



FOSTER WHEELER ENVIRONMENTAL CORPORATION

SCOPE OF WORK
for
PHASE IIB SITE INVESTIGATION



FIREWORKS I
(FORMER FIREWORKS FACILITY)
HANOVER, MA
TIER IA PERMIT #100233
RTN: 4-0090

December 1999
(Rev. 1)

Prepared for:

The Fireworks Site Cooperating Parties

Prepared by:

Foster Wheeler Environmental Corporation
470 Atlantic Avenue
Boston, MA 02210





FOSTER WHEELER ENVIRONMENTAL CORPORATION

April 18, 2000
OT00-046

Mr. Jonathan Hobill
Bureau of Waste Site Cleanup
Massachusetts Department of Environmental Protection
Southeast Regional Office
20 Riverside Drive
Lakeville, MA 02347

Subject: FIREWORKS I SITE, HANOVER, MA, RTN #4-0090, PERMIT #100223
PHASE IIB SCOPE OF WORK

Dear Mr. Hobill:

On behalf of the Cooperating Parties and pursuant to 310 CMR 40.0834(a), Foster Wheeler Environmental Corporation (Foster Wheeler) is submitting this Phase IIB Scope of Work for the Fireworks I Site, Release Tracking Number 4-0900, Permit Number 100223. Included as appendices to this Scope of Work are the Quality Assurance Plan and Health and Safety Plan that will be followed for all Phase IIB activities. The LSP of Record overseeing the Phase IIA investigation will be Mr. Robert Donati (License No. 5878).

Foster Wheeler's submission of these documents, does not constitute an acknowledgment of liability by any or all of the Cooperating Parties, and the Cooperating Parties each reserves its rights to dispute such liability in the future. Furthermore, these documents contain no admissions of any kind, and should not be construed to contain any admissions.

If you have any questions, please call the undersigned at (617) 457-8253.

Sincerely,

Boyd Allen III, CPG
Project Manager

Enclosures

cc: R. Jones
J. Grachuk
J. Beling
M. Goldstein
Hanover Board of Health
Hanson Board of Health

File: FRX 19.2
FRX 2.1.2



133 FEDERAL STREET, 6TH FLOOR, BOSTON, MA 02110
TEL: 617-457-8200 FAX: 617-457-8498/8499



COMPREHENSIVE RESPONSE ACTION TRANSMITTAL FORM & PHASE I COMPLETION STATEMENT

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

Release Tracking Number

4 - 0090

A. SITE LOCATION:

Site Name: (optional) Former Fireworks Facility (Fireworks I)

Street: King St.

Location Aid: _____

City/Town: Hanover

ZIP Code: 02234

Related Release Tracking Numbers that this Form Addresses: 4-0090

Tier Classification: (check one of the following)



Tier IA



Tier IB



Tier IC



Tier II



Not Tier Classified

If a Tier I Permit has been issued, state the Permit Number: 100223

B. THIS FORM IS BEING USED TO: (check all that apply)

- ☐ Submit a Phase I Completion Statement, pursuant to 310 CMR 40.0484 (complete Sections A, B, C, G, H, I and J).
- ☒ Submit a Phase II Scope of Work, pursuant to 310 CMR 40.0834 (complete Sections A, B, C, G, H, I and J).
- ☐ Submit a final Phase II Comprehensive Site Report and Completion Statement, pursuant to 310 CMR 40.0836 (complete Sections A, B, C, D, G, H, I and J).
- ☐ Submit a Phase III Remedial Action Plan and Completion Statement, pursuant to 310 CMR 40.0862 (complete Sections A, B, C, G, H, I and J).
- ☐ Submit a Phase IV Remedy Implementation Plan, pursuant to 310 CMR 40.0874 (complete Sections A, B, C, G, H, I and J).
- ☐ Submit an As-Built Construction Report, pursuant to 310 CMR 40.0875 (complete Sections A, B, C, G, H, I and J).
- ☐ Submit a Phase IV Final Inspection Report and Completion Statement, pursuant to 310 CMR 40.0878 and 40.0879 (complete Sections A, B, C, E, G, H, I and J).
- ☐ Submit a periodic Phase V Inspection & Monitoring Report, pursuant to 310 CMR 40.0892 (complete Sections A, B, C, G, H, I and J).
- ☐ Submit a final Phase V Inspection & Monitoring Report and Completion Statement, pursuant to 310 CMR 40.0893 (complete Sections A, B, C, F, G, H, I and J).

You must attach all supporting documentation required for each use of form indicated, including copies of any Legal Notices and Notices to Public Officials required by 310 CMR 40.1400.

C. RESPONSE ACTIONS:

- ☐ Check here if any response action(s) that serves as the basis for the Phase submittal(s) involves the use of Innovative Technologies. (DEP is interested in using this information to create an Innovative Technologies Clearinghouse.)

Describe Technologies: _____

D. PHASE II COMPLETION STATEMENT:

Specify the outcome of the Phase II Comprehensive Site Assessment:

- ☐ Additional Comprehensive Response Actions are necessary at this Site, based on the results of the Phase II Comprehensive Site Assessment.
- ☐ The requirements of a Class A Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- ☐ The requirements of a Class B Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- ☐ Rescoring of this Site using the Numerical Ranking System is necessary, based on the results of the final Phase II Report.

E. PHASE IV COMPLETION STATEMENT:

Specify the outcome of Phase IV activities:

- ☐ Phase V operation, maintenance or monitoring of the Comprehensive Response Action is necessary to achieve a Response Action Outcome. (This site will be subject to a Phase V Operation, Maintenance and Monitoring Annual Compliance Fee.)
- ☐ The requirements of a Class A Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- ☐ The requirements of a Class C Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

SECTION E IS CONTINUED ON THE NEXT PAGE

**COMPREHENSIVE RESPONSE ACTION TRANSMITTAL
FORM & PHASE I COMPLETION STATEMENT**

Release Tracking Number

4 - 0090

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

E. PHASE IV COMPLETION STATEMENT: (continued)

- ☐ The requirements of a Class C Response Action Outcome have been met. Further operation, maintenance or monitoring of the remedial action is necessary to ensure that conditions are maintained and that further progress is made toward a Permanent Solution. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

Indicate whether the operation and maintenance will be Active or Passive. (Active Operation and Maintenance is defined at 310 CMR 40.0006.)

☐ Active Operation and Maintenance☐ Passive Operation and Maintenance

(Active Operation and Maintenance makes the Site subject to a Post-RAO Class C Active Operation and Maintenance Annual Compliance Fee.)

F. PHASE V COMPLETION STATEMENT:

Specify the outcome of Phase V activities:

- ☐ The requirements of a Class A Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- ☐ The requirements of a Class C Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- ☐ The requirements of a Class C Response Action Outcome have been met. Further operation, maintenance or monitoring of the remedial action is necessary to ensure that conditions are maintained and that further progress is made toward a Permanent Solution. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

Indicate whether the operation and maintenance will be Active or Passive. (Active Operation and Maintenance is defined at 310 CMR 40.0006.)

☐ Active Operation and Maintenance☐ Passive Operation and Maintenance

(Active Operation and Maintenance makes the Site subject to a Post-RAO Class C Active Operation and Maintenance Annual Compliance Fee.)

G. LSP OPINION:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with the information contained in this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief,

> if Section B indicates that a **Phase I, Phase II, Phase III, Phase IV or Phase V Completion Statement** is being submitted, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B indicates that a **Phase II Scope of Work or a Phase IV Remedy Implementation Plan** is being submitted, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

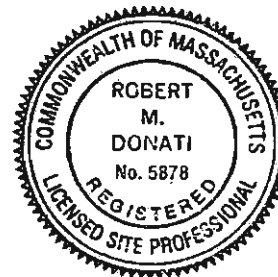
> if Section B indicates that an **As-Built Construction Report or a Phase V Inspection and Monitoring Report** is being submitted, the response action(s) that is (are) the subject of this submittal (i) is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

- ☐ Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

LSP Name: Robert M. Donati LSP #: 5878 Stamp:Telephone: (617)457-8247 Ext.: N/AFAX: (optional) (617)457-8299Signature: Robert M. Donati

Date: _____





COMPREHENSIVE RESPONSE ACTION TRANSMITTAL FORM & PHASE I COMPLETION STATEMENT

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

Release Tracking Number

4 - 0090

H. PERSON UNDERTAKING RESPONSE ACTION(S):

Name of Organization: The Fireworks Site Joint Defense Group c/o Kerr-McGee Chemical LLC

Name of Contact: Russell H. Jones Title: Technical Manager

Street: MT-2001, 123 Robert S. Kerr

City/Town: Oklahoma City State: OK ZIP Code: 73102

Telephone: (405) 270-2665 Ext.: _____ FAX: (optional) _____

☐ Check here if there has been a change in the person undertaking the Response Action.

I. RELATIONSHIP TO SITE OF PERSON UNDERTAKING RESPONSE ACTION(S): (check one)

☒ RP or PRP Specify: ☐ Owner ☐ Operator ☐ Generator ☐ Transporter Other RP or PRP: Alleged Successor
to past owner

☐ Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

☐ Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

☐ Any Other Person Undertaking Response Action Specify Relationship: _____

J. CERTIFICATION OF PERSON UNDERTAKING RESPONSE ACTION(S):

I, Russell H. Jones, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, i.e., accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: Russell H. Jones Title: Technical Manager
(signature)

For: Russell H. Jones Date: 4/14/00
(print name of person or entity recorded in Section H)

Enter address of the person providing certification, if different from address recorded in Section H:

Street: _____

City/Town: _____ State: _____ ZIP Code: _____

Telephone: _____ Ext.: _____ FAX: (optional) _____

YOU MUST COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.



FOSTER WHEELER ENVIRONMENTAL CORPORATION

SCOPE OF WORK for PHASE IIB SITE INVESTIGATION

**FIREWORKS I
(FORMER FIREWORKS FACILITY)
HANOVER, MA
TIER IA PERMIT #100233
RTN: 4-0090**

**December 1999
(Rev. 1)**

**Prepared for:

The Fireworks Site Cooperating Parties**

**Prepared by:

Foster Wheeler Environmental Corporation
470 Atlantic Avenue
Boston, MA 02210**



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1.0 INTRODUCTION

Foster Wheeler Environmental Corporation (Foster Wheeler) prepared this Phase IIB Scope of Work (SOW) on behalf of Kerr McGee Chemical LLC, Massachusetts Institute of Technology, and National Coatings (collectively known as the Cooperating Parties) to support Phase II - Comprehensive Site Assessment activities at the Fireworks Site (RTN #4-0090, Tier IA Permit No. 100233), located in Hanover, Massachusetts. In accordance with the requirements of the Massachusetts Contingency Plan (MCP) in 310 CMR 40.0834 as revised October 29, 1999, this Phase IIB SOW describes the Cooperating Parties' approach to the proposed environmental investigation and is being submitted to the Massachusetts Department of Environmental Protection (DEP) for approval. The Phase IIB SOW is the second task of a Phase II investigation and is intended to collect soil and groundwater data to partially fulfill the requirements in 310 CMR 40.0835.

The property known as the Fireworks Site (Site) is comprised of approximately 240 acres, portions of which have a history of the use, storage, and disposal of potentially hazardous materials associated with the manufacture and research of munitions and pyrotechnics. A USGS map showing the location of the Site is included as Figure 1-1. This Phase IIB SOW was developed to address the technical complexities associated with this Site, its large size, and various historical uses in a phased investigation, ultimately leading to completion of a Phase II Comprehensive Site Assessment (CSA).

The CSA is the second step of the MCP process. The first step, the Phase I investigation, confirms whether the site should be classified as a "disposal site" under state regulations and develops sufficient information to numerically rank and Tier Classify the site. The Tier Classification sets the regulatory framework on how the site is administered within the MCP. Foster Wheeler completed the Phase I investigation in 1997 and DEP classified the Site as Tier IA in 1998. The Phase II CSA is a systematic investigation and assessment of the entire site to provide the data necessary to develop remedial response alternatives. The CSA investigation can be divided into subphases based on the size and complexity of the site. The Cooperating Parties are using this approach and breaking the CSA into three separate investigations by media. Foster Wheeler completed the Phase IIA groundwater investigation in 1999 to develop an understanding of groundwater flow in the upper surficial aquifer and determine groundwater quality in selected areas of the Site. This SOW (Phase IIB) is designed to complete the characterization of soils in areas of potential contamination resulting from historic munitions manufacturing and storage uses and further define groundwater quality in several locations in the deep and shallow aquifer. The Phase IIC investigation is expected to focus on the sediments and surface waters of the Factory Pond drainage system. A more detailed survey of the regulatory history and investigation objectives and findings is presented in Section 2.0.

The format of this Phase IIB SOW includes Section 1.0 (this section), which describes the general approach to this investigation and organization of this Phase IIB SOW. Section 2.0 provides an overview of the Site and its history, and summarizes previous site assessment work under the MCP and the intended purpose of the Phase IIB investigation. Section 3.0 describes the field investigation for the program. Section 4.0 briefly discusses the format and content of the Phase IIB report and data submittal (the work products of this investigation). Section 5.0 briefly discusses public involvement. Sections 6.0 and 7.0 describe the Foster Wheeler project organization and the anticipated schedule for completion of project activities, respectively. Specific quality assurance (QA) procedures to be implemented during data collection activities are described in the QA Plan (QAP), included in Appendix A. Site specific health and safety procedures are included in the Health and Safety Plan (HASP) in Appendix B.

2.0 MCP INVESTIGATION HISTORY AND PROCESS

2.1 Site Location and General Operating History

The Fireworks Site is defined as approximately 240 acres of property generally located between King and Winter Streets in the Town of Hanover, Plymouth County, Massachusetts. A USGS map showing the location of the Site is included as Figure 1-1. The Site is bounded on the east by Winter Street and the Site security fence, on the west by King Street and the Drinkwater River wetland, on the north by First Street, and on the south by Factory Pond. The Drinkwater River and Torrey Brook, located on the Site, flow generally south/southwest toward Lily Pond and Factory Pond, also located within the site boundary. Factory Pond discharges to the Indian Head River which flows eastward to the North River (NUS, 1986). The Site is currently owned by over 20 different entities including the Town of Hanover. However, none of the members of the Cooperating Parties owns property constituting any portion of the Site.

Historical activities at the Site included the commercial manufacture of civilian fireworks and the research, development and manufacture of munitions and pyrotechnics for the United States Government between approximately 1907 and 1970. Lead, mercury, and various organic solvents, among other chemicals, were used in certain manufacturing processes and research and development during the facility's operational lifetime.

Following closure of the facility, U.S. military personnel came to the Site and destroyed the government owned raw materials and explosives at the Site in the Waste Burn Pit Area (Osborne, 1996). Several years later, the Town of Hanover purchased approximately 130 acres of the Site in the general area of Factory Pond; the Town continues to maintain the area for conservation purposes and has also built the Municipal Garage (Department of Public Works) on this parcel off of Ames Way. The remaining acreage was sold in May 1983 to Drinkwater Investment Corporation; it was subsequently subdivided and portions sold, creating a multi-tenant, commercial/industrial park.

After conducting surface water, sediment, and fish tissue sampling for mercury, lead, and other metals, DEP issued Notices of Responsibility (NORs) for the Fireworks Site on October 20, 1995 to Kerr-McGee Chemical Corporation, Massachusetts Institute of Technology, National Coating Corporation, Susquehanna Corporation, and the U.S. Department of Defense based on their alleged status as either owners, operators, generators, transporters or disposers, or successors to former site owners operators, generators, transporters or disposers. The first three entities (the Cooperating Parties), while not admitting liability, formed the Fireworks Site Joint Defense Group, an unincorporated association to respond to the NORs issued by DEP. All investigation and response activities since October 1995 were funded by the Cooperating Parties.

2.2 Phase I Investigation and Tier Classification

A Phase I investigation was undertaken by the Cooperating Parties and focused on several areas of concern identified by DEP to provide sufficient data to be used in conjunction with data from previous investigations to Tier Classify the Site under the MCP. A field investigation was performed in accordance with the July 1997 Scope of Work. Soil borings were advanced on site and a monitoring well installed in each of the five areas of interest: Fox Island, Building 80, Building 307, Waste Burn Pit and Demolition Area Pit. Soil and groundwater samples were collected and analyzed.

Five principal migration pathways of potential concern were identified for contaminants at the Fireworks Site in the following media: soil, groundwater, surface water, sediments and air. Several potential exposure points have been identified and include: surface soils primarily in the Demolition Pit and Waste Burn Pit areas, sediments in the Drinkwater River system, and surface waters, including wetland areas adjacent to the Demolition Pit.

The Site was numerically ranked using the soil and groundwater data from the July 1997 field investigation and historic sediment and surface water data from DEP's January 1995 sampling. Based on these data, the Site scored 681 points and was classified as a Tier IA site. Key points from the ranking score sheet are summarized below:

- Mercury levels (840 mg/kg) in one of the sediment samples collected in the river system by DEP in 1995 were greater than the DEP S-2 Reportable Concentration for soil (RCS-2) of 60 mg/kg. This comparison was made for scoring purposes only.
- Mercury concentrations (0.0026 mg/l) in groundwater at the Demolition Pit area were greater than the DEP GW-2 Reportable Concentration (RCGW-2) of 0.001 mg/l.
- Mercury (70 mg/kg) and lead (1200 mg/kg) levels were detected in the top six inches of soil at concentrations greater than the DEP S-1 soil standards of 20 mg/kg and 300 mg/kg, respectively.
- Neither mercury nor lead were detected in surface water samples collected by DEP in 1995.
- No Oil or Hazardous Material (OHM) was identified in air based on PID readings collected during the Phase I investigation fieldwork.
- A fish consumption advisory based on mercury levels in fish tissue was issued for Factory Pond by the Massachusetts Department of Public Health on June 24, 1994.

The Phase I Report (Foster Wheeler, 1997), Tier Classification and Tier IA Permit Application were submitted to DEP on October 20, 1997. A Tier IA permit (Permit No. 100223) was issued to the individual Cooperating Parties with an effective date of July 27, 1998.

2.3 Phase II Comprehensive Site Assessment

The MCP provides five years from the effective date of the permit to develop and implement a remedy at the Site, subject to possible extension with DEP approval. The Phase II Comprehensive Site Assessment is the next step in the MCP process and is a systematic investigation and assessment of the entire disposal site to be used in developing remedial response alternatives. The Phase II investigation is being conducted in 3 phases (Phases IIA, IIB, and IIC). Elements of the Phase II investigation have or will include:

- Physical characteristics of the site including site hydrogeology
- Identification of source and extent of any releases
- Characterization of OHM at the site including environmental fate and transport
- Identification of exposure points and exposure point concentrations
- Identification of background levels of OHM
- Characterization of risk and harm to human health, public welfare, safety, and the environment

In order to complete the Risk Characterization, the MCP requires exposure points for soil to be determined based on by the vertical and horizontal distribution of the contaminated soil in combination with the soil categories determined to be applicable [310 CMR 40.0924(2)(a)]. The exposure point concentrations (EPCs) for soil must be representative of the concentrations of OHM at each exposure point. In determining or estimating the EPCs, the objective is to identify a conservative estimate of the arithmetic mean concentration which represent the average concentration contacted by a receptor at the exposure point over the period of the assumed exposure [310 CMR 40.0926(3)]. The average should reflect the timing of the exposure, the nature of the potential receptors, and the likely frequency of exposure.

The MCP identifies the following depth ranges to be considered with any applicable site-specific information when determining exposure points [310 CMR 40.0924(2)(b)(3)]:

- 0' to 3' for exposures associated with surficial activity;
- 0' to 6' for exposures associated with utility installation and repair;
- 0' to 15' for exposures associated with excavation scenarios and building construction.

Therefore, for this Phase IIB program, the soil sampling is designed to address these three depth intervals.

2.3.1 Summary of the Phase IIA Investigation

The purpose of the Phase IIA groundwater investigation was to develop an understanding of groundwater flow in the upper surficial aquifer and determine groundwater quality in selected areas of the Site. A Phase IIA SOW describing the Cooperating Parties' approach to this investigation was submitted to the DEP on October 2, 1998 (Foster Wheeler, 1998) and approved by DEP on November 9, 1998. The SOW specified the methodology supporting the installation of thirty (30) well points and eight (8) staff gages to measure water levels and the subsequent collection of groundwater samples for analyses at the new well points and five existing Phase I monitoring wells.

Field activities were conducted from November 30 to December 4, 1998 following the execution of access agreements with the individual property owners at the Site. Based on access issues, one well point, PZ-20, could not be installed. (The Cooperating Parties are continuing to pursue access to this location.)

Twenty-nine (29) MicroWells™ constructed of 1.32-inch O.D. steel pipe with five foot long, stainless steel (type 304) screens were installed using a high frequency vibratory hammer. First round water level measurements were recorded on December 7, 1998 and the second round collected on January 22, 1999 following a warming period representing "January thaw" conditions. As expected, the Drinkwater River system influences groundwater flow in the northern part of the Site by acting as a "moat" and creating a radial drainage effect. In the central and southern portions of the Site, groundwater elevations tend to mirror local topography with gradients increasing rapidly on the western edges as groundwater flows towards the Factory Pond and Drinkwater River system.

One round of analytical samples was collected from December 8 through December 14, 1998 from twenty-eight well points and five existing monitoring wells using low flow sampling methods and analyzed for the following: volatile organic compounds (VOCs), including freon, with an instrument data library search of ten (10) Tentatively Identified Compounds (TICs); and certain inorganic analytes including nitrate, mercury, and lead. At seven selected locations, full Target Analyte List (TAL) metals were analyzed.

Overall, the results of the groundwater chemical analyses indicate sporadic presence of VOCs at certain Site locations. Trichloroethylene (TCE) and freon are the two VOCs which were detected most frequently and in highest concentrations. Locations where TCE and freon are detected generally correlate with areas known to have been used for past manufacturing or disposal operations (WB-MW1, PZ-12, PZ-17). However, TCE results in the northern end of the Site might result from current or recent industrial activity in the area (PZ-02).

Analytical results also indicate that mercury and lead are sporadically present in Site groundwater, although primarily confined to a few Site areas. Low but detectable mercury concentrations are reported for several locations primarily associated with past manufacturing or disposal areas. Elevated mercury concentrations were observed in one sample from the Demolition Pit area (DP-MW1). In general, although lead was detected in some samples, most concentrations tended to be relatively low (<10 µg/L), with results for only a few samples in excess of this value.

Nitrate results were generally low and did not indicate any obvious areas wherein nitrogen containing explosive compounds were likely to be a significant impact on groundwater. Rather, it appears that the observed nitrate distributions may reflect, at least in part, the introduction of nutrient related compounds from domestic activities such as septic systems and lawn care or possibly animal wastes.

2.3.2 Cold Waste Dump Area IRA

The Cold Waste Dump Area is located in the southern portion of the Site abutting the east bank of Factory Pond on land managed by the Hanover Conservation Commission. The area is presently used for passive recreation. Based on available information, the Cold Waste Dump Area previously served as a repository and burial area for metallic ordnance explosive waste that had been fired, discharged, detonated or otherwise spent (e.g., shell casings, metallic debris such as fins, fuse assemblies, firing pins, etc.). Historic wastes have also included unfused training rounds. Evidence of relic fencing (coarse, 2-inch square mesh) and a review of previous mapping (Atlantic Research Corporation, 1968) indicate that the Cold Waste Dump Area previously had been fenced off and isolated.

Souvenir hunters have excavated portions of the Cold Waste Dump Area and adjacent pond bank looking for metallic ordnance debris. In addition, precipitation and runoff have eroded portions of the Cold Waste Dump Area and exposed previously buried materials. Based on the nature of materials found in the Cold Waste Dump Area, the Cooperating Parties believe that responsibility for the cleanup of this portion of the Site belongs to the U.S. Department of Defense. At the DEP's request, the Cooperating Parties agreed to undertake an Immediate Response Action (IRA) and erect a temporary fence around the Cold Waste Dump Area to isolate it from recreational users until the area can be remediated by the United States. An IRA Plan (Foster Wheeler, 1999b) was submitted to DEP on July 15, 1999 and approval to proceed was received on July 16, 1999.

The IRA was conducted from July 19 - 26, 1998 in accordance with the approvals received from DEP and the Hanover Conservation Commission. An eight-foot wide area was cleared on the landward portions of the Cold Waste Area perimeter as defined by relic fencing and previous mapping. A fencing subcontractor set terminal posts and drove in line posts at 10-foot intervals along the fence perimeter to support an 8-foot-high, 11-gauge mesh, chain link fence. The contractor also set the gate posts for the two 12-foot wide double swing gates on both the eastern and western perimeters to provide emergency access to Factory Pond for the Hanover Fire and Police Departments. Suspect ordnance materials were uncovered during fence construction and collected by the Massachusetts State Police. Locked gates on both the landward (eastern) and waterside (western) perimeter secure the fenced area. An IRA Completion Report dated August 20, 1999 was prepared by Foster Wheeler (1999c) and submitted to DEP.

2.3.3 Objectives of the Phase IIB Investigation

The general objective of the Phase IIB investigation is to complete the characterization of the landward components of the Site (soil and groundwater). Using the previous Phase I and Phase IIA investigation results as the starting point, specific objectives of the Phase IIB investigation are to:

- further define groundwater quality at select locations in the deep and shallow aquifer;
- assess soil conditions at locations across the Site; and
- compile adequate data demonstrating no significant levels of hazardous material in specific areas of the Site (particularly in the central portion of the Site) to support initiation of appropriate actions to remove these areas from the MCP process.

Accomplishment of these objectives is discussed further below.

2.3.4 Proposed Phase IIC Investigation

The Phase IIC investigation is expected to focus on the sediments and surface waters of the Factory Pond drainage system. This includes the channelized areas around Fox Island, Torrey Brook, Lily Pond and other ancillary streams. Follow-up sampling of soils and groundwater will be performed where data gaps are identified. By the end of Phase IIC, there should be enough data to initiate risk characterization, evaluate contaminant fate and transport, and prepare the Comprehensive Site Assessment report.

3.0 FIELD INVESTIGATION PROGRAM

3.1 Mobilization Activities

Following DEP's approval of the Phase IIB SOW, Foster Wheeler will finalize procurements and subcontracts with the driller, laboratory and surveyor and prepare field equipment and personnel for mobilization to the Site. Concurrent with this activity, the seven-day notification describing the personal protective gear and methods of investigation will be submitted to the Town of Hanover and the Hanover Health Department. Because of the potential for sampling activities to occur within 100 feet of the Drinkwater River and Factory Pond, Foster Wheeler will contact the Hanover Conservation Commission with respect to the Massachusetts Wetlands Protection Act. Based on past experience at the Site, Foster Wheeler will submit a copy of the sampling locations for review by the Commission to confirm that changes in activities are not significant enough to require a new filing for a Determination of Applicability. The project previously received a Negative Determination of Applicability for both the Phase I and Phase IIB investigations.

In addition, access agreements must be obtained from landowners prior to entry for any field activities. After site access is secured but prior to commencement of the Phase IIB field activities, Foster Wheeler staff will walk the Site and stake out potential groundwater well and subsurface soil boring locations for Digsafe clearance. All on-site work will be performed in accordance with the Health and Safety Plan Health and Safety Plan included as Appendix B of this SOW.

3.2 Unexploded Ordnance (UXO) Avoidance

Given the unlikely but possible presence of unexploded ordnance (UXO) in particular areas of the Site (nominally at the Waste Burn Pit, Demolition Pit and Cold Waste Dump Areas), Foster Wheeler UXO specialists will screen the areas with a gradiometer prior to surface soil sampling. A hollow stem auger combined with a downhole magnetometer scan will be used to advance borings at those areas. The proposed hollow stem auger method is consistent with U.S. Army protocols for subsurface investigation in areas with potential UXO. Foster Wheeler UXO specialists will serve as safety officers for these activities and direct both surface and subsurface avoidance activities. (Specific details on UXO avoidance are contained in the Health and Safety Plan in Appendix B and are consistent with past investigations performed by Foster Wheeler.) If these initial borings confirm the absence of UXO, then alternative techniques such as geoprobe may be appropriate for subsequent subsurface investigations in those areas.

3.3 Field Activities

Given the large areal extent of the property and variety of past activities, the Site has been divided into three areas (see Figure 3-1). The northern area is accessed by Industrial Way and is bound by the site property line to the north and Torrey Brook to the south. The central area is accessed from Winter Street and bordered by Torrey Brook, Factory Pond, Winter Street and an east-west line extended across the Site, above the inlet trench near the Waste Burn Pit. The southern area is also accessed from Winter

Street and encompasses the remaining property south of the inlet trench. The residential area in Hanson across Factory Pond from the Demolition Pit is also included in the southern Area for Phase IIB.

Sampling locations in these three areas have been selected based on past historical activities or data from the Phase I and Phase IIA investigations. The following sections and Figures 3-2, 3-3, and 3-4 describe sampling locations and rationale within each of the geographic areas for both groundwater and soil media. Specific analytical parameters are tabulated for each area by media in Tables 3-1 and 3-2. Conceptual Site Models for each area for the Risk Characterization are provided in Figures 3-5 through 3-7. These serve as the basis for the Phase IIB sampling program. Background soil and groundwater samples will also be collected from appropriate locations and depths. These locations will be identified in the field. These samples will be analyzed for the full suite of analytes listed in Tables 3-1 and 3-2.

Following mobilization to the Site, monitoring wells will be installed in the deep portion of the unconsolidated aquifer at four locations with previously observed elevated levels of dissolved chlorinated organic compounds. These locations are shown on Figures 3-3 and 3-4 and will be leveled by a surveyor working off the established survey baselines on site. Two-inch diameter, PVC wells will be installed using hollow-stem auger, water rotary or drive and wash advancement techniques. Wells will be completed with ten foot PVC screens (nominally 10-slot) and a sand pack extending two feet above the screen. The annulus will be grouted to the surface. A locking steel protective casing will enclose the two to three foot PVC casing stick up. In the residential neighborhood south of the Site, 1.32-inch diameter carbon steel driven well points with five-foot stainless steel screens will be advanced to an average depth of ten feet below grade adjacent to the river. These locations are shown on Figure 3-4 and will be leveled by a surveyor. The well points will be installed using a soft tire mobile drilling rig and direct drive or vibratory techniques. Each well point will be completed with a three foot stick up above the ground surface and fitted with locking caps. These well points are considered "temporary", although they can be used for several years. Both wells and well points will be developed by surging techniques. Following a stabilization period, the wells, well points and one existing well will be sampled using low stress techniques. All development and sampling water will be disposed on the ground adjacent to the well points per 310 CMR 40.0045. Hydraulic testing (slug tests) will also be performed in the deeper wells and selected shallow wells.

The general approach to the Phase IIB soil sampling program utilizes an organic vapor meter (OVM) and x-ray fluorescence (XRF) techniques to perform field analytical screening. Shallow surface soil (zero to six inches depth) will be collected and screened first with the OVM, then analyzed with the XRF for lead and mercury. Results will be used to identify potential locations for subsurface borings (and subsequent screening) or to select samples for laboratory analysis. This same approach was used successfully in Phase I to provide rapid turnaround results for decision making on sample selection and boring locations. The field screening results also correlated well with the analytical laboratory data. Soil boring location samples are subdivided into 3-foot intervals relative to the potential exposure depth ranges in Section 2.3.

To avoid potential sediment-land conflicts in the future sediment program, sampling activities will generally stop within 50 feet of all water bodies. Those land areas within this 50 foot zone will be addressed in Phase IIC.

3.3.1 Northern Area

(See Figure 3-2 for area locations.)

3.3.1.1 Soil

Shallow surface soil samples will be collected for field screening purposes from various former building locations associated with past Fireworks Site research or assembly operations. These include:

- Laboratory – Building 295
- R&D Area – Building 365
- Mine Research Area – Building 264
- Fuse and Flare Production – Buildings 27 and 371
- Primer and Detonator Assembly – Buildings 113, 176, 186 and 346
- Explosives Loading Locations – Buildings 124, 125, 126 and 127

Soil samples will also be collected from sites previously investigated in Phase I as well as at relic structures, potential surface water runoff areas, and at the new deep monitoring well locations.

Building Locations — At each building area, four shallow soil samples will be collected from zero to six inches depth and screened for organic vapors, lead, and mercury. These screens will be used to select a fifth location in each area where a boring will be advanced and samples collected within the upper interval of zero to three feet depth and the lower interval of three to six feet depth. These boring samples will be screened and two samples (one from each interval) will be sent for laboratory analysis of TAL metals, VOCs, and semivolatile organic compounds (SVOCs). Samples from the Laboratory and R&D areas will also be analyzed for explosives.

Relic Structures — The same approach will be used at selected relic structures in the wooded area of the northeastern portion of the site. Four shallow soil screening analyses will be used to select a boring location and one sample from the upper and lower intervals in the boring will be sent for laboratory analysis of VOCs, SVOCs, and explosives.

Fox Island, Building 80 and Building 307 Areas — The Phase I sampling results and field screening will be used to select three boring locations for each area. Field screening will be completed for samples from the upper and lower intervals (zero to three feet and three to six feet depths, respectively) to select one sample per area per interval for laboratory analysis of TAL metals, VOCs, SVOCs and explosives. An additional set of “at large” samples (one for each interval) is allocated.

Surface Runoff Locations — Shallow surface soil samples will also be collected and screened for lead and mercury at up to eighteen surface water runoff locations throughout the northern area. Samples will be biased to those locations potentially contributing Site materials to the river and pond systems. Samples from nine of the locations will be sent for laboratory analysis of TAL metals.

Deep Monitoring Wells — Six subsurface soil samples will be collected using split spoons at the proposed deep monitoring well locations adjacent to PZ-02, PZ-12 and PZ-17 (see section 3.3.1.2). Samples will be collected in the well screen interval at each of the new well locations and at the elevation of the corresponding well point screen. Samples will be analyzed for total organic carbon (TOC) to support fate and transport calculations.

3.3.1.2 Groundwater

Three deep monitoring wells will be installed in the northern area adjacent to well points PZ-02, PZ-12, and PZ-17. Borings will extend to bedrock or refusal and each well will be completed in the deep aquifer above the overburden-bedrock interface. Each of the shallow well points that had elevated levels of chlorinated organic compounds in Phase IIA and the corresponding deeper wells will be used to evaluate chlorinated compounds at depth. Groundwater samples will be collected using low stress techniques from the newly installed wells and the corresponding shallow well points and analyzed for VOCs and TAL metals.

3.3.2 Central Area

(See Figure 3-3 for area locations.)

3.3.2.1 Soil

Shallow surface soil samples will be collected for field screening purposes from various locations associated with past Fireworks Site storage and disposal operations. These include:

- Drum remnants area found during the 1989 Goldman Environmental Consultants (GEC) drum removal operation for Susquehanna Corp.
- Individual storage magazine building foundations
- Drum area termed as the "Landers site" during the 1989 GEC drum removal operation
- Storm Water Settling Basin adjacent to Factory Pond

Drum Remnants — Fifteen shallow surface soil samples will be collected from zero to six inches depth and screened for organic vapors, lead and mercury in areas of drum remnants. These drum remnants were identified in the GEC report (1989) and are located throughout various areas in the Central Area. No sampling of drum contents is planned. Those drums with unknown or suspicious contents were removed by GEC during the 1989 operation for Susquehanna. Samples will not be collected from areas with household refuse and trash. These screens will be used to select six locations where borings will be advanced and soil samples collected within the upper interval of zero to three feet depth. Two soil samples from each boring location will be screened and five samples selected for laboratory analysis of TAL metals, VOCs and SVOCs.

Storage Magazines — The same approach will be used at selected relic storage magazine structures. Composite samples from shallow surface soils at twelve foundations/structures will be screened for lead and mercury to select four locations where borings will be advanced and samples collected within the upper interval of zero to three feet depth. Two samples from each boring location will be screened and four samples selected for laboratory analysis of TAL metals, SVOCs and explosives.

GEC Landers Site — A large number of drums were excavated by GEC at the Landers site and sampling performed on the underlying soils. Based on a review of the analytical data and the areal extent of the past drum excavation, a zone approach will be taken. The area will be subdivided into four quadrants and seven samples collected at depths between zero to fifteen feet within each quadrant. These samples will be screened with an organic vapor analyzer. Half of the samples (fourteen) will be field screened for organic vapors, lead, and mercury and twelve samples selected for laboratory analysis of TAL metals, VOCs, SVOCs, and explosives.

Stormwater Settling Basin — Although the stormwater settling basin is not associated with historic Fireworks Site operations, samples will be collected in and around the structure to assess if it is contributing any contamination to the area. One "sediment" sample will be collected from within the basin, one from any "sediment" in the outflow structure, and one soil/sediment sample within any drainage channel towards Factory Pond. These samples will each be analyzed at a laboratory for TAL metals, VOCs, SVOCs and explosives.

Care will be taken during sediment sample collection to ensure that the sample contains a minimum of 30% solids. If necessary, excess water will be decanted from the sample bottle.

3.3.2.2 Groundwater

One groundwater sample will be collected from within the GEC Landers drum site. The sample will be collected using a peristaltic pump or bailer through the soil boring casing or open hole and sent for laboratory analysis of TAL metals (filtered and unfiltered), VOCs, SVOCs and explosives. No monitoring device is being installed.

A "surface water" sample will also be collected from the stormwater settling basin and sent for laboratory analysis of TAL metals and explosives.

3.3.3 Southern Area

(See Figure 3-4 for area locations.)

3.3.3.1 Soil

Shallow surface soil samples will be collected for field screening purposes from various locations associated with past Fireworks Site testing and disposal operations. These include:

- Test Slab and Relic Foundations
- Testing Range
- "Factory Pond Drum Area" as described in the 1989 GEC drum removal operation for Susquehanna Corp.
- Waste Burn Pit Area and Inlet Trench
- Cold Waste Dump Area
- Demolition Pit
- Marsh uplands adjacent to and southwest of the Demolition Pit

Soil samples will also be collected at the new deep monitoring well location at the Demolition Pit.

Test Slab and Relic Foundations — Three shallow surface soil samples will be collected from zero to six inches depth and screened for organic vapors, lead and mercury in the vicinity of the Test Slab and relic foundations east of the Cold Waste Dump Area. These screens will be used to select one location where a boring will be advanced and a sample collected within the upper interval of zero to three feet depth. The sample will be screened and then sent for laboratory analysis of TAL metals and explosives.

Testing Range — Nineteen shallow surface soil samples will be collected from zero to six inches depth and screened for organic vapors, lead and mercury in the Testing Range Area and along the sand face located at the east end of the range. Samples will not be collected from areas with household refuse and trash or from obvious recreational shooting areas. These screens will be used to select five locations where borings will be advanced and samples collected within the upper interval of zero to three feet depth. Two samples from each boring location will be screened and six samples selected for laboratory analysis of lead and mercury only. Two samples will be selected for additional laboratory analysis for explosives and TCLP lead. Note that it may be difficult to separate out impacts on the area attributable to former munitions manufacturing and testing from more recent activities including target and skeet shooting on open town land.

Factory Pond Drum Area — Sixteen shallow surface soil samples will be collected from zero to six inches depth and screened for organic vapors, lead and mercury in areas of drum remnants. These drum remnants were identified in the GEC report (1989) and are located throughout various areas in the Southern Area. Samples will not be collected from areas with household refuse and trash. These screens will be used to select six locations where borings will be advanced and samples collected within the upper

interval of zero to three feet depth. Two samples from each boring location will be screened and three samples selected for laboratory analysis of TAL metals, VOCs and SVOCs.

Waste Burn Pit and Inlet Trench — Twenty shallow surface soil samples will be collected from zero to six inches depth and screened for organic vapors, lead and mercury in the Waste Burn Pit and Inlet Trench Area. These screens will be used to select five locations where borings will be advanced and samples collected within the upper interval of zero to three feet depth. Two samples from each boring location will be screened and five samples selected for laboratory analysis of TAL metals, VOCs, SVOCs and explosives.

Cold Waste Dump Area — Three shallow surface soil samples will be collected from zero to six inches depth and screened for organic vapors, lead and mercury within the fenced perimeter of the Cold Waste Dump Area. These screens will be used to select two locations where borings will be advanced and samples collected within the upper interval of zero to three feet depth. Two samples from each boring location will be screened and two samples selected for laboratory analysis of TAL metals, SVOCs and explosives.

Demolition Pit — Three borings will be advanced and samples collected from zero to six feet depth in the Demolition Pit Area. These boring locations will be selected using Phase I soil analytical data. Three samples from each boring location will be screened for lead and mercury and three samples selected for laboratory analysis of TAL metals, VOCs, SVOCs, and Pesticides/PCBs.

Marsh Uplands — Six shallow surface soil samples will be collected from zero to six inches depth and screened for organic vapors, lead and mercury in the Marsh Uplands adjacent to the Demolition Pit. There are suggestions that materials may have been thrown from the Pit into this area. These screens will be used to select three locations where borings will be advanced and a sample collected within the upper interval of zero to three feet depth. One sample from each boring location will be screened and the sample sent for laboratory analysis of TAL metals, VOCs, and SVOCs. If the entire area is submerged then potential locations will be flagged and sampling deferred until the sediment sampling program.

Deep Monitoring Well — Two subsurface soil samples will be collected using a split spoon sampler at the proposed deep monitoring well location adjacent to PZ-24 (see section 3.3.3.2). Samples will be collected in the well screen interval at the new well location and the elevation of the PZ-24 well point screen. Samples will be analyzed for total organic carbon to support fate and transport calculations.

3.3.3.2 Groundwater

One deep monitoring well will be installed in the southern area adjacent to PZ-24. The boring will extend to bedrock or refusal and the well completed in the deep aquifer above the overburden-bedrock interface. The deeper well will be used to evaluate the potential for chlorinated compounds found in PZ24 to be found at depth. Groundwater samples will be collected from the newly installed well and PZ-24 using low stress techniques and analyzed for TAL metals and VOCs.

Three shallow well points will be installed in Hanson on the south shore of Factory Pond across from the Demolition Pit Area. These well points will be used to evaluate the potential for groundwater flow from the Site to pass beneath Factory Pond. Current hydrogeological data suggest that groundwater flow from the Site discharges to the Pond and river system and does not flow under Factory Pond. The well points will be installed, developed and sampled for TAL metals and VOCs.

3.4 Hydraulic Testing and Measurements

Following the installation of the new monitoring wells and after an appropriate equilibration period, a synoptic water level measurement will be performed on all Site monitoring wells, well points and staff gages. Water level measurements will be collected on the same day and groundwater elevations calculated using surveyed elevations. The data will then be tabulated and presented as potentiometric contours on the Site base map in the Phase IIB report.

Hydraulic testing will be performed using a rising head/falling head (slug test) methodology to evaluate hydraulic response in the four deep wells and select shallow wells. These data will be reduced to quantify aquifer parameters of hydraulic conductivity and transmissivity.

3.5 Preparation of the Base Map

A topographic base map will be prepared using aerial photogrammetry and ground control. Map coverage will extend over the entire site. It is estimated that approximately ten to fifteen per cent of the area will lack detail based on the dense vegetation cover. Topographic control will be brought into these portions of the Site as necessary based on Site activities.

4.0 PREPARATION OF THE PHASE IIB INVESTIGATION REPORT

Following completion of field activities and receipt of laboratory data, a Phase IIB report will be prepared in accordance with the pertinent requirements of 310 CMR 40.0835. The Phase IIB report will present the data collected from the field investigation program discussed in Section 3.0. The report will summarize the field efforts and data collection activities, and present tabulated chemical and hydrogeological data. The analytical data reports from the laboratory will be included as a separate Appendix.

The conclusion section will include a summary of findings and a statement of conclusions with respect to soil and groundwater conditions at the Site and suggested follow-up activities for completing the Phase II Comprehensive Site Assessment.

5.0 PUBLIC INVOLVEMENT

All applicable public involvement requirements will be followed pursuant to the MCP in 310 CMR 40.0839. At this time, public involvement is being handled by the Cooperating Parties, in coordination with DEP. In addition, Foster Wheeler and the Cooperating Parties may be asked to attend public meetings or otherwise provide support for public involvement activities at the completion of the Phase IIB site work and/or subsequent site activities.

6.0 PROJECT TEAM

The project team is illustrated in Figure 6-1. This Phase IIB investigation will be performed under the direction of Massachusetts Licensed Site Professional Robert Donati of Foster Wheeler, LSP No. 5878. Three subcontractors will be utilized to provide off-site analytical laboratory services, well point installation and surveying services. Foster Wheeler has worked with all three firms on previous assignments.

Severn Trent Laboratories (formerly ITS/Aquatec) of Burlington, Vermont will serve as the off-site analytical laboratory. Severn Trent is well qualified to support the Fireworks project based on existing

certifications with DEP and the USACE, its reputation for performing quality work including metals analyses, and its demonstrated ability to provide high quality data from the Phase I and Phase IIA investigations.

Currently, no drilling subcontractor has been chosen. The selection will be made closer to execution of the field program and based on the subcontractor's ability to support the Project Schedule. Foster Wheeler has excellent relationships with a number of the drilling subcontractors in the area and has worked with them on this and similar projects.

SNB Land Surveyors (SNB) of Raynham, Massachusetts will serve as the surveying subcontractor. They are Registered Land Surveyors and performed the surveying to support Phase I activities. James W. Sewall Company of Old Town, Maine will support the preparation of the Base Map based on aerial photogrammetry with ground control support from SNB.

7.0 SCHEDULE

The current project schedule assumes DEP approval of the SOW in January 2000 and mobilization to the field in the early spring, contingent upon receiving access from property owners. Well point installation and groundwater sampling would be completed first. Mobilization for soil sampling will be dependent on the severity of the winter frost penetration and saturation of soils from spring thaw. It is anticipated that a final report would be prepared for submission to DEP in early summer 2000.

8.0 REFERENCES

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Foster Wheeler Environmental Corporation, 1998. Scope of Work for Phase IIA Groundwater Investigation, Fireworks I, Hanover, MA, RTN:4-0090, October 1998.

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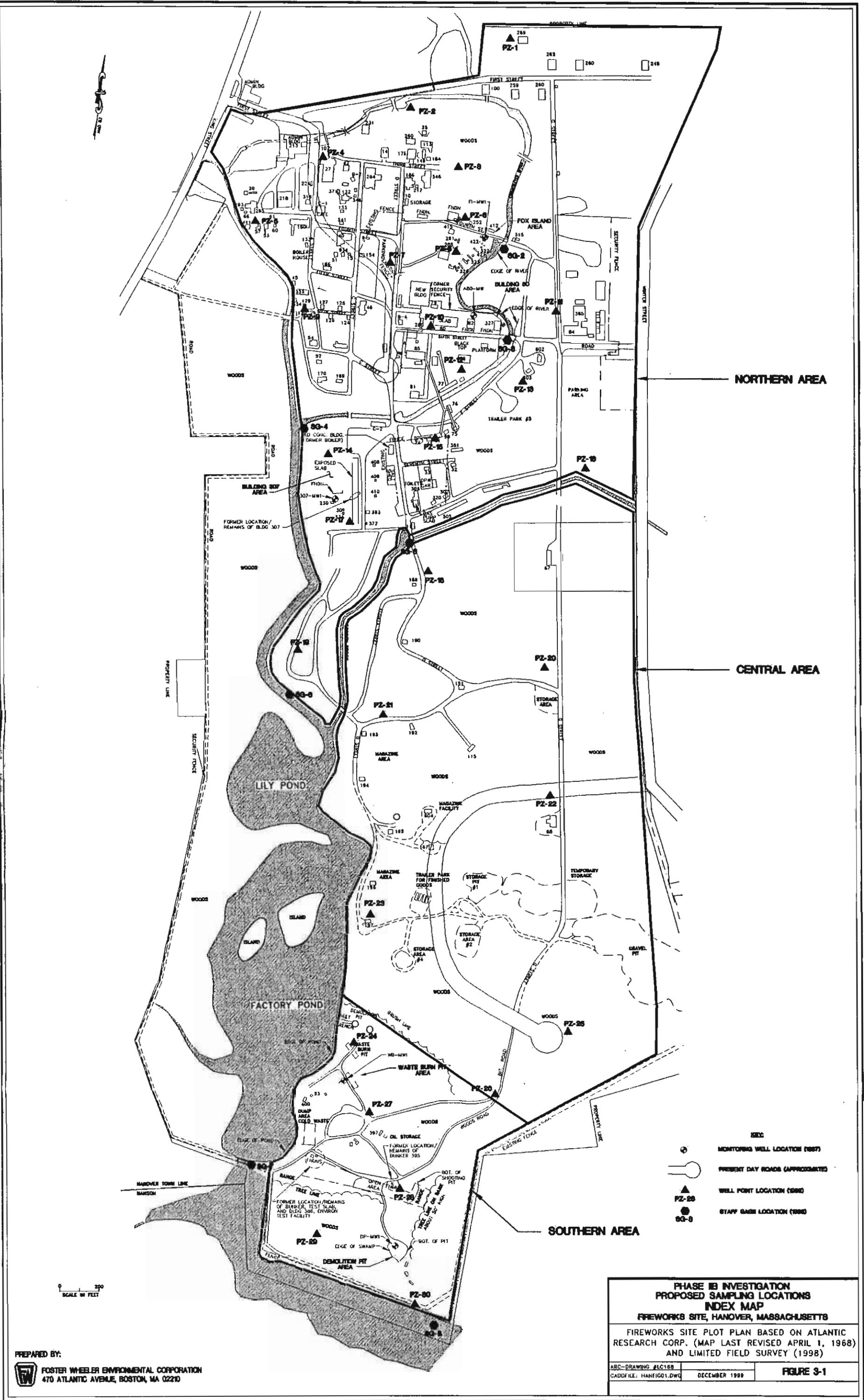
Osborne, Byron A., 1996. Affidavit dated December 17, 1996.

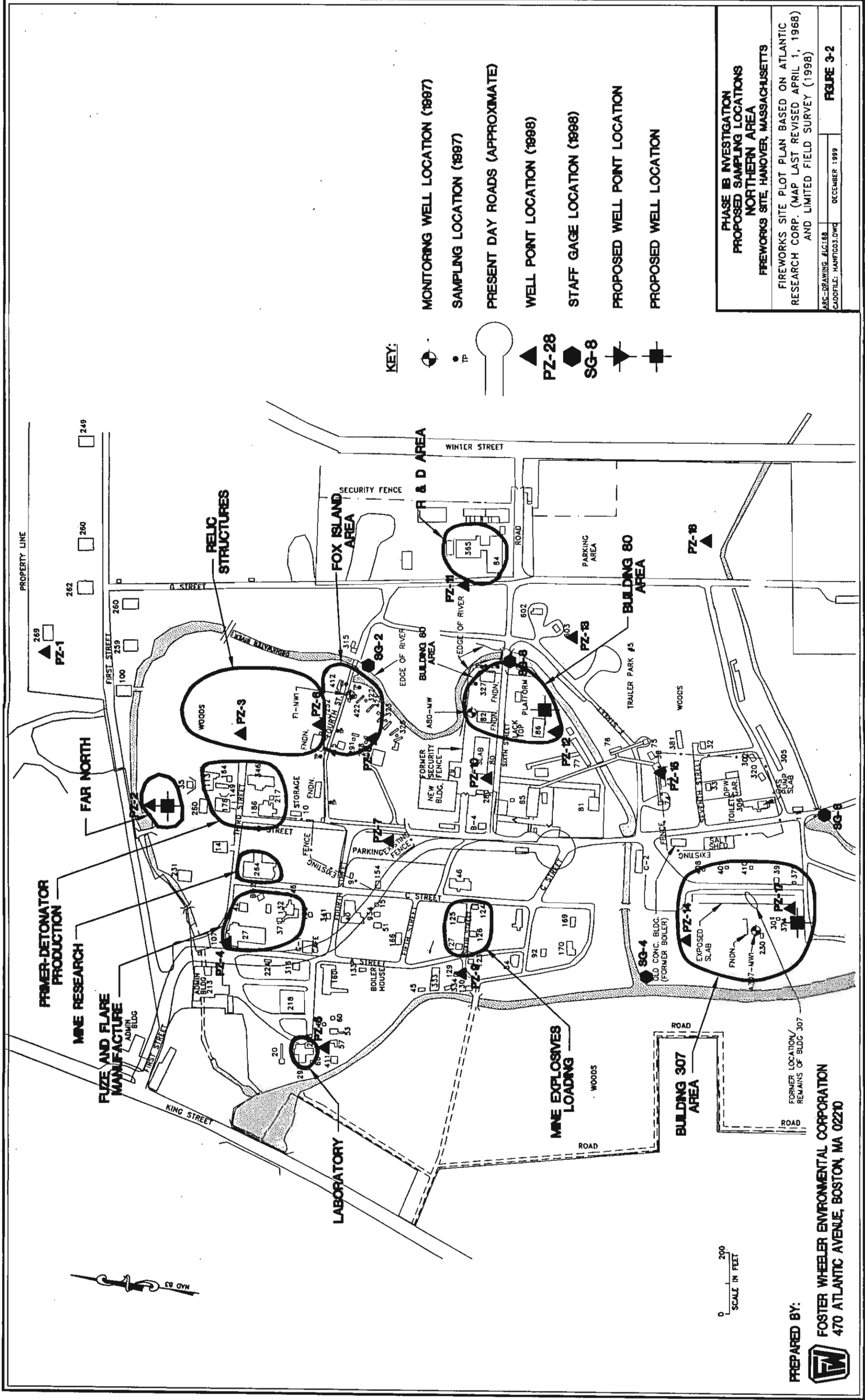
USGS, Topographic Maps, Whitman, MA Quadrangle, 1977 and Hanover, MA Quadrangle, 1978.

FIGURES



Source: USGS 7.5 Min Topographic Maps; Whitman, MA, 1977, and Hanover, MA 1978.





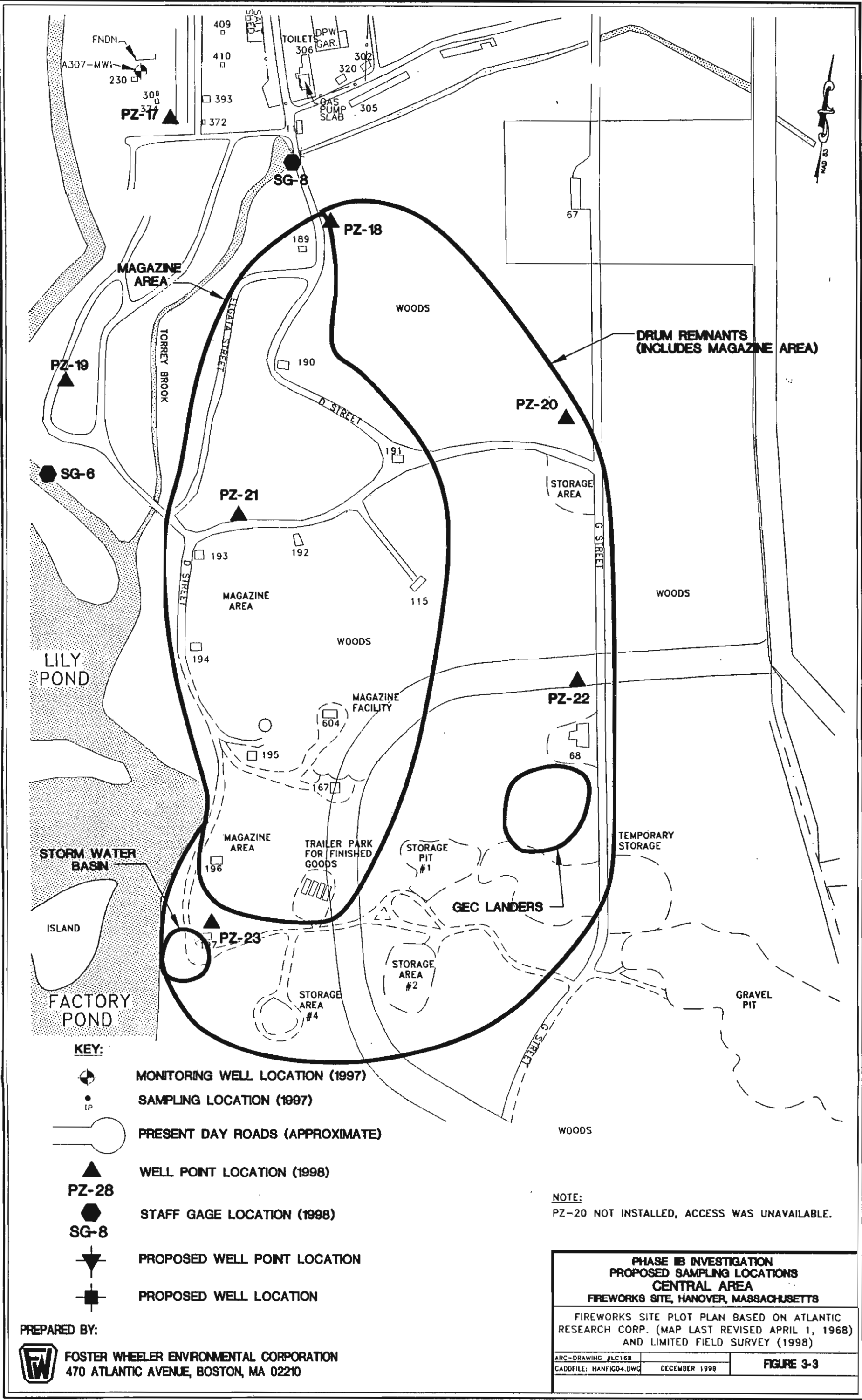
PHASE B INVESTIGATION
PROPOSED SAMPLING LOCATIONS
NORTHERN AREA
FIREWORKS SITE, HANOVER, MASSACHUSETTS

FIREWORKS SITE PLOT PLAN BASED ON ATLANTIC
RESEARCH CORP. (MAP LAST REVISED APRIL 1, 1968)
AND LIMITED FIELD SURVEY (1998)

ARC-DRAWING: #JG188
CAD-FILE: HANFG03.DWG
DECEMBER 1999

FIGURE 3-2

PREPARED BY:
F FOSTER WHEELER ENVIRONMENTAL CORPORATION
470 ATLANTIC AVENUE, BOSTON, MA 02210



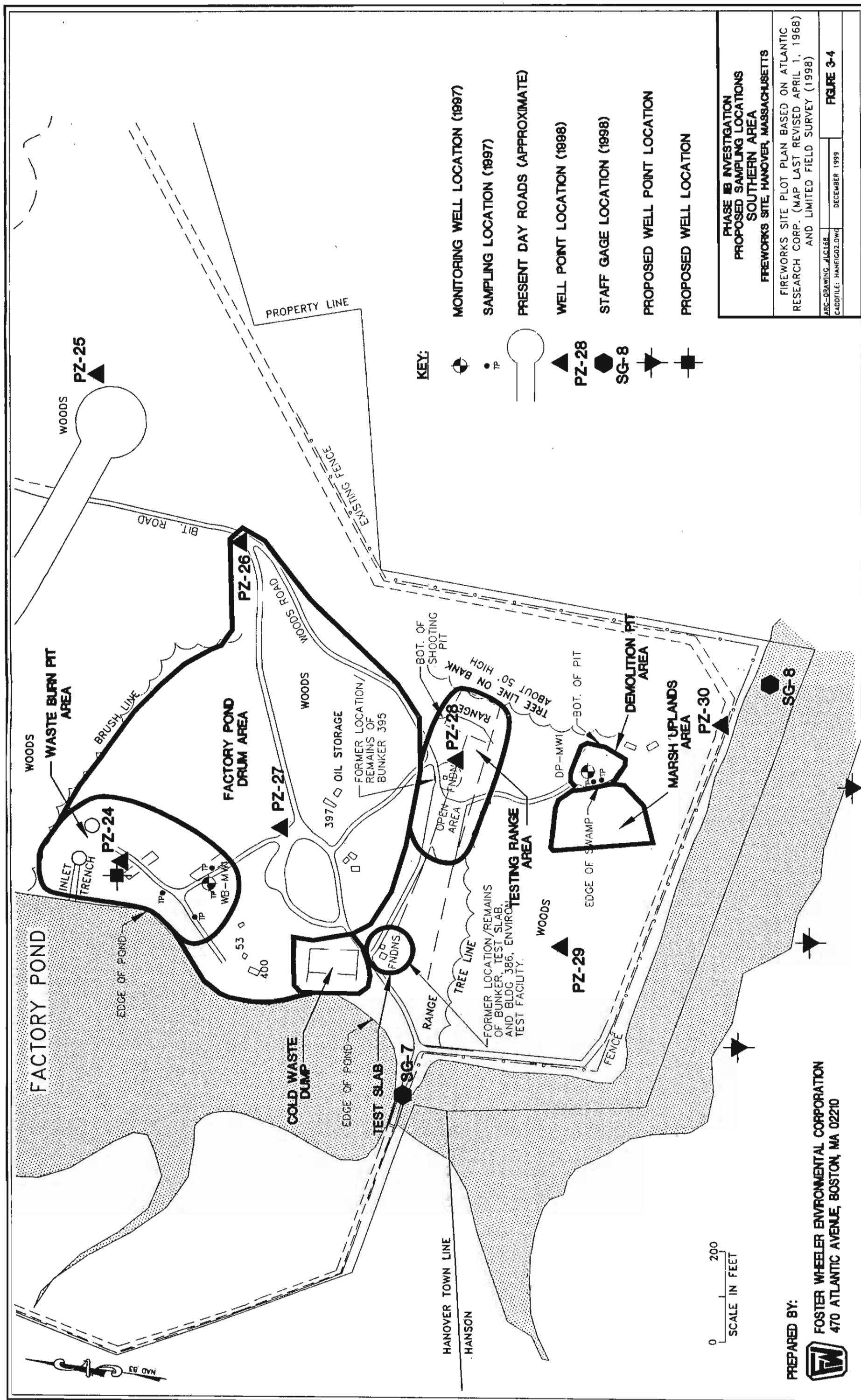
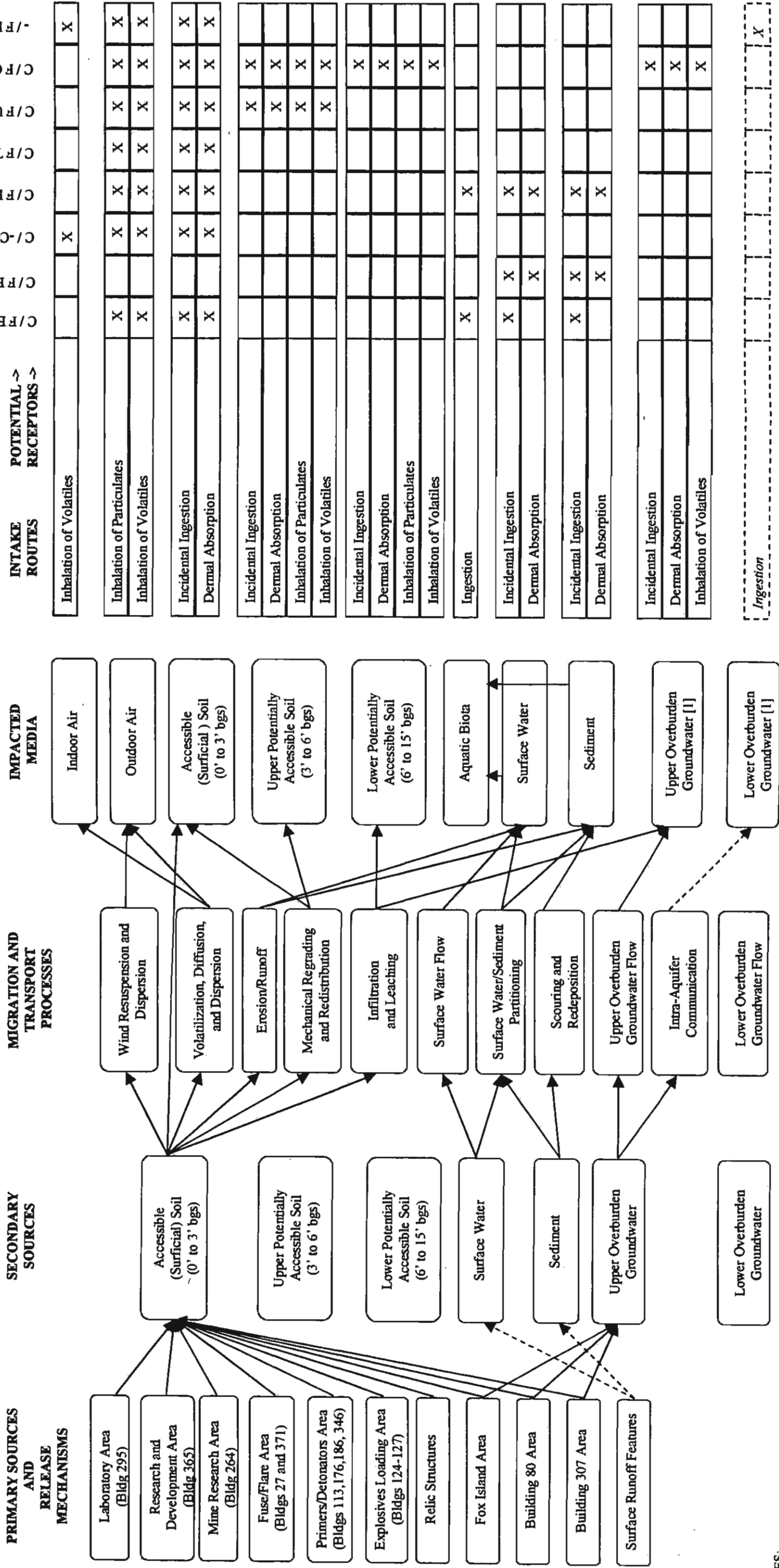


FIGURE 3-5 CONCEPTUAL SITE MODEL FOR THE RISK CHARACTERIZATION
FOR THE NORTHERN AREA AT THE HANOVER FIREWORKS SITE



NOTES:
[1] Upper and Lower Overburden groundwater are not potential sources for drinking water
[2] Dash lined boxes and arrows indicate possible elements or linkages that were considered

FIGURE 3-6 CONCEPTUAL SITE MODEL FOR THE RISK CHARACTERIZATION
FOR THE CENTRAL AREA AT THE HANOVER FIREWORKS SITE

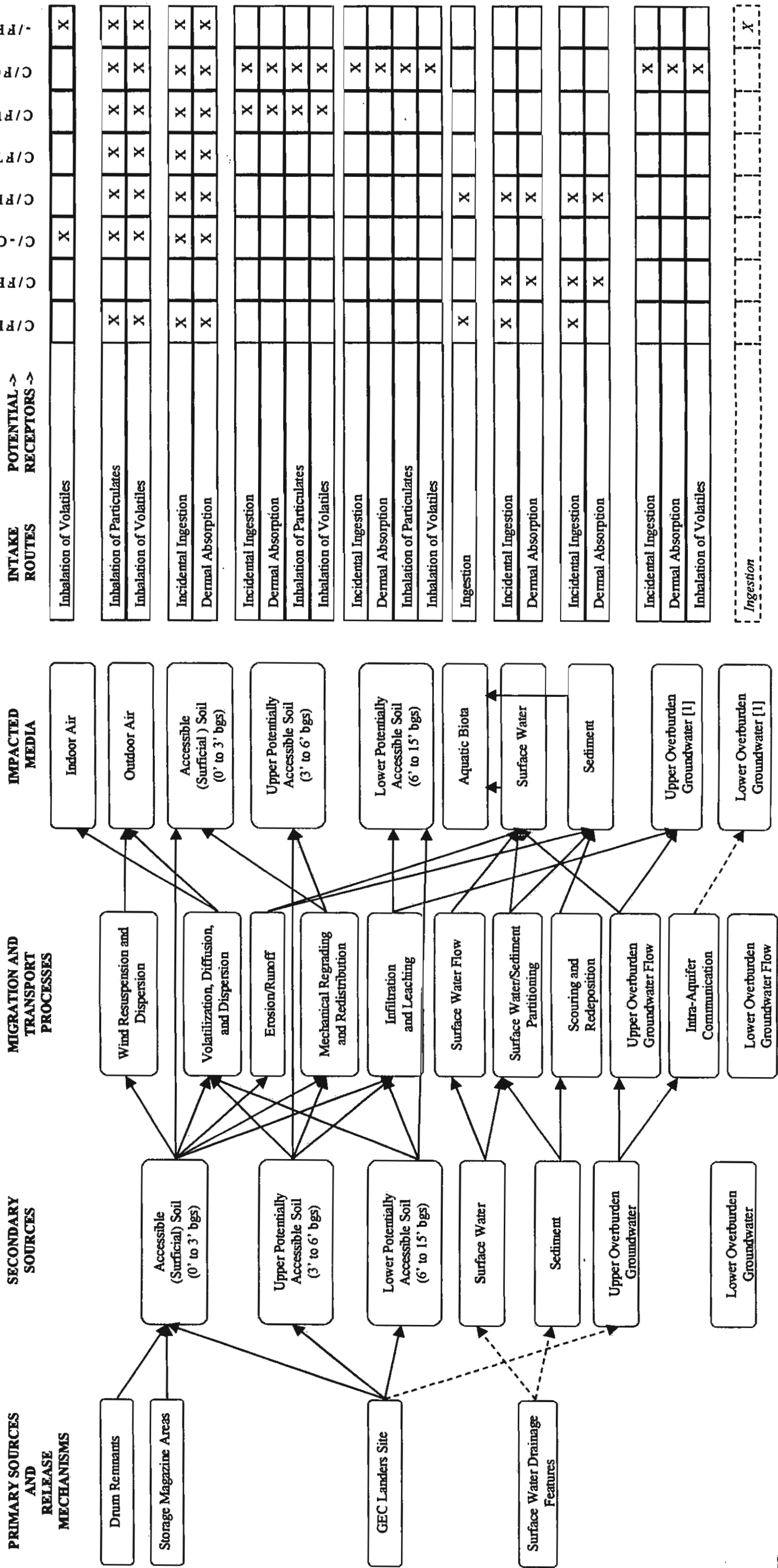
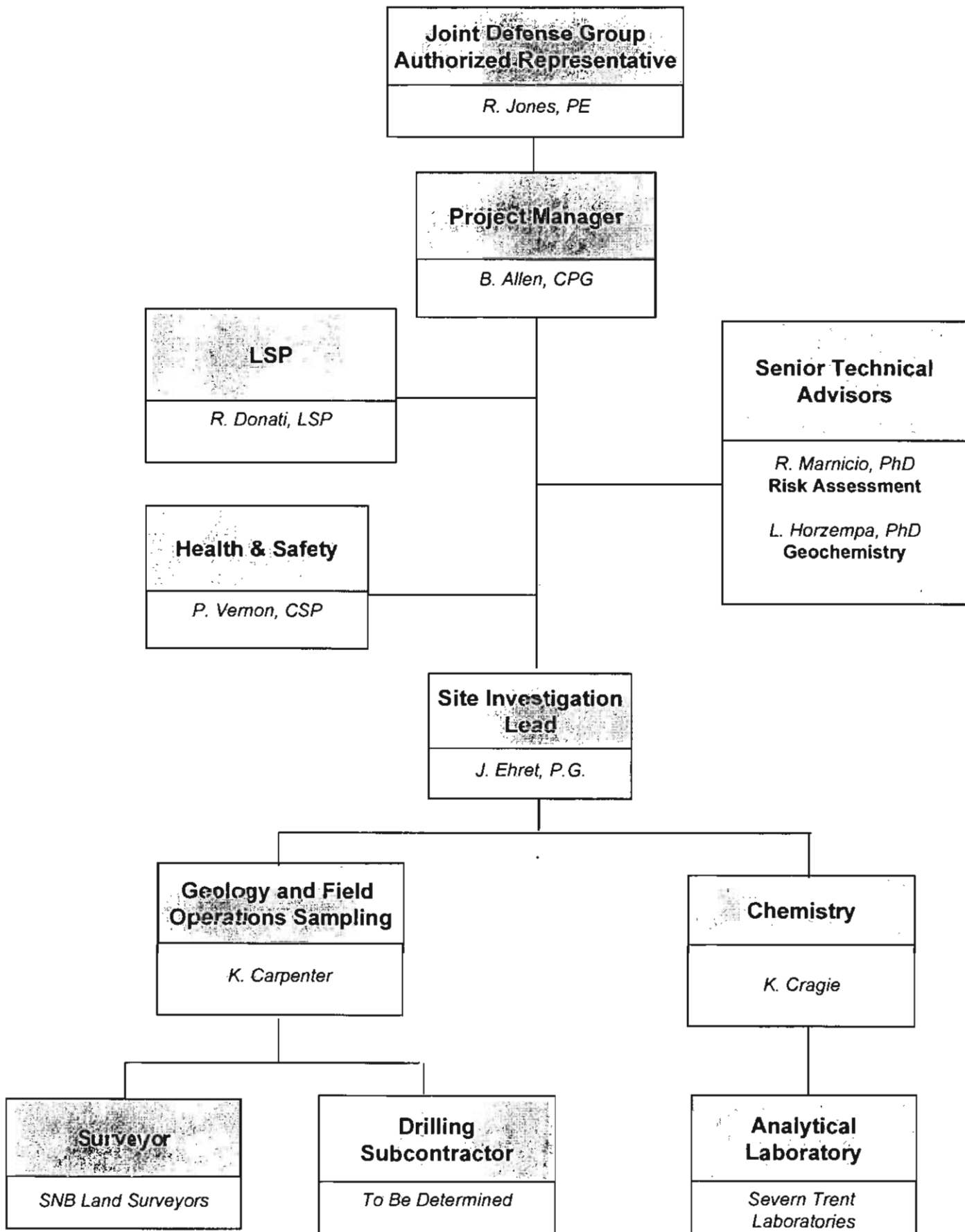


Figure 6-1 Fireworks Site Project Organizational Chart



TABLES

**TABLE 3-1
PHASE IIB SOIL SAMPLES
FIREWORKS SITE**

Location	# Sample Locations	# of Field Screens (Hg, Pb, Hnu)					# of Off-Site Analyses						
		0'-0.5'	0'-3'	3'-6'	0'-6'	0'-15'	Metals	VOCs	SVOCs	Pest/PCB	Explosive	TCLP Pb	TOC
NORTHERN AREA													
Laboratory Bldg. 295	4	4											
Laboratory Bldg. 295	1		1				2	2	2			2	
R&D Area Bldg. 365	4	4											
R&D Area Bldg. 365	1		1				2	2	2			2	
Mine Research Bldg. 264	4	4											
Mine Research Bldg. 264	1		1				2	2				2	
Fuse/Flare Bldgs. 27, 371	4	4											
Fuse/Flare Bldgs. 27, 371	1		1				2	2				2	
Primer/Deton Bldgs. 113, 176, 186, 346	4	4											
Primer/Deton Bldgs. 113, 176, 186, 346	1		1				2	2				2	
Explosives Loading Bldgs. 124 to 127	4	4											
Explosives Loading Bldgs. 124 to 127	1		1				2	2				2	
Relict Structures (woods)	4	4											
Relict Structures (woods)	1		1				2	2				2	
Fox Island Area	3		3				2	2	2			2	
Building 80 Area	3		3				2	2	2			2	
Building 307 Area	3		3				4	4	4			4	
Surface Runoff Features	18	18					9						
Deep Monitoring Well near PZ-02	2												2
Deep Monitoring Well near PZ-12	2												2
Deep Monitoring Well near PZ-17	2												2
Background Sample	1	1	1	1	1		3	3	3		3		
Northern Area Subtotals	69	47	17	17	0	0	34	25	15	0	25	0	6
CENTRAL AREA													
Storage Magazine Areas	12	12											
Storage Magazine Areas	4		8				4		4			4	
Drum Remnants	15	15											
Drum Remnants	6		12				5	5	5				
GEC Landers Site ²	4						12	12	12		12		
Storm Water Settling Basin - Sediment	1					14	1	1	1		1		
Stormwater Basin Outflow - Sediment	1						1	1	1		1		
Surface Water Drainage	1						1	1	1		1		
Background Sample	1	1	1	1	1	1	4	4	4		4		
Central Area Subtotals	45	28	21	1	0	15	28	24	28	0	23	0	0

TABLE 3-1
PHASE IIB SOIL SAMPLES
FIREWORKS SITE

Location	# Sample Locations	# of Field Screens (Hg, Pb, Hnu)					# of Off-Site Analyses						
		0-0.5'	0-3'	3-6'	0-6'	0-15'	Metals	VOCs	SVOCs	Pest/PCB	Explosive	TCLP Pb	TOC
SOUTHERN AREA													
Test Slab and Foundations	3	3											
Test Slab and Foundations	1		1				1					1	
Testing Range ³	19	19											
Testing Range ³	5		10				6 <-- Hg, Pb only					2	2
Factory Pond Drum Area	16	16											
Factory Pond Drum Area	6		12				3	3	3				
Waste Burn Pit Area & Inlet Trench	20	20											
Waste Burn Pit Area & Inlet Trench	5		10				5	5	5			5	
Cold Waste Dump Area	3	3											
Cold Waste Dump Area	2		4				2		2			2	
Demolition Pit	3				9		3	3	3	3			
Marsh Upland (near Demolition Pit)	6	6											
Marsh Upland (near Demolition Pit)	3		3				3	3	3				
Deep Monitoring Well near PZ-24	2												2
Background Sample	1	1	1	1			3	3	3			3	
Southern Area Subtotals	95	68	41	1	9	0	26	17	19	3	13	2	2
GRAND TOTALS	209	143	79	19	9	15	88	66	62	3	61	2	8
NOTES:													
1 Will use XRF sample screens to select boring locations for the 0-3 and 3-6 foot sample locations													
2 Quartering GEC Landers site: will screen 7 locations in each quad with Hnu, select half for XRF screening, select "hottest" location in each quad for boring with 3 sample depths													
3 Metals analysis for Hg and Pb only													

TABLE 3-2
PHASE IIB AQUEOUS SAMPLES
FIREWORKS SITE

Location	# Sample Locations	# of Off-Site Analyses					
		Metals	VOCs	SVOCs	Pest/PCB/Explosive	TCLP Pb	TOC
NORTHERN AREA							
Deep Monitoring Well near PZ-02	1	1	1				
PZ-02	1	1	1				
Deep Monitoring Well near PZ-12	1	1	1				
PZ-12	1	1	1				
Deep Monitoring Well near PZ-17	1	1	1				
PZ-17	1	1	1				
CENTRAL AREA							
Storm Water Settling Basin (water)	1	1				1	
GEC Landers Site (within boring)	1	2	1	1		1	
SOUTHERN AREA							
Demolition Pit Well DP-MW1	1	1	1				
Deep Monitoring Well near PZ-24	1	1	1				
PZ-24	1	1	1				
Well Points South of Factory Pond	3	3	3				
BACKGROUND SAMPLE	1	1	1	1		1	
GRAND TOTALS	15	16	14	2	0	3	0
Note:							
1 Landers site boring metals sample analyzed for both filtered and unfiltered metals							

APPENDIX A

Quality Assurance Plan

QUALITY ASSURANCE PLAN

1.0 INTRODUCTION

This Quality Assurance Plan describes the quality control (QC) and quality assurance (QA) measures that will be conducted for the Fireworks Site to ensure that the data generated from the Phase IIB sampling program are of known quality and are acceptable for project objectives.

Data generated for the Fireworks Site will be used to determine the following:

- presence and/or absence of contamination in selected areas of the Site;
- nature of the contaminants, if present; and
- provide a delineation of the extent and distribution of contaminants.

2.0 FIELD QA/QC PROCEDURES

2.1 Sample Designation System

The following system will be used to identify samples collected during the Phase IIB sampling program:

Target Area:	N	Northern Area
	C	Central Area
	S	Southern Area

Location:	MWxxx	Monitoring Well, where xxx designates the well ID
	PZxxx	Drive Point, where xxx designates the drive point ID

Each new well or drive point location will be recorded sequentially beginning with MW100 (or PZ 100, as appropriate). Samples collected from existing wells will be identified by the well ID assigned in previous work.

Soil and sediment samples will be numbered sequentially beginning with 01 as they are collected and identified by the target area they are collected in. The sample depth will be included in parentheses. This naming will be used for both the on-site screening samples and for samples sent to the off-site laboratory.

Example: N05(0-3) The fifth soil sample collected in the Northern Area, sample depth of 0-3 feet

QC Identifier:	D	Field duplicate
	TB	Trip blank
	EB	Equipment blank
	MS/MSD	Sample to be used as the MS/MSD or spike and duplicate for inorganics

QC samples which are not associated with physical locations will be referenced by the date collected (i.e., TB103198 would be a trip blank collected on October 31, 1998).

For example, MW101D would be a duplicate groundwater sample collected from Monitoring Well 101.

2.2 Quality Control Sampling Requirements

Specific quality control steps which will be taken to ensure that the data collected are representative, defensible, and accurate for the purposes of this project are described in this section and in the following subsections. Quality control (QC) samples that will be collected for the purpose of quantitatively

assessing the quality of the sampling effort and the laboratory analysis are discussed in this subsection. Other quality control requirements, including field documentation, sample handling and shipping requirements, and decontamination procedures, are also discussed in this section.

2.2.1 Quality Control Samples

The number and type of quality control samples that will be collected are summarized in the Work Plan. A general summary of how the samples will be collected and the frequency of collection is summarized below.

2.2.2 Field Duplicate Samples

Field duplicate samples are multiple grab or composite samples, collected separately, that equally represent a medium at a given location and time. Field duplicates will be collected at a frequency of approximately 5% per sample matrix for project parameters. Should conclusive data regarding the absence of these constituents, further sampling and analysis will be recommended.

2.2.3 Equipment Blanks

Equipment blanks are samples consisting of a reagent (analyte-free) water collected during a sampling event from a final rinse of sampling equipment after the decontamination procedure has been performed. The purpose of equipment blanks is to determine whether the sampling equipment is causing cross contamination of samples. Equipment blanks will not be collected for the groundwater samples, as these samples are obtained using disposable sampling equipment. Equipment blanks for soil samples will be collected at a rate of 1 for every 20 samples.

2.2.4 Trip Blanks

Trip blanks are samples consisting of reagent free (VOC free) water prepared and shipped with each cooler containing samples for VOC analysis. The purpose of these samples is to monitor the amount of contamination introduced to samples during the handling, packaging, and shipping process. Trip blanks will be analyzed for VOCs only.

2.2.5 Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples are laboratory QC samples used to assess the precision and accuracy of the laboratory analytical methods. Note that MS/MSD samples are analyzed for organic analyses; inorganic analyses require a spike and duplicate. Although, these are not actually field QC samples, additional volume of sample is required for the additional laboratory analyses. For this project, laboratory batch QC will be reported and additional site specific MS/MSDs are not proposed for collection.

2.3 **Equipment Decontamination Procedures**

Sampling equipment will be decontaminated using the following procedures:

- Wash equipment with non-phosphate detergent solution.
- Rinse with tap water.
- Rinse with 9.9% nitric acid (HNO₃) solution.
- Rinse with deionized water.
- Rinse with methanol.
- Repeat entire procedure or any parts of the procedure if necessary.

- Allow the equipment or material to air dry before re-using.
- Dispose of any soiled materials in a designated disposal container.

Drilling equipment or other large equipment or vehicles may be decontaminated using steam cleaning.

2.4 Documentation Procedures

A bound, weatherproof field notebook will be maintained by the sampling crew to record all information related to sampling activities. Information will document the following:

- Date and time of site visit.
- Key personnel on-site.
- Description of activities being performed.
- Sample identification and time of collection.
- QA/QC samples.
- Decontamination procedures.
- Sampling sequence and time of sample collection.
- Types of sample bottles and sample identifiers used.
- Preservatives used (if required).
- Parameters requested for analysis.
- Field observations, including sample conditions (sample matrix, sample volume, color, consistency, odor, evidence of contamination, etc.).
- Description of equipment used, including trade names, model numbers, diameters, material compositions, etc.
- Calibration data for field instruments (if required).
- Description of any problems encountered in the field.

Photographs may be taken to document site conditions, appearance, or specific samples. Photographs will be recorded in the site logbook.

2.5 Sample Chain of Custody, Packaging, and Shipping Procedures

2.5.1 Chain of Custody

To maintain and document sample possession, chain of custody (COC) procedures will be implemented. These procedures are necessary to insure the integrity of samples from the time of collection to data reporting. The COC protocol provides the ability to trace possession and handling of samples. A sample is considered under custody if:

- It is in a person's possession;
- It is in a person's view after being in your possession;
- It is in a person's possession and then locked up; or
- It is in a designated secure area.

Personnel collecting samples are responsible for the care and integrity of those samples until they are properly transferred or dispatched. Therefore, the number of people handling samples will be kept to a minimum.

A Chain of Custody form will be completed by the sampler for all samples to be shipped off-site and shall accompany the samples at all times. The following information shall be indicated on the COC record:

- Project identification;
- Signature of samplers;
- Sample identification, sample matrix, date and time of collection, grab or composite sample designation, number of containers corresponding to that sample identification, analyses required, remarks or sample location (if applicable), and preservation method(s);
- Signature of the individual relinquishing the samples; and
- Name of the individual(s) receiving the samples and air bill number, if applicable.

The COC preparer will then check the sample label and COC record for accuracy and completeness.

When transferring custody of samples, individuals relinquishing custody and individuals receiving custody will sign, date, and record the time on the COC. When samples are being shipped to the laboratory via courier or shipping company (Federal Express), the shipping company will be indicated as receiving custody. Upon receipt of shipment at the laboratory, a designated sample custodian will accept custody of the samples and verify that information on the sample labels match the COC record. Pertinent information on shipment, air bill number, pickup, courier, date, and time will be recorded on the COC. It is then the laboratory's responsibility to maintain logbooks and custody records throughout sample preparation and analysis.

2.5.2 Sample Packing and Shipping

Samples for off-site laboratory analysis will be shipped via Federal Express or by courier for overnight delivery in waterproof coolers using the procedures outlined below. The samples taken for this project shall be considered low-level or environmental samples for packaging and shipping purposes. The sample packing procedures are as follows:

- Fill out the pertinent information on the sample label, and ensure agreement with the COC.
- Place about 3 inches of cushioning material, such as vermiculite or bubblepack, in the bottom of the cooler.
- Wrap the sample containers in bubblepack. Place containers in the cooler in such a way that they will not touch during shipment.
- Put in additional packing material to partially cover sample containers (more than halfway).
- Place ice, sealed in plastic bags, around and on top of the containers. The temperature of the samples must be maintained at or below 4°C during shipment to the laboratory.
- Fill cooler with cushioning material.

If the cooler will be picked up by a laboratory courier, the cooler may be closed and transferred to the courier. The courier will sign the COC as a record of receipt, returning one signed copy to the sampler. If samples are to be shipped via Federal Express or other delivery service, the following steps will be taken:

- Put COC record in a waterproof plastic bag and tape it to the inside lid of the cooler.
- Tape the drain shut.
- Affix two signed and dated custody seals on opposite corners of the cooler so that the cooler cannot be opened without breaking the seals.
- Secure the lid by wrapping the cooler completely with nylon strapping tape or duct tape at a minimum of two locations.
- Attach completed shipping label to top of the cooler.

From the time of sample collection, samples for off-site analysis will be stored on ice.

2.6 Sample Containers, Preservatives, and Holding Times

Table A-1 summarizes the sample containers, preservation and holding times required for this sampling program:

Table A-1
Sample Containers, Preservatives, and Holding Times

Analysis	Container		Preservative		Holding Time
	Aqueous	Soil	Aqueous	Soil	
VOC	3 x 40 ml VOC vial	3 x 40 ml VOC vial ¹	HCl pH <2, Cool 4°C	2 w/MeOH and 1 w/NaHSO ₄	14 days
SVOC / P/PCB	4 x 1L amber	8 oz (or larger) glass	Cool 4°C	Cool 4°C	7 days to extraction, 40 days to analysis
Metals ⁴	1 L HDPE	8 oz (or larger) glass	HNO ₃ pH <2	None	Hg - 28 days, others 6 months
TCLP Pb	1 L HDPE	8 oz glass	HNO ₃ pH <2	None	28 days
Explosives	2 x 1L Amber	8 oz glass	Cool 4°C	Cool 4°C	7 days
TOC	—	2 oz glass amber	—	Cool 4°C	28 days

¹ Preservatives for aqueous QC samples (trip and equipment blanks) will be the same as for aqueous samples.

² Holding times are from time of sample collection.

³ If soil VOCs only are to be collected a separate 2 oz. jar will be submitted to the lab for percent moisture.

⁴ Same for samples collected for Lead (Pb) and Mercury (Hg) only.

HDPE = high density polyethylene

L = liter

HCl = Hydrochloric acid (1:1)

HNO₃ = Nitric acid

3.0 ANALYTICAL METHODS

3.1 On-Site Soil Screening

3.1.1 Volatiles Screening (OVM)

Headspace readings will be measured by immediately collecting and sealing a sample into a clean, contaminant-free jar. Samples will be agitated for at least 15 seconds, and allowed to equilibrate at or near 20°C. The jar lid will then be removed, and the vapor sampling probe will be immediately inserted. The headspace reading will be taken, and the maximum meter response recorded.

3.1.2 Lead and Mercury Screening (XRF)

Samples for XRF analysis are dried, sieved, and transferred to the XRF cup. The cup is covered with mylar film and a direct reading (in ppm) is generated. A Spectrace 9000 XRF or equivalent will be used to screen samples for lead and mercury. The reporting limits for lead and mercury by field XRF will be higher than the off-site laboratories listed in Table A-3.

3.2 Laboratory Analytical Methods

The off-site methods presented in Table A-2 will be used to analyze the samples from the Fireworks Site.

Analyte lists and reporting limits for the off-site analytical methods are provided in Tables A-3 and A-4.

Table A-2
Off-Site Analytical Methods

Analysis	EPA Reference Method	Analyte Lists and Reporting limits
Lead	6010	Table A-3
Mercury	7471/7470	Table A-3
TAL metals	6010/7000 series	Table A-3
TCLP Lead	1311/6010	Table A-3
Volatile Organics	8260B	Table A-5
Explosives	8330	Table A-4
Semivolatiles	8270C	Table A-6
Pesticides/PCBs	8081A/8082	Table A-7
TOC	9060	—

3.2 Laboratory Reporting Requirements

Laboratory reports submitted to Foster Wheeler will include, but not be limited to, the following:

- The name, address, and phone number of the analytical laboratory.
- Signature of an authorized laboratory individual, indicating the acceptability of the data.
- A copy of signed COC records, indicating the condition of samples at the time of receipt by the laboratory.
- Sample results reported in units of microgram or milligram per kilogram or liter.
- Sample results will include a summary of pertinent COC and tracking information (i.e., dates of preparation and analyses, analytical instrumentation, associated QC samples, etc.).
- Quality control results reported are to include spiking concentrations and acceptable limits. QC results that exceeded criteria and corrective actions should be discussed by the laboratory.

Copies of chromatograms, quantitation reports, other instrument output data, and relevant logbooks, including instrument injection logs, standard preparation logs, and sample preparation logs, must remain on file at the laboratory and be made available for review by Foster Wheeler upon request.

3.3 Quality Control Review

Following receipt of data from the laboratory, the Foster Wheeler Project Chemist will review the data and associated quality control results prior to being used in support of the hydrogeologic investigation. The data will be evaluated with respect to project objectives. Should the use of data be found limited due to QC exceedances, its use in future site characterization will be monitored accordingly. Similarly, should data be lost due to sample volume restrictions or breakage or found otherwise unacceptable due to severe QC exceedances, additional sampling and/or analysis may be recommended.

Table A-3
TAL Metals Target Analyte List and Reporting Limits

Analyte	Aqueous/Soil Reporting Limit (µg/L)/(mg/kg)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5,000
Chromium	10
Cobalt	50
Copper	25
Cyanide	10
Iron	100
Lead	3
Magnesium	5,000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5,000
Selenium	5
Silver	10
Sodium	5,000
Thallium	10
Vanadium	50
Zinc	20

¹ Reporting limits for soils may be elevated due to the actual mass digested and moisture content.

Table A-4
Explosives (EPA Method 8330) Compound List and Reporting Limits

Compound	Quantitation Limit in Extract (µg/L)	Reporting Limits	
		Water (µg/L)	Soil (µg/kg)
HMX	12.5	0.25	120
RDX	12.5	0.25	120
1,3,5-Trinitrobenzene	12.5	0.25	120
1,3-Dinitrobenzene	12.5	0.25	120
Tetryl	12.5	0.25	120
Nitrobenzene	12.5	0.25	120
2,4,6-Trinitrotoluene	12.5	0.25	120
4-amino-2,6-Dinitrotoluene	12.5	0.25	120
2-amino-4,6-Dinitrotoluene	12.5	0.25	120
2,6-Dinitrotoluene	12.5	0.25	120
2,4-Dinitrotoluene	12.5	0.25	120
2-Nitrotoluene	12.5	0.25	120
3-Nitrotoluene	12.5	0.25	120
4-Nitrotoluene	12.5	0.25	120

¹ Reporting limits may be elevated due to moisture content.

Table A-5
TCL Volatile Organic Compounds Analyte List and Reporting Limits - EPA Method 8260B

Compound	Water or Soil (µg/L or µg/kg) ¹
Freon-TF	1.0
Dichlorodifluoromethane	1.0
Trichlorofluoromethane	1.0
Vinyl chloride	1.0
Chloromethane	1.0
Bromomethane	1.0
Chloroethane	1.0
2-Butanone	1.0
2-Hexanone	1.0
4-Methyl-2-pentanone	1.0
Acetone	1.0
1,1-Dichloroethane	1.0
Methylene chloride	1.0
Trans 1,2-dichloroethene ²	1.0
Carbon disulfide	1.0
1,1-Dichloroethene	1.0
Chloroform	1.0
1,1,1-Trichloroethane	1.0
Carbon tetrachloride	1.0
1,2-Dichloroethane	1.0
Benzene	1.0
Trichloroethene	1.0
1,2-Dichloropropane	1.0
Bromodichloromethane	1.0
Trans-1,3-dichloropropene	1.0
Toluene	1.0
Cis-1,3-dichloropropene	1.0
1,1,2-Trichloroethane	1.0
Tetrachloroethene	1.0
Dibromochloromethane	1.0
Chlorobenzene	1.0
Ethyl benzene	1.0
Xylenes (total)	1.0
Styrene	1.0
Bromoform	1.0
1,1,2,2,-Tetrachloroethane	1.0

¹ Reporting limits for soil may be elevated due to moisture content.

² May be reported as Total

Table A-6
TCL Semivolatile Organic Compounds Target Compound List and Reporting Limits - EPA Methods 8270

Compound	Aqueous Reporting Limit (µg/L, ppb)	Low Soil Reporting Limit ¹ (µg/Kg, ppb)	Compound	Aqueous Reporting Limit (µg/L, ppb)	Low Soil Reporting Limit ¹ (µg/Kg, ppb)
Phenol	10	330	Acenaphthene ²	10	330
bis(2-Chloroethyl)ether	10	330	2,4-Dinitrophenol	50	830
2-Chlorophenol	10	330	4-Nitrophenol	50	830
1,3-Dichlorobenzene	10	330	Dibenzofuran	10	330
1,4-Dichlorobenzene	10	330	2,4-Dinitrotoluene	10	330
1,2-Dichlorobenzene	10	330	Diethylphthalate	10	330
2-Methylphenol	10	330	4-Chlorophenol-phenylether	10	330
2,2-oxybis(1-Chloropropane)	10	330	Fluorene ²	10	330
4-Methylphenol	10	330	4-Nitroaniline	50	830
N-Nitroso-di-n-dipropylamine	10	330	4,6-Dinitro-2-methylphenol	50	830
Hexachloroethane	10	330	N-nitrosodiphenylamine	10	330
Nitrobenzene	10	330	4-Bromophenol-phenylether	10	330
Isophorone	10	330	Hexachlorobenzene	10	330
2-Nitrophenol	10	330	Pentachlorophenol	50	830
2,4-Dimethylphenol	10	330	Phenanthrene ²	10	330
bis(2-Chloroethoxy)methane	10	330	Anthracene ²	10	330
2,4-Dichlorophenol	10	330	Carbazole	10	330
1,2,4-Trichlorobenzene	10	330	Di-n-butylphthalate	10	330
Naphthalene ²	10	330	Fluoranthene ²	10	330
4-Chloroaniline	10	330	Pyrene ²	10	330
Hexachlorobutadiene	10	330	Butylbenzylphthalate	10	330
4-Chloro-3-methylphenol	10	330	3,3'-Dichlorobenzidine	10	330
2-Methylnaphthalene ²	10	330	Benzo(a)anthracene ²	10	330
Hexachlorocyclopentadiene	10	330	Chrysene ²	10	330
2,4,6-Trichlorophenol	10	330	bis(2-Ethylhexyl)phthalate	10	330
2,4,5-Trichlorophenol	50	830	Di-n-octylphthalate	10	330
2-Chloronaphthalene ²	10	330	Benzo(b)fluoranthene ²	10	330
2-Nitroaniline	50	830	Benzo(k)fluoranthene ²	10	330
Dimethylphthalate	10	330	Benzo(a)pyrene ²	10	330
Acenaphthylene ²	10	330	Indeno(1,2,3-cd)pyrene ²	10	330
2,6-Dinitrotoluene	10	330	Dibenzo(a,h)anthracene ²	10	330
3-Nitroaniline	50	830	Benzo(g,h,i)perylene ²	10	330

Notes: ¹ The sample-specific Reporting Levels for soil samples will be adjusted for percent moisture and will be higher than those listed above. Medium level soil reporting limits are 1,000 times the aqueous limit, reported in µg/kg.

² PAHs

Table A-7
TCL Pesticide/PCB Analyte List and Reporting Limits - EPA Method 8081/8082

Compound	Reporting Limit	
	Water (µg/L)	Soil (µg/kg) ¹
alpha-BHC	0.05	1.7
beta-BHC	0.05	1.7
delta-BHC	0.05	1.7
gamma-BHC (Lindane)	0.05	1.7
Heptachlor	0.05	1.7
Aldrin	0.05	1.7
Heptachlor Epoxide	0.05	1.7
Endosulfan I	0.05	1.7
Dieldrin	0.10	3.3
4,4'-DDE	0.10	3.3
Endrin	0.10	3.3
Endosulfan II	0.10	3.3
4,4'-DDD	0.10	3.3
Endosulfan Sulfate	0.10	3.3
4,4'-DDT	0.10	3.3
Methoxychlor	0.50	17.0
Endrin Ketone	0.10	3.3
Endrin Aldehyde	0.10	3.3
alpha-Chlordane	0.05	1.7
gamma-Chlordane	0.05	1.7
Toxaphene	5.0	170.0
Aroclor 1016	1.0	33.3
Aroclor 1221	2.0	67.0
Aroclor 1232	1.0	33.0
Aroclor 1242	1.0	33.0
Aroclor 1248	1.0	33.0
Aroclor 1254	1.0	33.0
Aroclor 1260	1.0	33.0

¹ Reporting limits for soil may be elevated due to moisture content.

APPENDIX B

Site-Specific Environmental Health and Safety Plan



FOSTER WHEELER ENVIRONMENTAL CORPORATION

SITE-SPECIFIC ENVIRONMENTAL HEALTH AND SAFETY PLAN

SITE NAME:	<u>Fireworks Site</u>		
LOCATION:	Street No.:	<u>King Street</u>	
	City:	<u>Hanover</u>	
	State:	<u>Massachusetts</u>	
DATE PREPARED:	<u>May 30, 1997</u>		
REVISION / DATE:	<u>Rev. 2, December 20, 1999 / Rev. 3, April 14, 2000</u>		
PROJECT NUMBER:	<u>1780.0006.0000.00002</u>		
PROJECT DESCRIPTION:	The Fireworks site is a 250 acre OEW (ordnance and explosive waste) site with lead, mercury and VOC contamination and possibly small amounts of radioactive waste. The site was as a manufacturing facility for fireworks and later for munitions for the US Government and allegedly used for hazardous waste disposal. The factory was in operation from the early 1900s to 1972 and closed in 1972. The Phase I investigation evaluated the presence of wastes in five areas that may be contributing contamination to the Drinkwater River and Torrey Brook waters, sediment and biota. The Phase IIA investigation focused on the presence of lead, mercury, metals, and VOCs, in groundwater. The Phase IIB investigation will focus on the contaminants of concern in soil and groundwater.		
WASTE TYPE:	<u>mercury, lead, OEW, volatile organics, metals and possibly small amounts of radioactive waste</u>		
WASTE CHARACTERISTICS:	<u></u>		
UNUSUAL SITE FEATURES:	<u>Wooded site with surface water bodies.</u>		
STATUS (Active, Inactive, or Unknown):	<u>Primarily inactive, some business activity at the northern portion of the site.</u>		
LOCATION CLASS:	☒ Industrial	☒ Commercial	☐ Urban/Residential
	☒ Rural	☐ Other (specify):	<u></u>
OVERALL HAZARD:	☐ Serious	☐ Moderate	☒ Low ☐ Unknown
BACKGROUND REVIEW:	☒ Complete	☐ Preliminary	

DOCUMENTS USED AS REFERENCES FOR THIS PLAN:

- 1) Request for Proposal - Goodwin, Proctor & Hoar
- 2) Draft Site Inspection Report - NUS Corporation 12/8/86
- 3) Proposal for Work - Foster Wheeler Environmental Corporation
- 4) Draft Scope of Work for Phase I Investigation and Tier Classification
(Rev. 0) Fireworks Site, Hanover, MA RTN #4-0090, July 1997
- 5) Phase I Initial Site Investigation Report and Tier Classification,
Foster Wheeler Environmental Corporation, October 1997
- 6) Phase IIA Groundwater Data Report – Foster Wheeler Environmental
Corporation

PROJECT ORGANIZATION:

Project Manager:	Boyd Allen
Field Operations Lead:	Ken Carpenter
Project Health and Safety Manager:	Peter Vernon
Site Safety and Health Officer:	Brian Noonan & Ken Carpenter
Other (specify title/position):	LSP - Bob Donati
	Site Investigative Lead - Jay Ehret
	UXO Technical Consultant - David Keller

FOSTER WHEELER ENVIRONMENTAL CORPORATION, FOSTER WHEELER SUBCONTRACTORS, AND FOSTER WHEELER'S CLIENT DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION BY TRAINED HEALTH AND SAFETY SPECIALISTS. PROJECT TASKS, POTENTIAL HAZARDS, AND CONTROL MEASURES:

TASKS	POTENTIAL SAFETY, HEALTH, AND ENVIRONMENTAL HAZARDS	CONTROL MEASURES
Surface soil sampling	personal exposure, contact with UXO and OEW	Surface clearing by an UXO specialist, PPE
On-site chemical screening	- personal exposure to potential contaminants - exposure to reagents used in field screening samples	PPE and appropriate ventilation
Soil boring and monitoring well installation	- personal exposure - contact with UXO and OEW - contact with below ground utilities	Surface clearing by an UXO specialist, monitoring with a magnetometer and an OVM, PPE, contact Digsafe
Well point installation (off-site)	- personal exposure - contact with below ground utilities	Screening with OVM, PPE, contact Digsafe

PHYSICAL SAFETY HAZARDS TO PERSONNEL:

- ☐ Hot Work ☐ Line Breaking ☐ Boating ☒ Drill Rigs ☐ Excavation
☒ Heat ☐ Cold ☒ Precipitation ☐ Confined Space ☒ Terrain
☒ Walking/Working Surfaces ☒ Fire and Explosion ☐ Oxygen Deficiency
☒ Underground Utilities ☐ Overhead Utilities ☒ Heavy Equipment
☐ Unknowns in Drums, Tanks, Containers ☒ Ponds, Lagoons, Impoundments
☒ Rivers, Streams ☐ Pressurized Containers, Systems ☒ Noise
☐ Illumination ☐ Nonionizing ☒ Ionizing Radiation (potential, not confirmed)

BIOLOGICAL HAZARDS TO PERSONNEL:

- ☐ Infectious/Medical/Hospital Waste ☒ Non-domesticated Animals
☒ Insects ☒ Poisonous Plants/Vegetation ☐ Raw Sewage

TRAINING REQUIREMENTS:

- ☒ 40-Hour General Site Worker Course with three days supervised experience
☐ 24-Hour Course for limited, specific tasks with one day supervised experience
☐ 24-Hour Course for Level D Site with one day supervised experience
☒ 8-Hour Annual Refresher Health and Safety Training
☐ 8-Hour Management/Supervisor Training in addition to basic training course
☒ Site-Specific Health and Safety Training
☐ Pre-entry training for emergency response skilled support personnel
☐ 4-Hour DOT Training
☒ 4-Hour Waste Management Training - required for any personnel handling or labeling drums.
☐ Other (specify): _____

MEDICAL SURVEILLANCE REQUIREMENTS:

- ☒ Baseline initial physical examination with physician certification
☒ Annual medical examination with physician certification
☐ Site-specific medical monitoring protocol (Radiation, Pesticide, PCB, Metals)
☐ Asbestos Worker medical protocol
☐ Exempt from medical surveillance (specify): _____
☒ Examination required in event of chemical exposure or trauma

PERSONAL PROTECTIVE EQUIPMENT:

TASK	TYPE OF CHEMICAL PROTECTIVE COVERALL	UNDER GARMENT	INNER GLOVE	OUTER GLOVE	FOOT PROTECTION	RESPIRATORY PROTECTION TYPE	APR CARTRIDGE	ADDITIONAL INFORMATION
1	Surface Soil Sampling (hand auger and grab)	work clothes	surgical	nitrile	steel toed boots with rubber over boots	D	NA	potential upgrade based on air monitoring
2	Soil borings & monitoring and well point installation	work clothes	surgical	nitrile	steel toed boots with rubber over boots	D	NA	potential upgrade based on air monitoring
3	On-site chemical screening	work clothes		nitrile surgical	steel toed boots	D	NA	potential upgrade based on air monitoring
4	Groundwater and surface water sampling	work clothes	surgical	nitrile	steel toed boots with rubber over boots	D	NA	potential upgrade based on air monitoring
5								
6								
7								

Note: UXO Specialist is exempt from steel toed boot requirement to avoid interference with metal detection instrument.

AIR MONITORING:

TASK		INSTRUMENT	FREQUENCY	ACTION LEVEL	ACTION
1	Surface soil sampling	☐ CGI/O ₂	Before and during sample collection	>1 unit sustained in breathing zone	Stop work, notify PHSM, investigate source
		☒ PID			
		☒ Mercury Vapor Analyzer	During sampling	0.03 mg/m ³	Upgrade to Level B
		☒ Detector tube(s)	During sampling	>.05	Stop work, notify PHSM, investigate source
		☐ Type: Mercury	Each location		
		☒ Radiation meter	During sampling each location		
2	Soil borings and monitoring well installation	☒ CGI/O ₂	Continuous	> 10% LEL	Stop work, withdraw, investigate cause
		☒ PID	Every 2 feet	> 1 unit sustained in breathing zone	Stop work, notify PHSM, investigate source
		☐ FID			
		☐ Aerosol monitor			
		☐ Detector tube(s)			
		Type: _____			
3	On-site chemical screening	☒ Radiation meter Phase I only	Every 2 feet	> 3X bkgrd & < 1mr/hr > 1 mr/hr	Notify PHSM, proceed with caution, leave area, call PHSM
		☐ CGI/O ₂	None Required		
		☐ PID			
		Probe: _____ eV			
		☐ FID			
		☐ Aerosol monitor			
		☐ Detector tube(s)			
		Type: _____			
		☐ Radiation meter			

CALIBRATION: ALL INSTRUMENTS WILL BE CALIBRATED ACCORDING TO MANUFACTURERS' INSTRUCTIONS BEFORE AND AFTER USE (DAILY). THE RESULTS WILL BE DOCUMENTED IN THE SSHO LOGBOOK OR CALIBRATION SHEETS.

DECONTAMINATION:

☐ Dry Decon: _____
☒ Wet Decon: _____

DESCRIPTION OF SITE-SPECIFIC DECONTAMINATION PLAN:

Boot wash/rinse, wash /rinse outer gloves, remove tyvek, remove inner gloves

ADEQUACY OF DECONTAMINATION DETERMINED BY:

Visual observation

SITE WORK ZONES:

See Attachment 1.

HAZARDOUS WASTE SITE AND ENVIRONMENTAL SAMPLING ACTIVITIES:

Off-site: ☐ Yes ☒ No
On-site: ☒ Yes ☐ No

Description of types of sampling and methods used to obtain samples:

Surface soil samples will be collected by field personnel using a hand auger. Deeper subsurface soil samples will be collected by a drilling subcontractor using a drill rig with hollow stem augers and split spoons. Wells and well points installed by driller; groundwater samples collected with low-flow or bailer techniques.

WASTE MANAGEMENT PLAN:

WASTE TYPE	CONTAINER TYPE	WASTE CLASSIFICATION	STORAGE AREA REQUIREMENTS	EPA/DOE/TSCA LABEL REQUIREMENTS	DISPOSITION	ADDITIONAL INFORMATION
(e.g., Soil, Groundwater, PPE, Decon Fluids, C&D Debris, ACM, Used Oil, Spent Carbon)	(e.g., 55-gal. Open Head Steel Drum, 30-gal. Open Head Poly Drum)	(e.g., RCRA Hazardous, Non-hazardous, TSCA-regulated [PCBs])	(e.g., TSCA-PCB, <90-day RCRA Hazardous, Satellite Accumulation)	(e.g., Hazardous Waste, DOT Flammable, PCBs, Asbestos)	(Off-Site/ On-Site)	
Soil	55 gallon open head steel drum					Disposal by client
Decon Fluid	55 gallon closed head steel drum					Disposal by client
PPE	polyethylene bag				off-site (non-hazardous)	
Purge Water	Discharge to ground in immediate vicinity					

CHEMICAL DATA:

See Attachment 6 : MSDSs

COMMUNICATION:

List communication method/system to be used for each task and work zone.

TASK	WORK ZONE	COMMUNICATION METHOD	SPECIAL INSTRUCTIONS
Soil/Ground Wtr. Sampling	Exclusion Zone	Verbal	None
Soil Boring	Exclusion Zone	Verbal	None
Chemical Analysis	Support Zone	Verbal	None

EMERGENCY INFORMATION:

Emergency Coordinator: Ken Carpenter
First Aid/CPR Trained Personnel: Ken Carpenter, Brian Noonan

Emergency Signals/Communication: Three blasts of air horn
Cellular telephone - support zone

Emergency Response Procedures: See Attachment 2

Emergency Equipment: Fire extinguisher, portable eye wash, air horn, first-aid kit

EMERGENCY CONTACT	LOCATION	PHONE NUMBER	NOTIFIED
Hospital: South Shore Hospital	South Shore Hospital 55 Fogg Road Weymouth, MA	781-337-7011	NA
Ambulance	Hanover Fire Department	911	NA
Police	Hanover Police Dept. 550 Hanover St. Hanover, MA	911 non-emergency 781-826-3231	NA
Fire Department	Hanover Fire Dept. 32 Center St. Hanover, MA	911 non-emergency 781-826-3151	NA

DIRECTIONS TO HOSPITAL:

- Leaving site, turn Right on King Street and go 0.2 mile.
- Bear Left onto Circuit Street and go 0.8 mile.
- Turn Left onto Route 139 (West) and follow for 3.3 miles.
- Turn Right onto Route 58 (North) and follow for 1.5 miles.
- Take a Right at the end of the road onto Route 18 (North) and go 1.5 miles.
- Take a Left at Lights (3rd set) onto Fogg Road - Entrance to Hospital on your immediate Right (Emergency Entrance).

Route verified by: _____ Date: _____

ADDITIONAL EMERGENCY PHONE CONTACTS:

CONTACT	PHONE NUMBER
Peter Vernon (Health and Safety Manager)	(617) 457-8218 H (508) 429-4500
Mike McSherry (Director, Health and Safety Programs)	(215) 702-4021 H (215) 538-0471
Lee Dixon (Environmental Compliance Specialist)	(617) 457-8258 H (781) 749-7279
Karen Raffa (Director, Environmental Programs)	(425) 688-3768
Chemtrec	(800) 424-9300
ATSDR	(404) 639-0615
ATF (explosives information)	(800) 424-9555
National Response Center	(800) 424-8802
National Poison Control Center	(800) 942-5969
Medical Consultant (Dr. Greaney)	(800) 455-6155
David Keller (Manager, UXO and OE Programs)	(360) 679-1530 M (360) 908-3257

NOTE: THE NATURE OF THE WORK ASSIGNMENT MAY REQUIRE THE USE OF THE FOLLOWING PROCEDURES/PROGRAMS WHICH MAY BE INCLUDED AS ATTACHMENTS TO THIS PLAN AS APPLICABLE:

CHECK IF APPLICABLE:

**HEALTH
AND SAFETY**

- ☒ Activity Hazard Analysis
- ☐ Boating
- ☐ Chemical Hygiene Plan
- ☐ Confined Space Entry
- ☐ Demolition Safety
- ☒ Drill Rig Safety
- ☒ Drum and Container Handling
- ☐ Excavation and Trenching
- ☐ Fall Protection
- ☒ Hazard Communication Program
- ☐ Lockout/Tagout
- ☒ Temperature Extremes
- ☒ UXO Operations
- ☐ Welding/Hot Work

OSHA STANDARD	FOSTER WHEELER PROGRAM	OTHER
	EHS 3-5	
	EHS 6-6	
1910.1450		
1910.146	EHS 6-1	
1926, Subpart T		
	EHS 6-2	
	EHS 6-7	
1926.651	EHS 6-3	
1926, Subpart M	EHS 3-8	
1910.1200	EHS 4-2	
1910.147	EHS 6-4	
1910.120	EHS 4-6	
	EHS 7-1 to 7-5	
1910.252	EHS 6-5	

**ENVIRONMENTAL
COMPLIANCE**

- ☐ Transportation of Hazardous Mat.
- ☐ Signing Waste Documentation
- ☐ Permit Exceedance Reporting
- ☒ Reporting Spills and Releases

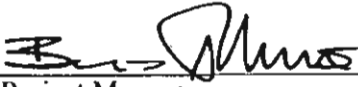
	RC-3	
	RC-4	
	RC-5	
	RC-6	

THE SIGNATURES BELOW INDICATE THAT THE INDIVIDUALS HAVE READ AND UNDERSTOOD THE SITE-SPECIFIC SAFETY AND HEALTH PLAN.

[illegible]

PLAN APPROVAL:

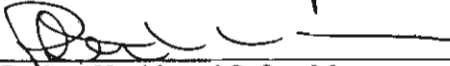
By their signature, the undersigned hereby certify that this plan has been reviewed and approved for use at the Fireworks site.


Project Manager

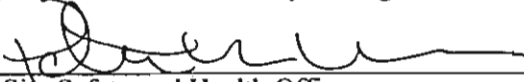
17 April 00
Date


Field Operations Leader *for Nunn*

17 April 00
Date


Project Health and Safety Manager

4/17/00
Date

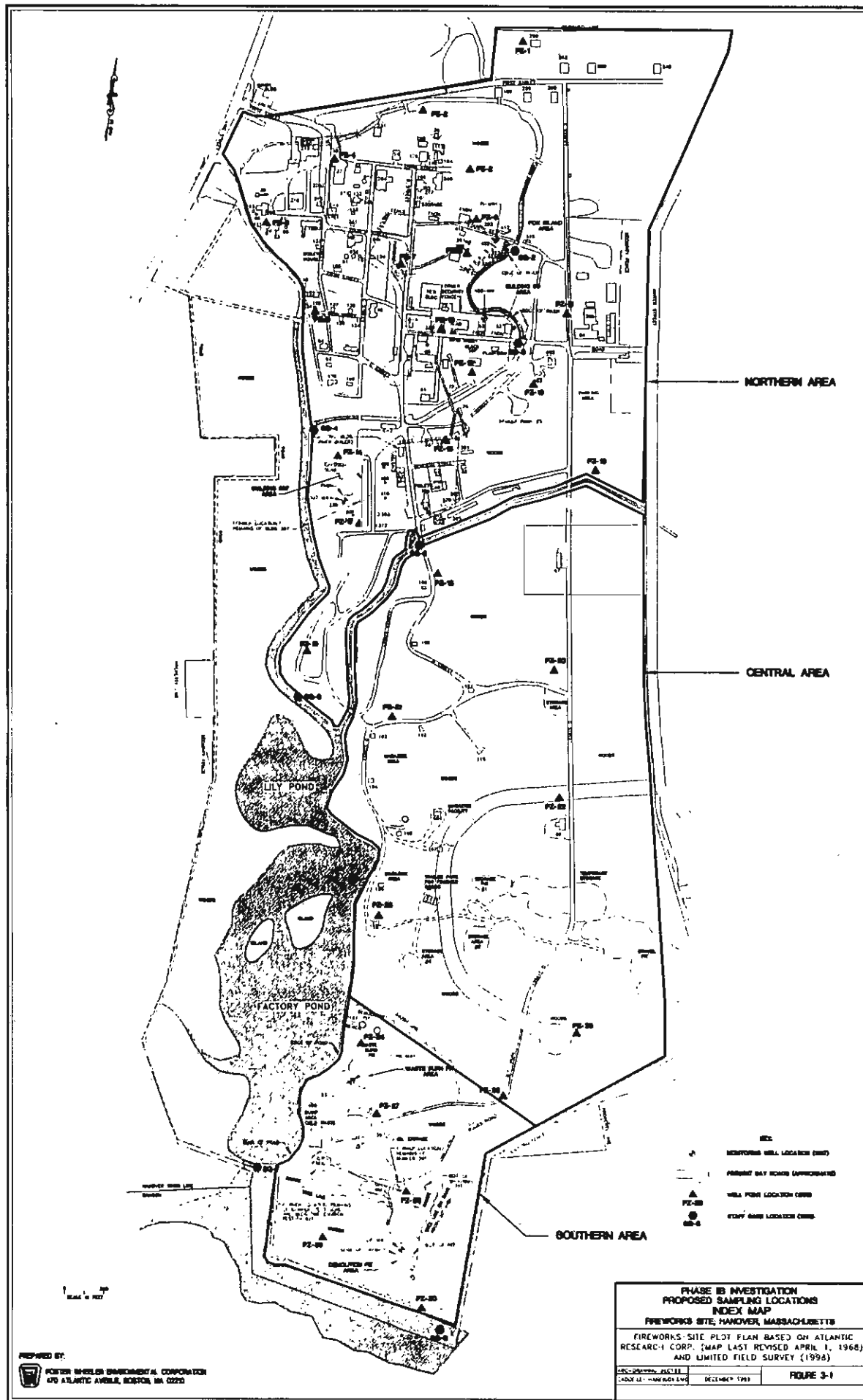

Site Safety and Health Officer

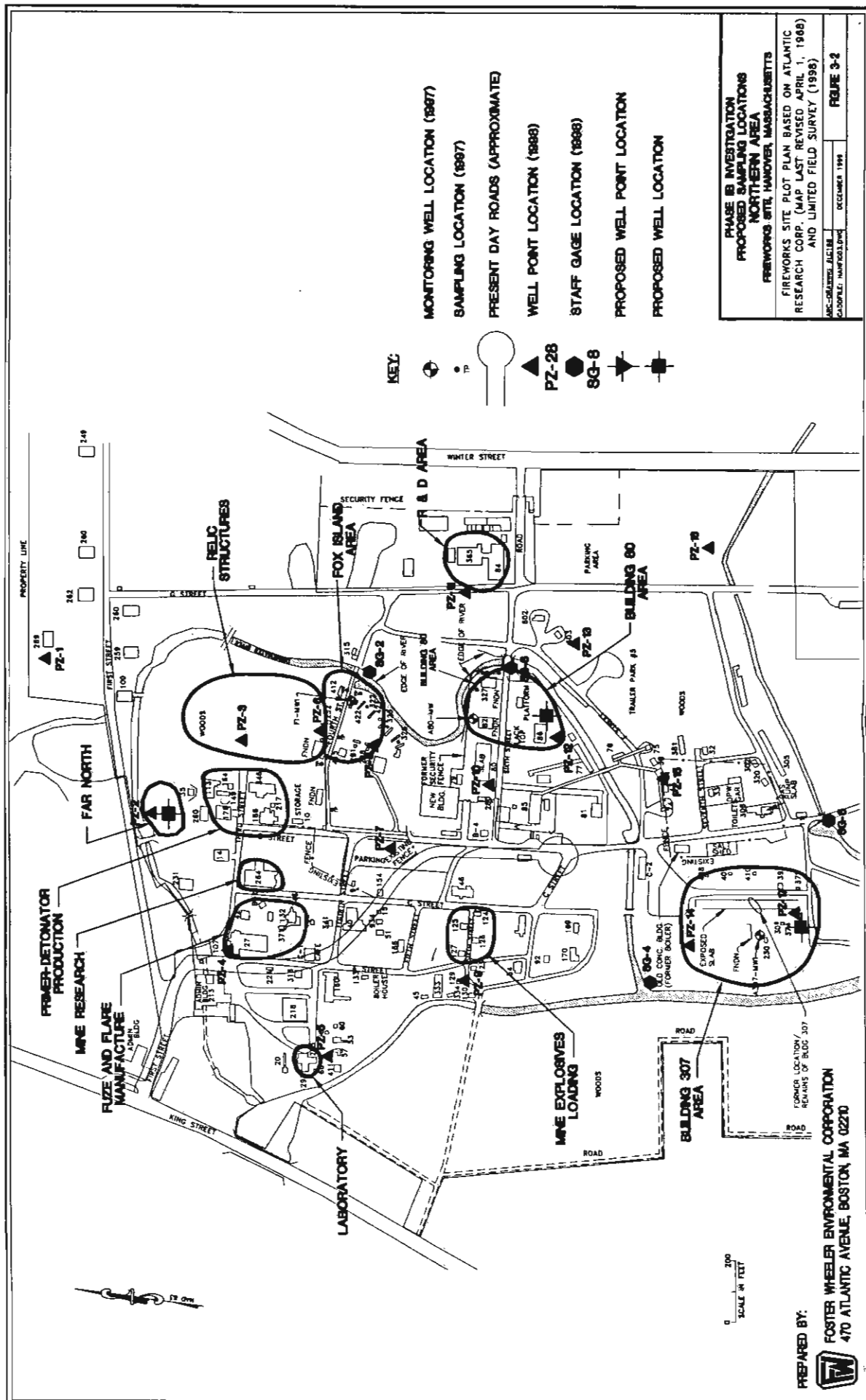
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Date

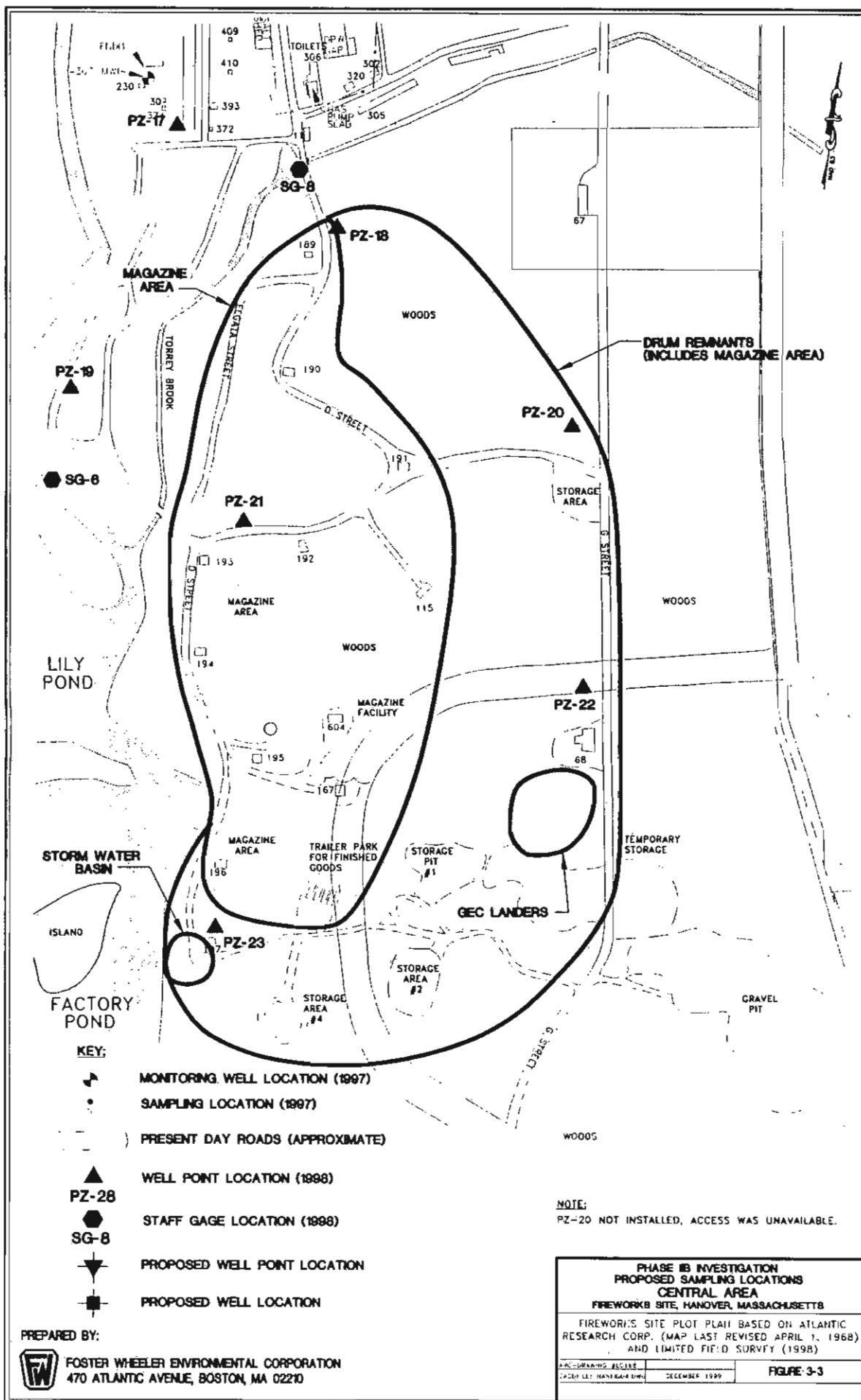
for Brian Noonan

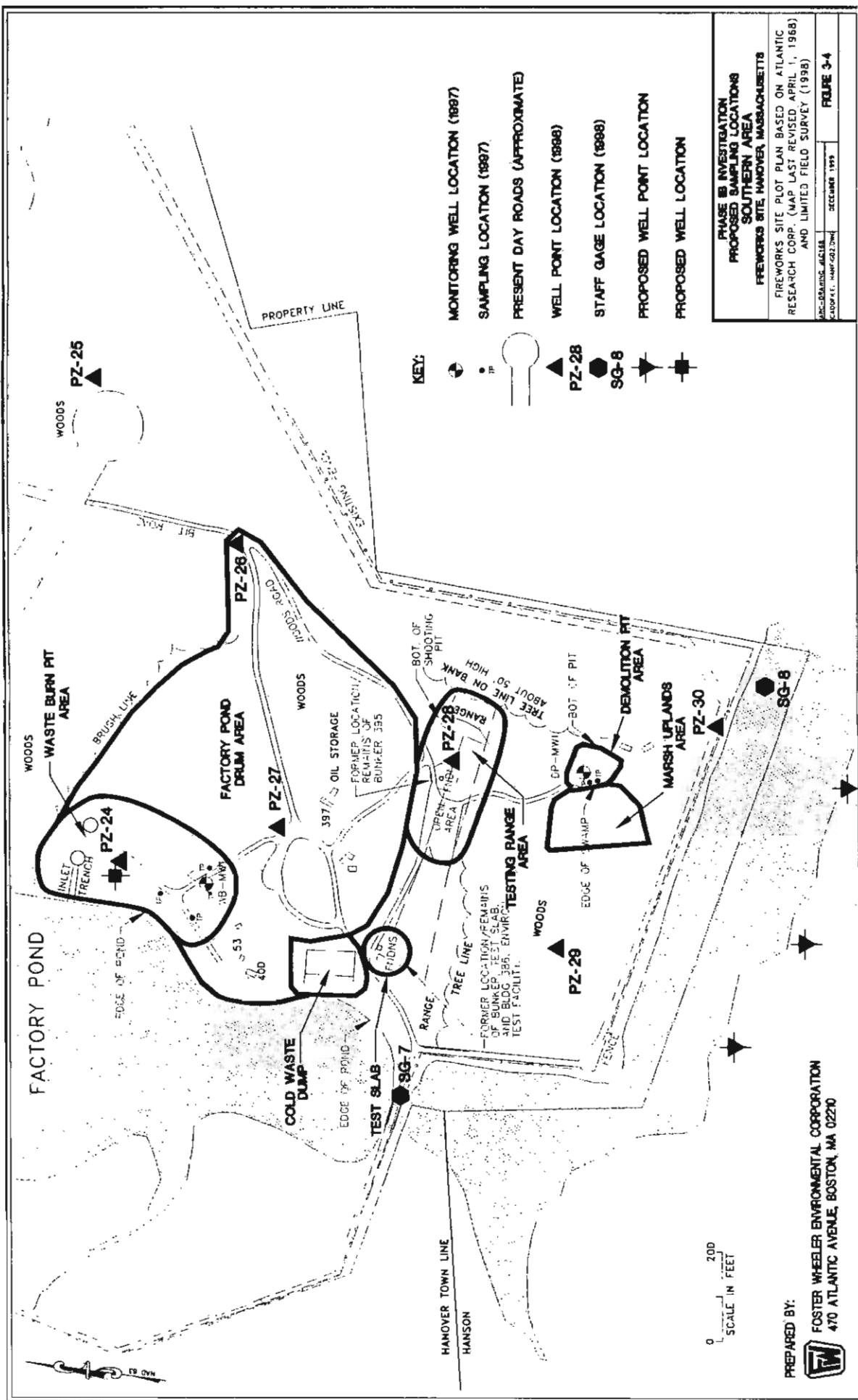
ATTACHMENT 1

SITE WORK ZONES









ATTACHMENT 2

EMERGENCY RESPONSE PROCEDURES

Foster Wheeler Environmental Regulatory Compliance Program Manual	REPORTING SPILLS AND RELEASES	RC 6 Revised: 08/18/95 Page 1 of 5
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1.0 PURPOSE

The purpose of this procedure is to implement Foster Wheeler Environmental Corporation's policy of strict compliance with all reporting requirements. This procedure describes the four categories of spills that Foster Wheeler Environmental employees must report, and identifies the specific reporting process to follow for each category.

Numerous federal, state, and local regulatory requirements govern spill/release reporting and response activities. Depending upon the circumstances, reporting may be necessary under federal (CWA, CERCLA, SARA Title III, RCRA, TSCA), state, and/or local spill reporting programs. Some programs specify minimum quantities, others do not. Some programs apply to virtually any spill, others are very specific.

Spill/release reporting can be complex. Outside contractor employees have been indicted and convicted of criminal violations of federal spill/release reporting requirements. This obligation may hold even though the spill was made by the client and not the contractor. In the absence of such requirements, money damages may still be imposed by a court for failure to disclose knowledge of spills that present a hazard to human health.

2.0 SCOPE

This procedure applies to all Foster Wheeler Environmental employees who learn of the existence of a spill or release during the course of a project. The procedure is to be implemented *immediately* once a Foster Wheeler Environmental employee learns of the existence of a spill or release, regardless of who may have caused the spill or when the spill may have occurred.

As noted in the Project Regulatory Compliance Procedure (RC 1), it is critical that spill reporting procedures be coordinated with the client prior to initiation of the project. If the procedures are modified and a mutually agreeable criteria to responding to spills are developed with the client, the Regulatory Compliance Manager must be advised of and must approve of these modified procedures.

3.0 DEFINITIONS

None.

4.0 RESPONSIBILITIES

Foster Wheeler Environmental Regulatory Compliance Program Manual	REPORTING SPILLS AND RELEASES	RC 6 Revised: 08/18/95 Page 2 of 5
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4.1 PROJECT PERSONNEL

The Project Manager shall present these procedures to the client prior to beginning the project. The Project Manager shall assign an On-Site Spill/Release Coordinator to each remediation and waste management project. The On-Site coordinator shall be identified in the project Regulatory Compliance Plan or Waste Management Plan, and shall be trained in these procedures by the assigned Regulatory Affairs Advisor.

4.2 REGULATORY COMPLIANCE PERSONNEL

The Regulatory Affairs Advisors must train the assigned On-Site Coordinators in these procedures and document that training. Any client questions or concerns regarding these procedures shall be referred to the Regulatory Affairs Advisor or the Regulatory Compliance Manager.

5.0 PROCEDURE

The On-Site Coordinator, in conjunction with the assigned Regulatory Affairs Advisor and the Regulatory Compliance Manager, must determine the following:

- *Who* caused the spill/release;
- *Whether* it is reportable;
- *Who* must report;
- *How* to report, if required.

The following steps must be followed to determine the answer to these questions and determine the appropriate reporting requirements.

STEP 1: DETERMINE WHO CAUSED THE SPILL - FOSTER WHEELER ENVIRONMENTAL OR CLIENT

Foster Wheeler Environmental Spill/Release

A spill/release is considered a "Foster Wheeler Environmental spill/release" if the following conditions are met:

- The spill/release is physically caused by, or is suspected to have been caused by, a Foster Wheeler Environmental or Foster Wheeler Environmental subcontractor employee.

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- The spill/release is from, or is suspected to have been from, a facility or equipment that meets one of the following criteria:
 - owned by Foster Wheeler Environmental or a Foster Wheeler Environmental subcontractor
 - operated by Foster Wheeler Environmental or a Foster Wheeler Environmental subcontractor
 - under Foster Wheeler Environmental's direct or indirect control as a construction manager, oversight contractor, or similar capacity.

Client Spill/Release

All other spills/releases are considered "client spills/releases" for purposes of this procedure.

STEP 2: DETERMINE IF THE SPILL OR RELEASE IS REPORTABLE

After responding to the spill as directed in the Foster Wheeler Environmental Health and Safety procedures, the On-Site Coordinator assigned to the project must contact the Regulatory Affairs Advisor to determine if the spill or release is subject to any federal, state, or local reporting requirements. The on-site coordinator must provide an estimate of quantity and concentration of the material spilled or released, and other details of the spill/release. The Regulatory Affairs Advisor will identify what agencies need to be notified and the type of notification (i.e., written or verbal) required.

STEP 3: DETERMINE IF THE SPILL OR RELEASE POSES A THREAT TO HUMAN HEALTH

If *no* reporting requirement is identified in Step 2, the Regulatory Affairs Advisor will contact the Regulatory Compliance Manager. The Regulatory Compliance Manager will determine if the spill or release poses a threat to human health. For purposes of this procedure a spill/release is considered to present a hazard to human health if the following criteria are met:

- The spill or release results, or may result, in downgradient groundwater contamination that has entered, or is about to enter, known drinking water sources (wells or surface water bodies)
- The spill or release has caused, or is about to cause, contamination of surface soils or other materials in areas accessible to the general public

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- The spill or release has caused, or is about to cause, odors/air contamination detectable in areas accessible to the general public.

STEP 4: REPORT THE SPILL OR RELEASE

Spills or releases that are either "reportable" (Step 2) or determined to pose a "hazard" (Step 3) must be reported as specified in Table 1 below. Spills or releases which are *not* "reportable" (Step 2) or determined *not* to pose a "hazard" (Step 3) need *not* be reported to an agency, but response information should be provided to the client and retained in the project file. These determinations and how the release was reported, if applicable, must be documented in the project file.

TABLE 1 - CATEGORIES AND ACTIONS FOR REPORTING SPILLS OR RELEASES		
PARTY WHO CAUSED SPILL	REPORTABLE TO AGENCY	NOT REPORTABLE BUT THREAT TO HUMAN HEALTH
<i>Foster Wheeler Environmental</i>	■ Immediately report to the client and regulatory agencies. ■ Regulatory Affairs Advisor must provide Regulatory Compliance Manager with verbal and written notification of the spill.	■ The Project Manager and Regulatory Compliance Manager will report to client. ■ Regulatory Compliance Manager and client will determine whether to report to agencies.
<i>Client</i>	<i>Real-Time Spill Release.</i> If Foster Wheeler Environmental personnel observe the occurrence of the spill or release or learn of it <i>immediately</i> after it happens: ■ Project Manager shall <i>immediately</i> contact the client to give the client a "right of first refusal" to report the spill/release, and notify the Regulatory Compliance Manager. ■ If the client cannot be reached or declines to report, Project Manager shall report to the regulatory agencies as specified in Step 2 above. <i>Historic Spill or Release.</i> If Foster Wheeler Environmental personnel observe or learn of evidence that a spill or release has occurred in the past: ■ Regulatory Affairs Advisor will immediately notify the Regulatory Compliance Manager. ■ The Regulatory Compliance Manager along with Project Manager will notify the client and evaluate whether the spill or release has been reported or whether to report to regulatory agencies.	■ The Project Manager and Regulatory Compliance Manager will report to client. ■ Regulatory Compliance Manager and client will determine whether to report to agencies.

6.0 TRAINING

All project personnel must be trained in this and other Regulatory Compliance Procedures and Policies. The assigned project Spill/Release Coordinator may contact the Regulatory Affairs Advisor if additional training is required in order to implement this procedure.

7.0 REFERENCES

None.

---End of Section---

ATTACHMENT 3

ACTIVITY HAZARD ANALYSES

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ACTIVITY HAZARD ANALYSIS

Project Identification:	Location:	Estimated Start Date:
Fireworks Site	Hanover , MA.	May 2000
Phase of Work	Analysis Performed by:	Analysis Approved by:
Phase IIA/B	Ken Carpenter	Peter Vernon, CSP
TASK	POTENTIAL HAZARDS	CONTROL MEASURES
Soil Sampling	Exposure to Chemical Hazards	• Practice contamination avoidance. • Follow proper personal and sample decontamination procedures. • Wash hands/face immediately after decontamination. • Wear chemical safety goggles when handling chemical sample preservatives and samples. • Wear nitrile gloves when collecting or handling samples. • Disposable booties will be worn when walking in areas of potential contamination. • Contaminated sampling materials, decontamination solutions, and PPE will be properly disposed. • Material Safety Data Sheets (MSDSs) for decon solutions and field test kit chemicals will be reviewed and attached to the HASP. Chemical Data Sheets for site contaminants will be reviewed and attached to the HASP.
	Manual Lifting and Material Handling	• Use proper lifting techniques. • Team lifting will be used for heavy loads.
	Sampling Tools	• Daily inspections will be performed. • Remove broken or damaged tools from service. • Use in accordance with manufacturers instructions. • Use the tool for its intended purpose.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ACTIVITY HAZARD ANALYSIS

Project Identification:	Location:	Estimated Start Date:
Fireworks Site	Hanover , MA.	May 2000
Phase of Work	Analysis Performed by:	Analysis Approved by:
Phase IIA/B	Ken Carpenter	Peter Vernon, CSP
TASK	POTENTIAL HAZARDS	CONTROL MEASURES
Soil Sampling	Dropped objects Slip/Trip/Falls Eye Injury Underground Hazards Vehicular Traffic Emergency Procedures	• Steel toe boots meeting ANSI Z41 will be worn (exception for UXO Specialist to avoid interference with metal detecting equipment). • Hardhats will be worn if overhead hazards exist. • Work areas and means of access shall be maintained neat and orderly. • Even terrain will be utilized as unloading areas. • Safety glasses meeting ANSI Z87 will be worn. • Before advancing tools or probes into soil to depths greater than 1.5 feet, any underground utilities must be identified through plans or Digsafe™. • Screening by UXO Specialist. • In areas where vehicular traffic is present, high visibility vests will be worn. • Emergency telephone numbers will be verified. • Directions to Hospital will be verified. • Eastern Edison's emergency procedures and notification systems will be reviewed by Foster Wheeler personnel prior to commencing work.

HAZARD ANALYSIS

Activity: Drilling and Sampling Operations Analyzed By/Date: Ken Carpenter 5/30/97 Reviewed By/Date: Peter Vernon, CSP 5/30/97

Principle Steps	Potential Hazards	Recommended Controls
Mobilization of Equipment and Supplies	Slip/Trip/Falls	• Work areas and means of access shall be maintained safe and orderly. • Even terrain will be utilized as unloading areas. • Tripping and poor footing hazards will be repaired as they are discovered or clearly identified.
	Vehicular Traffic	• Spotters will be used when backing up trucks and moving equipment. • Traffic vests will be worn when working near roadways. • Drill rig and support vehicles will be equipped with backup alarms.
	Heat Stress	• Work/rest regimes will be instituted once temperatures rise above adjusted 70 degrees F. • Air temperature and humidity will be monitored. • Medical monitoring will be conducted once temperatures rise above adjusted 70 degrees F.
	Back Injuries	• Site personnel will be instructed on proper lifting techniques. • Mechanical devices will be utilized to reduce manual handling of materials. • Team lifting will be used in lieu of mechanical devices.
	Dropped Objects	• Steel toe boots meeting ANSI Standard Z41 will be worn. (See previous exception for UXO Specialist.)
	Overhead Hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1.
	Eye Injury Struck By/Against	• Safety glasses that meet ANSI Standard Z87 will be worn. • Personnel will understand and review hand signals. • All machines will be equipped with backup alarms.
Drill Rig Fueling	Fire	• All fuel tank/trucks shall be grounded during fueling operations. • Smoking and open flames are not permitted within 50 feet of fueling/greasing areas. • All equipment shall be equipped with 10-lb. ABC type fire extinguishers. • 10-lb. ABC type fire extinguishers shall be readily available during fuel/greasing operations.
	Chemical Exposure	• Protective clothing (i.e., chemical gloves and safety glasses) will be worn during fueling operations. • Skin will be rinsed with water if contact with hazardous material occurs.
	Spills	• Spill and absorbent materials will be readily available. • Employees will be instructed as to proper fueling techniques. • Fuel nozzle and hose will be secured in holder after use. • Fuel caps will be secured after fueling operations. • Fuel tanks and equipment will be grounded and bonded during fueling operations.
	Rollovers	• Equipment shall be set-up on stable ground and maintained level. Cribbing will be used when necessary. • Outriggers shall be extended per the manufacturer's specification.
Drill Rig Set-Up	Back Injuries	• Site personnel will be instructed on proper lifting techniques. • Mechanical devices will be utilized to reduce manual handling of materials. • Team lifting will be used in lieu of mechanical devices.

HAZARD ANALYSIS

Activity: Drilling and Sampling Operations Analyzed By/Date: Ken Carpenter 5/30/97 Reviewed By/Date: Peter Vernon, CSP 5/30/97

Principle Steps	Potential Hazards	Recommended Controls
Drill Rig Set-Up (continued)	Overhead Hazards	• All personnel will wear hard hats. • All ropes will be rated for the load in which it is expected to lift. All ropes will be inspected at the beginning of each work shift. • All ground personnel will stay clear of all suspended loads. • All equipment will stay a minimum of 15 feet from energized electrical lines. This distance will increase as the voltage of the power lines increase.
	Slip/Trip/Falls	• Work areas and means of access shall be maintained safe and orderly. • Even terrain will be utilized as unloading areas. • Tripping and poor footing hazards will be repaired as they are discovered or clearly identified.
	Dropped Objects	• Steel toe boots meeting ANSI Standard Z41 will be worn. (See previous exception for UXO Specialist.)
	Eye Injury	• Safety glasses meeting ANSI Standard Z87 will be worn.
Drill Rig Operations	Struck By/Against	• No loose clothing, gauntlet-type gloves, rings or watches will be worn by personnel operating drill rig equipment. • Personnel will be trained as to the manufacturer recommended procedures prior to commencing operations. • Auger guides will be used on hard surfaces. • Personnel will understand and review hand signals. • Drill rigs and support equipment will be equipped with backup alarms. • The drill rig operator will verbally alert employees and visually ensure employees are clear from dangerous parts of the equipment prior to starting or engaging equipment. • All drill rig equipment shall be equipped with emergency shut off devices. Internal combustion engines will be equipped with an ignition or grounding switch. Diesel engines will be equipped with quick closing valves which will shut off air to the intake manifold. Electric motors will be equipped with suitable switch in motor circuits. • Gears will be enclosed by a well constructed metal guard and securely installed. These guards shall be maintained in place when machinery is in use.
	Underground Hazards	• All underground utilities will be identified prior to drilling. Dig Safe number(s) will be logged and documented. • Be alert for potential UXO (low probability).
	Flying Objects and Debris	• Safety glasses meeting ANSI Standard Z87 will be worn where applicable. • A portable eye wash station will be located adjacent to the work area.

HAZARD ANALYSIS

Activity: Drilling and Sampling Operations Analyzed By/Date: Ken Carpenter 5/30/97 Reviewed By/Date: Peter Vernon, CSP 5/30/97

Principle Steps	Potential Hazards	Recommended Controls
Drill Rig Operations (continued)	Overhead Hazards	• All personnel will wear hard hats meeting ANSI Standard Z89.1. • All ropes will be rated for the load in which it is expected to lift. All ropes will be inspected at the beginning of each work shift. • All ground personnel will stay clear of all suspended loads. • All equipment will stay a minimum of 15 feet from energized electrical lines. This distance will increase as the voltage of the power lines increase.
	Inhalation Hazards in the Exclusion Zone	• Work activities will be conducted in PPE per SSHP. • Air monitoring will be performed as required by SSHP. • Air sampling will be performed as required by SSHP.
	Chemical Exposure	• Exclusion zone areas will be identified. • Protective Clothing (tyvek, booties, inner gloves and nitrile outer gloves) will be worn. • Skin will be rinsed with water if contact with hazardous materials occurs.
	Noise	• All equipment will be equipped with manufacturers required mufflers. • Hearing protection will be provided with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs will be worn).
	Fire	• Smoking and open flames are not permitted. • All equipment shall be equipped with 10-lb. ABC type fire extinguishers. • 10-lb. ABC type fire extinguishers shall be readily available.
	Slip/Trip/Falls	• Personnel will clear walkways of equipment and materials. • Other obstructions will be marked, identified or barricaded. • Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. • Debris will not be allowed to accumulate where it becomes a hazard. • When repairing derrick, personnel will follow fall protection safety procedures.
Soil/Bedrock Sampling	Back Injuries	• Site personnel will be instructed on proper lifting techniques. • Mechanical devices will be utilized to reduce manual material handling. • Team lifting will be utilized in lieu of mechanical devices.
	Sharp Objects	• Cut resistant work gloves will be worn. • All hand and power tools will be maintained in safe condition. • First aid kits will be available by work area.
	Inhalation Hazards in the Exclusion Zone	• Work activities will be conducted in PPE per SSHP. • Air monitoring will be performed as required by SSHP. • Air sampling will be performed as required by SSHP.
	Eye Injury	• ANSI approved full faced respirators will be worn. • Portable eye wash station will be available.

HAZARD ANALYSIS

Activity: Drilling and Sampling Operations Analyzed By/Date: Ken Carpenter 5/30/97 Reviewed By/Date: Peter Vernon, CSP 5/30/97

Principle Steps	Potential Hazards	Recommended Controls
Soil/Bedrock Sampling (continued)	Overhead Hazards	Personnel will be required to wear hard hats meeting ANSI Standard Z89.1.
	Chemical Exposure	- Exclusion zone areas will be identified. - Protective Clothing (tyvek, booties, inner gloves and nitrile outer gloves) will be worn in exclusion zone areas. - Skin will be rinsed with water if contact with hazardous materials occurs. - All equipment and materials will be decontaminated as per the SSHP.
	Dropped Objects	Steel toe boots meeting ANSI Standard Z41 will be worn. (See previous exception for UXO Specialist.)
	Fire	- Smoking is not permitted in CRZ or exclusion zone areas. 10-lb. ABC type fire extinguishers will be located adjacent to the work area.
	Sharp Objects	- Cut resistant work gloves will be worn. - All hand and power tools will be maintained in safe condition. - First aid kits will be available by work area.
Bentonite/Concrete Mixing and Pumping	Back Injuries	- Site personnel will be instructed on proper lifting techniques. - Mechanical devices will be utilized to reduce manual material handling. - Team lifting will be utilized in lieu of mechanical devices.
	Dropped Objects	Steel toe boots will be worn.
	Flying Objects and Debris	ANSI approved full-face respirator will be worn.
	Slip/Trip/Fall	- Personnel will clear walkways of equipment and materials. - Other obstructions will be marked, identified or barricaded. - Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified.
	Noise	Hearing protection will be provided with a noise reduction rating capable of maintaining personal exposures below 85 dBA (ear muffs or plugs will be worn).
	Fire	10-lb. ABC type fire extinguisher will be located adjacent to the work area. - Smoking will not be allowed in the work area.
	Sharp Objects	- Cut resistant work gloves will be worn. - All hand and power tools will be maintained in safe condition. - First aid kits will be available by work area. - Guards will be kept in place while using hand tools.
	Chemical Exposure	- Exclusion zone areas will be identified. - Protective Clothing (tyvek, booties, inner gloves and nitrile outer gloves) will be worn. - Skin will be rinsed with water if contact with hazardous materials occurs. - Hoses and cuplinks will be inspected prior to pumping operations.

HAZARD ANALYSIS

Activity: Drilling and Sampling Operations Analyzed By/Date: Ken Carpenter 5/30/97 Reviewed By/Date: Peter Vernon, CSP 5/30/97

Principle Steps		Potential Hazards	Recommended Controls
Well Installation	Chemical Exposure	• Work activities will be conducted in PPE per SSHP. • Exclusion zone areas will be identified. • Protective Clothing (tyvek, booties, inner gloves and nitrile outer gloves) will be worn. • Skin will be rinsed with water if contact with hazardous materials occurs.	
	Sharp Objects	• Cut resistant work gloves will be worn. • All hand and power tools will be maintained in safe condition. • First aid kits will be available by work area. • Guards will be kept in place while using hand tools.	
	Back Injuries	• Site personnel will be instructed on proper lifting techniques. • Mechanical devices will be utilized to reduce manual material handling. • Team lifting will be utilized in lieu of mechanical devices.	
	Dropped Objects	• Steel toe boots will be worn.	
	Flying Objects and Debris	• ANSI approved full-face respirator will be worn.	
	Slip/Trip/Fall	• Personnel will clear walkways of equipment and materials. • Other obstructions will be marked, identified or barricaded. • Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified.	
	Noise	• Noise monitoring will be conducted. • Hearing protection will be provided with a noise reduction rating capable of maintaining personal exposures below 85 dBA (ear muffs or plugs will be worn).	
	Fire	• 10-lb. ABC type fire extinguisher will be located adjacent to the work area. • Smoking will not be allowed in the work area.	
	Struck By	• All drill rig equipment shall be equipped with emergency shut off devices. Internal combustion engines will be equipped with an ignition or grounding switch. Diesel engines will be equipped with quick closing valves which will shut off air to the intake manifold. Electric motors will be equipped with suitable switch in motor circuits. • No work will be performed on engines, motors, hoists, etc. until it has been properly locked and tagged out. • After clutches have been disengaged, the bypass valve should be opened to divert air from the clutches. • Machinery will not be lubricated while it is in operation or running.	
	Sharp Objects	• Cut resistant work gloves will be worn. • All hand and power tools will be maintained in safe condition. • First aid kits will be available by work area. • Guards will be kept in place while using hand tools	

HAZARD ANALYSIS

Activity: Drilling and Sampling Operations Analyzed By/Date: Ken Carpenter 5/30/97 Reviewed By/Date: Peter Vernon, CSP 5/30/97

Principle Steps		Potential Hazards	Recommended Controls
Equipment Repair (continued)	Overhead Hazards	Personnel are required to wear hard hats.	
	Dropped Objects	Steel toe boots meeting ANSI Standard Z41 will be worn.	
	Flying Objects and Debris	Safety glasses meeting ANSI Standard Z87 will be worn.	
	Chemical Exposure	- Protective clothing (i.e., chemical gloves and safety glasses) will be worn where applicable. - Skin will be rinsed with water if contact with hazardous material occurs.	
Decontamination of Equipment - Pressure Washer (Operation)	Fire	10-lb. ABC type fire extinguisher will be located adjacent to the work area. - Smoking will not be allowed in the work area.	
	Slip/Trip/Fall	- Personnel will clear walkways of equipment and materials. - Other obstructions will be marked, identified or barricaded. - Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified.	
	Back Injuries	- Site personnel will be instructed on proper lifting techniques. - Mechanical devices will be utilized to reduce manual material handling. - Team lifting will be utilized in lieu of mechanical devices.	
	Eye Injury from Liquids and Foreign Objects	- Chemical goggles and full-faced shieldCoping with ANSI Standard Z87 will be worn. - A portable eye wash station will be located by work area.	
	Sharp Objects	- Cut resistant work gloves will be worn. - All hand and power tools will be maintained in safe condition. - First aid kits will be readily available. - Guards will be kept in place while using hand or power tools.	
	Slips/Trips/Falls	- Work areas and means of access shall be maintained safe and orderly. - Obstructions will be marked, identified or barricaded. - Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. - Wet surfaces will be marked and identified.	
	Struck By (Water Stream)	- Proper instruction on safe use of pressure washers will be conducted. - Operators will not fix the hand trigger in the open position such that if the wand were left unattended, water would spray from the tip. - All pressure washers will be equipped with a deadman switch. - Pressure washers shall not be left running unattended. - Pressure hoses will be inspected prior to use. - First aid kit will be located adjacent to work area.	

HAZARD ANALYSIS

Activity: Drilling and Sampling Operations Analyzed By/Date: Ken Carpenter 5/30/97 Reviewed By/Date: Peter Vernon, CSP 5/30/97

Principle Steps		Potential Hazards	Recommended Controls
Decontamination of Equipment - Pressure Washer (Operation) (continued)	Fire		- Pressure washers will not be started unless a steady flow of water is running to the machine (pressure washers shall not be run dry). 10-lb. ABC type fire extinguishers will be located adjacent to work area. - All personnel are required to wear hard hats. - All personnel are required to wear steel toe boots.
	Overhead Hazards		
	Dropped Objects		
	Chemical Exposure		- Protective clothing (tyveks, chemical gloves, safety glasses, full-faced splash shields and chemical boots) will be worn. - Skin will be rinsed with water if contact with hazardous materials occurs. - All equipment will be decontaminated on the decon pad. - Spill and absorbent materials will be readily available.
Wipe Sampling	Spills		
	Chemical Exposure		- Protective clothing (tyvek, booties, chemical safety goggles and nitrile gloves) will be worn. - Exclusion zone areas will be identified. - Skin will be rinsed with water if contact with hazardous materials occurs. - Steel toe boots will be worn.
	Dropped Objects		
	Overhead Hazards		
	Eye Injury		- Chemical safety goggles will be worn. - Portable eye wash will be available.
	Spills		- Spill and absorbent materials will be available. - All spills will be cleaned up immediately. - Lid will be placed back in containers immediately after use.
	Fire		10-lb. ABC type fire extinguishers will be located adjacent to work area.
	Chemical Exposure		- Hazard communication training will be given to review the hazards associated with lab chemicals. - Chemical resistant gloves (nitrile surgical gloves) will be worn. - If skin comes in contact with hazardous materials, exposed areas will be rinsed with water.
	Spills		- Spill and absorbent materials will be readily available. - All small containers will be re-capped after use. - All small containers will be properly labeled as to contents. - All lab waste materials will be disposed of properly.
	Flying Objects and Debris		- ANSI approved safety glasses will be worn. - Portable eye wash station will be available.
	Fire		10-lb ABC type fire extinguishers will be located adjacent to the work area. - All flammable materials will be stored in flammable storage cabinet.

HAZARD ANALYSIS

Activity: Drilling and Sampling OperationsAnalyzed By/Date: Ken Carpenter 5/30/97Reviewed By/Date: Peter Vernon, CSP 5/30/97

Principle Steps		Recommended Controls	
Equipment To Be Used	Potential Hazards	Training Requirements	
		Inspection Requirements	
Immunoassay Screening continued)	Dropped Objects	Steel toe boots will be worn.	Hydraulic license for operators is required.
	Sharp Objects	All broken laboratory glassware will be handled with cut resistant work gloves and properly disposed.	Personnel will be given instructions on proper use of fire extinguishers.
Drill Rig		- Initial inspection will be conducted prior to use. - Monthly inspections will be performed.	Proficiency training for users will be given.
Fire Extinguishers		Pre and Post calibrations/system checks will be performed daily.	Personnel will be given training on proper donning and doffing procedures.
PID, FID, CGI/O ₂ meter		An initial inspection of each lot of PPE will be performed.	- Personnel with first aid and CPR will be identified. - Blood borne pathogen training will be reviewed with CPR and first aid trained employees.
PPE (coveralls, full-faced respirator tyvek/poly-coated tyvek, booties, steel toe boots, hard hats, safety glasses, leather or kevlar gloves and ear plugs or ear muffs).		Daily safety and weekly inspections will be performed.	Hazard communication training will be given.
First Aid Kits		Daily safety inspection of storage and use areas will be conducted.	Personnel will be given training on how to respond to spilled materials.
Diesel Fuel/Oil and Other Potentially Hazardous Materials		Daily safety inspections of spill control materials will be conducted.	Personnel will be trained on proper use of chains, slings and ropes.
Spill Control Materials		Inspections prior to each use will be conducted.	Proficiency training for users will be given.
Chains, Slings or Ropes		Initial inspection will be conducted prior to use.	Use and storage procedures will be reviewed.
Pressure Washer		Daily safety inspections of storage and use areas will be performed.	
Safety Cans			

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ACTIVITY HAZARD ANALYSIS

Project Identification: Fireworks	Location: Hanover, MA	Estimated Start Date: 10/98
Phase of Work: Phase IIA Assessment	Analysis Performed by: Peter Vernon	Reviewed by: Jay Ehret
TASK	POTENTIAL HAZARDS	CONTROL MEASURES
Well Sampling	Exposure to Chemical Hazards	• Wear nitrile outer and inner gloves. • Follow proper personal and sample decontamination procedures. • Wash hands/face immediately after decontamination. • Wear safety glasses when handling chemical sample preservatives and samples. • Avoid splashing. If inevitable, personnel should stay out of splash radius and wear tyvek coveralls. • Air monitoring will be performed in accordance with SSHP.
	Manual Lifting and Material Handling	• Use proper lifting techniques. • Team lifting will be used for heavy loads.
	Hand and Power Tool Usage	• Daily inspections will be performed. • Remove broken or damaged tools from service. • PPE as required. • Use in accordance with manufacturer's instructions. • Use the tool for its intended purpose. • Use safety glasses when operating.
	Dropped Objects	• Steel toe boots meeting ANSI Z41 will be worn.
	Slip/Trip/Falls	• Work areas and means of access will be maintained neat and orderly. • Even terrain will be utilized as unloading areas.
	Eye Injury	• Safety glasses meeting ANSI Z87 will be worn. • Portable eye wash station will be available.
	Cuts and Scrapes	• First aid kit will be readily available.
	Spills	• Spill absorbing materials will be readily available.
	Temperature Extremes	• A heated area or vehicle will be available for warm up as necessary. • Proper clothing will be worn, suitable for the current conditions. • All personnel will be familiar with the symptoms of hypothermia/Heat Stress.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ACTIVITY HAZARD ANALYSIS

Project Identification: Fireworks	Location: Hanover, MA	Estimated Start Date: 10/98
Phase of Work: Phase IIA Assessment	Analysis Performed by: Peter Vernon	Reviewed by: Jay Ehret
TASK	POTENTIAL HAZARDS	CONTROL MEASURES
Sample Shipping	Shipping Samples to Analytical Lab	- Nitrile surgical gloves will be worn when handling samples. - Foster Wheeler personnel will clean sample containers before packaging and shipping.
	Manual Lifting of Sample Coolers	- All provisions of Foster Wheeler's SSHP will be observed. - Team lifting will be used with greater than 30 lbs.
Generator Fueling	Fire	- Generator will not be refueled while operating. - Fuel cans will be approved by NFPA. - Fuel cans will be equipped with pouring spout or a funnel will be used. - Hot generator will not be stored near combustible or flammable materials. - Fuel caps will be secured before the generator is restarted. - Spilled fuel will be cleaned up immediately. - Smoking and open flames will not be permitted in refueling areas. - Fuel oil, lubricating oil, and dirt will be removed from the generator surface prior to fueling. - If a generator is hot, refueling will not begin until the generator has cooled down sufficiently (approximately 10 to 15 minutes). - The generator will be moved to another location prior to restarting (at least 3 meters from the fueling area). 20-lb. ABC type approved fire extinguishers will be readily available in fueling areas.
	Fuel/Oil Exposure	- Protective clothing (chemical gloves and safety glasses) will be worn during fueling operations. - Skin will be rinsed with water if contact with hazardous materials occurs.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ACTIVITY HAZARD ANALYSIS

Project Identification: Fireworks	Location: Hanover, MA	Estimated Start Date: 9/98
Phase of Work: Phase IIA Assessment	Analysis Performed by: Peter Vernon	Reviewed by: Jay Ehret
TASK	POTENTIAL HAZARDS	CONTROL MEASURES
Generator Oiling and Fueling (cont'd)	Spills	- Covers will be secured on equipment and containers after each use. - Spilled fuel or oil will be cleaned up immediately. - Spill and absorbent materials will be readily available near fueling and oiling areas. - Only approved fuel and oil cans will be used. - Generator will be placed on bare ground prior to fueling to minimize cleanup area if spills were to occur.
Generator Startup	Struck By	Startup areas will be free of obstructions.
Operation of Gas Powered Generator During Sampling	Fire	- Generator will be used in accordance with manufacturer's instructions. - Fire extinguisher will be available on-site. - Generator will be operated only in well ventilated area.
	Explosion	- Wells will be monitored for methane buildup prior to operation of the generator. - If air monitoring produces readings at or above 10% of the LEL, the work zone will be vented until the LEL drops below this level.
	Hazardous Materials Exposure	- Generators will be run in well ventilated areas to prevent carbon monoxide accumulation. - Personnel will be informed of the potential chemical hazards of gasoline, bar oil, grease, and other hazardous materials. - Appropriate PPE (gloves, coveralls, etc.) will be provided. - Personnel will wash immediately after contact with hazardous materials.
Generator Shutdown	Fire	Hot generators will not be placed into storage until they have cooled down (approximately 30 minutes).
Generator Cleaning	Struck By	Generators will not be cleaned or adjusted with engine running.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

ACTIVITY HAZARD ANALYSIS

Project Identification: Fireworks	Location: Hanover, MA	Estimated Start Date: 10/98
Phase of Work: Phase IIA Assessment	Analysis Performed by: Peter Vernon	Reviewed by: Jay Ehret
TASK	POTENTIAL HAZARDS	CONTROL MEASURES
Manual Handling of Generator	Slip/Trip/Falls	- Site personnel will be informed of potential poor footing. - Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. - Debris will not be allowed to accumulate to the point where it exacerbates slipping and tripping potential.
	Back Injuries	- Site personnel will be instructed on proper lifting techniques. - Team lifting will be used in lieu of mechanical devices. - Mechanical devices will be utilized to reduce manual material handling.
	Sharp Objects	- Keep guards in place during use. - First aid kits will be available adjacent to work areas.
Installing Staff Gages	Attaching Graduated Index to Structure	- Use Drills and masonry bits per manufacturers instructions - Daily tool inspections will be performed. - Remove broken or damaged tools from service. - PPE as required. - Use the tool for its intended purpose. - Use safety glasses when operating. - Tool will be double insulated or GFCI protected. - Secure footing will be maintained. - Adequate protection from vehicles will be provided.
	Driving Indexed Pole Into Substrate.	- Pole will be steadied while it is started into substrate and will stand free. - The pole will be held well below the striking area. - Leather Gloves will be worn. - Safety glasses will be worn.

HAZARD ANALYSIS

Activity: Installation of Chain Link Fencing

Analyzed By/Date: Roger Margotto and
Boyd Allen 7/12/99

Reviewed By: Peter Vernon, CSP

Principal Steps	Potential Hazards	Recommended Controls
Set up Work Area, Site Survey	Potential exposure to chemical hazards. Noise Exposure. Slip, trip and fall hazards.	- Identify all chemical hazards and receive training (MSDS) regarding safe handling of chemicals. Copies of all MSDS will be filed at Site by SHSS. - Hearing protection is required when sound levels exceed 84 dBA continuously. - Work areas shall be visually inspected and slip, trip, and fall hazards shall be marked, barricaded, or eliminated, if feasible. - Proper illumination shall be maintained in all work areas. - Refer to EHS Procedure 3-8 "Fall Protection".
	Permits may be required. Underground Utilities Insects/Plants	- Determine that all permits have been obtained. - Notify Underground Locator Service or have underground surveys performed. (DIGSAFE) - Note any signs of insect nesting (bees, wasps, and hornets). Arrange for removal of nests as this interferes with installation of fencing. - Note any poisonous plants (e.g., poison ivy) in area and wear protective clothing to avoid dermal contact
Unloading fence posts, parts and rolls of chain link fence.	Sharp objects/punctures.	- Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or other objects. When possible sharp edges will be blunted. - Workers should not stand or walk on supplies or fencing.

HAZARD ANALYSIS

Activity: Installation of Chain Link Fencing

Analyzed By/Date: Roger Margotto and
Boyd Allen 7/12/99

Reviewed By: Peter Vernon, CSP

Principal Steps	Potential Hazards	Recommended Controls
	Material handling.	• Identify and avoid pinch points. • Maintain communication with others involved in material handling.
	Strains from manually moving materials and equipment.	• Personnel shall be directed to use proper lifting techniques such as keeping the back straight, lifting with the legs, limiting twisting, and getting help in moving bulky/heavy materials and equipment. • Employees will not lift more than 50 pounds individually. • Mechanical lifting devices such as lift tail gates and hand trucks will be used for moving loads where practicable
	Lifting of supplies by mechanical equipment - improper techniques	• If forklift is used to unload, insure that driver has been trained in the use of forklifts and follows forklift safety rules. • If heavy equipment is used to lift, then insure that all rigging is properly used and that any ropes, slings, or chains used for lifting are rated for the load.
	Exposure to extreme temperatures.	• Monitor for heat and cold stress in accordance with EHS Procedure 4-6 "Temperature Extremes". • Provide fluids and rest breaks during warm weather.
	Eye Hazards.	• Safety glasses will be the minimum required eye protection for all work areas.

HAZARD ANALYSIS

Activity: Installation of Chain Link Fencing

Analyzed By/Date: Roger Margotto and
Boyd Allen 7/12/99

Reviewed By: Peter Vernon, CSP

Principal Steps	Potential Hazards	Recommended Controls
Installing Fence	Struck by or against heavy equipment.	• Make eye contact with operators before approaching equipment. • Understand and review hand signals.
	Sharp edges of fencing, punctures by wires or links.	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or other objects. When possible sharp edges will be blunted.
	Strains from manually moving materials and equipment.	• Workers should not stand or walk on supplies or fencing. • Personnel shall be directed to use proper lifting techniques such as keeping the back straight, lifting with the legs, limiting twisting, and getting help in moving bulky/heavy materials and equipment.
	Injury from repetitive motions such as shoveling, posthole digging, or pounding of posts into the ground.	• Employees will not lift more than 50 pounds. • Refer to EHS Procedure 3-1 "Ergonomics".
	Use of hand tools and power tools	• Rotate job tasks among the workers. • Take rest breaks as needed. • Warm-up before performing task.
	Falling or slipping while working on uneven terrain.	• Use only tools that have been inspected and are in good condition. • Know how to properly use tools. • Follow electrical safety rules for all power tools. (Including use of GFCI in all outdoor locations.) • Wear appropriate work boots. • Watch footing as job proceeds.

HAZARD ANALYSIS

Activity: Installation of Chain Link Fencing

Analyzed By/Date: Roger Margotto and
Boyd Allen 7/12/99

Reviewed By: Peter Vernon. CSP

Principal Steps	Potential Hazards	Recommended Controls
	Exposure to extreme temperatures. Eye Hazards. Noise	• Monitor for heat and cold stress in accordance with EHS Procedure 4-6 "Temperature Extremes". • Provide fluids and rest breaks during warm weather. • Safety glasses will be the minimum required eye protection for all work areas. • Wear hearing protection when noise levels exceed 84 dBA.
Equipment to be Used	Inspection Requirements	Training Requirements
Heavy equipment, hand tools	Daily and before use.	• Only trained equipment operators may operate heavy equipment; • Specific training for power tools, hand tools, and electrical safety. • Mechanical fence post driver should be operated in accordance with manufacturer's specifications.
Rigging – ropes, chains, slings	Before each use	• Know proper rigging techniques.

Notes:

PPE - personal protective equipment.

GFCI – Ground Fault Circuit Interrupter

ATTACHMENT 4

UXO PROCEDURES

UXO PROCEDURES

Surface Clearance and Drilling Procedures

Prior to soil sampling activities and/or monitoring well installation, the surface of each intended work area will be inspected for any potential UXO hazards to ensure worker safety.

Any suspected UXO items when encountered will not be moved or recovered. The health and safety officer will mark its location with a red pin flag to warn personnel to stay clear. The immediate area surrounding the red pin flag will be evacuated and all work efforts will be shifted to a new location. The HSO will immediately contact Foster Wheeler's Project Manager and UXO coordinator. The Cooperating Parties Technical Manager will also be notified in accordance with the Emergency Response Plan.

If during drilling advancement, any suspicious objects are encountered that could possibly UXO materials, borehole activity will be abandoned, tools withdrawn, the location marked with a red pin flag and work shifted to a new location as described above. The HSO will immediately contact Foster Wheeler's Project Manager and UXO coordinator. The Cooperating Parties Technical Manager will also be notified in accordance with the Emergency Response Plan.

ATTACHMENT 5

HOSPITAL ROUTE MAP

South Shore Hospital Route Map



ATTACHMENT 6

MSDSs

OHS14040 MERCURY FULMINATE

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SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.
14600 CATALINA STREET
SAN LEANDRO, CA 94577
1-800-635-0064 OR
1-510-895-1313

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000 USA

CAS NUMBER: 628-86-4
RTECS NUMBER: OW4055000
EU NUMBER (EINECS):
211-057-8

SUBSTANCE: MERCURY FULMINATE

TRADE NAMES/SYNONYMS:

FULMINIC ACID, MERCURY(2+) SALT; MERCURIC FULMINATE; MERCURY FULMINATE
HG(ONC)2; MERCURIC CYANATE; MERCURY(II) FULMINATE; RCRA P065; UN 0135;
12HGN2O2; OHS14040

CHEMICAL FAMILY:

salt

CREATION DATE: 09/09/87

REVISION DATE: 08/10/96

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: MERCURY FULMINATE
CAS NUMBER: 628-86-4
PERCENTAGE: 100.0

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=4

EU CLASSIFICATION:

R 33
E; R 3

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T; R 23/24/25

EMERGENCY OVERVIEW:

COLOR: white, brown or gray.

PHYSICAL FORM: crystalline powder.

MAJOR HEALTH HAZARDS: skin irritation, eye irritation, allergic reactions.

PHYSICAL HAZARDS: May explode if exposed to shock, friction or heating.

POTENTIAL HEALTH EFFECTS:**INHALATION:**

SHORT TERM EXPOSURE: allergic reactions, metallic taste, nausea, vomiting, diarrhea, chest pain, difficulty breathing, headache, lung damage, kidney damage.

LONG TERM EXPOSURE: blue lines on the gums, loosening of the teeth, nerve damage, reproductive effects.

SKIN CONTACT:

SHORT TERM EXPOSURE: irritation, allergic reactions.

LONG TERM EXPOSURE: same as effects reported in long term inhalation, kidney damage, nerve damage.

EYE CONTACT:

SHORT TERM EXPOSURE: irritation, itching.

LONG TERM EXPOSURE: no information on significant adverse effects.

INGESTION:

SHORT TERM EXPOSURE: same as effects reported in long term inhalation, nausea, vomiting.

LONG TERM EXPOSURE: same as effects reported in long term inhalation, kidney damage, nerve damage.

CARCINOGEN STATUS:

OSHA: N

NTP: N

IARC: N

SECTION 4 FIRST AID MEASURES

INHALATION: Remove from exposure immediately. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention.**SKIN CONTACT:** Remove contaminated clothing, jewelry, and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention, if needed.**EYE CONTACT:** Wash eyes immediately with large amounts of water or normal

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MERCURY FULMINATE

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saline, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.

INGESTION: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

ANTIDOTE: dimercaprol/oil, intramuscular; hemodialysis; penicillamine, oral; chelating agent.

NOTE TO PHYSICIAN: For ingestion, consider gastric lavage and catharsis.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Severe explosion hazard.

EXTINGUISHING MEDIA: Flood with water. If no water is available, use dry chemical or earth.

FIREFIGHTING: For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Flood with water. Explosive. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Evacuate if fire gets out of control or containers are directly exposed to fire. Evacuation radius: 500 feet.

FIREFIGHTING PROTECTIVE EQUIPMENT: Full firefighting turn-out gear (bunker gear). Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.

SECTION 6 ACCIDENTAL RELEASE MEASURES

WATER RELEASE:

Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:

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Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Small spills: Flood with water. Large spills: Wet down area with water. Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Reportable Quantity (RQ): 10 pounds. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

Store and handle in accordance with all current regulations and standards. Keep moist. Keep separated from incompatible substances.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

MERCURY FULMINATE:

MERCURY, ALL FORMS EXCEPT ALKYL (as Hg):

0.1 mg/m3 OSHA ceiling

0.05 mg/m3 OSHA TWA (vapor) (skin) (vacated by 58 FR 35338, June 30, 1993)

0.10 mg/m3 ACGIH TWA (aryl) (skin)

0.025 mg/m3 ACGIH TWA (metal and inorganic compounds) (skin)

0.05 mg/m3 NIOSH recommended TWA 10 hour(s) (vapor) (skin)

0.1 mg/m3 NIOSH recommended ceiling (skin)

0.01 ppm (0.1 mg/m3) DFG MAK TWA

0.1 ppm (1.0 mg/m3) DFG MAK peak 30 minute average value 1 times/shift

MEASUREMENT METHOD: Hydrar(R) sorbent tube; Acid; Atomic absorption spectrometry (cold); NIOSH III # 6009, Mercury

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

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GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. Respiratory equipment must be certified by NIOSH/MSHA.

Measurement Element:

Hg

1 mg/m³

Any chemical cartridge respirator with cartridge(s) providing protection against this substance.

End of service life indicator required (ESLI).

Any supplied-air respirator.

5 mg/m³

Any supplied-air respirator.

Any powered, air-purifying respirator with cartridge(s) providing protection against this substance.

End of service life indicator required (ESLI).

5 mg/m³

Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against this substance.

End of service life indicator required (ESLI).

Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.

End of service life indicator required (ESLI).

Any supplied-air respirator with a full facepiece.

Any powered, air-purifying respirator with a full facepiece and cartridge(s) providing protection against this substance.

Any self-contained breathing apparatus with a full facepiece.

Any supplied-air respirator with a full facepiece.

10 mg/m³

Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode.

Escape -

Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.

Any appropriate escape-type, self-contained breathing apparatus.

For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

COLOR: white, brown or gray

HEALTH EFFECTS:**INHALATION:**

MERCURY FULMINATE: See information on inorganic mercury compounds.

ACUTE EXPOSURE:

INORGANIC MERCURY COMPOUNDS: Inhalation of high levels of mercury compounds may cause almost immediate dyspnea, cough, fever, nausea, vomiting, diarrhea, headache, stomatitis, salivation, gingivitis, a metallic taste, and cardiac abnormalities. Respiratory irritation may occur with chest pain and tightness. Symptoms may resolve or may progress to necrotizing bronchiolitis, pneumonitis, pulmonary edema, pneumothorax, and interstitial fibrosis. Acidosis, renal damage and death may occur. Allergic reactions that may occur in previously exposed persons include dermatitis, encephalitis, and death.

CHRONIC EXPOSURE:

INORGANIC MERCURY COMPOUNDS: Repeated inhalation of mercury compounds may cause mercurialism, which is characterized by fine tremors and erethism. Tremors may affect the hands first, but may also become evident in the face, arms, and legs. Erethism may be manifested by abnormal shyness, blushing, self-consciousness, depression or despondency, resentment of criticism, irritability or excitability, headache, fatigue, and insomnia. In severe cases, hallucinations, loss of memory and mental deterioration may occur. Concentrations as low as 0.03 mg/m³ have induced psychiatric symptoms in humans. Renal involvement may be indicated by proteinuria, enzymuria, and anuria. Other effects may include salivation, gingivitis, stomatitis, loosening of the teeth, blue lines on the gums, diarrhea, weight loss, anorexia, speech and sensory disorders, unsteady gait, constricted visual fields, chronic pneumonitis and mild anemia. Repeated exposure to mercury and its compounds may result in sensitization. Mercury is excreted in breast milk. Several studies have revealed that inorganic mercury can cause reproductive effects such as chromosomal aberrations in humans and animals; transplacental passage in female humans and animals; decreased ovulation, lengthening of the estrus cycle, increased infant mortality, and congenital malformation in rodents. Spontaneous abortions, low birth weight and abnormal development of the nervous system have also been reported.

SKIN CONTACT:

MERCURY FULMINATE: See information on inorganic mercury compounds. May have a vesicant action and may cause dermatitis and allergic reactions.

ACUTE EXPOSURE:

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INORGANIC MERCURY COMPOUNDS: Mercury compounds may cause skin irritation. Small amounts of mercury may be absorbed through intact skin. Allergic reactions that may occur include dermatitis, encephalitis, and death.

CHRONIC EXPOSURE:

INORGANIC MERCURY COMPOUNDS: Prolonged or repeated exposure to mercury compounds may result in dermal sensitization and systemic effects as detailed in chronic inhalation.

EYE CONTACT:

MERCURY FULMINATE: See information on inorganic mercury compounds. Dust causes conjunctival irritation, itching erythema and swelling of the lids, face and other exposed skin.

ACUTE EXPOSURE:

INORGANIC MERCURY COMPOUNDS: Mercury compounds may cause irritation.

CHRONIC EXPOSURE:

INORGANIC MERCURY COMPOUNDS: Mercury exposure from inhalation, ingestion, or skin contact may be indicated by mercurialentis, discoloration of the crystalline lens, on slit lamp examination of the eyes.

INGESTION:

MERCURY FULMINATE: See information on inorganic mercury compounds.

ACUTE EXPOSURE:

INORGANIC MERCURY COMPOUNDS: Ingestion of mercury compounds may cause a burning of the mouth and throat, thirst, nausea and vomiting. May cause signs and symptoms as detailed in chronic inhalation.

CHRONIC EXPOSURE:

INORGANIC MERCURY COMPOUNDS: Repeated ingestion may result in toxic effects as detailed in chronic inhalation.

SECTION 12 ECOLOGICAL INFORMATION

No data available.

SECTION 13 DISPOSAL CONSIDERATIONS

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PHYSICAL FORM: crystalline powder
MOLECULAR WEIGHT: 284.62
MOLECULAR FORMULA: $\text{HG}-(\text{C}-\text{N}-\text{O})_2$
MELTING POINT: explodes
VAPOR PRESSURE: not applicable
VAPOR DENSITY: not applicable
SPECIFIC GRAVITY (water=1): 4.42
WATER SOLUBILITY: soluble in hot water
PH: not applicable
VOLATILITY: not applicable
ODOR THRESHOLD: No data available.
EVAPORATION RATE: not applicable
SOLVENT SOLUBILITY:
Soluble: alcohol, ammonium hydroxide

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Explosive if dry. May explode if exposed to shock, friction or heating.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Keep wet. Keep out of water supplies and sewers.

INCOMPATIBILITIES: acids.

MERCURY FULMINATE:
SULFURIC ACID: Explosive.

HAZARDOUS DECOMPOSITION: Thermal decomposition products: mercury, oxides of nitrogen.

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

MERCURY FULMINATE:
CARCINOGEN STATUS: None.
LOCAL EFFECTS:
Irritant: skin, eye.
ACUTE TOXICITY LEVEL: No data available.
TARGET ORGANS: immune system (sensitizer), nervous system, kidneys
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: kidney problems, nervous system problems, respiratory problems.

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Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): P065. Hazardous Waste Number(s): D009. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.2 mg/L. Dispose in accordance with all applicable regulations.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101 SHIPPING NAME-UN NUMBER:

Mercury fulminate, wetted-UN0135

U.S. DOT 49 CFR 172.101 HAZARD CLASS OR DIVISION:

1.1A

U.S. DOT 49 CFR 172.101 PACKING GROUP:

II

U.S. DOT 49 CFR 172.101 AND SUBPART E LABELING REQUIREMENTS:

EXPLOSIVE 1.1A

U.S. DOT 49 CFR 172.101 PACKAGING AUTHORIZATIONS:

EXCEPTIONS: None

NON-BULK PACKAGING: 49 CFR 173.62

BULK PACKAGING: None

U.S. DOT 49 CFR 172.101 QUANTITY LIMITATIONS:

PASSENGER AIRCRAFT OR RAILCAR: Forbidden

CARGO AIRCRAFT ONLY: Forbidden

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:

TSCA INVENTORY STATUS:

Y

TSCA 12(b) EXPORT NOTIFICATION:

Not listed.

CERCLA SECTION 103 (40CFR302.4):

Y

MERCURY FULMINATE

10 LBS RQ

SARA SECTION 302 (40CFR355.30):

N

SARA SECTION 304 (40CFR355.40):

N

SARA SECTION 313 (40CFR372.65):

Y

MERCURY, ALL FORMS EXCEPT ALKYL (as Hg)

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SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):

ACUTE:	Y
CHRONIC:	Y
FIRE:	Y
REACTIVE:	Y
SUDDEN RELEASE:	N

OSHA PROCESS SAFETY (29CFR1910.119):	N
--------------------------------------	---

STATE REGULATIONS:

CALIFORNIA PROPOSITION 65:	Y
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MERCURY, ALL FORMS EXCEPT ALKYL (as Hg)

INTERNATIONAL REGULATIONS:

EU NUMBER (EINECS): 211-057-8

EU RISK AND SAFETY PHRASES:

R: 3-23/24/25-33

Extreme risk of explosion by shock, friction, fire or other sources of ignition. Toxic by inhalation, in contact with skin and if swallowed. Danger of cumulative effects.

S: 1/2-3-35-45

Keep locked-up and out of reach of children. Keep in a cool place. This material and its container must be disposed of in a safe way. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

SECTION 16 OTHER INFORMATION

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MATERIAL SAFETY DATA SHEET

Trade Name: EnSys RDX Test

Description: An chemical test kit for the determination of
hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) in soil
samples

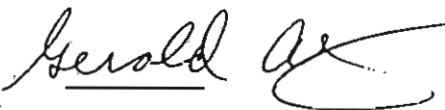
Hazardous Ingredients

CAS Number

- | | |
|------------------------------------|------------|
| 1. RDX control
* Acetone | 67-64-1 |
| 2. 77% Acetic Acid | 64-19-7 |
| 3. Zinc Dust | 7440-66-6 |
| 4. HACH NitriVer 3 Nitrite Reagent | Not Listed |

*See attached Material Safety Data Sheet for this particular hazardous chemical.

The information presented in this MSDS is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, expressed or implied with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.



Gerald Alvey, Manufacturing Director
EnSys Incorporated

Trade Name: EnSys RDX Test

MATERIAL: RDX Control

DESCRIPTION: 2ml amber glass flame sealed ampule containing
1ml liquid reagent

HAZARDOUS INGREDIENTS

<u>Reagent</u>	<u>Weight %</u>	<u>Nature of Hazard</u>
Acetone	> 99.9	flamable, eye, skin, mucous membrane/respiratory tract irritant, respiratory depressant

PHYSICAL DATA

Appearance: Clear colorless solution

Melting or freezing point: < -94° c

Boiling point: > 56.5° c

Solubility in water: Dilutable

FIRE AND EXPLOSION HAZARD DATA

Flashpoint: 1° F

Lower explosion level: 2%

Upper explosion level: 13%

Extinguishing media: Carbon dioxide, dry chemical powder or foam.

Special fire-fighting procedures:

Wear self-contained breathing apparatus and protective clothing
to prevent contact with skin and eyes.

Unusual fire and explosion hazards:

Extremely flammable. Vapor may travel considerable distance to
source of ignition and flashback.

Trade Name: EnSys RDX Test

MATERIAL: RDX Control (continued)

HEALTH HAZARD DATA

Effects of Overexposure:

Inhalation: Adverse health effects from vapors and spray mists in poorly ventilated areas may include irritation of the mucous membranes of the nose, throat, respiratory tract and symptoms of headache and nausea. May cause dermatitis.

Skin Contact: Prolonged and repeated contact with product may cause skin irritation.

Eye Contact: Direct contact with product may result in eye irritation.

Target organs: Brain and coverings, sense organs, lungs (respiratory depression), kidney and bladder (renal function), muscles (weakness, contraction, or spasticity)

Emergency and First-Aid Procedures:

Inhalation: Remove subject to fresh air. Seek medical attention if necessary.

Ingestion : Wash out mouth with water and call a physician.

Eye and Skin Contact: Flush eyes or skin with copious amounts of water. Wash contaminated clothing before reuse. Consult a physician if irritation persists.

REACTIVITY DATA:

Stability: Stable

Conditions to avoid: N/A

Hazardous decomposition products : Toxic fumes of carbon monoxide or carbon dioxide upon combustion

Trade Name: EnSys RDX Test

MATERIAL: RDX Control (continued)

Hazardous polymerization : Will not occur

Incompatible materials to avoid:

Oxidizing agents, reducing agents, bases, protect from moisture.

LEAK/SPILL DISPOSAL INFORMATION:

Steps to be taken in case of spill: Contain spill and then clean-up with copious amounts of water. Avoid contact with skin and clothing. Shut off all sources of ignition.

Waste disposal methods: Dispose of in a manner consistent with all Federal, State, and local laws concerning disposal of waste material.

SPECIAL PROTECTION INFORMATION:

Avoid prolonged or repeated exposure, wash thoroughly after handling, do not breath vapor, do not get in eyes (severe eye irritant), on skin or clothing, keep away from heat, sparks, and open flame.

STORAGE:

Storage temperature: Store at 23°C (room temperature)

This product is a mixture that may contain one or more hazardous chemicals. The hazardous ingredients listed are only those as required by 29 CFR 1910.1200.

MATERIAL SAFETY DATA SHEET

Pg. 1

Trade Name: PCB RISCTM Test Kit

Description: An immunoassay test kit for the determination of polychlorinated biphenyls (PCBs) in soil samples, in water samples, and on surfaces.

Hazardous Ingredients

CAS Number

- | | |
|---|------------|
| 1. Polychlorinated biphenyl standard | |
| • Aroclor 1248 in methanol | 11097-69-1 |
| 2. Extraction and dilution reagent | |
| • Methanol | 67-56-1 |
| 3. Substrate A | 68-12-2 |
| • N,N-Dimethylformamide | |
| 4. Stop Solution | 7664-93-9 |
| • Sulfuric acid, 1 M (6% v/v) | |
| 5. ENZYME (PCB Conjugate) | NA |
| • Polychlorinated biphenyl-Horseradish peroxidase conjugate | |
| 6. PCB Antibody | NA |
| • Monoclonal antibody to Polychlorinated biphenyls | |

*See attached Material Safety Data Sheet for this particular hazardous chemical.

The information presented in this MSDS is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, expressed or implied with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

Gerald Alvey, Manufacturing Director
EnSys Incorporated

MATERIAL SAFETY DATA SHEET

Pg. 2

Trade Name : PCB RISC™ Kit

MATERIAL : Polychlorinated biphenyl standard

DESCRIPTION : 2ML amber flame sealed glass ampoule containing
approximately 1 ml of liquid reagent

HAZARDOUS INGREDIENTS :

<u>Reagent</u>	<u>Weight %</u>	<u>Nature of Hazard</u>
Aroclor 1248	< 00.1	Carcinogen
Methanol	> 99.9	Flamable, eye & skin irritant

PHYSICAL DATA :

Appearance	Clear colorless liquid
Melting or freezing point :	- 98 c
Boiling point :	65 c
Solubility in water :	100%

FIRE AND EXPLOSION HAZARD DATA :

Extinguishing media : alcohol foam, CO , dry chemical

Special fire fighting procedures :

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Unusual fire and explosion hazards :

Fire hazard when exposed to heat, flame, or oxidizers. Vapors are explosive.

MATERIAL SAFETY DATA SHEET

Pg. 3

Trade Name : PCB RISC™ Kit

MATERIAL: Polychlorinated biphenyl standard (continued)

HEALTH HAZARD DATA:

Effects of overexposure:

Inhalation/Ingestion: Harmful if inhaled, may be fatal if swallowed. Headache, nausea, blindness, gastrointestinal disturbance. Contains low concentration of material known to cause cancer. Such concentration is sufficiently below the OSHA threshold(s) which would require listing as a component of this solution.

Emergency First Aid Procedures :

Inhalation : Remove subject to fresh air. Seek medical attention if necessary.

Eye and Skin Contact :

Flush eyes or skin with copious amounts of water (flush eyes for 15 minutes). Wash contaminated clothing before reuse. Consult a physician if irritation persists.

REACTIVITY DATA:

Stability: Stable

Conditions to avoid: N/A

Hazardous decomposition products: Toxic fumes of carbon monoxide and carbon dioxide

Hazardous polymerization: Will not occur

Incompatible materials to avoid:

Oxidizing agents, acids, acid chlorides, acid anhydrides, reducing agents, alkali metals

SPILL OR LEAK PROCEDURE:

Steps to be taken in case of spill:

Contain spill and take up with absorbant material. Eliminate ignition sources. Ventilate area.

MATERIAL SAFETY DATA SHEET

Pg. 4

Trade Name : PCB RISCTM Kit

MATERIAL: Polychlorinated biphenyl standard (continued)

Waste disposal methods: Observe all Federal, State, and local regulations.

SPECIAL PROTECTION INFORMATION:

Respiratory protection: None required with good ventilation.
Otherwise, wear MSHA/NIOSH approved
respirator with organic vapor canister.

Storage and Handling: Store in sealed container in a cool, dry
location. Keep away from oxidizers and/or
ignition sources.

This product may contain one or more hazardous chemicals. The
hazardous ingredients listed are only those as required by 29 CFR
1910.1200.

MATERIAL SAFETY DATA SHEET

Pg. 5

Trade Name : PCB RISC™ Kit

MATERIAL: Extraction and dilution reagent

DESCRIPTION: Clear colorless liquid in a 30ml HDPE screw top, impulse sealed container (extraction reagent) or a 2 ml flame sealed ampoule (dilution reagent)

HAZARDOUS INGREDIENTS:

Reagent	Weight %	Nature of Hazard
Methanol (CAS # 67-56-1)	100%	Flamable, eye & skin irritant

PHYSICAL DATA:

Appearance:	Clear colorless liquid
Melting or freezing point:	- 98 c
Boiling point:	65 c
Solubility in water:	100%
Specific gravity:	0.79

FIRE AND EXPLOSION HAZARD DATA:

Extinguishing media: alcohol foam, CO , dry chemical

Special fire fighting procedures: None for small quantities (< 1 liter). For large quantities, wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Unusual fire and explosion hazards: Fire hazard when exposed to heat, flame, or oxidizers. Vapors are explosive.

HEALTH HAZARD DATA:

Effects of overexposure:

Inhalation/Ingestion: Harmful if inhaled, may be fatal if swallowed. Headache, nausea, blindness, gastrointestinal disturbance. Contains low concentration of material known to cause cancer. Such concentration is sufficiently below the OSHA threshold(s) which would require listing as a component of this solution.

P/N 99996, Rev C

MATERIAL SAFETY DATA SHEET

Pg. 6

Trade Name : PCB RISC™ Kit

MATERIAL: Extraction and Dilution reagent (continued)

Emergency First Aid Procedures :

Inhalation : Remove subject to fresh air. Seek medical attention if necessary.

Eye and Skin Contact : Flush eyes or skin with copious amounts of water (flush eyes for 15 minutes). Wash contaminated clothing before reuse. Seek medical attention if irritation persists.

REACTIVITY DATA:

Stability: Stable

Conditions to avoid: N/A

Hazardous decomposition products: Toxic fumes of carbon monoxide and carbon dioxide

Hazardous polymerization: Will not occur

Incompatible materials to avoid: Oxidizing agents, acids, acid chlorides, acid anhydrides, reducing agents, alkali metals

SPILL OR LEAK PROCEDURE:

Steps to be taken in case of spill: Contain spill and take up with absorbant material. Eliminate ignition sources. Ventilate area.

Waste disposal methods: Observe all Federal, State, and local regulations.

SPECIAL PROTECTION INFORMATION:

Respiratory protection: None required with good ventilation. Otherwise, wear MSHA/NIOSH approved respirator with organic vapor canister.

Storage and Handling: Store in sealed container in a cool, dry location. Keep away from oxidizers and/or ignition sources.

MATERIAL SAFETY DATA SHEET

Pg. 7

Trade Name: PCB RISCTM Test Kit

MATERIAL: SUBSTRATE A

DESCRIPTION: A polyethylene dropper bottle (yellow cap) containing 5mL liquid reagent.

HAZARDOUS INGREDIENTS:

Reagent	Weight %	Nature of Hazard
N,N-Dimethylformamide	26	Skin and eye irritant, Possible carcinogen

PHYSICAL DATA:

Appearance: Clear to slightly bluish colored solution

Melting or freezing point: < 0 ° C/32° F (water)

Boiling point: > 100 ° C/212° F (water)

Solubility in water: Dilutable

FIRE AND EXPLOSION HAZARD DATA:

Extinguishing media: Foam, alcohol foam, CO₂, dry chemical, or water/fog

Special fire-fighting procedures: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Unusual fire and explosion hazards: N/A

HEALTH HAZARD DATA:

Effects of Overexposure:

Inhalation: Adverse health effects from vapors and spray mists in poorly ventilated areas may include irritation of the mucous membranes of the nose, throat, respiratory tract and symptoms of headache and nausea.

MATERIAL SAFETY DATA SHEET

Pg. 8

Trade Name: PCB RISCTM Test Kit

MATERIAL: SUBSTRATE A (continued)

Skin Contact: Prolonged and repeated contact with product may cause skin irritation.

Eye Contact: Direct contact with product may result in eye irritation.

Note: N,N-Dimethyl Formamide is a possible carcinogen (IARC class 2-B)

Emergency and First-Aid Procedures:

Inhalation: Remove subject to fresh air. Seek medical attention if necessary.

Eye and Skin Contact: Flush eyes or skin with copious amounts of water. Wash contaminated clothing before reuse. Consult a physician if irritation persists.

REACTIVITY DATA:

Stability: Stable

Conditions to avoid: N/A

Hazardous decomposition products: Carbon monoxide, carbon dioxide, nitrogen oxides

Hazardous polymerization: Will not occur

Conditions to avoid: N/A

Incompatible materials to avoid: Acid chlorides, oxidizing agents, chloroformates, reducing agents, halogens

SPILL OR LEAK PROCEDURE:

Steps to be taken in case of spill: Contain spill and then clean-up with copious amounts of water. Avoid contact with skin and clothing.

Waste disposal methods: Observe all Federal, State, and local laws concerning health and pollution.

MATERIAL SAFETY DATA SHEET

Pg. 9

Trade Name: PCB RISC™ Test Kit

MATERIAL: SUBSTRATE A (continued)

SPECIAL PROTECTION INFORMATION:

Respiratory protection: None required if good ventilation is maintained. Otherwise, wear MSHA / NIOSH approved respirator suitable for vapor or mist concentrations encountered.

STORAGE AND LABELING:

Storage temperature: Store at 25 °C (room temperature)

MATERIAL SAFETY DATA SHEET

Pg. 10

Trade Name: PCB RISC™ Test Kit

MATERIAL: STOP SOLUTION

DESCRIPTION: A polyethylene dropper bottle (red cap) containing 5 mL liquid reagent.

HAZARDOUS INGREDIENT:

Reagent	Concentration
Sulfuric Acid	5% v/v (1 M)

PRECAUTIONARY MEASURES

Danger! Corrosive. Liquid and mist cause severe burns to all body tissue. May be fatal if swallowed. Harmful if inhaled. Inhalation may cause lung damage.

Do not get in eyes, on skin, or on clothing.

Do not breathe mist.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

This substance is classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY/FIRST AID

In all cases call a physician. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, DO NOT INDUCE VOMITING! Give large quantities of water. 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.

DOT Hazard Class: Corrosive Material

PHYSICAL DATA:

Appearance: Colorless liquid

Odor: Odorless

Solubility: Infinite @ 20 °C.

Boiling point: > 100 °C.

MATERIAL SAFETY DATA SHEET

Pg. 11

Trade Name: PCB RISCTM Test Kit

MATERIAL: STOP SOLUTION (continued) _

Melting point: < 0 °C.

Specific gravity: 1.05

Vapor density: Not available

Vapor pressure (mm Hg): < 760

Evaporation rate: No information found.

FIRE AND EXPLOSION INFORMATION:

Fire: Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Reacts with most metals releasing flammable, potentially explosive hydrogen gas.

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

Fire extinguishing media: Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

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:

Stability: Stable under ordinary conditions of use and storage.

Hazardous decomposition products:

Toxic fumes of oxides of sulfur. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide, respectively.

MATERIAL SAFETY DATA SHEET

Pg. 12

Trade Name: PCB RISCTM Test Kit

MATERIAL: STOP SOLUTION (continued)

Hazardous polymerization: Will not occur.

Incompatibilities: Bases, organic material, halogens, metal acetylides, oxides and hydrides, strong oxidizing and reducing agents and many other reactive substances.

LEAK/SPILL DISPOSAL INFORMATION:

Dike and cover leaking or spilled liquid with dirt, vermiculite, kitty-litter or other inert absorbent. Cover spill with sodium bicarbonate or soda ash and mix. Clean-up personnel require protective clothing and respiratory protection from vapors and mists. Neutralized waste may be containerized and disposed in a RCRA approved waste disposal facility. Flush area of spill with dilute soda ash solution and discard to sewer.

Reportable Quantity (RQ) (CWA/CERCLA): 1000 lbs.

NFPA Ratings: Health: 3
Flammability: 0
Reactivity: 2
Other: None

MATERIAL SAFETY DATA SHEET

Pg. 13

Trade Name: PCB RISCTM Test Kit

MATERIAL: ENZYME-PCB Conjugate

DESCRIPTION: A 10x50mm polyethylene dropper tube filled with buffer and containing a small flame sealed glass capsule of freeze dried powder with trace amounts of PCB conjugate

HAZARDOUS INGREDIENTS:

Reagent	Conjugate weight/tube	Nature of Hazard
Polychlorinated biphenyl-Horseradish peroxide conjugate	< 5 micrograms	No known toxic effects

PHYSICAL DATA:

Appearance: White to slightly yellow powder

Solubility in water: >16 grams/liter

FIRE AND EXPLOSION INFORMATION:

FIRE: Not combustible

EXPLOSION: Not combustible

REACTIVITY DATA:

Stability: Stable at room temperature and under ordinary conditions of use and storage.

Hazardous decomposition products: None known

Hazardous polymerization: Will not occur

Conditions to avoid: None known

Incompatibilities: None known

MATERIAL SAFETY DATA SHEET

Pg. 14

Trade Name: PCB RISCTM Test Kit

MATERIAL: ENZYME-PCB Conjugate (continued)

LEAK/SPILL DISPOSAL INFORMATION:

Steps to be taken in case of spill: Contain spill if possible.
Clean up with absorbent material and/or water.

Waste disposal methods: Dispose of in a manner consistent with all Federal, State, and local regulations concerning disposal of waste material.

MATERIAL SAFETY DATA SHEET

Pg. 15

Trade Name: PCB RISCTM Test Kit

MATERIAL: PCB Antibody

DESCRIPTION: A clear plastic 12x75mm tube which appears empty. Trace amounts of PCB antibody have been coated on the inside walls of the tube. The PCB antibody can not be seen by visual inspection.

HAZARDOUS INGREDIENTS:

Reagent	Antibody weight/Tube	Nature of Hazard
Monoclonal antibody to Polychlorinated biphenyl	< 1 microgram	No known toxic effects

PHYSICAL DATA:

Appearance: Clear plastic tube. The antibody has been coated on the inside walls of the tube and can not be seen by visual inspection.

Solubility in water: Not determined

FIRE AND EXPLOSION INFORMATION:

FIRE: Not combustible

Explosion: Not combustible

REACTIVITY DATA:

Stability: Stable at room temperature and under ordinary conditions of use and storage.

Hazardous decomposition products: None known

Hazardous polymerization: Will not occur

Conditions to avoid: None known

Incompatibilities: None known

MATERIAL SAFETY DATA SHEET

Pg. 16

Trade Name: PCB RISC™ Kit

MATERIAL: PCB Antibody (continued)

LEAK/SPILL DISPOSAL INFORMATION:

Steps to be taken in case of spill: N/A... this material is dried onto the plastic tube and cannot spill.

Waste disposal methods: Dispose of in a manner consistent with all Federal, State, and local regulations concerning disposal of waste material.

While the information and recommendations set forth in this document are believed to be accurate as of the revision date, EnSys Inc. makes no warranty with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

FISHER SCIENTIFIC CHEMICAL DIV -- HYDROCHLORIC ACID, MURIATIC ACID, A-144 - HYDROCHLOR
MATERIAL SAFETY DATA SHEET
NSN: 6810011458100
Manufacturer's CAGE: 1B464
Part No. Indicator: A
Part Number/Trade Name: HYDROCHLORIC ACID, MURIATIC ACID, A-144
=====

General Information
=====

Item Name: HYDROCHLORIC ACID, ACS
Company's Name: FISHER SCIENTIFIC, CHEMICAL DIV.
Company's Street: 1 REAGENT LANE
Company's City: FAIR LAWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07410
Company's Emerg Ph #: 201-796-7100 OR 201-796-7523
Company's Info Ph #: 201-796-7100
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 007
Status: SE
Date MSDS Prepared: 10MAY91
Safety Data Review Date: 23DEC91
Supply Item Manager: CX
MSDS Serial Number: BLMWK
Specification Number: O-C-265
Hazard Characteristic Code: C1
Unit Of Issue: DR
Unit Of Issue Container Qty: 6.500 GALLONS
Type Of Container: DRUM
Net Unit Weight: 65.0 LBS
=====

Ingredients/Identity Information
=====

Proprietary: NO
Ingredient: HYDROGEN CHLORIDE (HYDROCHLORIC ACID) (SARA III)
Ingredient Sequence Number: 01
Percent: 37
NIOSH (RTECS) Number: MW4025000
CAS Number: 7647-01-0
OSHA PEL: C 5 PPM
ACGIH TLV: C 5 PPM; 9192
Other Recommended Limit: NONE SPECIFIED
=====

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 02
Percent: 63
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5
OSHA PEL: NOT RELEVANT
ACGIH TLV: NOT RELEVANT
Other Recommended Limit: NONE SPECIFIED
=====

Physical/Chemical Characteristics
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Appearance And Odor: COLORLESS TO YELLOW LIQUID WITH A PUNGENT, IRRITATING
ODOR.
Boiling Point: UNKNOWN
Melting Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): UNKNOWN
Vapor Density (Air=1): 1.3
Specific Gravity: 1.2
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: UNKNOWN

Solubility In Water: COMPLETE
Viscosity: UNKNOWN
pH: 1.1
Corrosion Rate (IPY): UNKNOWN

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Fire and Explosion Hazard Data

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Flash Point: NONE
Extinguishing Media: USE WATER FOG, CARBON DIOXIDE, FOAM, OR DRY CHEMICAL FOR SURROUNDING FIRE. DO NOT PUT WATER INTO THE ACID TANK.
Special Fire Fighting Proc: WEAR A FULL FACE SELF-CONTAINED BREATHING APPARATUS AND IMPERVIOUS CLOTHING. PREVENT HUMAN EXPOSURE TO FIRE, FUMES/ PRODUCTS OF COMBUSTION.
Unusual Fire And Expl Hazrds: EXCESSIVE HEAT MAY CAUSE THE TANK TO RUPTURE. TAKE CARE NOT TO IGNITE HYDROGEN GAS WHICH CAN ACCUMULATE INSIDE METAL TANKS CONTAINING HYDROCHLORIC ACID.

=====

Reactivity Data

=====

Stability: YES
Cond To Avoid (Stability): STABLE AT NORMAL AMBIENT TEMPERATURES AND ATMOSPHERIC PRESSURE. RELEASES HYDROGEN CHLORIDE GAS WHEN HEATED.
Materials To Avoid: ACETIC ANHYDRIDE, ALCOHOLIC HYDROGEN CYANIDE, AL, 2-AMINOETHANOL, NH4OH, BASES, WATER, BRASS, STRONG OXIDIZERS, METALS, FLUORINE
Hazardous Decomp Products: WITH METALS GIVES HYDROGEN GAS, WHICH WHEN MIXED WITH AIR, MAY RESULT IN EXPLOSION OR FIRE. WITH OXIDIZER GIVES OFF CL2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

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Health Hazard Data

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LD50-LC50 Mixture: LC50 INHALATION-RAT 4701 PPM/30 MINUTES
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE-INHALATION: MAY CAUSE IRRITATION, BURNING, COUGHING, CHOKING, HEADACHE, PULMONARY EDEMA, LIVER DAMAGE & DEATH. EYES: CAN CAUSE SEVERE IRRITATION, BURNS, LOSS OF VISION. SKIN: SEVERE IRRITATION, NECROSIS & BURNS. INGESTION: MAY CAUSE SEVERE BURNS TO MOUTH, THROAT & STOMACH. DEATH MAY OCCUR. CHRONIC-BRONCHITIS, GASTRITIS, DERMATITIS
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Signs/Symptoms Of Overexp: INHALATION MAY CAUSE IRRITATION, BURNING, COUGHING, CHOKING, HEADACHE, PULMONARY EDEMA, LIVER DAMAGE & DEATH. CAN CAUSE SEVERE EYE IRRITATION, BURNS, LOSS OF VISION. MAY RESULT IN SEVERE IRRITATION, NECROSIS, ULCERATION & BURNS OF SKIN. INGESTION MAY CAUSE SEVERE BURNS TO MOUTH, THROAT & STOMACH. DEATH MAY OCCUR.
Med Cond Aggravated By Exp: PRE-EXISTING SKIN DISORDERS
IMMEDIATELY FLUSH WITH WATER FOR AT LEAST 15 MINUTES. KEEP EYELIDS OPEN. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NECESSARY. INGESTION: DO NOT USE GASTRIC LAVAGE/EMESIS. IF CONSCIOUS, DRINK LARGE AMOUNT OF WATER/ MILK. IF VOMITING OCCURS, DRINK FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED 100 FOLD TO RENDER IT HARMLESS TO TISSUE. TREAT SYMPTOMATICALLY.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: WEAR PROPER PROTECTIVE EQUIPMENT. EVACUATE AREA, KEEP UPWIND. WEAR SELF-CONTAINED BREATHING APPARATUS. DIKE LARGE SPILLS. COVER SPILLS WITH SODIUM BICARBONATE, SODA ASH, OR LIME. AVOID FOAMING. TRANSFER TO DOT APPROVED CONTAINERS. IF SMALL SPILLS, USE SAND.
Neutralizing Agent: SODA ASH, LIME, SODIUM BICARBONATE
Waste Disposal Method: CONTACT FEDERAL, COUNTY, AND LOCAL ENVIRONMENTAL REGULATORS FOR GUIDANCE REGARDING PROPER DISPOSAL.
Precautions-Handling/Storing: STORAGE-STORE IN A COOL WELL VENTILATED

PLACE AWAY FROM SUN & HEAT.STORE IN AN UPRIGHT POSITION.

Other Precautions: DANGER! CORROSIVE; BURNS EYES AND SKIN.HARMFUL IF SWALLOWED. DO NOT GET IN EYES,ON SKIN,OR ON CLOTHING.DO NOT BREATH VAPORS. KEEP CONTAINER CLOSED.DO NOT TAKE INTERNALLY.ALWAYS POUR ACID INTO WATER. REPORTABLE QUANTITY IS 5000 POUNDS.

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Control Measures
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Respiratory Protection: USE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH) OR MINE SAFETY AND HEALTH ADMINISTRATION (MSHA) APPROVED RESPIRATOR APPROPRIATE FOR THIS PRODUCT WHEN PERMISSIBLE EXPOSURE LIMITS ARE EXCEEDED.

Ventilation: PROVIDE GENERAL VENTILATION TO MEET OSHA PERMISSIBLE EXPOSURE LIMITS (OSHA PEL).

Protective Gloves: RUBBER OR NEOPRENE

Eye Protection: CHEMICAL SAFETY GOGGLES & FACE SHIELD

Other Protective Equipment: USE RUBBER SPLASH APRON AND RUBBER BOOTS.

EYEWASH AND SAFETY SHOWER SHOULD BE LOCATED NEARBY.

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
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Transportation Data
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Trans Data Review Date: 91357

DOT PSN Code: HJG

DOT Proper Shipping Name: HYDROCHLORIC ACID, SOLUTION

DOT Class: 8

DOT ID Number: UN1789

DOT Pack Group: II

DOT Label: CORROSIVE

IMO PSN Code: IEX

IMO Proper Shipping Name: HYDROCHLORIC ACID, SOLUTION

IMO Regulations Page Number: 8183

IMO UN Number: 1789

IMO UN Class: 8

IMO Subsidiary Risk Label: -

IATA PSN Code: NPG

IATA UN ID Number: 1789

IATA Proper Shipping Name: HYDROCHLORIC ACID SOLUTION

IATA UN Class: 8

IATA Label: CORROSIVE

AFI PSN Code: NPG

AFI Symbols: T

AFI Prop. Shipping Name: HYDROCHLORIC ACID, SOLUTION

AFI Class: 8

AFI ID Number: UN1789

AFI Pack Group: II

AFI Label: CORROSIVE

AFI Special Prov: A3,A6,N41

AFI Basic Pac Ref: 12-5
=====

Disposal Data
=====

Label Data
=====

Label Required: YES

Technical Review Date: 23DEC91

MFR Label Number: UNKNOWN

Label Status: F

Common Name: HYDROCHLORIC ACID,MURIATIC ACID,A-144

Signal Word: DANGER!

Acute Health Hazard-Severe: X

Contact Hazard-Severe: X

Fire Hazard-None: X

Reactivity Hazard-Slight: X

Special Hazard Precautions: ACUTE-INHALATION:MAY CAUSE IRRITATION, BURNING, COUGHING, CHOKING, HEADACHE, PULMONARY EDEMA, LIVER DAMAGE & DEATH. EYES: CAN CAUSE SEVERE IRRITATION, BURNS, LOSS OF VISION. SKIN: SEVERE IRRITATION, NECROSIS & BURNS. INGESTION: MAY CAUSE SEVERE BURNS TO MOUTH, THROAT & STOMACH. DEATH MAY OCCUR. CHRONIC-BRONCHITIS, GASTRITIS, DERMATITIS. STORAGE- STORE IN A COOL WELL VENTILATED PLACE. FIRST AID-GET MEDICAL CARE IN ALL CASES. EYES/SKIN: IMMEDIATELY FLUSH WITH WATER FOR AT LEAST 15 MINUTES. KEEP EYELIDS OPEN. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NECESSARY. INGESTION: DO NOT USE GASTRIC LAVAGE/EMESIS. IF CONSCIOUS, DRINK WATER/MILK. ACID SHOULD BE DILUTED 100 FOLDS

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: FISHER SCIENTIFIC, CHEMICAL DIV.

Label Street: 1 REAGENT LANE

Label City: FAIR LAWN

Label State: NJ

Label Zip Code: 07410

Label Country: US

Label Emergency Number: 201-796-7100 OR 201-796-7523

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

QUEMETCO -- PURE LEAD
 MATERIAL SAFETY DATA SHEET
 NSN: 965000N052418
 Manufacturer's CAGE: 9N315
 Part No. Indicator: A
 Part Number/Trade Name: PURE LEAD

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General Information

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Company's Name: QUEMETCO INC
 Company's Street: 720 SOUTH SEVENTH AVE
 Company's City: CITY OF INDUSTRY
 Company's State: CA
 Company's Country: US
 Company's Zip Code: 91745
 Company's Emerg Ph #: 214-631-6070
 Company's Info Ph #: 214-631-6070
 Record No. For Safety Entry: 001
 Tot Safety Entries This Stk#: 001
 Status: SMJ
 Date MSDS Prepared: 01DEC88
 Safety Data Review Date: 25AUG94
 MSDS Serial Number: BVMFX
 Hazard Characteristic Code: NK

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Ingredients/Identity Information

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Proprietary: NO
 Ingredient: LEAD (SARA III)
 Ingredient Sequence Number: 01
 Percent: >99.9
 NIOSH (RTECS) Number: OF7525000
 CAS Number: 7439-92-1
 OSHA PEL: SEE 1910.1025
 ACGIH TLV: 0.15 MG/M3,DUST

Proprietary: NO
 Ingredient: OTHER PRECAUT:OR LAUNDERED W/PERSONAL CLTHG. LAUNDER CONTAMD
 CLTHG BEFORE REUSE. WASH HANDS, FACE, NECK & ARMS (ING 3)
 Ingredient Sequence Number: 02
 NIOSH (RTECS) Number: 9999999Z
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
 Ingredient: ING 2:THORO BEFORE EATING, DRINKING/SMOKING. THIS PROD IS
 INTENDED FOR INDUS USE ONLY & SHOULD BE ISOLATED (ING 4)
 Ingredient Sequence Number: 03
 NIOSH (RTECS) Number: 9999999Z
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
 Ingredient: ING 3:FROM CHILDREN AND THEIR ENVIRONMENT.
 Ingredient Sequence Number: 04
 NIOSH (RTECS) Number: 9999999Z
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
 Ingredient: RESP PROT:LOCAL AND STATE REGULATIONS MAY ALSO APPLY.
 Ingredient Sequence Number: 05
 NIOSH (RTECS) Number: 9999999Z
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: VENT:HYGIENISTS, SHALL BE PROVIDED IN AREAS WHERE EXPOS ARE
ABOVE PEL/THRESHOLD LIM VALUES SPECIFIED BY OSHA (ING 7)
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 6:OR OTHER LOCAL, STATE AND FEDERAL REGULATIONS.
Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: OTHER PROT EQUIP:DISPOS OF I/A/W LOCAL, STATE & FED REGS. HARD
HAT, SFTY BOOTS & OTHER SFTY EQUIP SHOULD BE WORN (ING 9)
Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 8:AS APPROP FOR INDUS ENVIRON. PERSON CLTHG & SHOES SHOULD
BE PROTECT FROM CONTAMINATION W/THIS PRODUCT.
Ingredient Sequence Number: 09
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: HYGIENE PRAC:NON-CONTAMINATED AREAS.
Ingredient Sequence Number: 10
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: SUPDAT:REPROD HAZARDS. SEEK CONSULTATION FROM APPROP HLTH
PROFESSIONALS CONCERNING LATEST HAZARD LSIT INFO AND (ING 12)
Ingredient Sequence Number: 11
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: ING 11:SAFE HANDLING & EXPOSURE INFORMATION (FP N).
Ingredient Sequence Number: 12
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FIRST AID PROC:OCCUP EXPOS TO LEAD (29CFR 1910.1925).
Ingredient Sequence Number: 13
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
=====

Physical/Chemical Characteristics

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Appearance And Odor: SILVER-GREY METAL, TARNISHES; NO APPARENT ODOR
Boiling Point: 3164F,1740C

Melting Point: 621F, 327C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 11.3 (H*20=1)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: N/A

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Fire and Explosion Hazard Data

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Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: DRY CHEMICAL/CARBON DIOXIDE SHOULD BE USED ON SURROUNDING FIRE. DO NOT USE WATER ON FIRES WHEN MOLTEN METAL IS PRESENT.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA OPERATED IN POSITIVE-PRESS MODE AND FULL BODY PROT CLOTHING.
Unusual Fire And Expl Hazrds: MOLTEN METALS PRODUCE FUME, VAPOR, AND/OR DUST THAT MAY BE TOX AND/OR RESP IRRITANTS. THE PRODUCT, OR ITS DUST, CAN REACT VIGOROUSLY W/STRONG OXIDIZING AGENTS.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): NOT APPLICABLE
Materials To Avoid: STRONG OXIDIZERS AND THIS PRODUCT MAY LIBERATE HYDROGEN GAS.
Hazardous Decomp Products: HIGH TEMPERATURES MAY PRODUCE HEAVY METAL FUME, VAPOR AND/OR DUST.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

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Health Hazard Data

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LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:IF LEFT UNTREATED:WEAKNESS, VOMIT, LOSS OF APPETITE, UNCOORDINATED BODY MOVEMENTS, CONVULSIONS, STUPOR & POSSIBLY COMA. INHAL:DUST, VAP AND/OR FUME MAY BE IRRITATING TO RESP SYS & CAN RSLT IN BOTH ACUTE & CHRONIC OVEREXP. SKIN:DUST, VAP AND/OR FUME MAY CAUSE IRRIT. SKIN ABSORP:DUST, VAP AND/OR (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ:FUME ARE NOT READILY ABSORBED THRU SKIN. EYE:DUST, VAP AND/OR FUME MAY CAUSE IRRIT. INGEST:DUST, VAP AND/OR FUME MAY BE ABSORBED BY DIGESTIVE SYS & CAN RSLT IN BOTH ACUTE & CHRONIC OVEREXP. CHRONIC:IF LEFT UNTREATED:WEAK, INSOM, HYPERTENSION, SLIGHT IRRIT TO SKIN & EYES, METALLIC TASTE IN MOUTH, (SUPDAT)
Med Cond Aggravated By Exp: CHRONIC FORMS OF KIDNEY, HEMATOPOEITIC AND/ OR NEUROLOGIC DISEASES, PREEXISTING SKIN AND/OR RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.
Emergency/First Aid Proc: EYES:FLUSH W/COPIOUS QTYS OF COOL WATER FOR AT REMOVE FROM EXPOS. GET MED ATTN IF EXPERIENCING EFTS OF OVEREXP. INGEST:GET IMMED MED ATTN. NOTES TO PHYS:LEAD & ITS INORGAN CMPDS ARE NEUROTOXINS WHICH MAY PRODUCE PERIPHERAL NEUROPATHY. FOR AN OVERVIEW OF EFTS OF LEAD EXPOS, CONSULT OCCUP SFTY & HLTH ADMIN APPENDIX A OF (ING 13)

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: DUST MATL SHOULD BE VACUUMED, OR WET SWEEPED WHERE VACUUMING IS NOT FEASIBLE. PARTICULATE MATTER SHOULD BE STORED IN DRY

CNTNRS FOR LATER DISP. DO NOT USE COMPRESSED AIR/DRY SWEEPING AS A MEANS OF CLEANING.

Neutralizing Agent: NOT APPLICABLE

Waste Disposal Method: DISPOSE OF TOX SUBSTANCES AND HAZARDOUS WASTES IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

Precautions-Handling/Storing: STORE IN COOL, DRY AREA WHERE ACCIDENTAL CONT W/ACIDS IS NOT POSS. AVOID SKIN CONT.

Other Precautions: ADHERE TO ALL PERS PROT EQUIP PROCEDURES WHEN HANDLING, & VENT REQUIREMENTS WHEN HEAVY METAL EXPOSURES ARE ABOVE PEL OR THRESHOLD LIM VALUES. WORK CLOTHES & EQUIP SHOULD REMAIN IN DESIGNATED LEAD CONTAMD AREAS, & NEVER TAKEN HOME (ING 2)

Control Measures

Respiratory Protection: NIOSH/MSHA APPRVD RESP APPROP FOR EXPOS OF CONCERN (FP N). AS SPECIFIED BY 29CFR1910.1025 SUBPART (F) OF THE FED OCCUP SFTY & HLTH ADMIN STD OCCUP EXPOS TO LEAD. OTHER (ING 5)

Ventilation: VENT, AS DESCRIBED IN INDUS VENT, A MANUAL OF REC PRACTICE PRODUCED BY AMERICAN CONFERENCE OF GOVT INDUS (ING 6)

Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: VENTED GOGG/FACE SHIELD.

Other Protective Equipment: COVERALLS/OTHER FULL BODY CLTHG SHALL BE WORN DURING PROD USE & PROPERLY LAUNDERED AFTER USE, W/WASH WATER (ING 8)

Work Hygienic Practices: NORMAL, GOOD PERS HYGIENE PRIOR TO SMOKING, EATING/DRINKING. SMOKING, EATING & DRINKING SHOULD BE CONFINED TO (ING 10)

Suppl. Safety & Health Data: EFTS OF OVEREXP:ANEMIA, CONSTIP, HDCH, MUSCLE & JOINT PAINS, NEUROMUSCULAR DYSFUNCTION, POSS PARAL & ENCEPHALOPATHY. LEAD EXPOS CAN POSE RISK TO DEVELOPING FETUSES & MAY ALSO IMPAIR REPROD SYS IN BOTH MEN & WOMEN. DMG TO KIDNEYS, HEMATOPOEITIC AND/OR CNS MAY OCCUR. LEAD APPEARS ON NAVY LISTING OF OCCUP CHEM (ING 11)

Transportation Data

Disposal Data

Label Data

Label Required: YES

Technical Review Date: 25AUG94

Label Date: 29AUG94

Label Status: G

Common Name: PURE LEAD

Chronic Hazard: YES

Signal Word: CAUTION!

Acute Health Hazard-Slight: X

Contact Hazard-Slight: X

Fire Hazard-None: X

Reactivity Hazard-None: X

Special Hazard Precautions: ACUTE:INHALATION:DUST, VAPOR AND/OR FUME MAY IRRITATE RESPIRATORY SYSTEM. INGESTION:DUST, VAPOR AND/OR FUME MAY BE DUST, VAPOR AND/OR FUME MAY CAUSE IRRITATION. EYE CONTACT:DUST, VAPOR AND/OR FUME MAY CAUSE IRRITATION. IF ANY EXPOSURE LEFT UNTREATED, WEAKNESS, VOMITING, LOSS OF APPETITE, UNCOORDINATED BODY MOVEMENTS, CONVULSIONS, STUPOR AND POSSIBLY COMA. CHRONIC:LEAD APPEARS ON NAVY OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS LIST (FP N). CAN DAMAGE KIDNEYS, BLOOD FORMING SYSTEM OR CNS.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: QUEMETCO INC

Label Street: 720 SOUTH SEVENTH AVE

Label City: CITY OF INDUSTRY

Label State: CA

Label Zip Code: 91745
Label Country: US
Label Emergency Number: 214-631-6070

=====

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

SUBSTANCE NAME: Lead azide
CAS Number: 13424-46-9

UN Number: 0129

CLASSIFICATION OF PURE SUBSTANCE

Risk Phrases:

R3 Extreme risk of explosion by shock, friction, fire or other sources of ignition.

R20/22 Harmful by inhalation and if swallowed.

R33 Danger of cumulative effects.

Safety Phrases:

S33 Take precautionary measures against static discharges.

S34 Avoid shock and friction.

S35 This material and its container must be disposed of in a safe way..

CLASSIFICATION OF SUBSTANCE AS AN INGREDIENT IN MIXTURE

Health Hazard Classification : Harmful

Concentration Cut-off level : 25 % weight/weight

Above this concentration ingredient to be classified with R20 and/or R21 and/or R22.

When classifying a substance as an ingredient in a mixture at a particular concentration cut-off level take into account any risk phrases that apply at the lower concentration cut-off level.

MSDS - MAGNESIUM

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: MAGNESIUM
FORMULA: MG
FORMULA WT: 24.30
CAS NO.: 7439-95-4
NIOSH/RTECS NO.: OM2100000
PRODUCT CODES: 2416
EFFECTIVE: 10/24/86
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 1 SLIGHT
FLAMMABILITY - 4 EXTREME (FLAMMABLE)
REACTIVITY - 3 SEVERE (WATER REACTIVE)
CONTACT - 1 SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; CLASS D EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING

CAUSES IRRITATION

DUST MAY FORM FLAMMABLE AND EXPLOSIVE MIXTURE WITH AIR, ESPECIALLY
WHEN DAMP.

KEEP AWAY FROM HEAT, SPARKS, FLAME.

DO NOT BREATHE DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH
ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE,
DO NOT USE WATER. USE DRY SAND, EARTH OR SODA ASH. IN CASE OF SPILL,
SWEEP UP AND CAREFULLY REMOVE.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
MAGNESIUM	90-100	7439-95-4

3 - PHYSICAL DATA

BOILING POINT:	1107 C (2025 F)	VAPOR PRESSURE(MM HG):	N/A
MELTING POINT:	650 C (1202 F)	VAPOR DENSITY(AIR=1):	0.84
SPECIFIC GRAVITY:	1.74	EVAPORATION RATE:	N/A
(H2O=1)		(BUTYL ACETATE=1)	
SOLUBILITY(H2O):	DECOMPOSES	% VOLATILES BY VOLUME:	0
APPEARANCE & ODOR:	SILVERY, WHITE METALLIC POWDER.		

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 634 C (1175 F) NFPA 704M RATING: 0-1-2 W

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

SMOTHER WITH DRY SODA ASH. NEVER USE WATER OR CHEMICAL FIRE
EXTINGUISHERS.

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED
BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.
MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER
TO KEEP FIRE-EXPOSED CONTAINERS COOL.
BURNS WITH A VERY BRIGHT FLAME, FIRE GLASSES MUST BE WORN.

UNUSUAL FIRE & EXPLOSION HAZARDS

REACTS VIOLENTLY WITH WATER PRODUCING HIGHLY FLAMMABLE VAPORS.
CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE OR EXPLOSION.
DUST MAY FORM EXPLOSIVE MIXTURE WITH AIR.

TOXIC GASES PRODUCED

HYDROGEN GAS

5 - HEALTH HAZARD DATA

TLV IS LISTED FOR MAGNESIUM OXIDE FUME.

THRESHOLD LIMIT VALUE (TLV/TWA): 10 MG/M3 (PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

INHALATION OF DUST MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT.
INHALATION OF FUMES MAY RESULT IN LEUKOCYTOSIS.
CONTACT MAY CAUSE IRRITATION OF SKIN, EYES, AND MUCOUS MEMBRANES.

TARGET ORGANS

RESPIRATORY SYSTEM, EYES

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

INHALATION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

CALL A PHYSICIAN.

IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE LARGE AMOUNTS OF
WATER.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT
LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID: MOISTURE, HEAT, FLAME, OTHER SOURCES OF IGNITION
INCOMPATIBLES: STRONG OXIDIZING AGENTS, STRONG ACIDS, WATER, HALOGENS,
CYANIDES
DECOMPOSITION PRODUCTS: HYDROGEN

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES,
SMOKING, OR FLAMES IN AREA. DO NOT USE WATER.
WITH CLEAN SHOVEL, PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER.
MOVE CONTAINER(S) FROM SPILL AREA.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL
ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001, D003 (IGNITABLE, REACTIVE WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION
TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.
RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION
CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS
HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.
EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE
RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE AWAY FROM WATER OR LOCATIONS WHERE
WATER MAY BE USED TO EXTINGUISH FIRE.
STORE IN A COOL, WELL-VENTILATED AREA AWAY FROM SOURCES OF HEAT, FLAME, OR
IGNITION.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	MAGNESIUM METAL (POWDERED)
HAZARD CLASS	FLAMMABLE SOLID
UN/NA	UN1869
LABELS	FLAMMABLE SOLID, DANGEROUS WHEN WET

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	MAGNESIUM, POWDER, NON-PYROPHORIC
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HAZARD CLASS	4.3
UN/NA	UN1418
LABELS	DANGEROUS WHEN WET

FISHER SCIENTIFIC CHEMICAL DIV -- MERCURY;METALLIC MERCURY - MERCURY,ACS
 MATERIAL SAFETY DATA SHEET
 NSN: 6810006021569
 Manufacturer's CAGE: 1B464
 Part No. Indicator: A
 Part Number/Trade Name: MERCURY;METALLIC MERCURY

General Information

Item Name: MERCURY,ACS
 Company's Name: FISHER SCIENTIFIC, CHEMICAL DIV.
 Company's Street: 1 REAGENT LANE
 Company's City: FAIR LAWN
 Company's State: NJ
 Company's Country: US
 Company's Zip Code: 07410
 Company's Emerg Ph #: 201-796-7100 OR 201-796-7523
 Company's Info Ph #: 201-796-7100
 Record No. For Safety Entry: 001
 Tot Safety Entries This Stk#: 001
 Status: SM
 Date MSDS Prepared: 13JUL90
 Safety Data Review Date: 03OCT90
 Supply Item Manager: 90
 MSDS Preparer's Name: GASTON L.PILLORI
 MSDS Serial Number: BFHRF
 Hazard Characteristic Code: J6
 Unit Of Issue: LB
 Unit Of Issue Container Qty: 6 POUNDS
 Type Of Container: BOTTLE
 Net Unit Weight: 6 LB

Ingredients/Identity Information

Proprietary: NO
 Ingredient: MERCURY (SARA III)
 Ingredient Sequence Number: 01
 Percent: 100.0
 NIOSH (RTECS) Number: OV4550000
 CAS Number: 7439-97-6
 OSHA PEL: S, C, 0.1 MG/M3
 ACGIH TLV: S, 0.05 MG/M3; 9192
 Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS,SILVERY LIQUID WITH METALLIC LUSTER
 Boiling Point: 674F,357C
 Melting Point: -38F,-39C
 Vapor Pressure (MM Hg/70 F): 0.002
 Vapor Density (Air=1): 7.0
 Specific Gravity: 13.5939
 Decomposition Temperature: UNKNOWN
 Solubility In Water: INSOLUBLE
 Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: NONE
 Extinguishing Media: USE WATER FOG, CARBON DIOXIDE, FOAM, OR DRY CHEMICAL.
 Special Fire Fighting Proc: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS EXPOSED TO FIRE.
 Unusual Fire And Expl Hazrds: AVOID BREATHING CORROSIVE AND POISONOUS VAPORS. KEEP UPWIND.

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Reactivity Data
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Stability: YES
Cond To Avoid (Stability): EXCESSIVE HEAT
Materials To Avoid: AMMONIA, METALS, O₂, OXIDANTS, ACETYLINICS, BORON, DIIDOPHOSPHIDE
Hazardous Decomp Products: THERMAL DECOMPOSITION PRODUCTS INCLUDE TOXIC MERCURY VAPORS AND OXYGEN.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE
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Health Hazard Data
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LD50-LC50 Mixture: LD50 (ORAL RAT) IS UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: SKIN: IRRITATION. ABSORBED THROUGH IMMEDIATE NECROSIS IN MOUTH, THROAT, ESOPHAGUS & STOMACH. DEATH MAY OCCURE. INHALATION: DYSPNEA, COUGH, FEVER, NAUSEA & VOMITING, DIARRHEA, STOMATITIS, SALIVATION & METALLIC TASTE. CHRONIC: CNS DISTURBANCES.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: DATA PER MSDS
Signs/Symptoms Of Overexp: TREMORS, CONVULSIONS & OTHER CNS DISTURBANCES, PNEUMONITIS, CHEST PAINS, DYSPNEA, COUGHING, STOMATITIS, GINGIVITIS AND LOOSENING OF TEETH, SALIVATION, LOSS OF MEMORY, METALLIC TASTE, DIZZINESS, CLUMSINESS, SLURRED SPEECH, DIARRHEA, PAIN & NUMBNESS IN EXTREMITIES, NEPHRITIS, ANXIETY, HEADACHE, WEIGHT LOSS, AND INSOMNIA.
Med Cond Aggravated By Exp: PERSONS WITH A HISTORY OF ALCOHOLISM, CHRONIC KIDNEY DISEASE OR KNOWN ALLERGY TO MERCURY MAY BE AT INCREASED RISK FROM EXPOSURE.
Emergency/First Aid Proc: INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE CPR/OXYGEN. GET MEDICAL ATTENTION. EYE: IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR 15 MINUTES HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. SKIN: REMOVE CONTAMINATED CLOTHING. WASH SKIN WITH PLENTY OF SOAP & WATER. INGESTION: GET IMMEDIATE MEDICAL ATTENTION. A 5% SOLUTION OF SODIUM FORMALDEHYDE SULFOXYLATE MAY BE USED TO INDUCE VOMITING.
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Precautions for Safe Handling and Use
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Steps If Matl Released/Spill: SMALL SPILL: PICK UP WITH VACUUM EQUIPMENT SPECIFICALLY DESIGNED FOR MERCURY PICK UP OR USE MERCURY SPILL KIT. LARGE SPILL: EVACUATE AND VENTILATE AREA. IF POSSIBLE, STOP LEAK. DIKE TO RETAIN. VACUUM UP FREE LIQUID. DO NOT TOUCH SPILLED MATERIAL.
Neutralizing Agent: NONE
Waste Disposal Method: DO NOT INCINERATE - RETURN TO RECLAMATION CENTER.
Precautions-Handling/Storing: STORE IN SEALED UNBREAKABLE POLYETHYLENE CONTAINERS IN A COOL, DRY, WELL VENTILATED AREA AWAY FROM HEAT. PROTECT CONTAINERS FROM PHYSICAL DAMAGE.
Other Precautions: THIS CHEMICAL IS SUBJECT TO SARA SECTION 313 REPORTING. PROVIDE PREPLACEMENT AND PERIODIC MEDICAL EXAMS FOR THOSE REGULARLY EXPOSED TO MERCURY, WITH EMPHASIS ON CNS, SKIN, LUNGS, LIVER, KIDNEYS AND G.I. TRACT.
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Control Measures
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Respiratory Protection: IF VENTILATION DOES NOT MAINTAIN INHALATION EXPOSURES BELOW PEL(TLV), USE NIOSH/MSHA APPROVED RESPIRATORS AS PER CURRENT 29 CFR 1910.134, INSTRUCTIONS/WARNINGS AND NIOSH-RESPIRATOR DECISION LOGIC-PUBLICATION NUMBER 87.108.
Ventilation: PROVIDE SUFFICIENT GENERAL/LOCAL EXHAUST VENTILATION IN PATTERN/VOLUME TO CONTROL INHALATION EXPOSURES BELOW OSHA'S PEL.
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Protective Gloves: RUBBER
Eye Protection: CHEMICAL SAFETY GOGGLES
Other Protective Equipment: SEPARATE WORK AND STREET CLOTHING. STORE WORK CLOTHING IN SPECIAL LOCKERS. SHOWER BEFORE CHANGING TO STREET CLOTHES.
Work Hygienic Practices: OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND RECOMMENDED PROCEDURES.
Suppl. Safety & Health Data: DO NOT GET ON SKIN, IN EYES OR ON CLOTHING. DO NOT BREATHE VAPORS.

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Transportation Data

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Trans Data Review Date: 88165
DOT PSN Code: IWD
DOT Symbol: A,W
DOT Proper Shipping Name: MERCURY
DOT Class: 8
DOT ID Number: UN2809
DOT Pack Group: III
DOT Label: CORROSIVE
IMO PSN Code: JKJ
IMO Proper Shipping Name: MERCURY
IMO Regulations Page Number: 8191
IMO UN Number: 2809
IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: PYF
IATA UN ID Number: 2809
IATA Proper Shipping Name: MERCURY
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: PYF
AFI Prop. Shipping Name: MERCURY
AFI Class: 8
AFI ID Number: UN2809
AFI Pack Group: I
AFI Label: CORROSIVE
AFI Basic Pac Ref: 12-13

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Disposal Data

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Disposal Data Review Date: 88291
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: MSDS DATED 12-13-86/ IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U151
1st EPA Haz Wst Name New: MERCURY
1st EPA Haz Wst Char New: TOXIC (T)
1st EPA Acute Hazard New: NO

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Label Data

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Label Required: YES
Technical Review Date: 03OCT90
Label Status: F
Common Name: MERCURY;METALLIC MERCURY
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: CONTACT CAUSES BURNS TO SKIN AND EYES. IF INHALED, MAY BE HARMFUL. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES.

IRRITATION. ABSORBED THROUGH SKIN CAUSING ANURIA. EYE:IRRITATION, CORNEAL INJURY OR BURNS. INGESTION:IMMEDIATE NECROSIS IN MOUTH, THROAT, ESOPHAGUS & STOMACH. INHALATION:DYSPNEA, COUGH, FEVER, NAUSEA & VOMITING, DIARRHEA, STOMATITIS, SALIVATION & METALLIC TASTE.FIRST AID:IF INHALED OR INGESTED, REMOVE TO FRESH AIR AND CONSULT A PHYSICIAN.FOR EYES AND SKIN,FLUSH WITH PLENTY OF WATER FOR ABOUT 15-20 MINUTES AND SEEK MEDICAL ATTENTION IMMEDIATELY.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: FISHER SCIENTIFIC, CHEMICAL DIV.

Label Street: 1 REAGENT LANE

Label City: FAIR LAWN

Label State: NJ

Label Zip Code: 07410

Label Country: US

Label Emergency Number: 201-796-7100 OR 201-796-7523

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

MDC000 CAS: 628-86-4
MERCURY(II) FULMINATE (dry)**HR: 3** Hg and NO_x. See also MERCURY FULMINATE (dry).

DOT: UN 0135

mf: C₂HgN₂O₂ mw: 284.63

PROP: White solid. Mp: explodes, d: 4.42.

SYNS: FULMINATE of MERCURY, DRY (DOT) * MERCURY FULMINATE (DOT) * RCRA WASTE NUMBER P065

CONSENSUS REPORTS: Mercury and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory.

OSHA PEL: (Transitional: CL 1 mg/10m³)CL 0.1 mg(Hg)/m³ (skin)ACGIH TLV: TWA 0.1 mg(Hg)/m³ (skin)NIOSH REL: (Inorganic Mercury) TWA 0.05 mg(Hg)/m³

DOT Classification: Forbidden.

SAFETY PROFILE: An explosive sensitive to flame, heat, impact, friction, intense radiation, or contact with sulfuric acid. Self-explodes. Dangerously flammable; should be kept moist until used. Incompatible with sulfuric acid. When heated to decomposition it emits very toxic fumes of Hg and NO_x. See also MERCURY COMPOUNDS and FULMINATES.**MDC250** CAS: 628-86-4
MERCURY FULMINATE (wet)**HR: 3**

DOT: UN 0135

mf: C₂HgN₂O₂ mw: 284.63

SYNS: FULMINATE of MERCURY, WET (DOT) * INITIATING EXPLOSIVE FULMINATE of MERCURY (DOT) * RCRA WASTE NUMBER P065

CONSENSUS REPORTS: Mercury and its compounds are on the Community Right-To-Know List.

OSHA PEL: (Transitional: CL 1 mg/10m³)CL 0.1 mg(Hg)/m³ (skin)ACGIH TLV: TWA 0.1 mg(Hg)/m³ (skin)NIOSH REL: (Inorganic Mercury) TWA 0.05 mg(Hg)/m³

DOT Classification: Label: Explosive A.

SAFETY PROFILE: An explosive. It can be kept more safely in wet form. When heated to decomposition it emits very toxic fumes of

MDC500 CAS: 63937-14-4
MERCURY(II) GLUCONATE**HR: 3**

DOT: UN 1637

mf: C₆H₁₁O₇Hg mw: 395.76

PROP: White solid.

SYNS: MERCUROUS GLUCONATE * MERCUROUS GLUCONATE, solid (DOT)

CONSENSUS REPORTS: Mercury and its compounds are on the Community Right-To-Know List.

OSHA PEL: (Transitional: CL 1 mg/10m³)CL 0.1 mg(Hg)/m³ (skin)ACGIH TLV: TWA 0.1 mg(Hg)/m³ (skin)NIOSH REL: (Inorganic Mercury) TWA 0.05 mg(Hg)/m³

DOT Classification: Poison B; Label: Poison.

SAFETY PROFILE: A poison. When heated to decomposition it emits toxic fumes of Hg. See also MERCURY COMPOUNDS, ORGANIC.

MDC750 CAS: 7783-30-4
MERCURY(II) IODIDE**HR: 3**

DOT: UN 1638

mf: HgI mw: 327.49

PROP: Heavy, odorless, yellow, tetragonal crystals or amorphous powder. D: 7.70, mp: 290° when rapidly heated (partial decomp). Insol in water, alc, and ether; sol in solns of mercurous or mercuric nitrates. Protect from light.

SYNS: IODURE de MERCURE (FRENCH) * MERCUROUS IODIDE * MERCUROUS IODIDE, solid (DOT) * MERCURY PROTOIODIDE * YELLOW MERCURY IODIDE

CONSENSUS REPORTS: Mercury and its compounds are on the Community Right-To-Know List.

NIOSH REL: (Inorganic Mercury) TWA 0.05 mg(Hg)/m³

DOT Classification: Poison B; Label: Poison.

FISHER SCIENTIFIC -- METHANOL - METHANOL, TECHNICAL
MATERIAL SAFETY DATA SHEET
NSN: 6810002756010
Manufacturer's CAGE: 1B464
Part No. Indicator: A
Part Number/Trade Name: METHANOL

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General Information

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Item Name: METHANOL, TECHNICAL
Company's Name: FISHER SCIENTIFIC
Company's Street: 1 REAGENT LANE
Company's City: FAIR LAWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07410
Company's Emerg Ph #: 201-796-7100 OR 201-796-7523
Company's Info Ph #: 201-796-7100
Record No. For Safety Entry: 005
Tot Safety Entries This Stk#: 027
Status: SE
Date MSDS Prepared: 14JAN91
Safety Data Review Date: 14NOV92
Supply Item Manager: CX
MSDS Serial Number: BDSGR
Specification Number: O-M-232
Hazard Characteristic Code: F3
Unit Of Issue: CN
Unit Of Issue Container Qty: 5 GALLONS
Type Of Container: CAN, METAL
Net Unit Weight: 32.9 LBS

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: METHYL ALCOHOL (METHANOL) (SARA III)
Ingredient Sequence Number: 01
Percent: >99
NIOSH (RTECS) Number: PC1400000
CAS Number: 67-56-1
OSHA PEL: S, 200PPM/250STEL
ACGIH TLV: S, 200PPM/250STEL; 93

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR, COLORLESS LIQUID
Boiling Point: 149F, 65C
Vapor Pressure (MM Hg/70 F): 97MMHG@20C
Vapor Density (Air=1): 1.11
Specific Gravity: 0.792
Decomposition Temperature: 725F, 385C
Evaporation Rate And Ref: <1.0 (BUT ACETAT=1
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 100

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Fire and Explosion Hazard Data

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Flash Point: 52.0F, 11.1C
Flash Point Method: TCC
Lower Explosive Limit: 6.0
Upper Explosive Limit: 36.5
Extinguishing Media: DRY CHEMICAL, CARBON DIOXIDE, ALCOHOL-RESISTANT FOAM, WATER SPRAY
Special Fire Fighting Proc: USE NIOSH APPROVED SCBA WITH FULL PROTECTION FOR FIREFIGHTING. DO NOT SCATTER THE FIRE. APPLY COOLING WATER TO COOL DOWN

FIRE EXPOSED CONTAINERS.

Unusual Fire And Expl Hazrds: NONE SPECIFIED.MAY GIVE TOXIC VAPORS.

Reactivity Data

Stability: YES

Cond To Avoid (Stability): HEAT, SPARKS, FLAME.

Materials To Avoid: STRONG OXIDIZERS.

Hazardous Decomp Products: CHLOROFORM, FORMALDEHYDE

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NONE SPECIFIED

Health Hazard Data

LD50-LC50 Mixture: 5628 MG/KG ORAL RAT.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE-INGESTION:HARMFUL OR FATAL. ASPIRATION INTO LUNGS CAN CAUSE CHEMICAL PNEUMONIA AND CAN BE FATAL. INHALATION OF IRRITATION. CHRONIC-PROLONGED/REPEATED SKIN CONTACT MAY CAUSE IRRITATION, DERMATITIS.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NONE STATED.

Signs/Symptoms Of Overexp: INHHALATION: EXCESSIVE BREATHING OF VAPORS MAY CAUSE NASAL AND RESPIRATORY IRRITATION. EYES: CAUSES SEVERE IRRITATION AND BLURRED VISION; SKIN: CAUSES IRRITATION. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE AN ALLERGIC SKIN REACTION ON PROLONGED AND REPEATED CONTACT; INGESTION: MAY BE HARMFUL.CAUSES GI IRRITATION

Med Cond Aggravated By Exp: INDIVIDUALS WITH KIDNEY, EYE, OR SKIN DISORDER MAY BE AT INCREASED RISK FROM EXPOSURE OF THIS MATERIAL.

Emergency/First Aid Proc: EYE:FLUSH WITH WATER 15 MIN. SKIN:WASH WITH SOAP & WATER. INHALED:REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION OR OXYGEN AS NEEDED. INGESTED:DO NOT INDUCE VOMITING. GIVE LARGE QUANTITY OF MILK OR WATER.(NOTHING BY MOUTH IF UNCONSCIOUS.) GET IMMEDIATE MEDICAL ATTENTION. IF ANY IRRITATION PERSISTS OR IS SEVERE,GET PROMPT MEDICAL CARE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REMOVE IGNITION SOURCES. CONTAIN LIQUID. USE PERSONAL PROTECTIVE EQUIPMENT. EVACUATE AREA IF POSSIBLE. ABSORB ON VERMICULITE. SCOOP UP AND PLACE IN A SUITABLE CONTAINER. KEEP PENDING DISPOSAL INSTRUCTIONS.

Neutralizing Agent: NONE

Waste Disposal Method: CONSULT LOCAL AUTHORITIES.DISPOSAL MUST BE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. SEE EPA DISPOSAL CODE FOR METHANOL FOR DISPOSAL PROCEDURES.

Precautions-Handling/Storing: STORE IN COOL, DRY AND WELL-VENTILATED AREA. HANDLE AS CLASSIFIED FLAMMABLE LIQUIDS.

Other Precautions: DO NOT SMOKE.AVOID CONTACT WITH EYES,SKIN & CLOTHINGS. DO NOT INHALE OR INGEST.

Control Measures

Respiratory Protection: USE NIOSH APPROVED ORGANIC VAPORS RESPIRATOR OR SCBA.

Ventilation: PROVIDE MECHAN(GEN/LOCAL EXHAUST)VENT TO MAINTN <TLV

Protective Gloves: RUBBER

Eye Protection: SAFETY/CHEM GOGGLES

Other Protective Equipment: FULL PROTECTIVE CLOTHING,SAFETY SHOWER,EYE WASH STATION

Work Hygienic Practices: USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING.

Suppl. Safety & Health Data: MSDS DATED APRIL 8,1980

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Transportation Data

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Trans Data Review Date: 96060
 DOT PSN Code: JEZ
 DOT Proper Shipping Name: METHANOL, OR METHYL ALCOHOL
 DOT Class: 3
 DOT ID Number: UN1230
 DOT Pack Group: II
 DOT Label: FLAMMABLE LIQUID, POISON
 IMO PSN Code: JPB
 IMO Proper Shipping Name: METHANOL
 IMO Regulations Page Number: 3251
 IMO UN Number: 1230
 IMO UN Class: 3.2
 IMO Subsidiary Risk Label: TOXIC
 IATA PSN Code: QHQ
 IATA UN ID Number: 1230
 IATA Proper Shipping Name: METHANOL
 IATA UN Class: 3
 IATA Subsidiary Risk Class: 6.1
 IATA Label: FLAMMABLE LIQUID & TOXIC
 AFI PSN Code: QHQ
 AFI Prop. Shipping Name: METHANOL OR METHYL ALCOHOL
 AFI Class: 3
 AFI ID Number: UN1230
 AFI Pack Group: II
 AFI Label: FLAMMABLE LIQUID, POISON
 AFI Basic Pac Ref: 7-7

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Disposal Data

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Disposal Data Review Date: 88231
 Rec # For This Disp Entry: 02
 Tot Disp Entries Per NSN: 012
 Landfill Ban Item: YES
 Disposal Supplemental Data: MSDS DATED APRIL 8,1980 IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
 1st EPA Haz Wst Code New: U154
 1st EPA Haz Wst Name New: METHANOL; METHYL ALCOHOL
 1st EPA Haz Wst Char New: IGNITABLE (I)
 1st EPA Acute Hazard New: NO

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Label Data

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Label Required: YES
 Technical Review Date: 14NOV92
 Label Status: F
 Common Name: METHANOL
 Chronic Hazard: YES
 Signal Word: DANGER!
 Acute Health Hazard-Moderate: X
 Contact Hazard-Moderate: X
 Fire Hazard-Severe: X
 Reactivity Hazard-None: X
 Special Hazard Precautions: POISONOUS! CONTAIN METHYL ALCOHOL. MAY BE FATAL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION. IN CASE OF CONTACT, WASH WITH SOAP AND WATER. FLUSH EYES WITH LARGE QUANTITY OF WATER. IF SWALLOWED, DRINK LARGE AMOUNT OF WATER.. CONTACT POISON CONTROL CENTER.
 Protect Eye: Y
 Protect Skin: Y
 Protect Respiratory: Y

Label Name: FISHER SCIENTIFIC, CHEMICAL DIV.

Label Street: 1 REAGENT LANE

Label City: FAIR LAWN

Label State: NJ

Label Zip Code: 07410

Label Country: US

Label Emergency Number: 201-796-7100 OR 201-796-7523

Year Procured: 1980

=====

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FISHER SCIENTIFIC -- NITRIC ACID (A-200) - NITRIC ACID, ACS
MATERIAL SAFETY DATA SHEET
NSN: 6810007534779
Manufacturer's CAGE: 94480
Part No. Indicator: A
Part Number/Trade Name: NITRIC ACID (A-200)

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General Information
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Item Name: NITRIC ACID, ACS
Company's Name: FISHER SCIENTIFIC
Company's Street: 1 REAGENT LANE
Company's City: FAIR LAWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07410
Company's Emerg Ph #: 201-796-7100; 800-424-9300 (CHEMTREC)
Company's Info Ph #: 201-796-7100
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 002
Status: SMJ
Date MSDS Prepared: 14DEC90
Safety Data Review Date: 13FEB91
Supply Item Manager: S9M
MSDS Serial Number: BKLJY
Hazard Characteristic Code: N/

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Ingredients/Identity Information
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Proprietary: NO
Ingredient: NITRIC ACID (SARA III)
Ingredient Sequence Number: 01
Percent: 70
NIOSH (RTECS) Number: QU5775000
CAS Number: 7697-37-2
OSHA PEL: 2 PPM/4 STEL
ACGIH TLV: 2 PPM/4 STEL; 9192

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 02
Percent: 30
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: MATLS TO AVOID: OXIDIZERS. FOR MORE SPECIFIC INFORMATION
CONTACT FOCAL POINT (FP N). HLTH HAZ: HEAL SLOWLY. (SEE ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO
Ingredient: ING 3: (CHRONIC) DERMATITIS OR EFTS SIMILAR TO ACUTE EXPOS.
EYE: (ACUTE) PAIN & BURNS, POSS SEVERE. CORNEA DMG (SEE IN 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO
Ingredient: ING 4: & POSS BLINDNESS. EYE MAY BE TOTALLY DESTROYED. YELLOW
DISCOLORATION. (CHRONIC) CONJUNCTIVITIS & EFTS (SEE ING 6)
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 5:SIMILAR TO ACUTE EXPOS. INGEST:(ACUTE) BURNS/
DISCOLORATION TO MOUTH, THROAT, ESOPHAGUS. EPIGLOTTAL (SEE ING 7)

Ingredient Sequence Number: 06

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 6:EDEMA WHICH MAY RESULT IN RESP DISTRESS & ASPHYXIA. PAIN
& INABILITY TO SWALLOW OR SPEAK. EPIGASTRIC (SEE ING 8)

Ingredient Sequence Number: 07

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 7:PAIN, SHOCK W/MARKED HYPOTENSION. CIRCULATORY COLLAPSE
MAY ENSUE & IF UNCORRECTED, LEAD TO RENAL (SEE ING 9)

Ingredient Sequence Number: 08

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 8:FAILURE. POSS ESOPHAGEAL & GASTRIC PERFORATION RESULTING
IN PERITONITIS. GASTRIC & PYLORIC STRICTURE (SEE ING 10)

Ingredient Sequence Number: 09

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 9:MAY OCCUR WITHIN A FEW WEEKS/MAY BE DELAYED FOR MONTHS
OR EVEN YEARS. DEATH MAY RESULT FROM ASPHYXIA, (SEE ING 11)

Ingredient Sequence Number: 10

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 10:CIRCULATORY COLLAPSE OR ASPIRATION. (CHRONIC) INFLAMM
OR ULCERATIVE CHANGES OF THE MUCOUS MEMBRANES. (SEE ING 12)

Ingredient Sequence Number: 11

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 11:LATER DEATH MAY BE FROM PERITONITIS, SEVERE NEPHRITIS
OR PNEUMONIA. FIRST AID PROC:COVER W/STERILE (SEE ING 13)

Ingredient Sequence Number: 12

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 12:BANDAGES, GET MD IMMED. INGEST:DO NOT USE GASTRIC
LAVAGE/EMESIS. DILUTE BY GIVING LG QTY OF WATER (SEE ING 14)

Ingredient Sequence Number: 13

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 13:OR MILK. IF VOMITING PERSISTS, GIVE FLUIDS RPTDLY. ACID
MUST BE DILUTED 100 FOLD. MAINTAIN AIRWAY, (SEE ING 15)

Ingredient Sequence Number: 14

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 14:TREAT FOR SHOCK. GET MD IMMED. KEEP HEAD BELOW HIPS
WHEN VOMITING. HNDLG/STOR PREC:ORGANIC OR OTHER (SEE ING 16)

Ingredient Sequence Number: 15

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO

Ingredient: ING 15:READILY OXIDIZABLE MATLS. PROVIDE GOOD VENTILATION AND
AVOID DIRECT SUNLIGHT. SPILL PROC:KEEP (SEE ING 17)

Ingredient Sequence Number: 16

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO
Ingredient: ING 16:UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA & DENY
ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.
Ingredient Sequence Number: 17
NIOSH (RTECS) Number: 9999999ZZ
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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS TO PALE YELLOW LIQUID WITH A SUFFOCATING
ODOR.
Boiling Point: 181F, 83C
Melting Point: -44F, -42C
Vapor Pressure (MM Hg/70 F): 47.9
Vapor Density (Air=1): 3.2
Specific Gravity: 1.5027
Solubility In Water: VERY SOLUBLE
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Fire and Explosion Hazard Data

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Flash Point: N/A
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: WATER, DRY CHEMICAL OR SODA ASH. LARGER FIRES, FLOOD
AREA WITH WATER FROM A DISTANCE.
Special Fire Fighting Proc: USE NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP
(FP N). MOVE CNTNR FROM FIRE AREA IF W/O RISK. APPLY COOLING WATER TO SIDES
EXPOSED TO FLAMES UNTIL (SEE SUPP DATA)
Unusual Fire And Expl Hazrds: OXIDIZERS DECOMPOSE WHEN HEATED/INCR BURN
RATE OF COMBUST MATL. CNTCT W/EASILY OXIDIZABLE, ORG/OTHER COMBUST MATLS
MAY RESULT IN IGNIT, VIOLENT COMBUST/EXPLOS.
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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): REACTS EXOTHERMICALLY WITH WATER.
Materials To Avoid: ACETYLENE, ORGANICS, WATER, AMMONIA, AMINES, NITROGEN
DIOXIDE, CARBOHYDRATES, ORGANIC ACID, STRONG (SEE INGRED 3)
Hazardous Decomp Products: REACTS EXOTHERMICALLY WITH WATER.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT
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Health Hazard Data

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LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: INHAL:(ACUTE) SEVERE RESP IRRIT, W/POSS MUC
MEMB BURNS. PULMONARY EDEMA MAY OCCUR IMMED OR DELAYED 5-72 HRS. (CHRONIC)
EROSION OF TEETH, INFLAMMATION & POSS ULCERS TO MOUTH & POSS JAW NECROSIS.
BRONCHIAL INFLAMM & POTNTL BRONCHIAL ASTHMA. SKIN:(ACUTE) SEVERE PAIN,
BURNS & POSS YELLOW STAINS. BURNS MAY (SEE INGRED 3)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: INHAL:COUGHING, CHOKING, DIZZINESS, HEADACHE,
NAUSEA, WEAKNESS. TIGHTNESS IN CHEST, DYSPNEA, FROTHY SPUTUM & CYANOSIS,
HYPOTENSION. SKIN:PAIN & DISCOLORATION. EYE:EXCESSIVE LACRIMATION, PAIN,
PHOTOPHOBIA. INGEST:MARKED THIRST, NAUSEA, VOMITING, DIARRHEA, BLOOD TINGED
VOMITUS, WEAK PULSE, SHALLOW RESPIRATION.
Med Cond Aggravated By Exp: IMPAIRED PULMONARY FUNCTION, PRE-EXISTING EYE
AND SKIN DISORDERS.
Emergency/First Aid Proc: INHAL:REMOVE TO FRESH AIR. SUPPORT BRTHG
=====

(O*2/ARTF RESP), GET MD IMMED. SKIN:REMOVE CONTAM CLTHG/SHOES IMMED. WASH W/MILD SOAP & LG QTY OF WATER FOR AT LEAST 15-20 MINS. IN CASE OF CHEM BURNS, COVER W/DRY, STERILE DRSG, BANDAGE. GET MD IMMED. EYES:FLUSH IMMED W/LG AMTS OF WATER FOR AT LEAST 15-20 MINS. CONTINUE IRRIGATION W/STERILE WATER UNTIL PH HAS RETURNED TO NORMAL (30-60 MINS) (SEE INGRED 12)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: KEEP COMBUST AWAY FROM SPILLED MATL. DO NOT TOUCH MATL. STOP LEAK IF W/O RISK. USE WATER SPRAY TO REDUCE VAPS. DO NOT GET WATER INSIDE CNTNR. SMALL:FLUSH AREA W/FLOODING AMTS OF WATER. LG:DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. (SEE INGRED 16)
Neutralizing Agent: SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.
Waste Disposal Method: DISPOSAL MUST BE I/A/W STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262, EPA HAZARDOUS WASTE NUMBER D002. REPORTABLE QUANTITY:1000 POUNDS.
Precautions-Handling/Storing: PROTECT AGAINST PHYSICAL DAMAGE. SEPARATE FROM METALLIC POWDERS, CARBIDES, HYDROGEN SULFIDE, TURPENTINE, ORGANIC ACIDS & ALL COMBUST, (SEE INGRED 15)
Other Precautions: MAY IGNITE OTHER COMBUSTIBLE MATLS. REACTS VIOLENTLY W/ WATER AND FUELS. FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN TANKS & HOPPER CARS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

Control Measures

Respiratory Protection: USE NIOSH/MSHA APPRVD RESP EQUIP. CONC:125 MG/M3; SUPPLIED AIR RESP IN CONTINUOUS FLOW MODE. 250 MG/M3; SCBA W/FULL FACEPIECE, AIR PURIFYING, FULL FACEPIECE (GAS MASK), CHEMICAL CARTRIDGE W/ FULL FACEPIECE.
Ventilation: PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: CHEM WORKERS GOGG.MAY ADD FULL(SEE SUPP)
Other Protective Equipment: DELUGE SHOWER. EMERGENCY WASH FACILITIES, IMPERVIOUS CLOTHING AND EQUIPMENT.
Work Hygienic Practices: WASH HANDS THOROUGHLY AFTER USE AND BEFORE EATING, SMOKING OR USING SANITARY FACILITIES (FP N).
Suppl. Safety & Health Data: FIREFIGHT PROC:WELL AFTER FIRE OUT.AVOID ENDS OF TANKS. FOR MASSIVE FIRE,CARGO AREA,USE UNMANNED HOSE HOLDER/MONITOR NOZZLES; IF IMPOSS,GET OUT/LET FIRE BURN. USE FLOODING AMTS/WATER AS FOG. COOL CNTNRS W/FLOODING AMTS/WATER, APPLY FROM A FAR.AVOID BRTHG CORR VAP, KEEP UPWIND.EYE PROT:LENGTH FACE SHIELD TO GOGG(FP N).

Transportation Data

Trans Data Review Date: 91214
DOT PSN Code: KFD
DOT Proper Shipping Name: NITRIC ACID
DOT Class: 8
DOT ID Number: UN2031
DOT Pack Group: II
DOT Label: CORROSIVE
IMO PSN Code: KPF
IMO Proper Shipping Name: NITRIC ACID
IMO Regulations Page Number: 8195
IMO UN Number: 2031
IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: RWF
IATA UN ID Number: 2031
IATA Proper Shipping Name: NITRIC ACID
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: RWF
AFI Symbols: 0

AFI Prop. Shipping Name: NITRIC ACID
AFI Class: 8
AFI ID Number: UN2031
AFI Pack Group: II
AFI Label: CORROSIVE
AFI Basic Pac Ref: 12-14

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Disposal Data

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Label Data

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Label Required: YES
Technical Review Date: 10JUN91
Label Date: 10JUN91
Label Status: G
Common Name: NITRIC ACID (A-200)
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-Moderate: X
Special Hazard Precautions: ACUTE: CORROSIVE TO ALL TISSUES. SKIN: MAY CAUSE DEEP SEVERE BURNS. EYES: MAY CAUSE BLINDNESS. INGEST: MAY CAUSE SEVERE GI BURNS/ULCERATION. MAY CAUSE PERFORATIONS OF GI TRACT. MAY LEAD TO CIRCULATORY COLLAPSE AND/OR NEPHRITIS. INHAL: MAY CAUSE SEVERE RESPIRATORY IRRITATION AND PULMONARY EDEMA, PERHAPS FATAL. CHRONIC: EROSION OF TEETH, JAW NECROSIS, FREQUENT ATTACKS OF BRONCHIAL PNEUMONIA, GI DISTURBANCES.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: FISHER SCIENTIFIC
Label Street: 1 REAGENT LANE
Label City: FAIR LAWN
Label State: NJ
Label Zip Code: 07410
Label Country: US
Label Emergency Number: 201-796-7100;800-424-9300 (CHEMTREC)

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FISHER SCIENTIFIC -- C182, TETRACHLOROETHYLENE - TETRACHLOROETHYLENE, TECHNICAL
MATERIAL SAFETY DATA SHEET
NSN: 6810010319531
Manufacturer's CAGE: 1B464
Part No. Indicator: A
Part Number/Trade Name: C182, TETRACHLOROETHYLENE

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General Information

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Item Name: TETRACHLOROETHYLENE, TECHNICAL
Company's Name: FISHER SCIENTIFIC
Company's Street: 1 REAGENT LANE
Company's City: FAIR LAWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07410-2802
Company's Emerg Ph #: 201-796-7523; 800-424-9300 (CHEMTREC)
Company's Info Ph #: 201-796-7100; 201-796-7523
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Status: SMJ
Date MSDS Prepared: 13JUL90
Safety Data Review Date: 03JUN92
MSDS Serial Number: BNWBH
Hazard Characteristic Code: NK

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: ETHYLENE, TETRACHLORO-; (PERCHLOROETHYLENE) (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: KX3850000
CAS Number: 127-18-4
OSHA PEL: 100 PPM
ACGIH TLV: 25PPM/100, A3 STEL; 94

Proprietary: NO
Ingredient: SUPDAT: SUBSIDED AFTER 1-2 HRS. SEV EXPOS MAY RESULT IN
VESICULATION & POSS BURNS. ABSORP MAY OCCUR. EYE: VAPS MAY (ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 2: CAUSE MILD IRRIT. HIGHER LEVELS/DIRECT CONT MAY CAUSE
PAIN, LACRIM & BURNING, BUT SERIOUS INJURY IS (ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 3: UNLIKELY. AT 1500 PPM, IRRIT IS ALMOST INTOLERABLE.
INGEST: MAY CAUSE SEV GI IRRIT W/NAUS, VOMIT, ABDOM (ING 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 4: CRAMPS & DIARR, POSS W/BLOODY STOOLS. NARC EFTS MAY INCL
HDCH, DIZZ, EXHILARATION, INEBRIATION. CHRONIC: (ING 6)
Ingredient Sequence Number: 05

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

Proprietary: NO

Ingredient: ING 5:INHAL:WORKERS EXPOSED TO 1-40 PPM OVER 7.5 YRS SHOWED
ALTERED ELECTRODIAGNOSTIC & NEUROLOGICAL RATING (ING 7)

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

Proprietary: NO

Ingredient: ING 6:SCORES. RPTD EXPOS MAY ALSO CAUSE RESP TRACT IRRIT, CNS
DEPRESS W/OUT NARCOS, CONFUSN, HDCH, FATG, DIZZ, (ING 8)

Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 7:INEBRIATION, INSOMNIA, NAUS, ANOREXIA, ABDOM PAIN,
CONSTIP, BLURRED VISION, MULTIPLE PREMATURE VENTRICULAR (ING 9)

Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 8:BEATS & PERIPHERAL NEUROPATHY W/NUMB IN FINGERS,
TREMBLING, NEURITIS & MEMORY DEFECTS, HEPATIC DMG MAY (ING 10)

Ingredient Sequence Number: 09
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 9:OCCUR. SKIN:RPTD/PRLNG CONT MAY PRDCE DERM W/DRY, SCALY,
FISSURED SKIN. EYE:RPTD/PRLNG EXPOS MAY CAUSE (ING 11)

Ingredient Sequence Number: 10
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 10:CONJ. ONE STUDY REPORTED INCR INCIDENCE OF LACRIMAL
DUCT DISEASE IN EXPOSED WORKERS. INGEST:LONGTERM (ING 12)

Ingredient Sequence Number: 11
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 11:INGEST OF 50 MG/KG PRDCD LIVER & KIDNEY DMG IN MICE.
HAS PRDCD HEPATOCELLULAR CARCINOMAS IN MICE. TARGET (ING 13)

Ingredient Sequence Number: 12
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 12:EFTS:CNS DEPRESS. POISONING MAY ALSO AFFECT LIVER &
KIDNEYS. ALCOHOL MAY ENHANCE TOX EFTS. STIMULANTS (ING 14)

Ingredient Sequence Number: 13
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 13:SUCH AS EPINEPHRINE MAY INDUCE VENTRICULAR
FIBRILLATION, MAY BE EXCRETED IN BREAST MILK. ONE STUDY SHOWS (ING 15)

Ingredient Sequence Number: 14
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 14:INCR RISK OF LEUKEMIA FOR CHILDREN WHOSE FATHERS HAD
OCCUP EXPOS TO CHLORINATED SOLVS AFTER BIRTH OF CHILD.

Ingredient Sequence Number: 15
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: FIRST AID PROC:(APPROX 15-20 MINS). GET MD IMMED. EYE:WASH
IMMED W/LG AMTS OF H*2O/NORMAL SALINE, OCCAS LIFTING (ING 17)

Ingredient Sequence Number: 16
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 16:UPPER & LOWER LIDS, UNTIL NO EVID OF CHEM REMAINS
(APPROX 15-20 MINS). GET MD IMMED. INGEST:REMOVE BY (ING 18)

Ingredient Sequence Number: 17
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 17:GASTRIC LAVAGE/EMESIS. MAINTAIN BLOOD PRESS & AIRWAY.
GIVE O*2 IF RESP IS DEPRESSED. DO NOT PERFORM (ING 19)

Ingredient Sequence Number: 18
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 18:GASTRIC LAVAGE/EMESIS IF VICTIM IS UNCON. GET MD IMMED.
ADMIN OF GASTRIC LAVAGE/O*2 SHLD BE PERFORMED BY (ING 20)

Ingredient Sequence Number: 19
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 19:QUALIFIED MED PERS. NO SPECIFIC ANTIDOTE. TREAT
SYMPTOMATICALLY & SUPPORTIVELY.

Ingredient Sequence Number: 20
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR, COLORLESS, VOLATILE LIQUID W/MILD ETHER-LIKE
ODOR.

Boiling Point: 250F,121C

Melting Point: -2F,-19C

Vapor Pressure (MM Hg/70 F): 14 @ 20C
Vapor Density (Air=1): 5.83
Specific Gravity: 1.6227
Evaporation Rate And Ref: 2.8 (BUTYL ACETATE=1)
Solubility In Water: 0.018%

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Fire and Explosion Hazard Data

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Extinguishing Media: DRY CHEMICAL, CO*2 OR HALON. FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP (FP N). STAY AWAY FROM STOR TANK ENDS. COOL CNTNRS EXPOSED TO FLAMES W/H*20 FROM SIDE UNTIL WELL AFTER (SUPDAT)
Unusual Fire And Expl Hazrds: NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): MAY BURN BUT DOES NOT IGNITE READILY. CONTAINER MAY EXPLODE IN HEAT OF FIRE.
Materials To Avoid: AL, BA, BASES, BE, N*2O*4, METALS (LIGHT), O*2, PLASTICS, RUBBER, KOH & NAOH.
Hazardous Decomp Products: THERMAL DECOMP PRODS MAY INCLUDE HIGHLY TOX FUMES OF PHOSGENE, TOX & CORROSIVE FUMES OF CHLORIDES & CO*X.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

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Health Hazard Data

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LD50-LC50 Mixture: LD50:(ORAL,RAT)2829 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:INHAL:VAP MAY CAUSE IRRIT OF NOSE, THROAT & MUC MEMBS, FLUSHED FACE & NECK, SINUS CONGESTION, NASAL DISCHARGE, HDCH, DIZZ, LT HEAD, DROW, THICK TONGUE, TIGHTNESS AROUND MOUTH, SLURRED SPEECH, CONFUSN, INCOORD, NAUS & REVERSIBLE LIVER & KIDNEY CHANGES. OTHER REPORTED SYMPS INCL WEAK, COUGH, CHEST (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: TETRACHLOROETHYLENE:ANTICIPATED TO BE A CARCINOGEN(NTP), GRP 2B(IARC).
Signs/Symptoms Of Overexp: HLTH HAZ:PAINS, RAPID/WEAK PULSE, BLURRED VISION, IRRITABILITY, ANOREXIA, VOMIT, HALLUCINATIONS, DISTORTED PERCEPTIONS, ACIDOSIS, LATENT JAUNDICE & ABNORM LIVER FUNCS. MASSIVE EXPOS BRIEF IMMERSION CAUSES ONLY MILD IRRIT. LIQ ON SKIN FOR 40(SUPDAT)
Med Cond Aggravated By Exp: PERSONS W/PRE-EXISTING SKIN, EYE, LIVER, KIDNEY, CVS OR NEUROLOGICAL DISORDERS ARE AT INCREASED RISK FROM EXPOSURE.
Emergency/First Aid Proc: INHAL:REMOVE TO FRESH AIR IMMED. IF BRTHG HAS STOPPED, PERFORM ARTF RESP. MAINTAIN AIRWAY & BLOOD PRESS & ADMIN O*2 IF AVAIL. KEEP AFFECTED PERSON WARM & @ REST. TREAT SYMPTOMATICALLY & SUPPORTIVELY. ADMIN OF O*2 SHLD BE PERFORMED BY QUALIFIED PERS. GET MD IMMED. SKIN:REMOVE CONTAM CLTHG & SHOES IMMED. WASH AFFECTED AREA W/SOAP/ MILD DETERGENT & LG AMTS OF H*2O UNTIL NO EVID OF CHEM REMAINS(ING 16)

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: SHUT OFF IGNIT SOURCES. STOP LEAK IF W/OUT RISK. SM LIQ SPILLS, TAKE UP W/SAND, EARTH/OTHER ABSORB MATL. FOR LGR SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISP. NO SMOKING, FLAMES/FLARES IN HAZ AREA! KEEP UNNEC PEOPLE AWAY.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSAL MUST BE I/A/W STANDARDS APPLIC TO

GENERATORS OF HAZ WASTE, 40 CFR 262. EPA HAZ WASTE# U210. DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N).

Precautions-Handling/Storing: OBSERVE ALL FED, STATE & LOC REGS WHEN STORING/DISP OF SUBSTANCE. FOR ASSISTANCE, CONT DISTRICT DIRECTOR OF EPA. Other Precautions: STORE IN COOL, DRY, WELL-VENTED LOCATION, AWAY FROM ANY AREA WHERE FIRE HAZ MAY BE ACUTE. STORE AWAY FROM INCOMPATIBLE MATERIALS.

Control Measures

Respiratory Protection: SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN WORK PLACE, MUST NOT EXCEED WORKING LIMITS OF RESPIRATOR & BE JOINTLY APPROVED BY NIOSH/MSHA. FOR MORE SPECIFIC INFO CONTACT NEHC (FP N).

Ventilation: PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PEL.

Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: APPROP PROT (IMPERVIOUS) CLTHG & EQUIP TO PVNT RPTD/PRLNG SKIN CONT. EYE WASH FOUNTAIN W/IN IMMED WORK AREA.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: FIRE FIGHT PROC: FIRE IS OUT. EXTING USING AGENT(S) SUITABLE FOR TYPE OF SURROUND FIRE. AVOID CONTAM OF H₂O SOURCES & SEWERS, BUILD DIKES TO CONTAIN FLOW. AVOID BRTHG VAPS, KEEP UPWIND. EFTS OF OVEREXP: MINS RESULTED IN PROGRESSIVELY SEV BURNING SENSATION, BEGINNING W/ IN 5-10 MINS & MARKED ERYTHEMA, WHICH (ING 2)

Transportation Data

Trans Data Review Date: 92274
DOT PSN Code: NYB
DOT Proper Shipping Name: TETRACHLOROETHYLENE
DOT Class: 6.1
DOT ID Number: UN1897
DOT Pack Group: III
DOT Label: KEEP AWAY FROM FOOD
IMO PSN Code: OJV
IMO Proper Shipping Name: TETRACHLOROETHYLENE
IMO Regulations Page Number: 6264
IMO UN Number: 1897
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: XOW
IATA UN ID Number: 1897
IATA Proper Shipping Name: TETRACHLOROETHYLENE
IATA UN Class: 6.1
IATA Label: TOXIC
AFI PSN Code: XOW
AFI Prop. Shipping Name: TETRACHLOROETHYLENE
AFI Class: 6.1
AFI ID Number: UN1897
AFI Pack Group: III
AFI Label: KEEP AWAY FROM FOOD
AFI Special Prov: N36
AFI Basic Pac Ref: 10-10

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 03JUN92
Label Date: 28MAY92
Label Status: G
Common Name: C182, TETRACHLOROETHYLENE

Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE:INHALATION OF VAPORS MAY CAUSE IRRITATION OF NOSE, THROAT & MUCOUS MEMBRANES, HEADACHE, DIZZINESS, LIGHTHEADEDNESS, DROWSINESS, SLURRED SPEECH, CONFUSION, INCOORDINATION, WEAKNESS, PULMONARY EDEMA, UNCONSCIOUSNESS, COMA & DEATH. EYE CONTACT MAY CAUSE IRRITATION, PAIN, LACRIMATION & BURNING. SKIN CONTACT MAY CAUSE IRRITATION, BURNING & ERYTHEMA. INGESTION MAY CAUSE GI IRRITATION, NAUSEA, VOMITING, ABDOMINAL CRAMPS, DIARRHEA & NARCOTIC EFFECTS. CHRONIC:CANCER HAZARD.TETRACHLOROETHYLENE IS LISTED AS A CARCINOGEN.MAY CAUSE CNS DEPRESSION, LIVER & KIDNEY EFFECTS, PERIPHERAL NEUROPATHY, DERMATITIS & CONJUNCTIVITIS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: FISHER SCIENTIFIC
Label Street: 1 REAGENT LANE
Label City: FAIR LAWN
Label State: NJ
Label Zip Code: 07410-2802
Label Country: US
Label Emergency Number: 201-796-7523;800-424-9300 (CHEMTREC)

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

FISHER SCIENTIFIC -- T-324,TOLUENE - TOLUENE, ACS
MATERIAL SAFETY DATA SHEET
NSN: 6810002572487
Manufacturer's CAGE: 22527
Part No. Indicator: A
Part Number/Trade Name: T-324,TOLUENE

General Information

Item Name: TOLUENE, ACS
Company's Name: FISHER SCIENTIFIC COMPANY
Company's Street: 1 REAGENT LANE
Company's City: FAIRLAWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07410
Company's Emerg Ph #: 201-796-7100;800-424-9300 (CHEMTREC)
Company's Info Ph #: 201-796-7100
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 005
Status: SMJ
Date MSDS Prepared: 16JAN92
Safety Data Review Date: 27APR94
MSDS Serial Number: BDPHZ
Specification Number: O-C-265
Hazard Characteristic Code: F3
NRC/State License Number: N/A
Net Propellant Weight-Ammo: N/A

Ingredients/Identity Information

Proprietary: NO
Ingredient: TOLUENE (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 100 PPM; 150 STEL
ACGIH TLV: 100 PPM; 150 STEL

Proprietary: NO
Ingredient: SUPDAT:IN ALL DIRECTIONS IF TANK, RAIL CAR/TANK TRUCK INVOLVED
IN FIRE. EXTING ONLY IF FLOW CAN BE STOPPED. USE (ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 2: WATER IN FLOODING QTYS AS FOG, SOLID STREAMS MAY SPREAD
FIRE. APPLY FROM AS FAR A DIST AS POSS. KEEP UPWIND.
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: EXPLO HAZ: ELECTROCONDUCTIVITY OF SUBSTANCE, FLOW/AGITATION
MAY GENERATE ELECTROSTATIC CHARGES W/SPK & POSS IGNIT.
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: MATL TO AVOID:DIMETHYL-2,4-IMIDAZOLIDIDIONE, DINITROGEN
TETRAFLUORIDE, NITRIC ACID, NITROGEN TETROXIDE, (ING 6)
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 5:OXIDIZERS, PLASTICS, RUB & COATINGS, SILVER PERCHLORATE,
SULFUR DICHLORIDE, SULFURIC ACID.
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: EFTS OF OVEREXP:GAG, DISTRESS, ACUTE HEMORR PNEUM & PULM
EDEMA. APPROX LETHAL DOSE 15-30ML. CHRONIC: TOLUENE (ING 8)
Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 7:APPEARS ON NAVY LIST OF CHEM REPRO HAZ. SEEK
CONSULTATION FROM APPROP HLTH PROFESSIONALS CONCERNING LATEST (ING 9)
Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
MAY CAUSE MUC MEMB IRRIT, VOMIT, INSOM, NOSEBLEEDS, (ING 10)
Ingredient Sequence Number: 09
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 9:CHEST PAIN, HDCH, VERTIGO, NAUS, ANOREXIA, MOMETARY
MEMORY LOSS, TINNITUS, IMPAIRED SPEECH, VISION &/OR (ING 11)
Ingredient Sequence Number: 10
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 10:HEARING, ALCOHOL INTOLERANCE, ABNORM BLEED. SKIN:PRLNG/
RPTD CNTCT MAY CAUSE DEFAT W/DRY FISSURED DERM. (ING 12)
Ingredient Sequence Number: 11
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 11: EYES: RPTD/PRLNG CNTCT W/IRRITANTS MAY CAUSE CONJ.
Ingredient Sequence Number: 12
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FIRST AID PROC: OF CHEM REMAINS (@ LEAST 15 MIN). GET MED ATTN
IMMED. INGEST: EXTREME CARE MUST BE USED TO PVNT (ING 14)
Ingredient Sequence Number: 13

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

 Proprietary: NO

Ingredient: ING 13: ASPIR. GASTRIC LAVAGE W/CUFFED ENDOTRACHEAL TUBE IN PLACE TO PVNT ASPIR SHOULD BE DONE W/IN 15 MIN. IN (ING 15)

Ingredient Sequence Number: 14

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

 Proprietary: NO

Ingredient: ING 14: ABSENCE OF DEPRESS/CONVLS/IMPAIRED GAG REFLEX, EMESIS CAN ALSO BE INDUCED USING SYRUP OF IPECAC W/OUT (ING 16)

Ingredient Sequence Number: 15

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

 Proprietary: NO

Ingredient: ING 15: INCR HAZ OF ASPIR. TREAT SYMP & SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED PERS. GET (ING 17)

Ingredient Sequence Number: 16

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

 Proprietary: NO

Ingredient: ING 16: MED ATTN IMMED. NO SPECIFIC ANTIDOTE. TREAT SYMP & SUPPORTIVELY.

Ingredient Sequence Number: 17

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

 Proprietary: NO

Ingredient: SPILL PROC: OR FLARES IN HAZ AREA. KEEP UNNEC PERS AWAY; ISOLATE HAZ AREA & RESTRICT ENTRY. RQ: 1000 LBS.

Ingredient Sequence Number: 18

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

 Proprietary: NO

Ingredient: RESP PROT: CARTRIDGE, SCBA. 2000PPM: SUPPLIED-AIR RESP OPERATED IN CONTINUOUS FLOW MODE. SCBA W/FULL FACEPIECE. (ING 20)

Ingredient Sequence Number: 19

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

 Proprietary: NO

Ingredient: ING 19: SUPPLIED-AIR RESP W/FULL FACEPIECE. AIR-PURIFYING FULL FACEPIECE RESP (GAS MASK) W/CHIN-STYLE, FRONT- OR (ING 21)

Ingredient Sequence Number: 20

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

 Proprietary: NO

Ingredient: ING 20: BACK-MOUNTED ORG VAP CANISTER. ESCAPE: AIR-PURIFYING, FULL FACEPIECE RESP (GAS MASK) W/CHIN-STYLE, FRONT- (ING 22)

Ingredient Sequence Number: 21

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 21:OR BACK-MOUNTED ORG VAP CANISTER. APPROP ESCAPE-TYPE,
SCBA.
Ingredient Sequence Number: 22
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR, COLORLESS LIQUID; AROMATIC ODOR.
Boiling Point: 231F, 111C
Melting Point: -139F, -95C
Vapor Pressure (MM Hg/70 F): 22
Vapor Density (Air=1): 3.1
Specific Gravity: 0.868
Evaporation Rate And Ref: 2.24 (BUTYL ACETATE=1)
Solubility In Water: 0.05%
Percent Volatiles By Volume: 100
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Fire and Explosion Hazard Data

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Flash Point: 40F/4C
Flash Point Method: CC
Lower Explosive Limit: 1.2%
Upper Explosive Limit: 7.1%
Extinguishing Media: DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR
FOAM. FOR LARGER FIRES USE WATER SPRAY, FOG OR REGULAR FOAM.
Special Fire Fighting Proc: NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP (FP
N). MOVE CNTNR FROM FIRE AREA IF IT CAN BE DONE W/OUT RISK. APPLY COOLING
WATER TO SIDES OF CNTNRS EXPOS TO (SUPDAT)
Unusual Fire And Expl Hazrds: DANGEROUS FIRE HAZ WHEN EXPOS TO HEAT/FLAME.
VAPS HVR/AIR & MAY TRAVEL CONSIDERABLE DIST TO SOURCE OF IGNIT & FLASH
BACK. VAP-AIR MIX EXPLO. DUE TO LOW (ING 4)
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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: ALLYL CHLORIDE + DICHLOROETHYL ALUMINUM/ETHYLALUMINUM
SESQUICHLORIDE, BROMINE TRIFLUORIDE, 1,3-DICHLORO-5,5- (ING 5)
Hazardous Decomp Products: THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE &
IRRITATING FUMES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.
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Health Hazard Data

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LD50-LC50 Mixture: LD50: (ORAL, RAT) 2250 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHAL:2000PPM IMMED DANGEROUS TO LIFE/HLTH.
ODOR DETECTION INSUFFICIENT WARNING DUE TO OLFACTORY FATG. 100PPM:IRRIT.
200-600PPM, UP TO 8 HRS:FATG, WEAK, CONFUSN, HDCH, NAUS, IMPAIRED
COORDINATION & RXN TIME, PARESTHESIAS OF SKIN, EUPHORIA, DIZZ, DILATED
PUPILS. 800PPM:IRRIT, NASAL MUC SECRETION, METAL (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ:TASTE, DROW, IMPAIRED BALANCE W/
=====

AFTEREFTS INCL NERVOUSNESS, MUSC FATG & INSOM. DEATH MAY BE DUE TO RESP FAILURE/VENTRICULAR FIBRILLATION. SKIN: IRRIT, DRYING. EYES: IRRIT & BURNING SENSATION & ABDOM SPASMS. ASPIR MAY CAUSE COUGH, (ING 7)
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: INHAL: REMOVE TO FRESH AIR IMMED. IF BRTHG STOPPED PERFORM ARTF RESP. KEEP WARM & AT REST. TREAT SYMP & SUPPORTIVELY. GET MED ATTN IMMED. SKIN: REMOVE CONTAMD CLTHG & SHOES IMMED. WASH AREA W/ SOAP/MILD DETERGENT & LG AMTS WATER UNTIL NO EVID OF CHEM REMAINS (APPROX 15-20 MIN). GET MED ATTN IMMED. EYES: WASH IMMED W/LG AMTS WATER/NORM SALINE, OCCAS LIFTING UPPER & LOWER LIDS UNTIL NO EVID (ING 13)

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: SHUT OFF IGNIT SOURCES. STOP LEAK IF IT CAN BE DONE W/OUT RISK. USE WATER SPRAY TO REDUCE VAPS. SM SPILLS: TAKE UP W/ SAND/OTHER ABSORB MATL & PLACE INTO CNTNRS FOR LATER DISP. LG SPILLS: DIKE FAR AHEAD OF SPILL FOR LATER DISP. NO SMKNG, FLAMES (ING 18)
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER U220.
Precautions-Handling/Storing: STORE IN ACCORDANCE WITH 29 CFR 1910.106. STORE AWAY FROM INCOMPATIBLE SUBSTANCES. SEPARATE FROM OXIDIZING MATERIALS.
Other Precautions: PROTECT AGAINST PHYSICAL DMG. OUTSIDE/DETACHED STORAGE PREF. INSIDE STORAGE SHOULD BE IN STD FLAMM LIQ STORAGE ROOM/CABINET. SUBSTANCES W/LOW ELECTROCONDUCTIVITY SHOULD BE STORED IN CNTNRS WHICH MEET BONDING & GROUNDING GUIDELINES.

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Control Measures

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Respiratory Protection: RESP SELECTED MUST BE BASED ON CONTAM LEVELS 1000PPM: ANY CHEM CARTRIDGE RESP W/ORG VAP CARTRIDGE. SUPPLIED-AIR RESP. POWERED AIR-PURIFYING RESP W/ORG VAP (ING 19)
Ventilation: LOCAL/MECHANICAL.
Protective Gloves: IMPERVIOUS.
Eye Protection: SPLASH PROOF/SAFETY GOGGLES.
Other Protective Equipment: EMERGENCY EYEWASH. APPROP PROTECTIVE (IMPERVIOUS) CLOTHING & EQUIPMENT TO PREVENT REPEATED/PROLONGED SKIN CONTACT.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: FIRE FIGHT PROC: FLAMES UNTIL WELL AFTER FIRE OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER/MONITOR NOZZ. IF IMPOSS, W/DRAW FROM AREA & LET FIRE BURN. W/DRAW IMMED IF RISING SOUND FROM VENTING SFTY DEVICE/ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE (ING 2)

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Transportation Data

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Trans Data Review Date: 95163
DOT PSN Code: OJY
DOT Proper Shipping Name: TOLUENE
DOT Class: 3
DOT ID Number: UN1294
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: OSR
IMO Proper Shipping Name: TOLUENE
IMO Regulations Page Number: 3285
IMO UN Number: 1294
IMO UN Class: 3.2
IMO Subsidiary Risk Label: -
IATA PSN Code: YEL
IATA UN ID Number: 1294
IATA Proper Shipping Name: TOLUENE
IATA UN Class: 3

IATA Label: FLAMMABLE LIQUID
AFI PSN Code: YEL
AFI Prop. Shipping Name: TOLUENE
AFI Class: 3
AFI ID Number: UN1294
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

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Disposal Data

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Disposal Data Review Date: 88077
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: CONTAINER SIZE: 1 GAL CAN, 4 CLASS,V TYPE. IN
CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE
FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U220
1st EPA Haz Wst Name New: TOLUENE; METHYLBENZENE
1st EPA Haz Wst Char New: TOXIC (T)
1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D001
2nd EPA Haz Wst Name New: IGNITIBLE
2nd EPA Haz Wst Char New: IGNITABILITY
2nd EPA Acute Hazard New: NO

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Label Data

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Label Required: YES
Technical Review Date: 27APR94
Label Date: 27APR94
Label Status: G
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: EXTREMELY FLAMMABLE. ACUTE: EYES: IRRITATION,
BURNS. INGESTION/INHALATION: IRRITATION, FATIGUE, NAUSEA, WEAKNESS,
IMPAIRED COORDINATION. SKIN: IRRITATION. CHRONIC: TOLUENE APPEARS ON THE
IRRITATION, BLEEDING, SKIN: DEFATTING. EYES: CONJUNCTIVITIS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: FISHER SCIENTIFIC CO
Label Street: 1 REAGENT LANE
Label City: FAIRLAWN
Label State: NJ
Label Zip Code: 07410
Label Country: US
Label Emergency Number: 201-796-7100;800-424-9300(CHEMTREC)

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delete information in this archive please send updates to dan@siri.org.

CHEM SERVICE -- TRICHLOROETHENE, 0-664
MATERIAL SAFETY DATA SHEET
NSN: 681000N054678
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: TRICHLOROETHENE, 0-664

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General Information

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Company's Name: CHEM SERVICE INC
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381
Company's Emerg Ph #: 215-692-3026
Company's Info Ph #: 215-692-3026
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 07JAN93
Safety Data Review Date: 03NOV94
MSDS Serial Number: BVYRM
Hazard Characteristic Code: NK

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: ETHYLENE, TRICHLORO-; (TRICHLOROETHYLENE) (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: KX4550000
CAS Number: 79-01-6
OSHA PEL: 100 PPM
ACGIH TLV: 50 PPM;100 PPM STEL

Proprietary: NO
Ingredient: SUPP DATA: BRTHG ADMIN ARTF RESPS.IF PATIENT IS IN CARD ARREST
ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL(ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: ING 2: MEDICAL ASSISTANCE HAS ARRIVED. INGESTION: CALL MD
IMMEDIATELY (FP N).
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: EYE PROTECTION: FULL LENGTH FACESHIELD (FP N).
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS LIQUID.
Boiling Point: 189F,87C
Melting Point: -125F,-87C
Vapor Pressure (MM Hg/70 F): 58 @ 20C
Specific Gravity: 1.462

Solubility In Water: INSOLUBLE

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Fire and Explosion Hazard Data

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Flash Point: NON-FLAMMABLE

Lower Explosive Limit: 11%

Upper Explosive Limit: 41%

Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.

Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire And Expl Hazrds: THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HCL AND PHOSGENE (FP N).

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Reactivity Data

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Stability: YES

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

Materials To Avoid: STRONG BASES, STRONG OXIDIZING AGENTS.

Hazardous Decomp Products: DECOMPOSITION LIBERATES TOXIC FUMES.

DECOMPOSITION PRODUCTS ARE CORROSIVE. HCL, PHOSGENE (FP N).

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT.

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Health Hazard Data

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LD50-LC50 Mixture: LD50 (ORAL,RAT): 4920 MG/KG.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: CONT LENSES SHOULD NOT BE WORN IN LAB. ALL CHEMS SHOULD BE CONSIDERED HAZ-AVOID DIRECT PHYS CONT! SUSPECTED CARCIN-MAY PRDCE CANCER. MAY BE HARMFUL IF ABSORB THRU SKIN. MAY BE HARMFUL IF INHALED. MAY BE HARMFUL IF SWALLOWED. LACHRYMATOR-CAUSES SEV EYE IRRIT. VAPS &/OR DIRECT EYE CONT CAN CAUSE SEV EYE (EFTS OF OVEREXP)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT.

Signs/Symptoms Of Overexp: HLTH HAZ: BURNS. CAN CAUSE EYE IRRIT. CAN CAUSE SKIN IRRIT. CAN CAUSE SKIN BURNS. CAN CAUSE SEV SKIN BURNS. EXPOS CAN CAUSE LIVER DMG. EXPOS CAN CAUSE KIDNEY DMG. CAN CAUSE GI DISTURB. CAN BE IRRIT TO MUC MEMBS. PRLNGD EXPOS MAY CAUSE NAUS/HDCH/DIZZ &/OR EYE DMG.CAN CAUSE SENSIT BY SKIN CONT. CHLOROCARBON MATLS(SUPDAT)

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: AN ANTIDOTE IS SUBSTANCE INTENDED TO COUNTERACT EFT OF POIS. IT SHOULD BE ADMIN ONLY BY PHYS/TRAINED EMER PERS. MED ADVICE CAN BE OBTAINED FROM POIS CNTRL CNTR. EYE: FLUSH CONTINUOUSLY W/ WATER FOR AT LST 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNS HAVE OCCURED-USE SOAP & WATER TO CLEANSE SKIN. INHAL: REMOVE PATIENT TO FRESH AIR. ADMIN OXYGEN IF PATIENT IS HAVING DFCLTY (SUPDAT)

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS (FP N).

Precautions-Handling/Storing: AVOID CONTACT WITH SKIN, EYES AND CLOTHING. KEEP TIGHTLY CLOSED IN COOL DRY PLACE. STORE ONLY WITH COMPATIBLE CHEMICALS.

Other Precautions: NO SMOKING IN AREA OF USE. DO NOT USE IN GENERAL

VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFACES. HEAT AND/OR UV RADIATION MAY CAUSE FORMATION OF HCL AND/OR PHOSGENE (FP N).

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN HOOD.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGG & (ING 4)
Other Protective Equipment: USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT. EMER EYEWASH & DELUGE SHOWER WHICH MEET ANSI DESIGN STANDARDS (FP N).
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: EFTS OF OVEREXP: HAVE PRDCED SENSIT OF MYOCARDIUM TO EPINEPHRINE IN LAB ANIMALS & COULD HAVE SIMILAR EFT IN HUMANS. ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY/CHRONICALLY EXPOS TO CHLOROCARBONS (FP N). FIRST AID PROC: BRTHG. IF PATIENT HAS STOPPED (ING 2)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 03NOV94
Label Date: 26OCT94
Label Status: G
Common Name: TRICHLOROETHENE, 0-664
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: INHALATION OF VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEAT (FP N). MAY BE HARMFUL IF ABSORB THRU SEVERE BURNS/IRRITATION MAY CAUSE LIVER/KIDNEY DAMAGE, GASTROINTESTINAL DISTURBANCE. MAY CAUSE MUCOUS MEMBRANE IRRITATION. CHRONIC: NAUSEA, HEADACHE, DIZZINESS AND/OR EYE DAMAGE.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CHEM SERVICE INC
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381
Label Country: US
Label Emergency Number: 215-692-3026

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FISHER SCIENTIFIC -- T341500, TRICHLOROETHYLENE - TRICHLOROETHYLENE, ACS
 MATERIAL SAFETY DATA SHEET
 NSN: 6810013195400
 Manufacturer's CAGE: 1B464
 Part No. Indicator: A
 Part Number/Trade Name: T341500, TRICHLOROETHYLENE

General Information

Item Name: TRICHLOROETHYLENE, ACS
 Company's Name: FISHER SCIENTIFIC
 Company's Street: 1 REAGENT LANE
 Company's City: FAIR LAWN
 Company's State: NJ
 Company's Country: US
 Company's Zip Code: 07410
 Company's Emerg Ph #: 201-796-7100; 800-424-9300 (CHEMTREC)
 Company's Info Ph #: 201-796-7100
 Record No. For Safety Entry: 001
 Tot Safety Entries This Stk#: 001
 Status: SMJ
 Date MSDS Prepared: 10MAR89
 Safety Data Review Date: 25JUN92
 MSDS Serial Number: BPKRC
 Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
 Ingredient: TRICHLOROETHYLENE (SARA III)
 Ingredient Sequence Number: 01
 Percent: >99
 NIOSH (RTECS) Number: KX4550000
 CAS Number: 79-01-6
 OSHA PEL: 100 PPM/100 STEL
 ACGIH TLV: 50 PPM/100, A5STEL; 93

Proprietary: NO
 Ingredient: ANTIOXIDANT (SUCH AS AMINES OR EPOXIDES & ESTERS TO STABILIZE)
 Ingredient Sequence Number: 02
 NIOSH (RTECS) Number: 1000125AO
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
 Ingredient: CNDTNS (POLYM): STABILIZER IS REQD TO PVNT POLYMERIZATION WHEN HEATED OR EXPOSED TO SUNLIGHT.
 Ingredient Sequence Number: 03
 NIOSH (RTECS) Number: 9999999ZZ
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
 Ingredient: EFTS OF OVEREXP: WHEN IN CONT W/SOAKED CLTHG FOR LONG TIME, BLISTERING MAY OCCUR. MAY BE ABSORBED THRU SKIN. (ING 5)
 Ingredient Sequence Number: 04
 NIOSH (RTECS) Number: 9999999ZZ
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
 BURNS OF LIDS, CONJ & CORNEA W/REDNESS, TEARING & (ING 6)
 Ingredient Sequence Number: 05
 NIOSH (RTECS) Number: 9999999ZZ
 OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 5:BLURRED VISION. INGEST:SEV BURNING SENSATION IN MOUTH, THROAT & STOM, DIARR, CONFUSN, INEBRIATION & CNS (ING 7)

Ingredient Sequence Number: 06

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 6:DEPRESS (DIZZ, NAUS, HCHD, CONVLS & COMA), HDCH, AMNESIA, NUMB, WEAK OF EXTREMS & PSYCHOSIS, DEATH FROM (ING 8)

Ingredient Sequence Number: 07

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 7:RESP/CARDIAC/HEPATORNEAL FAILURE. CHRONIC:INHAL:NAUS, VOMIT, ABDOM CRAMPS, SLEEPINESS, DRUNKENNESS, (ING 9)

Ingredient Sequence Number: 08

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 8:FLUSHING, ANOREXIA, SWELL OF EYES, FACE & HANDS & MILD CARDIAC ARRYTHMIA, WHEEZING, FACIAL NERVE PARAL, (ING 10)

Ingredient Sequence Number: 09

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 9:LOSS OF COORD & SENSE OF SMELL/TASTE, DOUBLE VISION, BLINDNESS, INTOLERANCE TO ALCOHOL, BRADYCARDIA & (ING 11)

Ingredient Sequence Number: 10

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 10:ANXIETY, LIVER, KIDNEY & BRAIN DMG. REPRO EFTS REPORTED IN ANIMALS. SKIN:DERM RESULTING IN ROUGHNESS, (ING 12)

Ingredient Sequence Number: 11

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 11:CHAPPING, VESICULATION & SECONDARY INFECTION, PARAL OF FINGERS, SENSIT. CHRONIC LOW DOSE EXPOS MAY CAUSE (ING 13)

Ingredient Sequence Number: 12

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 12:INEBRIATION, IRRITABILITY & PERSONALITY CHANGES, NAUS, ANOREXIA, FATG, VISUAL IMPAIRMENT, JOINT PAIN & (ING 14)

Ingredient Sequence Number: 13

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 13:WHEEZING. EYE:CONJ & CORNEAL INFLAMM. INGEST:IRRIT OF MUC MEMBS, HDCH, DROW, FATG, GIDD, EXCITABILITY, (ING 15)

Ingredient Sequence Number: 14

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 14:INDIGESTION, NAUS, DISTURBS OF SENSATIONS IN EXTREMS & OTHER SYMPS AS IN CHRONIC INHAL. REPRO EFTS, LIVER(ING 16)

Ingredient Sequence Number: 15

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 15:LUNG NEOPLASMS REPORTED IN ANIMALS. EPINEPHRINE/OTHER STIMULANTS MAY INDUCE VENTRICULAR ARRHYTHMIAS. (ING 17)

Ingredient Sequence Number: 16

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 16:CHLOROCARBON MATLS HAVE PRDCD SENSIT OF MYOCARDIUM TO EPINEPHRINE IN LAB ANIMALS & COULD HAVE SIM EFT IN (ING 18)

Ingredient Sequence Number: 17

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 17:HUMANS. ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN (ING 19)

Ingredient Sequence Number: 18

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Other Recommended Limit: N/AE SPECIFIED

Proprietary: NO

Ingredient: ING 18:HUMANS ACUTELY/CHRONICALLY EXPOSED TO CHLOROCARBONS (FP N). FOR MORE SPEC INFO ON HLTH EFTS, CONT NEHC (FP N).

Ingredient Sequence Number: 19

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: FIRST AID PROC:NO CHEM REMAINS (APPROX 15-20 MINS). GET MD IMMED. INGEST:REMOVE BY GASTRIC LAVAGE/EMESIS. MAINT (ING 21)

Ingredient Sequence Number: 20

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 20:BLOOD PRESS & AIRWAY. GIVE O*2 IF RESP IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE/EMESIS IF VICTIM IS (ING 22)

Ingredient Sequence Number: 21

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

 Proprietary: NO
 Ingredient: ING 21:UNCON. GET MD IMMED. ADMIN OF GASTRIC LAVAGE/O*2 SHLD
 BE PERFORMED BY QUALIFIED MED PERSONNEL. NO SPEC (ING 23)
 Ingredient Sequence Number: 22
 NIOSH (RTECS) Number: 9999999Z
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
 Ingredient: ING 22:ANTIDOTE. TREAT SYMPTOMATICALLY & SUPPORTIVELY.
 Ingredient Sequence Number: 23
 NIOSH (RTECS) Number: 9999999Z
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE

Proprietary: NO
 Ingredient: SPILL PROC:FOR MORE SPECIFIC INFORMATION, CONTACT NEHC (FP N).
 Ingredient Sequence Number: 24
 NIOSH (RTECS) Number: 9999999Z
 OSHA PEL: NOT APPLICABLE
 ACGIH TLV: NOT APPLICABLE
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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS, HEAVY, MOBILE LIQUID W/MILD CHLOROFORM-
 LIKE ODOR.
 Boiling Point: 188F,87C
 Melting Point: -99F,-73C
 Vapor Pressure (MM Hg/70 F): 58 @ 20C
 Vapor Density (Air=1): 4.5
 Specific Gravity: 1.5
 Evaporation Rate And Ref: 0.69 (CCL4 = 1)
 Solubility In Water: 0.1%
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Fire and Explosion Hazard Data

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Lower Explosive Limit: 10.5% @ 25C
 Upper Explosive Limit: 8% @ 25C
 Extinguishing Media: DRY CHEMICAL, CO*2 OR HALON. FOR LARGER FIRES, USE
 WATER SPRAY, FOG OR STANDARD FOAM.
 Special Fire Fighting Proc: WEAR NIOSH/MSHA APPRVD PRESS DEMAND SCBA &
 FULL PROT EQUIP (FP N). STAY AWAY FROM STOR TANK ENDS. COOL CNTNRS EXPOSED
 TO FLAMES W/H*20 FROM SIDE UNTIL (SUPDAT)
 Unusual Fire And Expl Hazrds: SLIGHT FIRE HAZ WHEN EXPOS TO HEAT/FLAME.
 THERMAL DECOMP PRODS MAY INCL HCL & PHOSGENE (FP N). MAY BURN BUT DOES NOT
 IGNITE READILY.
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Reactivity Data

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Stability: YES
 Cond To Avoid (Stability): HIGH TEMPERATURE, OPEN FLAME OR ULTRAVIOLET
 LIGHT.
 Materials To Avoid: ALKALI, AL, METALS (PWRD), STRONG OXIDIZERS,
 EPOXIDES, O*2. FOR COMPLETE LIST OF MATLS TO AVOID, CONT NEHC (FP N).
 Hazardous Decomp Products: UPON CONT W/CERTAIN METALS, HIGH TEMPS, OPEN
 FLAME/ULTRAVIOLET LIGHT, DECOMPOSES INSTANTLY TO HIGHLY TOX & CORR (SUPDAT)
 Hazardous Poly Occur: YES
 Conditions To Avoid (Poly): MAY POLYMERIZE WHEN CATALYZED BY ALUM CHLORIDE
 IN SELF-SUSTAINING RXN WHICH MAY DEVEL TEMPS UP TO 1350C. (ING 3)
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Health Hazard Data

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LD50-LC50 Mixture: LD50:(ORAL,MOUSE)2402 MG/KG.
 Route Of Entry - Inhalation: YES
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Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE:INHAL:LOSS OF MEMORY, COMPLEX RXN TIME & MANUAL DEXTERITY, MILD RESP IRRIT, DROW, DIZZ, HDCH, NAUS, VOMIT, CRAMPS & FLUSHED SKIN. HIGHER CONCS MAY CAUSE PALLOR, PERSPIRATION, PULM EDEMA, NARCOS, FACIAL NERVE DYSFUNC, ANESTH, UNCON & COMA. NAUS & VOMIT MAY FOLLOW FOR SEVERAL HRS. ANEMIA & DMG TO (EFTS OF OVEREXP)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT

Signs/Symptoms Of Overexp: HLTH HAZ:LIVER, KIDNEYS, SPLEEN & LUNGS MAY OCCUR. DEATH MAY OCCUR FROM RESP ARREST/VENTRICULAR FIBRILLATION & PRIMARY CARDIAC FAILURE. ADDICTION OCCURRED FROM DELIB INHAL OF MOD AMTS WHICH CAUSE EUPHORIA, DISORIENTATION, VISUAL HALLUCINATIONS, DELUSIONS & OTHER PSYCHOTIC SYMPS. SKIN:IRRIT & DERM. SENSIT DERM. (ING 4)

Med Cond Aggravated By Exp: ALCOHOLIC BEVERAGES MAY ENHANCE TOXICITY.

EPINEPHRINE/STIMULANTS MAY INDUCE VENTRICULAR ARRHYTHMIAS.

Emergency/First Aid Proc: INHAL:REMOVE FROM EXPOS TO FRESH AIR IMMED. IF BRTHG HAS STOPPED, PERFORM ARTF RESP. KEEP PERS WARM & @ REST. TREAT SYMP & SUPPORTIVELY. GET MD IMMED. SKIN:REMOVE CONTAM CLTHG & SHOES IMMED. WASH AFFECTED AREA W/SOAP/MILD DETERGENT & LG AMTS OF H*2O UNTIL NO CHEM REMAINS (APPROX 15-20 MINS). GET MD IMMED. EYE:WASH IMMED W/LG AMTS OF H*2O/NORM SALINE, OCCASLIFTING UPPER & LOWER LIDS, UNTIL(ING 20)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SHUT OFF IGNIT SOURCES. STOP LEAK IF YOU CAN DO IT W/OUT RISK. FOR SM LIQ SPILLS, TAKE UP W/SAND, EARTH/OTHER ABSORB MATL. FOR LGR SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISP. NO SMOKING, FLAMES/FLARES IN HAZ AREA! KEEP UNNEC PEOPLE AWAY. (ING 24)

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: REPORTABLE QUANTITY:1000 LBS. DISPOSAL MUST BE I/ A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N).

Precautions-Handling/Storing: STORE IN COOL, DRY, WELL-VENTED LOCATION, AWAY FROM ANY AREA WHERE FIRE HAZARD MAY BE ACUTE.

Other Precautions: MAY BURN BUT DOES NOT IGNITE READILY. CNTNR MAY EXPLODE IN HEAT OF FIRE. NO SMOKING IN AREA OF USE. DO NOT USE IN GEN VICIN OF ARC WELDING, OPEN FLAMES/HOT SURFS. HEAT &/OR UV RADIA MAY CAUSE FORM OF HCL &/ OR PHOSGENE (FP N).

Control Measures

Respiratory Protection: SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAM LEVELS FOUND IN WORKPLACE & BE NIOSH/MSHA APPROVED. FOR SPECIFIC REPSIRATOR SELECTION, CONTACT NEHC (FP N).

Ventilation: PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PELS.

Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: APPROP PROT (IMPERVIOUS) CLTHG & EQUIP TO PVNT RPTD/PRLNG SKIN CONT. EMER EYEWASH & DELUGE SHOWER (FP N).

Work Hygienic Practices: CONTACT LENSES SHOULD NOT BE WORN.

Suppl. Safety & Health Data: FIRE FIGHT:WELL AFTER FIRE IS OUT. USE AGENT SUITABLE FOR TYPE OF FIRE. AVOID BRTHG TOX VAPS, KEEP UPWIND. HAZ DECOMP PROD:FUMES OF PHOSGENE &/OR HCL, CHLORINE & DICHLOROACETYL CHLORIDE. >700C VAPS DECOMPOSE TO MIXT OF DICHLOROETHYLENE, TETRACHLORETHYLENE, CARBON TETRACHLORIDE, CHLOROFORM & METHYLCHLORIDE.

Transportation Data

Trans Data Review Date: 93021

DOT PSN Code: OQK

DOT Proper Shipping Name: TRICHLOROETHYLENE

DOT Class: 6.1

DOT ID Number: UN1710
 DOT Pack Group: III
 DOT Label: KEEP AWAY FROM FOOD
 IMO PSN Code: OVL
 IMO Proper Shipping Name: TRICHLOROETHYLENE
 IMO Regulations Page Number: 6273
 IMO UN Number: 1710
 IMO UN Class: 6.1
 IMO Subsidiary Risk Label: -
 IATA PSN Code: YMD
 IATA UN ID Number: 1710
 IATA Proper Shipping Name: TRICHLOROETHYLENE
 IATA UN Class: 6.1
 IATA Label: TOXIC
 AFI PSN Code: YMD
 AFI Prop. Shipping Name: TRICHLOROETHYLENE
 AFI Class: 6.1
 AFI ID Number: UN1710
 AFI Pack Group: III
 AFI Label: KEEP AWAY FROM FOOD
 AFI Special Prov: N36
 AFI Basic Pac Ref: 10-10

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Disposal Data

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Label Data

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Label Required: YES
 Technical Review Date: 24JUN92
 Label Date: 23JUN92
 Label Status: G
 Common Name: T341500, TRICHLOROETHYLENE
 Chronic Hazard: YES
 Signal Word: DANGER!
 Acute Health Hazard-Severe: X
 Contact Hazard-Slight: X
 Fire Hazard-None: X
 Reactivity Hazard-None: X
 Special Hazard Precautions: OSHA CLASS IC. AVOID ALKALI, AL/METAL PWDRS,
 INHAL:ADDICTION, EUPHORIA, DISORIENTATION, DELUSIONS, RESP IRRIT, CNS
 EYE IRRIT, BURNS, REDNESS, BLURRED VISION, SKIN IRRIT, DERM & MAY BE
 ABSORBED IN TOX AMTS. INGEST:SEV BURNING SENSE IN MOUTH/THROAT/STOM, DIARR,
 CONFUSN, INEBRIATION, CNS DEPRESS, DEATH FROM RESP/CARDIAC FAILURE.
 CHRONIC:LIVER/KIDNEY/LUNG/BRAIN DMG, CARDIAC ARRHYTHMIA, VOMIT, CRAMPS,
 SLEEPINESS, BLINDNESS, PARAL OF FINGERS, PERSONALITY CHANGES, CONJ, REPRO
 EFTS.
 Protect Eye: Y
 Protect Skin: Y
 Protect Respiratory: Y
 Label Name: FISHER SCIENTIFIC
 Label Street: 1 REAGENT LANE
 Label City: FAIR LAWN
 Label State: NJ
 Label Zip Code: 07410
 Label Country: US
 Label Emergency Number: 201-796-7100;800-424-9300 (CHEMTREC)

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***ACETONE**

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***ACETONE**
***ACETONE**

MATERIAL SAFETY DATA SHEET

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SUBSTANCE IDENTIFICATION

SUBSTANCE: ***ACETONE**

CAS-NUMBER 67-64-1

TRADE NAMES/SYNONYMS:

DIMETHYLFORMALDEHYDE, DIMETHYLKETAL, DIMETHYL KETONE, BETA-KETOPROPANE, PROPANONE, 2-PROPANONE, PYROACETIC ETHER, B-KETOPROPANE, RCRA U002, STCC 4908105, UN 1090, A-949, A-40, A-20, A-19, A-946, A-18, A-18-S, A-18-SK, A-11, A-11-S, A-16-P, A-16-S, C3H6O,

CHEMICAL FAMILY:
KETONE, ALIPHATIC

MOLECULAR FORMULA: C-H3-C-O-C-H3

MOLECULAR WEIGHT: 58.08

CERCLA RATINGS (SCALE 0-3): HEALTH=1 FIRE=3 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ACETONE

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
ACETONE:

750 PPM (1780 MG/M3) OSHA TWA, 1000 PPM (2375 MG/M3) OSHA STEL
750 PPM (1780 MG/M3) ACGIH TWA, 1000 PPM (2375 MG/M3) ACGIH STEL
250 PPM (590 MG/M3) NIOSH RECOMMENDED 10 HOUR TWA

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS, VOLATILE LIQUID WITH A CHARACTERISTIC, SWEETISH, FRAGRANT, MINT-LIKE ODOR AND PUNGENT, SWEETISH TASTE.

BOILING POINT: 133 F (56 C) MELTING POINT: -139 F (-95 C)

SPECIFIC GRAVITY: 0.7899 VOLATILITY: 100%

VAPOR PRESSURE: 180 MMHG @ 20 C EVAPORATION RATE: (BUTYL ACETATE=1) 14.7

PH: NEUTRAL IN SOLUTION SOLUBILITY IN WATER: VERY SOLUBLE

ODOR THRESHOLD: 20 PPM VAPOR DENSITY: 2.0

SOLVENT SOLUBILITY: SOLUBLE IN ETHANOL, ETHER, CHLOROFORM, BENZENE, MOST OILS, DIMETHYLFORMAMIDE

FIRE AND EXPLOSION DATA

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

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: -4 F (-20 C) (CC) UPPER EXPLOSIVE LIMIT: 13%

LOWER EXPLOSIVE LIMIT: 2.5% AUTOIGNITION TEMP.: 869 F (465 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR ALCOHOL FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

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

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK ENDS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES. ELSE WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 26).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED. USE FLOODING AMOUNTS OF WATER AS A FOG. SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS. KEEP UPWIND. IF FIRE IS UNCONTROLLABLE OR CONTAINERS ARE EXPOSED TO DIRECT FLAME, EVACUATE TO A RADIUS OF 1500 FEET. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

WATER MAY BE INEFFECTIVE (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS, EIGHTH EDITION).

ALCOHOL FOAM (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIAL, EIGHTH EDITION).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101;
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND 172.402;
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.119
EXCEPTIONS: 49CFR173.118

TOXICITY

ACETONE:

500 PPM EYE-HUMAN IRRITATION; 395 MG OPEN SKIN-RABBIT MILD IRRITATION; 3950 UG EYE-RABBIT SEVERE IRRITATION; 20 MG/24 HOURS EYE-RABBIT MODERATE IRRITATION; 500 MG/24 HOURS SKIN-RABBIT MILD IRRITATION; 500 PPM INHALATION-HUMAN TCLO; 12000 PPM/4 HOURS INHALATION-MAN TCLO; 10 MG/M3/6 HOURS INHALATION-MAN TCLO; 440 UG/M3/6 MINUTES INHALATION-MAN TCLO; 2857 MG/KG ORAL-MAN TDLO; 1159 MG/KG UNREPORTED-MAN LDLO; 5800 MG/KG ORAL-RAT LD50; 8 GM/KG ORAL-DOG LDLO; 3000 MG/KG ORAL-MOUSE LD50; 5340 MG/KG ORAL-RABBIT LD50; 20 GM/KG SKIN-RABBIT LD50; 110 GM/M3/1 HOUR INHALATION-MOUSE LCLO; 1297 MG/KG INTRAPERITONEAL-MOUSE LD50; 8 GM/KG INTRAPERITONEAL-DOG LDLO; 500 MG/KG INTRAPERITONEAL-RAT LDLO; 1576 MG/KG INTRAVENOUS-RABBIT LDLO; 5500 MG/KG INTRAVENOUS-RAT LD50; 4 GM/KG INTRAVENOUS-MOUSE LDLO; 5000 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 5 GM/KG SUBCUTANEOUS-DOG LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS);

CARCINOGEN STATUS: NONE.

ACETONE IS A SKIN, EYE AND MUCOUS MEMBRANE IRRITANT AND CENTRAL NERVOUS SYSTEM DEPRESSANT. THE USE OF ALCOHOLIC BEVERAGES MAY ENHANCE THE TOXIC EFFECTS. PERSONS WITH CHRONIC RESPIRATORY OR SKIN DISEASES MAY BE AT AN INCREASED RISK FROM EXPOSURE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

ACETONE:

IRRITANT/NARCOTIC. 20,000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- VAPOR CONCENTRATIONS AROUND 1000 PPM MAY CAUSE SLIGHT TRANSIENT IRRITATION OF THE UPPER RESPIRATORY TRACT. EXPOSURE TO 12,000 PPM HAS CAUSED THROAT IRRITATION AND CENTRAL NERVOUS SYSTEM DEPRESSION WITH WEAKNESS OF THE LEGS, HEADACHE, DIZZINESS, DROWSINESS, NAUSEA AND A GENERAL FEELING OF MALAISE. OTHER POSSIBLE EFFECTS FROM EXPOSURE TO HIGH CONCENTRATIONS INCLUDE DRYNESS OF THE MOUTH AND THROAT, INCOORDINATION OF MOTION AND SPEECH, RESTLESSNESS, ANOREXIA, VOMITING, SOMETIMES FOLLOWED BY HEMATEMESIS, HYPOTHERMIA, DYSPNEA, SLOW, IRREGULAR RESPIRATION, SLOW, WEAK PULSE, PROGRESSIVE COLLAPSE WITH STUPOR, AND IN SEVERE CASES, COMA. LIVER DAMAGE MAY BE INDICATED BY HIGH UROBILIN LEVELS AND JAUNDICE. KIDNEY DAMAGE MAY BE INDICATED BY ALBUMIN AND RED AND WHITE BLOOD CELLS IN THE URINE. BLOOD GLUCOSE LEVELS MAY BE AFFECTED AND FATAL KETOSIS IS POSSIBLE. CHRONIC EXPOSURE- WORKERS EXPOSED TO 500 PPM/6 HOURS/6 DAYS EXPERIENCED MUCOUS MEMBRANE IRRITATION, AN UNPLEASANT SMELL, HEAVY EYES, OVERNIGHT HEADACHE, AND GENERAL WEAKNESS ACCOMPANIED BY HEMATOLOGIC CHANGES. RECOVERY OCCURRED IN SEVERAL DAYS. WORKERS EXPOSED TO 1000 PPM FOR 3 HOURS/DAY FOR 7-15 YEARS REPORTED CHRONIC INFLAMMATION OF THE RESPIRATORY TRACT, STOMACH AND DUODENUM, DIZZINESS, LOSS OF STRENGTH, AND ASTHENIA, DROWSINESS, VERTIGO, SENSATION OF HEAT, AND COUGHING HAVE ALSO BEEN REPORTED FROM CHRONIC EXPOSURE TO LOW CONCENTRATIONS. ANIMAL STUDIES SHOW ADVERSE EFFECTS ON FERTILITY WHEN FEMALES WERE EXPOSED CHRONICALLY DURING PREGNANCY.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

ACETONE:

IRRITANT.

*****ACETONE*****

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ACUTE EXPOSURE- CONTACT WITH THE LIQUID CAUSED MILD IRRITATION IN RABBITS. CELLULAR DAMAGE TO THE OUTER LAYERS OF THE EPITHELIUM WITH MILD EDEMA AND HYPEREMIA HAS BEEN DEMONSTRATED IN HUMANS, BUT WAS READILY REVERSIBLE. SMALL AMOUNTS MAY BE ABSORBED THROUGH INTACT SKIN. CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS WITH DRYING, CRACKING, AND ERYTHEMA DUE TO THE DEFATTING ACTION. THE AMOUNT ABSORBED THROUGH THE SKIN INCREASES DIRECTLY WITH THE FREQUENCY AND EXTENT OF THE EXPOSURE. 2 OF 3 GUINEA PIGS EXPOSED BY SKIN CONTACT FOR 3 WEEKS DEVELOPED CATARACTS BY THE END OF THREE MONTHS.

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 (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

ACETONE:

IRRITANT.

ACUTE EXPOSURE- IN HUMANS, VAPORS PRODUCE ONLY SLIGHT IRRITATION WHEN THE CONCENTRATION IS AT OR BELOW 1000 PPM. HOWEVER, HIGH VAPOR CONCENTRATIONS HAVE CAUSED CORNEAL EPITHELIAL AND CONJUNCTIVAL INJURY IN ANIMALS. LIQUID SPLASHED IN HUMAN EYES CAUSES AN IMMEDIATE STINGING SENSATION AND, IF WASHED PROMPTLY, DAMAGE ONLY TO THE CORNEAL EPITHELIUM CHARACTERIZED BY MICROSCOPIC GRAY DOTS AND A FOREIGN BODY SENSATION, WHICH HEALS COMPLETELY IN 1-2 DAYS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO THE VAPORS MAY CAUSE IRRITATION OR CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

ACETONE:

NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE A FRUITY OOR OF THE BREATH AND MUCOUS MEMBRANE AND GASTROENTERIC IRRITATION. IN ACUTE CASES, A LATENT PERIOD MAY BE FOLLOWED BY RESTLESSNESS AND VOMITING PROCEEDING TO HEMATEMESIS AND PROGRESSIVE COLLAPSE WITH STUPOR. HEPATORENAL LESIONS HAVE BEEN REPORTED. THE BLOOD GLUCOSE LEVEL MAY BE AFFECTED AND KETOSIS MAY BE FATAL. 10-20 MILLILITERS HAVE BEEN TOLERATED WITHOUT ILL EFFECTS. 200 MILLILITERS HAVE CAUSED STUPOR WITHIN A HALF HOUR, FLUSHED CHEEKS, SHALLOW RESPIRATION, AND COMA WHICH LASTED FOR 12 HOURS. RENAL GLUCOSURIA PERSISTED FOR 5 MONTHS. CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS AND CONSIDER USING ACTIVATED CHARCOAL. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS ON AN UNCONSCIOUS PERSON. MAINTAIN BLOOD PRESSURE AND RESPIRATION. GIVE OXYGEN IF RESPIRATION IS SHALLOW OR ANOXIA IS PRESENT. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.) TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. LAVAGE AND OXYGEN MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

ACETONE:

ACIDS: INCOMPATIBLE.
AMINES (ALIPHATIC): INCOMPATIBLE.
BROMINE: VIOLENT REACTION WITH EXCESS AMOUNTS OF BROMINE.
BROMINE TRIFLUORIDE: EXPLOSION ON CONTACT.
BROMOFORM: VIOLENT REACTION IN PRESENCE OF BASES (E.G. POTASSIUM HYDROXIDE).
CHLOROFORM: VIOLENT REACTION IN PRESENCE OF A BASE.
CHROMIUM TRIOXIDE: IGNITION ON CONTACT AT AMBIENT TEMPERATURE.
CHROMYL CHLORIDE: INCANDESCENT REACTION.
DIOXYGEN DIFLUORIDE + SOLID CARBON DIOXIDE: EXPLOSION AT -78 C.
HEXACHLOROMELAMINE: POSSIBLE EXPLOSION.
HYDROGEN PEROXIDE: EXPLOSION.
NITRIC ACID: IGNITION.
NITRIC + ACETIC ACID MIXTURE: POSSIBLE EXPLOSION.
NITRIC + SULFURIC ACID MIXTURE: VIOLENT OXIDATION.
NITROSYL CHLORIDE: EXPLOSIVE REACTION.
NITROSYL PERCHLORATE: IGNITION AND EXPLOSION.
NITRYL PERCHLORATE: IGNITION AND EXPLOSION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
PERMONOSULFURIC ACID: EXPLOSION.
PLASTICS: INCOMPATIBLE.
PLATINUM + NITROSYL CHLORIDE: POSSIBLE EXPLOSION.
POTASSIUM-TERT-BUTOXIDE: IGNITION.
RAYON: INCOMPATIBLE.
SODIUM HYPOBROMITE: EXPLOSION.
SODIUM HYPOIODITE: POSSIBLE EXPLOSION.
SULFUR DICHLORIDE: VIOLENT REACTION.
SULFURIC ACID AND POTASSIUM BICHROMATE: IGNITION.
THIODIGLYCOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.
THIOURAZYL PERCHLORATE: POSSIBLE EXPLOSION.
1,1,1-TRICHLOROETHANE: EXOTHERMIC CONDENSATION BY A BASIC CATALYST.
TRICHLOROMELAMINE: POSSIBLE EXPLOSION.
SEE ALSO KETONES.

KETONES:

ACETALOEHYDE: VIOLENT CONOENSATION REACTION.

DIACETONEIII
NITRIC ACID + HYDROGEN PEROXIDE: FORMATION OF EXPLOSIVE PRODUCT.
PERCHLORIC ACID: VIOLENT DECOMPOSITION.

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DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

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.

IIISTORAGEIII

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983. RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

IIIDISPOSALIII

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE. 40CFR 262. EPA HAZARDOUS WASTE NUMBER U002.

CONDITIONS TO AVOID

MAY BE IGNITED BY HEAT, SPARKS OR FLAMES. CONTAINER MAY EXPLODE IN HEAT OF FIRE. VAPOR EXPLOSION HAZARD INDOORS, OUTDOORS OR IN SEWERS. RUN-OFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 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 GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

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 OR NIOSH CRITERIA DOCUMENTS, OR DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

1000 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

6250 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

12,500 PPM- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

20,000 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

ACETONE

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

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 09/06/84 REVISION DATE: 04/03/89

-ADDITIONAL INFORMATION-

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ACETIC ACID, GLACIAL
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MATERIAL SAFETY DATA SHEET

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SUBSTANCE IDENTIFICATION

SUBSTANCE: ***ACETIC ACID, GLACIAL***

CAS-NUMBER 64-19-7

TRADE NAMES/SYNONYMS:
ACETIC ACID, GLACIAL ACETIC ACID, ETHANOIC ACID, VINEGAR ACID, ETHYLIC ACID,
PYROLIGNEOUS ACID, METHANECARBOXYLIC ACID, STCG 4911303, UN 2789,
A-37, A-38, A-38C, A-38-P, A-38-SI, A-38-S, A-507, A-465, C2H4O2, ACC00120

CHEMICAL FAMILY:
CARBOXYLIC ACID, ALIPHATIC

MOLECULAR FORMULA: C-H3-C-O2-H

MOLECULAR WEIGHT: 60.05

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=2 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=2 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: ACETIC ACID, GLACIAL

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

ACETIC ACID, GLACIAL:
10 PPM (25 MG/M3) OSHA TWA
10 PPM (25 MG/M3) ACGIH TWA, 15 PPM (37 MG/M3) ACGIH STEL

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH A STRONG, PUNGENT, CHARACTERISTIC
ODOR OF VINEGAR AND WHEN WELL DILUTED WITH WATER, AN ACID TASTE.

BOILING POINT: 244 F (118 C) MELTING POINT: 62 F (17 C)

SPECIFIC GRAVITY: 1.0492 VAPOR PRESSURE: 11.8 MMHG @ 20 C

EVAPORATION RATE: (BUTYL ACETATE=1) 0.97 PH: 2.4 (1.0 M SOL.)

SOLUBILITY IN WATER: VERY SOLUBLE ODOR THRESHOLD: 1.0 PPM

VAPOR DENSITY: 2.07

SOLVENT SOLUBILITY: SOLUBLE IN ETHANOL, GLYCEROL, ETHER, ACETONE, BENZENE,
CARBON TETRACHLORIDE, INSOLUBLE IN CARBON DISULFIDE, CHLOROFORM, DIMETHYL
SULFOXIDE

VISCOSITY: 1.22 CPS @ 20 C

FIRE AND EXPLOSION DATA

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

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.

FLASH POINT: 103 F (39 C) (CC) UPPER EXPLOSIVE LIMIT: 19.9% @ 200 F

4/14/95

LOWER EXPLOSIVE LIMIT: 4.0% AUTOIGNITION TEMP.: 867 F (464 C)

FLAMMABILITY CLASS(OSHA): II

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM
(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. DO NOT GET WATER INSIDE CONTAINER.
COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS
OUT. STAY AWAY FROM STORAGE TANK ENDS. WITHDRAW IMMEDIATELY IN CASE OF RISING
SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF STORAGE TANK DUE TO
FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 29).

USE FLOODING AMOUNTS OF WATER AS A FOG. SOLID STREAMS MAY BE INEFFECTIVE.
COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS
POSSIBLE. USE WATER SPRAY TO ABSORB CORROSIVE VAPORS. AVOID BREATHING
CORROSIVE VAPORS. KEEP UPWIND.

ALCOHOL FOAM (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIAL, EIGHTH
EDITION).

FIRE FIGHTING PHASES: USE WATER SPRAY, DRY CHEMICAL, ALCOHOL FOAM, OR CARBON
DIOXIDE. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF A LEAK OR SPILL
HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROTECT THE MEN
ATTEMPTING TO STOP A LEAK. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM
EXPOSURES AND TO DILUTE SPILLS TO NONFLAMMABLE MIXTURES (NFPA 49, HAZARDOUS
CHEMICALS DATA, 1975).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.245
EXCEPTIONS: 49CFR173.244

TOXICITY

ACETIC ACID, GLACIAL:
IRRITATION DATA: 50 MG/24 HOURS SKIN-HUMAN MILD; 525 MG OPEN SKIN-RABBIT
SEVERE; 50 MG/24 HOURS SKIN-RABBIT MILD; 50 UG OPEN EYE-RABBIT SEVERE;
20 MG/24 HOURS SKIN-RABBIT MODERATE; 5 MG/30 SECONDS RINSED EYE-RABBIT MILD.
TOXICITY DATA: 816 PPM/3 MINUTES INHALATION-HUMAN LCLO, 16,000 PPM/4 HOURS
INHALATION-RAT LCLO, 5620 PPM/1 HOUR INHALATION-MOUSE LC50, 1060 MG/KG
SKIN-RABBIT LD50, 1470 UG/KG ORAL-HUMAN TDLO, 3530 MG/KG ORAL-RAT LD50,
1200 MG/KG ORAL-RABBIT LDLO, 525 MG/KG INTRAVENOUS-MOUSE LD50, 308 MG/KG
UNREPORTED-MAN LDLO, 1200 MG/KG SUBCUTANEOUS-MOUSE LDLO, 1200 MG/KG
RECTAL-RABBIT LDLO, MUTAGENIC DATA (RTECS), REPRODUCTIVE EFFECTS DATA
(RTECS).

CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE- EYE, SKIN, MUCOUS MEMBRANES.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION, DERMAL ABSORPTION,
INGESTION.
TARGET EFFECTS: POISONING MAY AFFECT THE LIVER, KIDNEYS, AND CARDIOVASCULAR
SYSTEM.
AT INCREASED RISK: PERSONS WITH A HISTORY OF RESPIRATORY, SKIN OR EYE DISEASE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
ACETIC ACID, GLACIAL:
CORROSIVE, 1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION OF THE RESPIRATORY TRACT. 50 PPM
OR MORE IS INTOLERABLE TO MOST PERSONS AND RESULTS IN PHARYNGEAL EDEMA
AND CHRONIC BRONCHITIS. OTHER SYMPTOMS MAY INCLUDE COUGHING, DYSPNEA,
SHORTNESS OF BREATH, LARYNGITIS, PULMONARY EDEMA, BRONCHOPNEUMONIA AND
HYPOTENSION.
CHRONIC EXPOSURE- WORKERS REPEATEDLY EXPOSED TO CONCENTRATIONS UP TO 200
PPM HAVE BEEN FOUND TO SUFFER FROM PALPEBRAL EDEMA WITH HYPERTROPHY OF
THE LYMPH NODES, CHRONIC PHARYNGITIS, CHRONIC BRONCHITIS AND IN SOME
CASES, ASTHMATIC BRONCHITIS AND TRACES OF EROSION OF THE TEETH. COMPLAINTS
OF DIGESTIVE DISORDERS WITH PYROSIS AND CONSTIPATION HAVE ALSO BEEN
REPORTED.

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

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IMMEDIATELY.**SKIN CONTACT:****ACETIC ACID, GLACIAL:****CORROSIVE.**

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE SEVERE IRRITATION WITH PAIN, ERYTHEMA, BLISTERS, BURNS AND SUPERFICIAL DESTRUCTION OF THE SKIN WITH SLOW HEALING. THE SKIN MAY BECOME BLACKENED, HYPERKERATOTIC AND FISSURED.

CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT MAY CAUSE DARKENING OF THE SKIN, IRRITATION AND DERMATITIS.

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.

EYE CONTACT:**ACETIC ACID, GLACIAL:****CORROSIVE.**

ACUTE EXPOSURE- DIRECT CONTACT CAUSES SEVERE IRRITATION, LACRIMATION, CORNEAL EROSION, OPACIFICATION, IRITIS AND POSSIBLY LOSS OF SIGHT IN HUMANS. REGENERATION OF THE EPITHELIUM MAY TAKE MANY MONTHS, BUT CORNEAL ANESTHESIA AND OPACITY WILL USUALLY BE PERMANENT. IN LESS SEVERE CASES, CONJUNCTIVITIS, PHOTOPHOBIA AND HYPEREMIA OF THE CONJUNCTIVA OCCURRED. THE VAPOR AND DILUTE SOLUTIONS MAY CAUSE CONJUNCTIVAL HYPEREMIA AND SOMETIMES INJURY TO THE CORNEAL EPITHELIUM.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE, EFFECTS SIMILAR TO ACUTE EXPOSURE MAY OCCUR.

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:**ACETIC ACID, GLACIAL:****CORROSIVE.**

ACUTE EXPOSURE- IN CASES OF ACCIDENTAL INGESTION, SEVERE ULCERONECROTIC LESIONS OF THE UPPER DIGESTIVE TRACT, STRICTURE OF THE ESOPHAGUS, AND PERFORATION OF THE ESOPHAGUS AND PYLORUS HAVE BEEN OBSERVED WITH HEMATEMESIS, DIARRHEA, SHOCK, HEMOGLOBINURIA FOLLOWED BY ANURIA AND UREMIA. OTHER SYMPTOMS MAY INCLUDE VOMITING, ABDOMINAL SPASMS, THIRST, DIFFICULTY IN SWALLOWING, HYPOTHERMIA, RAPID AND WEAK PULSE, SLOW AND SHALLOW BREATHING, LARYNGITIS, BRONCHITIS, PULMONARY EDEMA, PNEUMONIA, HEMOLYSIS, ALBUMINURIA, HEMATURIA, TWITCHING, CONVULSIONS, CARDIOVASCULAR COLLAPSE, SHOCK AND DEATH. EFFECTS ON THE NEWBORN HAVE BEEN REPORTED IN RATS FROM 700 MG/KG, ADMINISTERED 18 DAYS AFTER GESTATION.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY BY DRINKING LARGE QUANTITIES OF WATER OR MILK. IF VOMITING PERSISTS, ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

REACTS EXOTHERMICALLY WITH WATER.

INCOMPATIBILITIES:**ACETIC ACID, GLACIAL:**

ACETALDEHYDE: VIOLENT, EXOTHERMIC POLYMERIZATION REACTION.

ACETIC ANHYDRIDE + WATER: VIOLENT, EXOTHERMIC REACTION.

2-AMINOETHANOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

AMMONIUM NITRATE: IGNITES ON WARMING, ESPECIALLY IF CONCENTRATED.

5-AZIDOTETRAZOLE: POSSIBLE EXPLOSIVE REACTION.

BASES: EXOTHERMIC REACTION.

BROMINE PENTAFLUORIDE: FIRE AND EXPLOSION HAZARD.

CARBONATES: INCOMPATIBLE.

CHLORINE TRIFLUORIDE: VIOLENT, POSSIBLY EXPLOSIVE REACTION.

CHLOROSULFONIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

CHROMIC ACID: EXPLOSIVE REACTION IF NOT KEPT COLD.

CHROMIUM TRIOXIDE: POSSIBLE FIRE AND EXPLOSION HAZARD.

DIALLYL METHYL CARBINOL AND OZONE: EXPLOSIVE REACTION.

ETHYLENE DIAMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ETHYLENEIMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

HYDROGEN PEROXIDE: EXOTHERMIC REACTION ON HEATING WITH THE PRODUCTION OF

PERACETIC ACID WHICH WILL EXPLODE AT 110 C.

HYDROXIDES: INCOMPATIBLE.

LEAD: CORRODES.

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METALS: ATTACKS MOST METALS, INCLUDING ZINC.
NITRIC ACID: EXPLOSIVE REACTION IF NOT KEPT COLD.
NITRIC ACID AND ACETONE: EXPLOSIVE REACTION (DELAYED) IN CLOSED CONTAINER.
OLEUM: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
OXIDIZERS: VIOLENT REACTION.
PERCHLORIC ACID: EXPLOSIVE REACTION.
PERMANGANATES: EXPLOSIVE REACTION IF NOT KEPT COLD.
PHOSPHATES: INCOMPATIBLE.
PHOSPHORUS ISOCYANATE: VIOLENT REACTION.
PHOSPHORUS TRICHLORIDE: EXPLOSIVE REACTION.
POTASSIUM HYDROXIDE: VIOLENT REACTION.
POTASSIUM PERMANGANATE: POSSIBLE EXPLOSION IF INADEQUATELY COOLED.
POTASSIUM TERT-BUTOXIDE: IGNITION REACTION.
SODIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
SODIUM PEROXIDE: EXPLOSIVE REACTION IF NOT KEPT COLD.
XYLENE: MAY FORM DETONABLE MIXTURES DURING TERPHTHALIC ACID PRODUCTION, THE PRESENCE OF WATER MAY DECREASE THE HAZARD.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

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****

PROTECT AGAINST PHYSICAL DAMAGE. DETACHED STORAGE IS PREFERRED. SEPARATE FROM OXIDIZING MATERIALS AND AVOID STORAGE NEAR COMBUSTIBLE MATERIALS. KEEP ABOVE ITS FREEZING POINT (62 F) TO AVOID RUPTURE OF CARBOYS AND GLASS CONTAINERS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES OR OTHER IGNITION SOURCES. VAPORS MAY BE EXPLOSIVE. MATERIAL IS CORROSIVE. AVOID CONTACT WITH SKIN OR EYES. DO NOT ALLOW CONTAMINATION OF WATER SOURCES.

USUAL SHIPPING CONTAINERS:

GLASS AND POLYETHYLENE CARBOYS AND POLYETHYLENE-LINED DRUMS, TANK BARGES (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

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 WITH CAUSTIC SODA (NAOH) OR SODA ASH (NA2CO3)

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

WATER USED TO KNOCK DOWN VAPORS MAY BECOME CORROSIVE OR TOXIC AND SHOULD BE CONTAINED PROPERLY FOR LATER DISPOSAL.

WATER SPILL:
NEUTRALIZE WITH CAUSTIC SODA.

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT GET WATER INSIDE CONTAINER. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS,

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DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 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 155.40). 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 VENTILATION SYSTEM 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, 29CFR1910 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).

ACETIC ACID, GLACIAL:

250 PPM- SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.
POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).

500 PPM- CHEMICAL CARTRIDGE RESPIRATOR WITH FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S).
SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE.
SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE.
AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
POWERED AIR-PURIFYING RESPIRATOR WITH TIGHT-FITTING FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S).

1000 PPM- SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

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

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

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

EMERGENCY WASH FACILITIES:

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

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 09/06/84 REVISION DATE: 09/29/89

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ZINC POWDER OR DUST, NONPYROPHORIC

ZINC POWDER OR DUST, NONPYROPHORIC

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ZINC POWDER OR DUST, NONPYROPHORIC

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
AFTER BUSINESS HOURS, HOLIDAYS:
(201) 796-7523
CHEMTREC ASSISTANCE: (800) 429-9300

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 7440-66-6

SUBSTANCE: **ZINC POWDER OR DUST, NONPYROPHORIC**

TRADE NAMES/SYNONYMS:

ZINC DUST; ZINC POWDER, BLUE POWDER, GRANULAR ZINC, C.I. 77945;
C.I. PIGMENT BLACK 16; C.I. PIGMENT METAL 6; UN 1436; Z-2; Z-4; Z-5; Z-11;
Z-12; Z-15; Z-16; Z-46; Z-56;

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: ZN

MOLECULAR WEIGHT: 65.38

CERCLA RATINGS (SCALE 0-3): HEALTH=0 FIRE=3 REACTIVITY=3 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=0 FIRE=1 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: ZINC

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NUISANCE PARTICULATES (NUISANCE DUST):

5 MG/M3 OSHA TWA (RESPIRABLE DUST); 15 MG/M3 OSHA TWA (TOTAL DUST)

10 MG/M3 ACGIH TWA (TOTAL DUST) (NO ASBESTOS AND < 1% CRYSTALLINE SILICA)

PHYSICAL DATA

DESCRIPTION: BLUISH-GRAY POWDER BOILING POINT: 1664 F (907 C)

MELTING POINT: 787 F (420 C) SPECIFIC GRAVITY: 7.1

VAPOR PRESSURE: 1 MMHG @ 487 C SOLUBILITY IN WATER: REACTS

SOLVENT SOLUBILITY: SOLUBLE IN ACIDS, ALKALIS, ACETIC ACID

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME. DANGEROUS WHEN WET! MAY HEAT SPONTANEOUSLY AND IGNITE ON EXPOSURE TO AIR. DUST-AIR MIXTURES ARE EXPLOSIVE. EXPLOSION HAZARD WITH ACIDS, OXIDIZERS OR OTHER INCOMPATIBILITIES. EASILY IGNITED BY NAKED LIGHT, WITH POSSIBLE EXPLOSION.

FLASH POINT: FLAMMABLE SOLID UPPER EXPLOSIVE LIMIT: NOT AVAILABLE

LOWER EXPLOSIVE LIMIT: 500 GM/M3 AUTOIGNITION TEMP.: 860 F (460 C)

FIREFIGHTING MEDIA:

USE DRY CHEMICAL, SODA ASH, LIME OR SAND. DO NOT USE WATER OR FOAM.
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:

DO NOT GET WATER INSIDE CONTAINER. MOVE CONTAINERS FROM FIRE AREA IF POSSIBLE. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES. ELSE WITHDRAW FROM AREA AND LET FIRE BURN (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 76).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101;
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND 172.402;

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****ZINC POWDER OR DUST, NONPYROPHORIC****

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.154
EXCEPTIONS: 49CFR173.153

TOXICITY**ZINC:**

TOXICITY DATA: 300 UG/3 DAYS-INTERMITTENT SKIN-HUMAN MILD IRRITATION;
124 MG/M3/50 MINUTES INHALATION-HUMAN TCLO;
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT- MUCOUS MEMBRANES, SKIN.
ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.
TARGET EFFECTS: POISONING MAY AFFECT THE BLOOD.
ADDITIONAL DATA: ZINC IS ESSENTIAL IN THE ACTIVITY OF NUMEROUS ENZYMES, AND
METABOLIC PROCESSES. EXCESSIVE ZINC INTAKE HAS BEEN ASSOCIATED WITH A
COPPER-DEFICIENCY ANEMIA. APPARENTLY, ZINC INTERFERES WITH COPPER AND IRON
METABOLISM.

HEALTH EFFECTS AND FIRST AID**INHALATION:****ZINC:**

ACUTE EXPOSURE- PURE ZINC POWDER OR DUST IS NOT EXPECTED TO BE IRRITATING ON
ACUTE EXPOSURE. HOWEVER, WHEN HEATED, IT EVOLVES A FUME OF ZINC OXIDE
WHICH WHEN INHALED FRESH CAN CAUSE A DISEASE KNOWN AS ZINC METAL FUME
FEVER. MOST AUTHORITIES AGREE THAT FRESH FUMES ARE NECESSARY TO PRODUCE
THE DISEASE BUT THAT THE PARTICLE SIZE IS THE MOST IMPORTANT FACTOR IN THE
GENESIS OF THE CONDITION. MOST OF THE RESPONSIBLE PARTICLES ARE IN THE
RANGE OF 0.02-0.25 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND MAY
INCLUDE A METALLIC OR FOUL TASTE, DRY THROAT, CHEST PAIN, DYSPNEA, DRY
COUGH, CHILLS, LASSITUDE, MALAISE, FATIGUE, HEADACHE, MUSCLE CRAMPS,
NAUSEA, FEVER, PERSPIRATION, VOMITING AND LEUKOCYTOSIS. TOLERANCE TO FUMES
DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. PRELIMINARY EXPOSURE TO ACETIC ACID
MAY INCREASE SUSCEPTIBILITY TO ZINC FUME FEVER. RECOVERY USUALLY OCCURS
WITHIN 24 TO 48 HOURS.

CHRONIC EXPOSURE- ZINC FACTORY WORKERS EXPOSED FOR 2-3 YEARS REPORTED UPPER
RESPIRATORY TRACT IRRITATION WITH NASOPHARYNGITIS AND LARYNGITIS.
GASTROINTESTINAL DISTURBANCES AND CLINICALLY LATENT LIVER DYSFUNCTION HAS
ALSO BEEN REPORTED TO OCCUR IN WORKERS AFTER LONG-TERM EXPOSURE.

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.

SKIN CONTACT:**ZINC:**

ACUTE EXPOSURE- PURE ZINC POWDER OR DUST IS NOT EXPECTED TO BE IRRITATING
ON SINGLE EXPOSURE.

CHRONIC EXPOSURE- MAY CAUSE DERMATITIS AFTER REPEATED OR PROLONGED EXPOSURE.
300 UG APPLIED TO HUMAN SKIN INTERMITTENTLY FOR THREE DAYS CAUSED MILD
IRRITATION. ALLERGIC SENSITIZATION IS EXTREMELY RARE.

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 (APPROXIMATELY 15-20 MINUTES). GET MEDICAL
ATTENTION IMMEDIATELY.

EYE CONTACT:**ZINC:**

ACUTE EXPOSURE- NO DATA AVAILABLE. HOWEVER, IT IS EXPECTED TO CAUSE
IRRITATION TO SOME DEGREE DUE TO A FOREIGN PARTICLE EFFECT.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE.
OCCASIONALLY LIFTING UPPER AND LOWER LIDS. UNTIL NO EVIDENCE OF CHEMICAL
REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:**ZINC:**

ACUTE EXPOSURE- THE ZINC ION IS ORDINARILY TOO POORLY ABSORBED TO CAUSE
ACUTE SYSTEMIC TOXICITY. AFTER LARGE DOSES HAVE BEEN INGESTED, FATAL
COLLAPSE MAY OCCUR AS A RESULT OF SERIOUS DAMAGE TO THE BUCCAL AND
GASTROENTERIC MUCOUS MEMBRANES. ACIDIC FOODS OR BEVERAGES PREPARED OR
STORED IN GALVANIZED ZINC CANS OR UTENSILS MAY DISSOLVE SUFFICIENT ZINC
METAL INTO ZINC SALTS. INGESTION OF THESE SOLUTIONS MAY CAUSE POISONING
WITH FEVER, NAUSEA, VIOLENT VOMITING, STOMACH CRAMPS, AND DIARRHEA WITHIN
3 TO 12 HOURS. SHOCK, COLLAPSE AND DEATH MAY ALSO OCCUR. SURVIVORS MAY
HAVE RESIDUAL NEPHRITIS AND STRICTURES OF THE ESOPHAGUS AND PYLORIC END OF
THE STOMACH.

CHRONIC EXPOSURE- PATIENTS TAKING ZINC IN AMOUNTS 10 TIMES THE RDA FOR
MONTHS AND YEARS HAVE NOT SHOWN ANY ADVERSE REACTIONS. EXCESSIVE
ABSORPTION MAY CAUSE COPPER-DEFICIENCY ANEMIA. APPARENTLY, ZINC INTERFERES
WITH COPPER AND IRON METABOLISM. THE TASTE THRESHOLD FOR ZINC IN WATER IS
APPROXIMATELY 15 PPM. DRINKING WATER CONTAMINATED WITH 40 PPM ZINC HAS
CAUSED DROWSINESS, MENTAL FATIGUE, NAUSEA, MUSCLE PAIN AND STIFFNESS,
INSOMNIA, ANOREXIA, LASSITUDE AND FATIGUE. ANIMAL STUDIES INDICATE THAT
RATS TOLERATED 0.1% ZINC IN THEIR DIET, BUT MORE THAN 0.5% REDUCED THEIR
CAPACITY TO REPRODUCE, AND 1% INHIBITED GROWTH AND CAUSED SEVERE ANEMIA
AND DEATH; 2% METALLIC ZINC IN THE DIET OF RATS RESULTED IN NO INJURY.

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

4/14/95

****ZINC POWDER OR DUST, NONPYROPHORIC****
ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

ZINC METAL IS STABLE IN DRY AIR, BUT BECOMES COVERED WITH A WHITE COATING OF BASIC CARBONATE ON EXPOSURE TO MOIST AIR AND MAY BE EXPLOSIVE. ZINC POWDER OR DUST EVOLVES HIGHLY FLAMMABLE HYDROGEN GAS ON CONTACT WITH WATER; THE HEAT OF THE REACTION MAY BE SUFFICIENT TO IGNITE THE HYDROGEN. ZINC FOIL MAY IGNITE IN THE PRESENCE OF MOISTURE.

INCOMPATIBILITIES:**ZINC:**

ACIDS: EVOLVES HYDROGEN GAS WHICH MAY BE IGNITED BY THE HEAT OF THE REACTION
 ALKALIES: EVOLVES HYDROGEN GAS WHICH MAY BE IGNITED BY THE HEAT OF THE REACTION.

ALUMINUM: POSSIBLE IGNITION.

ALUMINUM-MAGNESIUM ALLOY + RUSTED STEEL: MAY SPARK ON IMPACT.

AMMONIUM NITRATE: VIOLENT REACTION OR FORMATION OF EXPLOSIVE MIXTURE.

AMMONIUM SULFIDE: MAY EXPLODE IN A CLOSED CONTAINER.

ARSENIC: INCANDESCENT REACTION WHEN HEATED.

ARSENIC TRIOXIDE: EXPLOSIVE REACTION ON HEATING.

BROMOMETHANE: FORMS FLAMMABLE COMPOUNDS.

CAESIUM: INCANDESCENT REACTION.

CALCIUM CHLORIDE: EVOLVES HYDROGEN GAS WHICH MAY BE IGNITED BY THE HEAT OF THE REACTION.

CARBON DISULFIDE: INCANDESCENT REACTION.

CARBON TETRACHLORIDE + METHANOL: EXTREMELY VIGOROUS REACTION.

CHLORATES: FORMS SHOCK-SENSITIVE MIXTURES.

CHLORINATED RUBBER: VIOLENT OR EXPLOSIVE REACTION AT ELEVATED TEMPERATURES.

CHROMIC ANHYDRIDE: VIOLENT REACTION AND POSSIBLE IGNITION.

HALOCARBONS: POSSIBLE VIOLENT REACTION.

HALOGENS: POSSIBLE IGNITION.

HYDRAZINE NITRATE: IGNITES ABOVE 70 C.

HYDROXYLAMINE: MAY IGNITE OR EXPLODE WHEN HEATED.

INTERHALOGENS: VIOLENT REACTION AND POSSIBLE IGNITION.

LEAD AZIDE: FORMS EXPLOSIVE COMPOUND.

MANGANESE DICHLORIDE: EXPLOSIVE REACTION WHEN HEATED.

METAL HALIDES (TRANSITION) + IRON PENTACARBONYL: VIOLENT REACTION.

METAL OXIDES: POSSIBLE IGNITION.

NITRIC ACID: INCANDESCENT REACTION.

2-NITROANISOLE + SODIUM HYDROXIDE: EXOTHERMIC REACTION.

NITRIL FLUORIDE: INCANDESCENT WHEN WARMED.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

PEROXYFORMIC ACID: VIOLENT EXPLOSION ON CONTACT.

POTASSIUM NITRATE: EXPLOSIVE REACTION ON HEATING.

POTASSIUM PEROXIDE: INCANDESCENT REACTION.

SELENIUM: INCANDESCENT REACTION.

SELENIYL BROMIDE: IGNITION.

SILVER + ELECTROLYTES (BATTERIES): MAY SPONTANEOUSLY COMBUST.

SULFUR: VIOLENT REACTION.

TELLURIUM: INCANDESCENT REACTION.

DECOMPOSITION:**ZINC:**

THERMAL DECOMPOSITION RELEASES ACRID AND TOXIC FUMES OF ZINC OXIDE.

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****

STORAGE: PROTECT AGAINST PHYSICAL DAMAGE. STORE IN COOL, DRY, VENTILATED PLACE. SEPARATE FROM ACIDS, HALOGENATED HYDROCARBONS, AND STRONG ALKALI HYDROXIDES. PROTECT FROM MOISTURE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

 CONDITIONS TO AVOID

MAY BE IGNITED BY HEAT, SPARKS OR FLAMES. MAY BURN RAPIDLY WITH FLARE-BURNING EFFECT. MAY IGNITE IN PRESENCE OF MOISTURE. VIOLENT REACTION WITH WATER.

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

 SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. SHUT OFF IGNITION SOURCES, NO FLARES, SMOKING

ZINC POWDER OR DUST, NONPYROPHORIC
NO WATER ON SPILLED MATERIAL; DO NOT GET WATER INSIDE CONTAINER. DIKE SPILL
FOR LATER DISPOSAL. CLEAN UP ONLY UNDER SUPERVISION OF AN EXPERT.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED
EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON THE 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.

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON THE DATA FOUND IN THE
PHYSICAL DATA, HEALTH EFFECTS AND TOXICITY SECTIONS. THEY ARE RANKED IN
ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION:

DUST, MIST, AND FUME RESPIRATOR.

POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

TYPE "C" SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE,
HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

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

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

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT 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 THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN
AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - FISHER SCIENTIFIC GROUP, INC.
CREATION DATE: 12/08/84 REVISION DATE: 03/29/89

-ADDITIONAL INFORMATION-

THE INFORMATION BELOW IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST
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SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE
INFORMATION FOR THEIR PARTICULAR PURPOSES.

MSDS DATE: 1/13/93
CHANGE NO.: 0745For Assistance, Contact:
Regulatory Affairs Dept.
PO Box 907 Ames, IA 50010
(515) 227-4226HACH COMPANY
PO BOX 907
AMES, IA 50010Emergency Telephone #
Rocky Mountain Poison Ctr.
(303) 423-5716

I. PRODUCT IDENTIFICATION

PRODUCT NAME: NitriVer # 3 Nitrite Reagent
CAS NO.: NA CHEMICAL NAME: Not applicable
FORMULA: Not applicable CHEMICAL FAMILY: Not applicable

II. INGREDIENTS

Potassium Phosphate, Monobasic
PCT: <05 CAS NO.: 7776-77-0 SARA: NOT LISTED
TLV: Not established PEL: Not established
HAZARD: Moderately toxic; may cause irritationSodium Sulfonate
PCT: <15 CAS NO.: 515-74-2 SARA: NOT LISTED
TLV: Not established PEL: Not established
HAZARD: Toxicity unknownPotassium Pyrosulfate
PCT: <10 CAS NO.: 7799-62-7 SARA: NOT LISTED
TLV: Not established PEL: Not established
HAZARD: Aqueous solution is strongly acidic4,5-Dihydroxy-2,7-naphthalenedisulfonic Acid, Disodium Salt
PCT: <5 CAS NO.: 129-96-4 SARA: NOT LISTED
TLV: Not established PEL: Not established
HAZARD: May cause irritation1,2-Cyclohexanediaminetetracarboxylic Acid, Trisodium Salt (CDTA)Na3
PCT: <5 CAS NO.: 36679-96-6 SARA: NOT LISTED
TLV: Not established PEL: Not established
HAZARD: Toxicity unknown; may cause irritation

III. PHYSICAL DATA

STATE: solid APPEARANCE: White powder ODOR: Not determined
SOLUBILITY IN: WATER: Soluble ACID: Not determined
OTHER: Not determined BOILING POINT: NA MELTING PT.: 224°C
SPEC GRAVITY: ND pH: of 5% soln. = 5.2 VAPOR PRESSURE: Not applicable
VAPOR DENSITY (air=1): NA EVAPORATION RATE: NA
METAL CORROSIVITY - ALUMINUM: 0.00 in/yr STEEL: 0.057 in/yr
STABILITY: See Conditions to Avoid
STORAGE PRECAUTIONS: Store in a cool, dry place.

IV. FIRE, EXPLOSION HAZARD AND REACTIVITY DATA

FLASH PT.: Not applicable METHOD: NA
FLAMMABILITY LIMITS - LOWER: NA UPPER: NA
SUSCEPTIBILITY TO SPONTANEOUS HEATING: None
SHOCK SENSITIVITY: None AUTOIGNITION PT.: NA
EXTINGUISHING MEDIA: water, carbon dioxide, or dry chemical
FIRE/EXPLOSION HAZARDS: May emit toxic fumes in fire
HAZARDOUS DECOMP. PRODUCTS: May emit toxic fumes of phosphorus oxides in fire
OXIDIZER: No NFPA Codes: Health: 2 Flammability: 0 Reactivity: 1
CONDITIONS TO AVOID: Heat, moisture

V. HEALTH HAZARD DATA

THIS PRODUCT MAY BE: corrosive to eyes, irritating to skin and respiratory tract.
ACUTE TOXICITY: Moderately toxic
ROUTES OF EXPOSURE: Ingestion
TARGET ORGANS: Not determined
CHRONIC TOXICITY: Not determined
ROUTES OF EXPOSURE: Not determined
TARGET ORGANS: Not determined
CANCER INFORMATION: Not applicable
ROUTES OF EXPOSURE: Not applicable
TARGET ORGANS: Not applicable
OVEREXPOSURE: Causes burns to eyes; may irritate to skin and respiratory tract
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin conditions

VI. PRECAUTIONARY MEASURES

Avoid contact with eyes and skin.
Do not breathe dust.
Wash thoroughly after handling.
PROTECTIVE EQUIPMENT: adequate ventilation, lab grade goggles, disposable latex gloves

VII. FIRST AID

EYE AND SKIN CONTACT: Immediately flush eyes with water for 15 minutes. Call physician. Flush skin with plenty of water.
INGESTION: Do NOT induce vomiting. Give 1 - 2 glasses of water. Call a physician immediately. Never give anything by mouth to an unconscious person.
INHALATION: Remove to fresh air. Give artificial respiration if necessary. Call physician.

VIII. SPILL AND DISPOSAL PROCEDURES

IN CASE OF SPILL OR RELEASE: Sweep spilled material into a beaker and dissolve with water. Neutralize to a pH between 6 and 9 with an alkali such as soda ash. Flush neutralized waste to the drain with an excess of water.
DISPOSE OF IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS.

IX. TRANSPORTATION DATA

D.O.T. PROPER SHIPPING NAME: Not Currently Regulated
HAZARD CLASS: Not applicable ID: NAI.C.A.O. PROPER SHIPPING NAME: Not Currently Regulated
HAZARD CLASS: NA ID: NA GROUP: NAI.M.O. PROPER SHIPPING NAME: Not Currently Regulated
HAZARD CLASS: NA ID: NA GROUP: NA

X. REFERENCES

- 1) TLV's Threshold Limit Values and Biological Exposure Indices for 1986-1989. American Conference of Governmental Industrial Hygienists, 1986.
- 2) Air Contaminants, Federal Register, Vol. 54, No. 12, Thursday, January 19, 1989. pp. 2332-2363.
- 3) In-house information
- 4) Technical judgment