCULAR ACHES AND WEAKNESS.
SYMPTOMS MAY BE DELAYED 1-3 HOURS FOLLOWING EXPOSURE. THERE IS NO EVIDENCE
THAT DUST INHALATION LEADS TO LUNG INJURY. MAY CAUSE LEUKOCYTOSIS.

CHRONIC EXPOSURE- MAY CAUSE RESPIRATORY IRRITATION OR METAL FUME FEVER.

FIRST AID- REMOVE FROM EXPOSURE TO FRESH AIR IMMEDIATELY. TREAT METAL FUME
FEVER BY BED REST AND GIVE ASPIRIN FOR FEVER AND PAIN. (DREISBACH, HAND-
BOOK OF POISONING, 11TH EDITION, 1983).

SKIN CONTACT:

ACUTE EXPOSURE- MAGNESIUM OXIDE DUSTS ON THE SKIN MAY PRODUCE ALLERGIC REAC-
TIONS IN SOME INDIVIDUALS.

CHRONIC EXPOSURE- NO EFFECTS KNOWN IN HUMANS.

EYE CONTACT:

INGESTION:
-IRRITANT.

ACUTE EXPOSURE- INGESTION OF MASSIVE AMOUNTS MAY PRODUCE DIARRHEA.

CHRONIC EXPOSURE- NO KNOWN EFFECTS IN HUMANS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
NORMALLY STABLE BUT MAY BECOME UNSTABLE AT ELEVATED TEMPERATURES AND PRESSURE.

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COMPATIBILITIES:

- DEHYDRATED SULFUR: MAY IGNITE AND EXPLODE ON HEATING.
- MAGNESIUM: MAY IGNITE AND EXPLODE ON HEATING.
- ALUMINUM: MAY IGNITE AND EXPLODE ON HEATING.
- STRONG OXIDIZERS: VIOLENT REACTION.
- STRONG ACIDS: VIOLENT REACTION.
- BROMINE PENTAFLUORIDE: VIOLENT REACTION.
- CHLORINE TRIFLUORIDE: MAY IGNITE.
- PHOSPHORUS PENTACHLORIDE: INCANDESCES BRILLIANTLY ON HEATING.

DECOMPOSITION:
NONE HAZARDOUS.

POLYMERIZATION:
NOT KNOWN TO OCCUR.

CONDITIONS TO AVOID

SPILL AND LEAK PROCEDURES

AIR SPILL:
KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION OR GENERAL DILUTION VENTILATION TO MEET PERMISSIBLE EXPOSURE LIMITS.

- RESPIRATOR:
- 150 MG/M3- FUME OR HIGH-EFFICIENCY PARTICULATE RESPIRATOR.
SELF-CONTAINED BREATHING APPARATUS.
SUPPLIED-AIR RESPIRATOR.
 - 750 MG/M3- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE, HELMET, OR HOOD.
SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
HIGH-EFFICIENCY PARTICULATE RESPIRATOR WITH A FULL FACEPIECE.
 - 7500 MG/M3- POWERED AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY FILTER.
TYPE C SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE OR CONTINUOUS-FLOW
MODE.

FIREFIGHTING- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
PROTECTIVE CLOTHING NOT REQUIRED. AVOID REPEATED OR PROLONGED CONTACT WITH THIS SUBSTANCE.

GLOVES:
PROTECTIVE GLOVES ARE NOT REQUIRED BUT RECOMMENDED.

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EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A
FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO
THIS SUBSTANCE, THE EMPLOYER SHALL PROVIDE AN EYE-WASH FOUNTAIN WITHIN THE
IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - ALLIED FISHER SCIENTIFIC
CREATION DATE: 01/11/85 REVISION DATE: 04/26/85

-ADDITIONAL INFORMATION-

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Scott Specialty Gases, Inc.

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MATERIAL SAFETY DATA SHEET

15343

- PLUMSTEADVILLE, PA 215-788-8881 (Corporate & Regional Office)
- FREMONT, CA 810-659-0162
- LONGMONT, CO 303-442-4700
- TROY, MI 313-688-2950
- SOUTH PLAINFIELD, NJ 908-754-7700
- SAN BERNARDINO, CA 714-387-2571
- WAKEFIELD, MA 617-246-8707
- DURHAM, NC 919-220-0803
- HOUSTON, TX 713-644-4820

SECTION I - MATERIAL IDENTIFICATION

CHEMICAL NAME: Nitrogen Dioxide in Air SUPPLIER: Scott Specialty Gases

CHEMICAL FORMULA: NO₂/Air ADDRESS: Route 611 Plumsteadville, PA 18949

CHEMICAL FAMILY: Oxidizing Liquefiable Gas in Mixture In Case of Emergency, Contact your Regional Plant Manager

DATE PREPARED: 9/15/91 OTHER DESIGNATIONS: None

SECTION II - HAZARDOUS INGREDIENTS

COMPONENT	CAS #	CONCENTRATION	EXPOSURE LIMITS (PPM)		
			ACGIH TLV	OSHA PEL	OTHER
Nitrogen Dioxide	10102-44-0	3 ppm - 0.5%	3	5	
Air	7782-44-7 (O ₂) 7727-37-9 (N ₂)	Balance	-	-	

SECTION III - PHYSICAL DATA

BOILING POINT (°C): N/A SPECIFIC GRAVITY (H₂O = 1) @ 20°C: N/A

VAPOR PRESSURE @ 20°C: N/A PERCENT, VOLATILE BY VOLUME (%): Gas

VAPOR DENSITY (AIR = 1): 1.00 - 1.074 EVAPORATION RATE (_____ = 1): Gas

SOLUBILITY IN WATER 20°C: NO₂ decomposes in water to form nitric acid and nitrous acid. APPEARANCE AND ODOR: Colorless, NO₂ has a pungent acrid odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT AND METHOD	FLAMMABLE LIMITS	LEL	UEL
N/A	Non-flammable		

EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus and full protective clothing. Use water spray to keep fire exposed cylinders cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Compressed air at high pressures will accelerate the combustion of flammable materials. NO₂ is a strong oxidizing agent which may increase this hazard.

SECTION V - REACTIVITY DATA

STABILITY: Stable under normal storage conditions

Disclaimer: The information in this Material Safety Data Sheet is offered without charge for use by technically qualified personnel at their discretion and risk. Scott Specialty Gases, Inc. has made this sheet available with data which we believe is reliable, but the accuracy and completeness of the data is not guaranteed and no warranty is either expressed or implied. Since Scott Specialty Gases, Inc. has no control over the use of the product described herein, we assume no liability for loss of damage incurred from the proper or improper use of such product. This form is essentially similar to U.S. Department of Labor form OSHA-174.

INCOMPATIBILITY (MATERIALS TO AVOID): Flammable and combustible materials, especially greases and oils. NO_2 reacts with hydrocarbons, organic dusts, cyclohexane, fluorine, formaldehyde, alcohols, nitrobenzene, toluene and petroleum.

HAZARDOUS DECOMPOSITION PRODUCTS: When heated to decomposition or reacted with water, NO_2 may emit toxic fumes.

HAZARDOUS POLYMERIZATION: Will not occur

SECTION VI - HEALTH HAZARD DATA

ROUTES OF ENTRY: Inhalation

EFFECTS OF OVER EXPOSURE (ACUTE): Inhalation of NO_2 will cause constriction of the throat and bronchi and edema of the lungs. Symptoms may include headache, dizziness, irritation of the nose and throat, coughing and burning in throat and chest. **(CHRONIC):** At 5 - 50 ppm can cause a slowly evolving pulmonary edema with respiratory tract irritation, cough, headache, weakness and corrosion of teeth. **(MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE):** None

CARCINOGENICITY - NTP? NO IARC MONOGRAPHS? NO OSHA REGULATED? NO

EMERGENCY AND FIRST AID: Inhalation - Give victim 100% oxygen if breathing has not stopped. If breathing has stopped, give artificial respiration with oxygen. Get immediate medical attention. Skin/Eye contact - Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing. Contact a physician.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoors area. Shut off gas source if possible and remove sources of heat. Contact supplier for further steps. Red-brown color of NO_2 will identify large leaks.

WASTE DISPOSAL METHOD: Return cylinders to supplier for proper disposal with any valve outlet plugs or caps secured and valve protection cap in place. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): Use a self-contained breathing apparatus in case of emergency or non-routine use.

VENTILATION: Provide adequate general and local exhaust ventilation

OTHER PROTECTIVE EQUIPMENT: Safety glasses, safety shoes when handling cylinders.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in well ventilated areas only. Keep valve protection cap on cylinders when not in use and secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Move cylinder with adequate hand truck. Cylinders should be refilled by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

MATERIAL SAFETY DATA SHEET

SECTION 1

Manufacturer's Name: Westinghouse Materials Company of Ohio
 Mailing Address: P. O. Box 39870 •
 Cincinnati, OH 45239
 Shipping Address: 7400 Willey Road
 Fernald, OH 45030
 Manufacturer's Emergency Telephone No.: (513) 738 - 6511
 Other Information Calls: (513) 738 - 6212
 Date MSDS Revised: 01/86

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SECTION 2 - HAZARDOUS INGREDIENTS / IDENTITY

Principal Hazardous Components (synonyms)	Percent	PEL	TLV	Other Limits
Nitric Acid (aqueous HNO ₃)	10-20 by weight	2 ppm	2 ppm	4 ppm *

OSHA and ACGIH 1984/2 Short-Term Exposure Limit

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS

Boiling Pt. (F)	-212 ^o	Specific Gravity (H ₂ O=1.0)	Unknown
Vapor Pressure (mm Hg)	Unknown	Vapor Density (Air=1)	Unknown
Water Solubility	Complete	Water Reactivity	Exothermic Solution
Freezing Pt. (F)	N/A	pH	< 1
Color & Odor	Water-like liquid having bitter fumes and taste		

SECTION 4 - FIRE & EXPLOSION DATA

Flammable? No
 Protective Equipment: (See Section 8)

Special Fire or Explosion Hazards:

- Releases mixture of toxic corrosive nitrous fumes (NO_x) and nitric acid vapor when heated.
- May produce fire or explosion by violent reaction with reducing agents including but not limited to: acetic acid, acetic anhydride, (acetone+acetic acid), (acetone+sulfuric acid), acetylene, acrolein, acrylonitrile, allyl alcohol, allyl chloride, 2-amino ethanol, ammonia, ammonium hydroxide, aniline, anion exchange resins, (dichromate+anion exchange resins, antimony, antimony hydride, arsine, bismuth, boron, B₄H₁₀, boron decahydride, boron phosphide, bromine pentafluoride, n-butylaldehyde, calcium hypophosphite, carbon, cesium carbide, 4-chloro-2-nitroaniline, chlorine trifluoride, chlorosulfonic acid, cresol, cumene, Cu₃N₂, CuN₃, cyanides, cyclic ketones, cyclohexanol, cyclohexanone, diborane, 2,6-di-*t*-butyl phenol, diisopropyl ether, epichlorohydrin, ethanol, *m*-ethyl-aniline, ethylene diamine, ethylene imine, 5-ethyl-2-picolene, C₂H₅PH₂, iron II oxide, fluorine, furfuryl alcohol, germanium, glyoxal, hydrozine, hydrogen iodide, hydrogen peroxide, isoprene, (ketones+hydrogen peroxide), (lactic acid+hydrogen fluoride), lithium, lithium silicide, magnesium, magnesium phosphide, magnesium-titanium alloy, manganese, mesitylene, mesityl oxide, 2-methyl-5-ethyl-pyridine, 4-methyl-cyclohexanone, neodymium phosphide, nitrobenzene, oleum, organic matter, PH₃, PH₄I, phosphorous, P₄I₃, PCl₃, phthalic acid, phthalic anhydride, KH₂PO₂, beta-propiolactone, pyridine, RB₂C₂, selenium, selenium iodophosphide, (silver+ethanol), sodium, NaN₃, sodium hydroxide, sulfamic acid, (glycerides+sulfuric acid), terpenes, thiocyanates, thiophene, titanium, (sulfuric acid+n-hexane), toluidine, triazine, unsym.-dimethyl hydrazine, uranium, uranium-neodymium alloy, uranium-neodymium-zirconium alloy, vinylacetate, vinylidene chloride, zinc.

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S E C T I O N 5 - REACTIVITY DATA

ability: Unstable, corrosive, oxidizing agent
 Conditions to Avoid: Reacts with many materials to form flammable, toxic, or explosive products (see Section 4). **6037**
 Polymerization: Will Not Occur
 Hazardous Decomposition Products: Releases toxic and corrosive NO fumes when acid is heated, especially when in contact with reducing agents (see Section 4).

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S E C T I O N 6 - HEALTH HAZARDS

Signs of Exposure:
 Acute: Irritation to nose, mouth, upper respiratory tract and eyes.
 Chronic: Possible dental erosion. Chest pain, throat dryness, bronchitis, and cough, and shortness of breath.
 Medical Conditions Aggravated by Exposure: Lung disease
 Chemical a Human Carcinogen? No
 Chemical a Suspect Human Carcinogen? No

Routes of Chemical Entry:

1. Inhalation: Acute exposures to the acid vapor or to the nitrous fumes irritate the upper respiratory tract. High exposures can cause pulmonary edema, cyanosis, and possible death.
2. Eyes: Contact of concentrated acid with eyes causes conjunctival and corneal irritation with corneal opacification if not promptly removed.
3. Skin: Corrosive to skin! Contact with less concentrated acid causes yellow to brown staining and skin hardening. Higher concentrations cause chemical burns, which may or may not be accompanied by immediate pain.
4. Ingestion: Causes severe mouth, throat, and stomach burns leading to permanent tissue destruction of these organs and probable death.

Emergency & First Aid:

Inhalation: Remove to fresh air; give artificial respiration if breathing is stopped; get medical aid immediately.
 Eyes: Flush eyes thoroughly with water; get medical aid immediately.
 Skin: Flush skin thoroughly with water and remove contaminated clothing and shoes get medical aid immediately.
 Ingestion: Do not induce vomiting. Dilute stomach contents with large amounts of water or milk. Get medical aid immediately.

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S E C T I O N 7 - SPECIAL PRECAUTIONS / SPILL & LEAK PROCEDURES

Storage: Glass or stainless steel containers should be in a diked area.
 Other Precautions: See Sections 4, 5, & 8.
 Spill Procedure: Contain in a diked area. Insure personnel are adequately protected (Section 8). Neutralize with hydrated lime, soda ash or other alkali. Dispose neutralized slurry in an approved manner.

.....
S E C T I O N 8 - PERSONAL PROTECTIVE EQUIPMENT & CONTROL MEASURES

Work Practices: Avoid breathing fumes. Avoid acid contact on body. Remove acid-soaked clothing and footwear immediately and do not reuse clothing until after laundering. Do not reuse shoes which have had acid contact.
 Ventilation: May be required to keep acid concentration under 2 ppm.
 Respirators: Full-face air-purifying cartridge respirator when under 2 ppm. Self-contained breathing apparatus with full acid suit when over 5 ppm.
 Eye Protection: Do not wear contact lenses. Chemical safety goggles when under 5 ppm; Self-contained breathing apparatus when over 5 ppm **000047**
 Protective Gloves: Neoprene or nitrile rubber boots, gloves, aprons, etc. to prevent contact with body. Check for leaks before use.

Westinghouse Materials Company of Ohio provides no warranties, either implied or expressed, and assumes no responsibility for the accuracy or

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MATERIAL SAFETY DATA SHEET

No. 0034 (2 pages)
 Revised 03/12/92

I. PRODUCT IDENTIFICATION

Trade Name(s): Dicalite 341, 375, 689, 2500, 4200, L-10, SP-5, Special Speedflow, Speedex, Speedplus, D.C. Speedplus, Swimming Pool Grade

Generic Name: Flux-Calcined Diatomaceous Earth (or Diatomaceous Silica) CAS #: 68855-54-9 *

Chemical Name: Silica Formula: Predominantly SiO 2

Manufacturer: GREFCO, INC. Telephone: (310) 517-0700
 Address: 3435 W. LOMITA BLVD. (310) 517-0766
 City: TORRANCE State: CA Zip: 90509

II. PRODUCT INGREDIENTS

INGREDIENT NAME	CAS NUMBER	%	PERMISSIBLE EXPOSURE LIMIT
Flux-Calcined Diatomaceous Earth	68855-54-9 *	100	0.069 mg/m 3
Contains Crystalline Silica			Respirable Mass
(Quartz - up to 5%)	14808-60-7		(PEL calculation based
(Cristobalite - up to 70%)	14464-46-1		on up to 75%
			crystalline silica
			ref: ACGIH-A.2 for TLV)

III. PHYSICAL DATA

Appearance and Odor: White to off white powder; odorless.
 Boiling Point: N/A Evaporation Rate (= 1): N/A
 Vapor Pressure: N/A Specific Gravity (water = 1): 2.35
 Water Solubility (%): Slight Melting Point: N/A
 Vapor Density: (Air=1): N/A % Volatile by Volume: N/A

IV. FIRE AND EXPLOSION DATA

Flash Point (Method): Nonflammable NFPA Flammable/Combustible
 Flammable Limits: N/A Liquid Classification: N/A
 Extinguishing Media: N/A Auto-Ignition Temperature: N/A
 Unusual Fire or Explosion Hazards: None Special Fire-Fighting Procedures: None

V. HEALTH HAZARDS A. Summary/Risks

Summary: This product contains crystalline silica (see Section II). Long term inhalation of crystalline silica dusts may cause lung disease (silicosis). Crystalline silica has been classified as a probable human carcinogen (Group 2A) by IARC, a unit of the World Health Organization. This product has not been classified a carcinogen by NTP and/or OSHA. Greco is currently in the process of evaluating the conclusions reached by IARC through studies sponsored by the International Diatomite Producers Association (IDPA) and conducted by The University of Washington School of Public Health.

Medical Conditions Which May Be Aggravated: Pre-existing upper respiratory and lung disease, (such as bronchitis, emphysema, asthma, or others).

Target Organ(s): Lungs Primary Entry Route(s): Inhalation 000048

Health Effect: Transitory upper respiratory irritant.

Chronic Health Effects: Long term inhalation of dust levels in excess of the PEL may cause lung disease (silicosis). IARC has classified crystalline silica as a probable human carcinogen.

DICALITE: 341, 375, 689, 2500, 4200, L-10, SP-5, Special Speedflow,
Speedex, Speedplus, D.C.Speedplus, Swimming Pool Grade

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V. HEALTH HAZARDS B. Signs/Symptoms of Overexposure

=====

Inhalation: Coughing, irritation of nose and throat; congestion may occur upon overexposure.
Skin Contact: N/A Skin Absorption: N/A
Ingestion: Not hazardous. Eyes: Temporary irritation and/or inflammation.

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V. HEALTH HAZARDS C. First Aid/Emergency Procedures

=====

Inhalation: Remove from dusty area; drink water to clear throat; blow nose to evacuate dust.
Skin Contact: N/A Eyes: Do not rub eyes. Flush eyes with copious amounts of
Skin Absorption: N/A water to remove any dust particles.
Ingestion: N/A Consult a physician if irritation persists.

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VI. REACTIVITY DATA

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Stability: Material is stable. Hazardous polymerization will not occur.
Chemical Incompatibilities: Hydrofluoric acid
Conditions to Avoid: None in designed use. Avoid contact with hydrofluoric acid.
Hazardous Decomposition Products: Reacts with Hydrofluoric acid to form toxic
silicon tetrafluoride gas.

=====

VII. SPILL OR LEAK PROCEDURES

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Procedures for Spill/Leak: Vacuum clean or wet sweep; avoid dusting; use a dust
suppressant when sweeping.
Waste Management: Not considered as hazardous wastes by RCRA (40 CFR Part 261).
Place waste and spillage in closed containers. Dispose of in approved landfill. RQ-N/

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VIII. SPECIAL PROTECTION INFORMATION

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Goggles: Normally not required. May use safety eyewear to protect from dusts.
Gloves: Normally not required. May use gloves to protect overly-sensitive skin.
Respirator: Use NIOSH approved respirators to protect against silicosis producing dusts.
Ventilation: Use adequate exhaust ventilation and/or dust collection to keep dust levels
below PEL.
Special Considerations for Repair/Maintenance of Contaminated Equipment: Insure proper
respiratory protection.

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IX. SPECIAL PRECAUTIONS

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Storage Segregation Hazard Classes: N/A

*** ALWAYS SEGREGATE MATERIALS BY MAJOR HAZARD CLASS ***

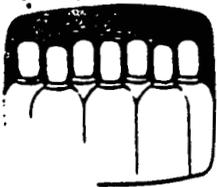
Special Handling/Storage: Store in dry place. Repair all broken bags immediately.
Avoid creating dust. Maintain good housekeeping practice.
Special Workplace Engineering Controls: Adequate ventilation and appropriate local
exhaust where needed to keep dust levels below PEL.
Others: Comply with all Federal, State and local regulations.

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Prepared/Revised by: W.N. Pavlakovich Title: Product Manager

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As of the date of preparation of this document, the foregoing information is believed to
accurate and is provided in good faith to comply with applicable Federal and State laws.
However, no warranty or representation with respect to such information is intended or given.



MATHESON GAS PRODUCTS MATERIAL SAFETY DATA SHEET

6037

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MAT16630

PAGE 01 OF 03

MATERIAL SAFETY DATA SHEET

MATHESON GAS PRODUCTS
30 SEAVIEW DRIVE
SECAUCUS, NEW JERSEY 07096
(201) 867-4100

EMERGENCY CONTACT:
CHEMTREC 1-800-424-9300

12373

SUBSTANCE IDENTIFICATION

CAS-NUMBER 10102-44-0

SUBSTANCE: NITROGEN DIOXIDE, LIQUID

TRADE NAMES/SYNONYMS:

NITROGEN DIOXIDE LIQUID; NITROGEN OXIDE (NO2); NITRITE RADICAL; NITRITO;
NITRO; NITROGEN DIOXIDE; NITROGEN DIOXIDE (NO2); NITROGEN PEROXIDE;
RCRA P078; STCC 4920340; UN 1067; NO2; MAT16630

CHEMICAL FAMILY:
INORGANIC GAS

MOLECULAR FORMULA: N₂O₂

MOLECULAR WEIGHT: 66.0

OSHA RATING (SCALE 1-3): 3
NFPA RATINGS (SCALE 1-4): 2-2-1
REACTIVITY: 2
PERSISTENCE: 40

COMPONENTS AND CONTAMINANTS

COMPONENT: NITROGEN DIOXIDE
CAS: 10102-44-0
PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS

NITROGEN DIOXIDE

- 1 PPM (1.8 MG/M³)
- 3 PPM ACGIH TLV
- 1 PPM NIOSH REL

100 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY
10 POUNDS SARA SECTION 304 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: REDDISH-BROWN GAS OR YELLOWISH-BROWN LIQUID WITH A PUNGENT,

ACRID ODOR. BOILING POINT: 70 F (21 C) MELTING POINT: 12 F (-11 C)

SPECIFIC GRAVITY: 1.449 VAPOR PRESSURE: 720 MMHG @ 20 C

SOLUBILITY IN WATER: DECOMPOSES ODOR THRESHOLD: 5 PPM

VAPOR DENSITY: 1.58

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SOLVENT SOLUBILITY: SOLUBLE IN CONCENTRATED SULFURIC ACID, NITRIC ACIDS,
CARBON DISULFIDE, CHLOROFORM, ALKALIES

VISCOSITY (LIQUID): 0.42 CP @ 20 C

6037

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER. CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE OR HALON
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. STAY AWAY FROM STORAGE TANK ENDS. COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES, ELSE WITHDRAW FROM AREA AND LET BURN (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 20).

USE AGENTS SUITABLE FOR TYPE OF FIRE. USE WATER IN FLOODING AMOUNTS AS FOG. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING POISONOUS VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
POISON A

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUPART E:
POISON GAS AND OXIDIZER

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.336
EXCEPTIONS: NONE

TOXICITY**NITROGEN DIOXIDE:**

200 PPM/1 MINUTE INHALATION-HUMAN LCLO; 90 PPM/40 MINUTES INHALATION-MAN TCLO;
6200 PPB/10 MINUTES INHALATION-MAN TCLO; 88 PPM/4 HOURS INHALATION-RAT LC50;
1000 PPM/10 MINUTES INHALATION-MOUSE LCLO; 123 MG/M3 INHALATION-DOG LCLO;
315 PPM/15 MINUTES INHALATION-RABBIT LC50; 30 PPM/1 HOUR INHALATION-GUINEA PIG
LC50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); CARCINOGEN

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NONE.

GEN DIOXIDE IS TOXIC AND IS A SEVERE EYE, SKIN, AND MUCOUS MEMBRANE
 ACUTE POISONING MAY AFFECT THE RESPIRATORY SYSTEM, BLOOD, AND CENTRAL
 NERVOUS SYSTEM.

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 HEALTH EFFECTS AND FIRST AID

INHALATION:

NITROGEN DIOXIDE:

CORROSIVE/TOXIC. 50 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- USUALLY NO SYMPTOMS OCCUR AT THE TIME OF EXPOSURE, WITH THE
 EXCEPTION OF A SLIGHT COUGH AND PERHAPS FATIGUE AND NAUSEA. EXPOSURE TO
 LOW CONCENTRATIONS, BELOW 50 PPM, MAY RESULT IN IMPAIRED PULMONARY DEFENSE
 MECHANISMS. ONLY VERY CONCENTRATED FUMES, ABOVE 100 PPM, MAY PRODUCE
 PROMPT COUGHING, CHOKING, HEADACHE, DIZZINESS, NAUSEA, ABDOMINAL PAIN, AND
 DYSPNEA. A SYMPTOM-FREE LATENT PERIOD MAY FOLLOW EXPOSURE LASTING 5-72
 HOURS. FATIGUE, UNEASINESS, RESTLESSNESS, COUGH, HYPERPNEA, AND DYSPNEA
 MAY APPEAR GRADUALLY. INCREASINGLY RAPID AND SHALLOW RESPIRATIONS, MILD OR
 VIOLENT COUGHING WITH FROTHY EXPECTORATIONS, CYANOSIS, POSSIBLE FORMATION
 OF METHEMOGLOBIN, AND PHYSICAL SIGNS OF PULMONARY EDEMA MAY OCCUR.
 ANXIETY, MENTAL CONFUSION, LETHARGY, AND FINALLY LOSS OF CONSCIOUSNESS
 MAY RESULT. THE CIRCULATORY SYSTEM MAY BE AFFECTED AS NOTED BY A WEAK,
 RAPID PULSE, DILATED HEART, VENOUS CONGESTION, INTENSE CYANOSIS, AND
 SEVERE HEMOCONCENTRATION. CIRCULATORY COLLAPSE MAY OCCUR BUT IS SECONDARY
 TO ANOXIA AND HEMOCONCENTRATION. DEATH COMMONLY OCCURS WITHIN A FEW HOURS
 AFTER THE FIRST EVIDENCE OF PULMONARY EDEMA AND IS DUE TO ASPHYXIATION. A
 SECOND ACUTE PHASE SOMETIMES FOLLOWS THE INITIAL PULMONARY REACTION AFTER
 A LATENT PERIOD OF SEVERAL WEEKS. SIGNS MAY INCLUDE FEVER, CHILLS, COUGH,
 DYSPNEA, TACHYPNEA, TACHYCARDIA, AND CYANOSIS. THE RELAPSE MAY BE ABRUPT
 AND FULMINATING, LEADING EITHER TO DEATH OR A SLOW CONVALESCENCE, WHICH
 MAY BE COMPLICATED BY INFECTIOUS BRONCHITIS, BRONCHIOLITIS OBLITERANS,
 PNEUMONIA, AND GENERAL ASTHENIA. ONE STUDY WITH RATS INDICATED THAT
 EXERCITION MAY POTENTIATE THE TOXIC EFFECTS OF NITROGEN DIOXIDE.

CHRONIC EXPOSURE- PROLONGED EXPOSURE TO LOW CONCENTRATIONS, INSUFFICIENT
 TO CAUSE PULMONARY EDEMA, MAY RESULT IN CHRONIC IRRITATION OF THE
 RESPIRATORY TRACT, WITH HEADACHE, DIZZINESS, ULCERS OF THE NOSE AND MOUTH,
 MOIST RALES AND WHEEZES, SPORADIC COUGH WITH MUCOPURULENT EXPECTORATION,
 ANOREXIA, DYSPEPSIA, DENTAL EROSION, INSOMNIA, GRADUAL LOSS OF STRENGTH,
 DYSPNEA UPON EXERCITION, CHRONIC BRONCHITIS, AND EMPHYSEMATOUS LESIONS.
 EFFECTS ON FERTILITY, EMBRYO, AND NEWBORN HAVE BEEN REPORTED WHEN FEMALE
 RATS WERE CHRONICALLY EXPOSED PRIOR TO MATING. EFFECTS ON THE NEWBORNS
 HAVE ALSO BEEN REPORTED FROM CHRONIC EXPOSURE DURING PREGNANCY IN RATS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING
 HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD
 PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND
 AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN
 SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION
 IMMEDIATELY.

IN CONTACT:

NITROGEN DIOXIDE:
 CORROSIVE.

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ACUTE EXPOSURE- DIRECT CONTACT WITH LIQUID MAY CAUSE SEVERE IRRITATION, PAIN, YELLOW-BROWN DISCOLORATION, NECROSIS, FROSTBITE, AND POSSIBLE BURNS EITHER BY THE VAPORS OR RAPID EVAPORATION OF THE LIQUID.
CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH CORROSIVE SUBSTANCES MAY RESULT IN DERMATITIS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
NITROGEN DIOXIDE:
CORROSIVE.

ACUTE EXPOSURE- DIRECT CONTACT WITH THE LIQUID MAY CAUSE SEVERE IRRITATION WITH REDNESS, PAIN, BLURRED VISION, EDEMA OF THE EYELIDS, CORNEAL ULCERATION, POSSIBLE BURNS, AND FROSTBITE EITHER BY THE VAPORS OR RAPID EVAPORATION OF THE LIQUID.
CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH CORROSIVE SUBSTANCES MAY RESULT IN CONJUNCTIVITIS OR EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
NITROGEN DIOXIDE:

ACUTE EXPOSURE- INGESTION OF THE LIQUID MAY CAUSE AN ACID TASTE, NAUSEA, VOMITING, ABDOMINAL PAIN, AND FROSTBITE DAMAGE OF THE LIPS, MOUTH, AND MUCOUS MEMBRANES.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
NITROGEN DIOXIDE (NITROGEN TETROXIDE):
ACETIC ANHYDRIDE: VIOLENT EXPLOSION.
ACETONITRILE AND INDIUM: POSSIBLE EXPLOSION.
ALCOHOLS: POSSIBLE EXPLOSION.
ALUMINUM POWDER: POSSIBLE IGNITION.
AMMONIA: EXPLOSIVE REACTION.
BARIUM OXIDE: INTENSE REACTION AT 200 C.

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ON TRICHLORIDE: INTERACTION IS ENERGETIC.
IUM: EXPLOSIVE INTERACTION.
ON DICHLORIDE: FORMATION OF EXPLOSIVE MIXTURE.
CARBON DISULFIDE: FIRE AND EXPLOSION HAZARD.
CARBONYLMETALS: COMBINATION IS HYPERGOLIC.
CESIUM ACETYLENE CARBIDE: IGNITION AT 100 C.
CHLOROFORM: EXPLOSION ON IMPACT.
CELLULOSE AND MAGNESIUM PERCHLORATE: POSSIBLE EXPLOSION.
COMBUSTIBLE MATERIALS: FIRE AND EXPLOSION HAZARD.
CYCLOALKENES AND OXYGEN: FORMATION OF EXPLOSIVE COMPOUND.
CYCLOHEXANE: VIOLENT REACTION.
1,2-DICHLOROETHANE: FORMATION OF EXPLOSIVE MIXTURE.
DICHLOROETHYLENE: FORMATION OF EXPLOSIVE COMPOUND.
DIFLUOROTRIFLUOROMETHYLPHOSPHINE: POSSIBLE IGNITION.
DIMETHYL SULFOXIDE: EXPLOSIVE REACTION.
ETHYLENE: FORMATION OF UNSTABLE COMPOUND.
FLUORINE: POSSIBLE IGNITION.
FORMALDEHYDE: POSSIBLE EXPLOSION.
FUELS: POSSIBLE IGNITION.
HALOCARBONS: FORMATION OF EXPLOSIVE COMPOUND.
HETEROCYCLIC BASES: VIOLENT REACTION.
HYDRAZINE DERIVATIVES: FORMATION OF EXPLOSIVE MIXTURE.
HYDROCARBONS: FORMATION OF EXPLOSIVE PRODUCT.
HYDROGEN AND OXYGEN: FORMATION OF EXPLOSIVE MIXTURE.
IRON (REDUCED): DECOMPOSES WITH INCANDESCENCE.
IRON OXIDE: INCANDESCENT REACTION BY HEATING.
ISOPROPYL NITRITE AND PROPYL NITRITE: POSSIBLE EXPLOSION.
MAGNESIUM: BURNS VIGOROUSLY.
MANGANESE: POSSIBLE IGNITION.
METALS: POSSIBLE IGNITION.
METAL ACETYLIDES: POSSIBLE IGNITION.
METAL CARBONYLS: VIOLENT REACTION.
METHYLENE CHLORIDE: FORMATION OF EXPLOSIVE MIXTURE.
NITROANILINE: POSSIBLE IGNITION.
NITROAROMATICS: POSSIBLE EXPLOSION.
NITROBENZENE: FORMATION OF EXPLOSIVE MIXTURE.
NITROGEN TRICHLORIDES: POSSIBLE EXPLOSION.
OLEFINS: FORMATION OF EXPLOSIVE PRODUCT.
OXIDIZERS (STRONG): REACTS.
OZONE: EXPLOSIVE REACTION.
PETROLEUM: VIOLENT REACTION.
PHOSPHAM: POSSIBLE IGNITION.
PHOSPHINE: POSSIBLE IGNITION.
PHOSPHORUS: VIOLENT COMBUSTION.
PHOSPHORUS TRICHLORIDE: POSSIBLE EXPLOSION.
PHTHALIC ANHYDRIDE AND SULFURIC ACID: EXPLOSIVE DECOMPOSITION.
PLASTICS, RUBBER, COATINGS: MAY BE ATTACKED.
POTASSIUM: POSSIBLE IGNITION.
PROPYLENE: POSSIBLE EXPLOSION.
REDUCING AGENTS: REACTS VIOLENTLY.
SODIUM (GASEOUS): REACTS WITH MARKED LUMINESCENCE AT 260 C.
SODIUM AMIDE: VIOLENT REACTION.
STEEL: CORROSIVE WHEN WET.
SULFUR: VIOLENT COMBUSTION.
SULFURYL CHLORIDE: EXPLOSIVE REACTION.
TETRACARBONYLNICKEL: VIOLENT REACTION.
TETRACHLOROETHANE: FORMATION OF EXPLOSIVE COMPOUND.
TETRACHLOROETHYLENE: FORMATION OF EXPLOSIVE COMPOUND.

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TETRAMETHYL TIN: INTERACTION IS EXPLOSIVELY VIOLENT EVEN AT -80 C.
 TOLUENE: VIOLENT REACTION.
 TRICHLOROETHANE: FORMATION OF EXPLOSIVE COMPOUND.
 TRICHLOROETHYLENE: FORMATION OF EXPLOSIVE COMPOUND.
 TRIETHYLAMINE: FORMATION OF EXPLOSIVE COMPOUND.
 TRIETHYLAMMONIUM NITRATE: FORMATION OF HEAT-SENSITIVE EXPLOSIVE COMPOUND.
 TUNGSTEN CARBIDE: BURNS WITH INCANDESCENCE.
 VINYL CHLORIDE: POSSIBLE EXPLOSION.

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DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF NITROGEN.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

 STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

THRESHOLD PLANNING QUANTITY (TPQ):

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

 CONDITIONS TO AVOID

AVOID CONTACT WITH COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC); CONTACT MAY RESULT IN IGNITION OR EXPLOSION. MATERIAL MAY BE POISONOUS; AVOID INHALATION OF VAPORS OR CONTACT WITH SKIN. DO NOT ALLOW MATERIAL TO CONTAMINATE WATER SOURCES.

 SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIXED FOR CONTAINMENT.

SPILL:

MIX WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE, OR SODIUM CARBONATE.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

STOP WORK IF YOU CAN DO IT WITHOUT RISK. KEEP COMBUSTIBLES AWAY FROM SPILLED MATERIAL. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE AREA AND DENY ENTRY UNTIL GAS IS DISPERSED. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 10 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

25 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

50 PPM- ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
 ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST THE COMPOUND OF CONCERN.
 ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

NOTE: DO NOT USE OXIDIZABLE SORBENTS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY

Fire and Explosion Information

SECTION 2

Fire: Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.

Explosion: Strong oxidants may explode when shocked, or if exposed to heat, flame, or friction. Also may act as initiation source for dust or vapor explosions.

Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

Reactivity Data

SECTION 3

Stability: Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products: Oxides of nitrogen.

Possible slightly radioactive uranium oxide.

Hazardous Polymerization: This substance does not polymerize.

Incompatibilities: Reducing agents, halogens.

Leak/Spill Disposal Information

SECTION 4

Clean-up personnel should wear protective clothing and respiratory equipment suitable for toxic, combustible, or explosive dusts. Sweep, scoop or pick up spilled material. Vacuuming or wet sweeping may be used to avoid dust dispersal. Radioactive material, clean up thoroughly and package all residues for recovery or return to supplier. Disposal must comply with CFR 10 Part 40.

Reportable Quantity (RQ)(CWA/CERCLA) : 5000 lbs.

Ensure compliance with local, state and federal regulations.

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Health Hazard InformationSECTION 5A. Exposure/Health Effects

- Inhalation:** Soluble uranium salts are moderately hazardous on inhalation. Coughing, sneezing and breathing difficulty may be expected as with other nitrates, and damage to kidneys and liver may occur after continued exposure.
- Ingestion:** Toxicity rating is not high (slight to moderate) due to the low absorption rate of soluble uranium compounds. However, gastrointestinal discomfort with vomiting and diarrhea may follow sizeable ingestions. Kidneys and liver may be damaged as well.
- Skin Contact:** Mild irritation, reddening and possible soreness may be experienced. These symptoms are similar to those normally found after contact with nitrates.
- Eye Contact:** Absorption of soluble uranium salts through the eye tissues is reported. Nitrate irritation with reddening of the eye surfaces, pain and partly impaired vision are the more ordinary symptoms.
- Chronic Exposure:** Principal hazards are kidney and liver damage resulting from prolonged contact and absorption.
- Aggravation of Pre-existing Conditions:** Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

B. FIRST AID

- Inhalation:** Remove to fresh air. Get medical attention for any breathing difficulty.
- Ingestion:** If swallowed, induce vomiting immediately by giving two glasses of water, or milk if available and sticking finger down throat. Call a physician immediately. Never give anything by mouth to an unconscious person.
- Skin Exposure:** Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.
- Eye Exposure:** Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

No LD50/LC50 information found relating to normal routes of occupational exposure. Mutation data references cited.

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URANYL NITRATE**Material Safety Data Sheet**Emergency Telephone Number
314-982-5000

~~XXXXXXXXXX~~
Mallinckrodt Inc.
Science Products Division
P.O. Box M
Paris, Kentucky 40361

Effective Date: 06-09-86 Supersedes 09-04-85

PRODUCT IDENTIFICATION:

Synonyms: Uranium, dinitratodioxo-, hexahydrate; uranyl nitrate hexahydrate

Formula CAS No.: 13520-83-7 (Hydrated) Molecular Weight: 502.13
TSCA CAS No.: 10102-06-4 (Anhydrous)Hazardous Ingredients: Uranyl nitrate Chemical Formula: $UO_2(NO_3)_2 \cdot 6H_2O$ **PRECAUTIONARY MEASURES**

**DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
HARMFUL IF SWALLOWED OR INHALED. CAUSES KIDNEY AND LIVER DAMAGE.
CAUTION! RADIOACTIVE MATERIAL**

Avoid breathing dust.
Use with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.

EMERGENCY/FIRST AID

If swallowed, induce vomiting immediately by giving two glasses of water, or milk if available and sticking finger down throat. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases call a physician.
SEE SECTION 5.

DOT Hazard Class: Radioactive Material

Physical Data**SECTION 1**Half Life : 4.51×10^9 years

Appearance: Large, pale yellow crystals.

Odor: Odorless.

Solubility: Approximately 66g/100g water.

Boiling Point: 118°C (244°F) Decomposes.

Vapor Density (Air=1): No information found.

Melting Point: 60°C (140°F).

Vapor Pressure (mm Hg): No information found.

Density: 2.807

Evaporation Rate: No information found.

Specific Activity: ca. 0.2 microcuries/gm

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Occupational Control MeasuresSECTION 6Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
 0.05 mg(U)/m³ TWA. (Soluble Uranium compounds)
 -ACGIH Threshold Limit Value (TLV):
 0.2 mg(U)/m³ (TWA). 0.6mg(U)/m³ (STEL).

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators
(NIOSH Approved)

If the TLV is exceeded, a dust/mist respirator with chemical goggles may be worn, in general, up to ten times the TLV. Consult respirator supplier for limitations. Alternatively, a supplied air full facepiece respirator or airlined hood may be worn.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Use chemical safety goggles. Contact lenses should not be worn when working with this material.

Maintain eye wash fountain and quick-drench facilities in work area.

Storage and Special InformationSECTION 7

Keep in a tightly closed container. Protect container from physical damage. Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Do not store on wooden floors.

 The information contained herein is provided in good faith and is believed to be correct as of the date hereof. However, Mallinckrodt, Inc. makes no representation as to the comprehensiveness or accuracy of the information. It is expected that individuals receiving the information will exercise their independent judgment in determining its appropriateness for a particular purpose. Accordingly, Mallinckrodt, Inc. will not be responsible for damages of any kind resulting from the use of or reliance upon such information. NO REPRESENTATIONS, OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR TO THE PRODUCT TO WHICH THE INFORMATION REFERS.

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SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:

FOR THE GAS FORM, PROTECTIVE CLOTHING NOT REQUIRED.
IF CONTACT WITH THE LIQUID FORM IS POSSIBLE, EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT TO PREVENT SKIN FROM FREEZING.

GLOVES:

WEAR FULL PROTECTIVE, COLD INSULATING GLOVES.

EYE PROTECTION:

FOR THE GAS FORM EYE PROTECTION IS NOT REQUIRED BUT RECOMMENDED.
WHERE THERE IS ANY POSSIBILITY OF CONTACT WITH THE LIQUID FORM, EMPLOYEE MUST WEAR SPLASH-PROOF SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THE LIQUID FORM OF THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 01/24/89 REVISION DATE: 06/14/90

-ADDITIONAL INFORMATION-

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**ATTACHMENT F
WORK AREA MAP**

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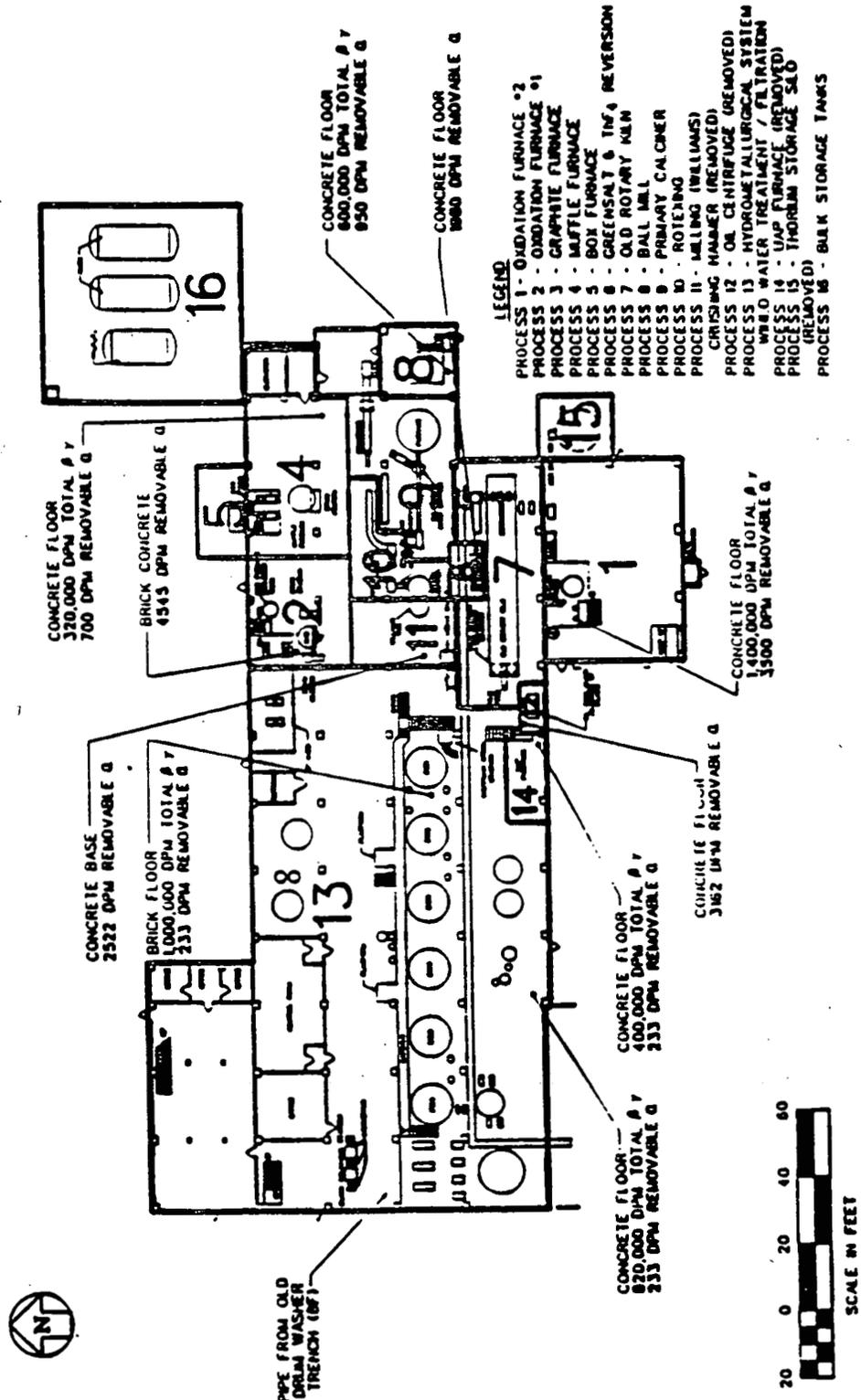


FIG A-1 Layout of Building 8A — First Floor

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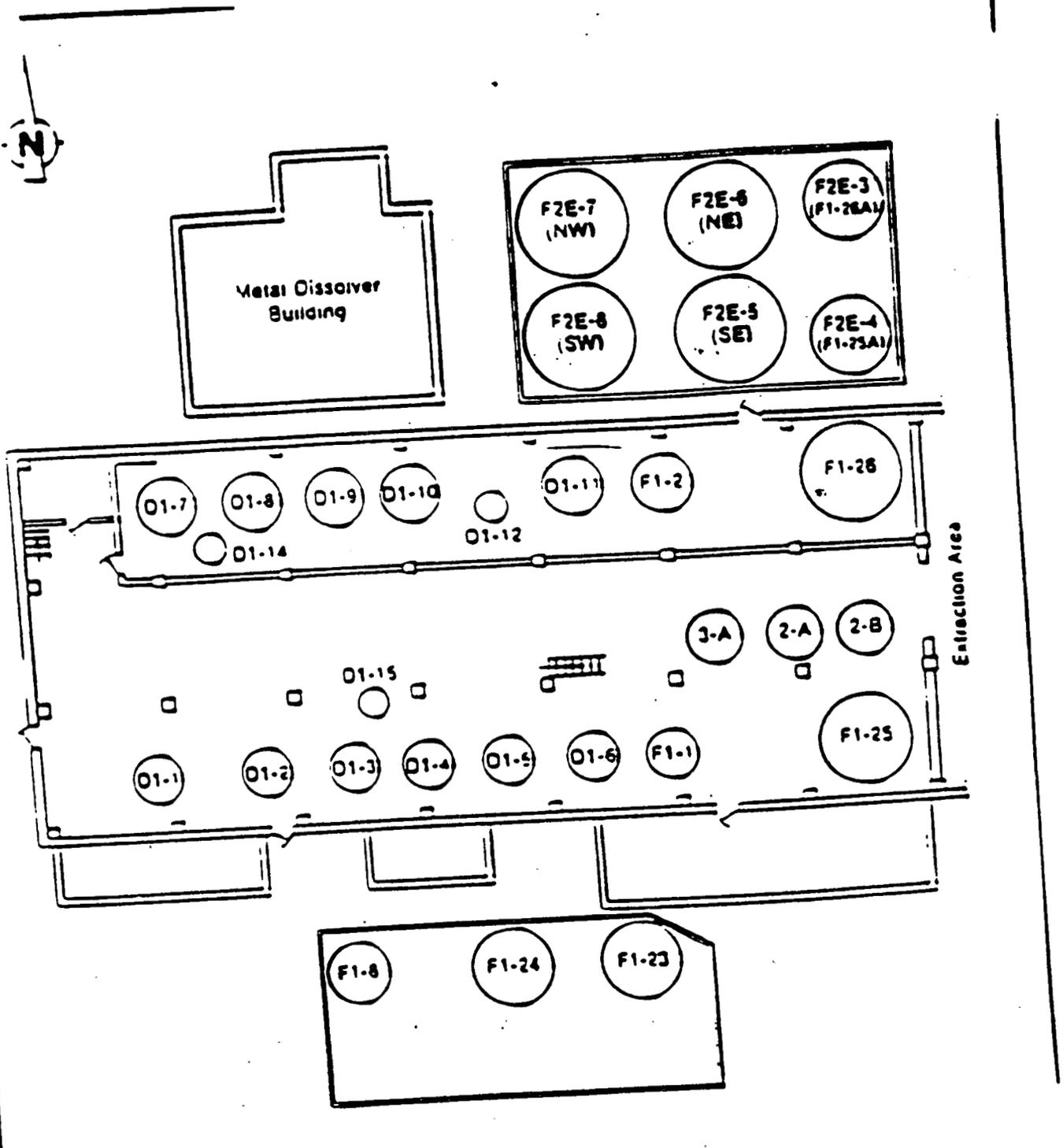
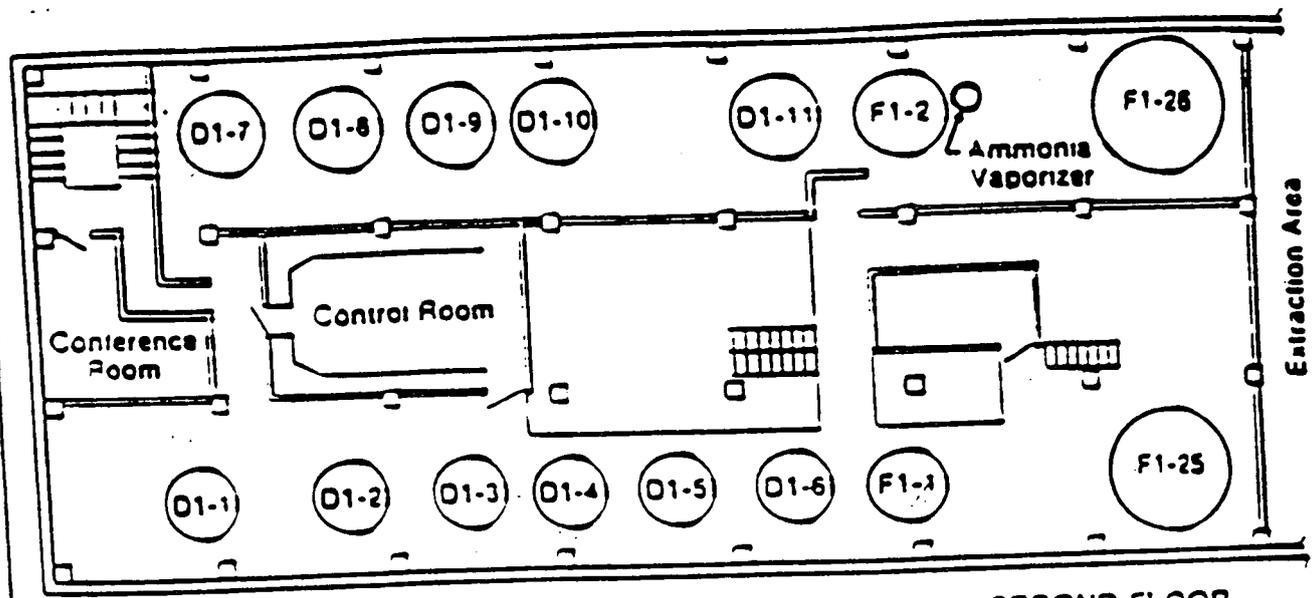


Figure 4-2. Digestion Area First Floor



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SECOND FLOOR

**ATTACHMENT G
PSHSP ACKNOWLEDGEMENT FORM**

