DOE/PPPO/03-0140&D0

RCRA Part B Permit Renewal Application

At the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Volume 1.
Part A, Section B-N

US EPA RECORDS CENTER REGION 5
1006581

This document is approved for public release per review by:

Henry H. Thomas 07/14/2010

PORTS Classification/Information Office Date

Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

SEP 1 3 2010

Mr. Chris Korleski, Director
Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street
Suite 700
Columbus, Ohio 43215

PPPO-03-986910-10B

Dear Mr. Korleski:

RESOURCE CONSERVATION AND RECOVERY ACT PART B PERMIT RENEWAL APPLICATION DEPARTMENT OF ENERGY/PORTSMOUTH GASEOUS DIFFUSION PLANT U.S. EPA I.D. NO., OH7 890 008 983

Reference: Letter from J. Carroll to W. Murphie and L. Bauer, "Renewal of Hazardous Waste Facility Installation and Operation Permit," dated July 19, 2010

The purpose of this letter is to transmit two copies of the attached application to support renewal of the Resource Conservation and Recovery Act (RCRA) Part B Permit for the United States Department of Energy Portsmouth Gaseous Diffusion Plant. The following items are included in the attached application

- Resource Conservation and Recovery Act Part B Permit Renewal Application,
- Part B Application Renewal Review Checklist

This submittal is formatted in accordance with the above referenced letter received from Mr. Carroll at the Ohio Environmental Protection Agency dated July 19, 2010. As per that letter, an additional copy of this application is being sent to Scott Bergreen in the Southeast District Office.

If you have any questions or need additional information, please contact Kristi Wiehle at (740) 897-5020.

Sincerely,

William E. Murphie
Manager
Portsmouth/Paducah Project Office

Enclosures:
1. Resource Conservation and Recovery Act Part B Permit Renewal Application
2. Part B Application Renewal Review Checklist

cc w/enclosures:
J. Bradburne, PPPO/PORTS
K. Wiehle, PPPO/PORTS
RCRA Branch Program Section, U.S. EPA Region 5
J. Carroll, Ohio EPA/Columbus (2 copies)
S. Bergreen, Ohio EPA/Logan
L. Bauer, LPP/PORTS
Administrative Records

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SUBMISSION DATE: SEPTEMBER 13, 2010

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OMB# 2050-0024; Expires 11/30/2011

SEND COMPLETED FORM TO: The Appropriate State or Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**
1. Reason for Submittal MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location) ☒ To provide a Subsequent Notification (to update site identification information for this location) ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application ☐ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment #_____) ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below) ☐ Site was a TSD facility and/or generator of ≥1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)
2. Site EPA ID Number	**EPA ID Number** OH7890008983
3. Site Name	**Name:** Portsmouth Gaseous Diffusion Plant
4. Site Location Information	**Street Address:** 3930 U.S. Route 23 South **City, Town, or Village:** Piketon **County:** Pike **State:** Ohio **Country:** United States **Zip Code:** 45661
5. Site Land Type	☐ Private ☐ County ☐ District ☒ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other
NAICS Code(s) for the Site (at least 5-digit codes)	**A.** 562211 **C.** **B.** **D.**
7. Site Mailing Address	**Street or P.O. Box:** P.O. Box 700 **City, Town, or Village:** Piketon **State:** Ohio **Country:** United States **Zip Code:** 45661-0700
8. Site Contact Person	**First Name:** William **MI:** E. **Last:** Murphie **Title:** Manager, Portsmouth/Paducah Project Office **Street or P.O. Box:** 1017 Majestic Drive, Suite 200 **City, Town or Village:** Lexington **State:** Kentucky **Country:** United States **Zip Code:** 40513 **Email:** william.murphie@lex.doe.gov **Phone:** (859) 219-4000 **Ext.:** **Fax:**
9. Legal Owner and Operator of the Site	**A. Name of Site's Legal Owner:** U.S. Department of Energy **Date Became Owner:** 01/14/1955 **Owner Type:** ☐ Private ☐ County ☐ District ☒ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other **Street or P.O. Box:** 1017 Majestic Drive, Suite 200 **City, Town, or Village:** Lexington **Phone:** (859) 219-4000 **State:** Kentucky **Country:** United States **Zip Code:** 40513 **B. Name of Site's Operator:** LATA/Parallax Portsmouth, LLC **Date Became Operator:** 6/27/2005 **Operator Type:** ☐ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☒ Other

EPA ID Number OH7890008983 OMB#: 2050-0024; Expires 11/30/2011

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-7.

Y ☒ N ☐ **1. Generator of Hazardous Waste**
If "Yes", mark only one of the following – a, b, or c.

- ☒ a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs./mo.) or more of hazardous waste, **or** Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs./mo) of acute hazardous waste, **or** Generates, in any calendar month, **or** accumulates at any time, more than 100 kg/mo (220 lbs./mo) of acute hazardous spill cleanup material.
- ☐ b. SQG: 100 to 1,000 kg/mo (220 – 2,200 lbs./mo) of non-acute hazardous waste.
- ☐ c. CESQG. Less than 100 kg/mo (220 lbs./mo) of non-acute hazardous waste

If "Yes" above, indicate other generator activities.

Y ☐ N ☒ d. Short-Term Generator (generate from a short-term or one-time event and not from on-going processes) If "Yes", provide an explanation in the Comments section.

Y ☐ N ☒ e. United States Importer of Hazardous Waste

Y ☒ N ☐ f. Mixed Waste (hazardous and radioactive) Generator

Y ☐ N ☒ **2. Transporter of Hazardous Waste**
If "Yes", mark all that apply.
- ☐ a. Transporter
- ☐ b. Transfer Facility (at your site)

Y ☒ N ☐ **3. Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste permit is required for these activities.

Y ☐ N ☒ **4. Recycler of Hazardous Waste**

Y ☐ N ☒ **5. Exempt Boiler and/or Industrial Furnace**
If "Yes", mark all that apply.
- ☐ a. Small Quantity On-site Burner Exemption
- ☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☒ **6. Underground Injection Control**

Y ☐ N ☒ **7. Receives Hazardous Waste from Off-**

B. Universal Waste Activities; Complete all parts 1-2.

Y ☒ N ☐ **1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes", mark all that apply.**

- a. Batteries ☒
- b. Pesticides ☐
- c. Mercury containing equipment ☒
- d. Lamps ☒
- e. Other (specify) Hg Thermostats ☒
- f. Other (specify) _____ ☐
- g. Other (specify) _____ ☐

Y ☐ N ☒ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities; Complete all parts 1-4.

Y ☐ N ☒ **1. Used Oil Transporter**
If "Yes", mark all that apply.
- ☐ a. Transporter
- ☐ b. Transfer Facility (at your site)

Y ☐ N ☒ **2. Used Oil Processor and/or Re-refiner**
If "Yes", mark all that apply.
- ☐ a. Processor
- ☐ b. Re-refiner

Y ☐ N ☒ **3. Off-Specification Used Oil Burner**

Y ☐ N ☒ **4. Used Oil Fuel Marketer**
If "Yes", mark all that apply.
- ☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
- ☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

EPA ID Number | O | H | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 8 | 3 |

OMB#: 2050-0024; Expires 11/30/2011

Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

- You must check with your State to determine if you are eligible to manage laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

☐ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories **See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:**

- ☐ a. College or University
- ☐ b. Teaching Hospital that is owned by or has a formal written affiliation agreement with a college or university
- ☐ c. Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university

☐ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Waste

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D002	D003	D004	D005	D018	D006
D019	D020	D021	D022	D007	D023	D024
D025	D026	D016	D027	D028	D029	D030
D012	D031	D032	D033	D034	D008	D013
D009	D014	D035	D036	D037	D038	D010
D011	D039	D015	D040	D041	D042	D017
D043	D-XXX	F001	F002	F003	F004	F005
F006	F007	F027	F-XXX	K-XXX	P023	P058
P003	P070	P004	P005	P008	P119	P099

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

EPA ID Number |O|H|7|8|9|0|0|0|8|9|8|3| OMB#: 2050-0024; Expires 11/30/2011

12. Notification of Hazardous Secondary Material (HSM) Activity

Y ☐ N ☒ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes", you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

9.B) Operator Type is Federal Government Contractor; 11.A) (continued) P010,P012, P038, P011, P013, P024, P077, P028, P042, P046, P001, P015, P018, P021, P022, P095, P029, P030, P031, P033, P016, P037, P041, P060, P051, P047, P048, P020, P111, P050, P056, P059, P116, P068, P063, P082, P064, P071, P072, P073, P074, P075, P076, P078, P087, P089, P093, P110, P098, P114, P104, P105, P106, P108, P115, P113, P123, P120, P121, P-XXX, U001, U034, U240, U112, U144, U214, U002, U003, U004, U006, U007, U008, U009, U012, U017, U018, U094, U328, U353, U222, U019, U030, U037, U028 U069, U088, U102, U107, U070, U071, U072, U060, U223, U239, U201, U127, U056, U220, U105, U106, U055, U246, U169, U183, U185, U020, U207, U061,U247, U023, U234, U021, U202, U141, U064, U248, U022, U107, U073, U225, U128, U031, U159, U160, U074, U032, U211, U036, U039, U042, U044, U046, U047, U048, U050, U051, U052, U129, U057, U130, U063, U066, U075, U078, U079, U081, U082, U084, U108, U086, U092, U096, U101, U109, U110, U041, U067, U076, U077, U131, U117, U184, U208, U209, U218, U226, U227, U043, U210, U228, U113, U238, U359, U118, U120, U122 U123, U147, U213, U126, U243, U133, U134, U135, U137, U190, U140, U142, U146, U145, U149, U150, U151, U152, U029, U045, U068, U080, U138, U153, U121, U154, U161, U162, U167, U165, U236, U217, U170, U171, U182, U188, U191, U235, U083, U196, U204, U205, U216, U219, AND U-XXX.

14. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
WE Murphie	William E. Murphie, Manager,	9/13/10
	Portsmouth/Paducah Project Office	
Linda Bauer	Dr. Linda Bauer, Project Manager	09/11/2010
	LATA/Parallax Portsmouth, LLC	

EPA ID Number | O | H | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 8 | 3 |

SUBMISSION DATE: SEPTEMBER 13, 2010
OMB#: 2050-0034; Expires 7/31/2012

United States Environmental Protection Agency

HARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact	**First Name:** William	**MI:** E.	**Last Name:** Murphie	
	Contact Title: Manager, Portsmouth/Paducah Project Office			
	Phone: (859) 219-4000	**Ext.:**	**Email:** william.murphie@lex.doe.gov	
2. Facility Permit Contact Mailing Address	**Street or P.O. Box:** 1017 Majestic Drive, Suite 200			
	City, Town, or Village: Lexington			
	State: Kentucky			
	Country: United States	**Zip Code:** 40513		
3. Operator Mailing Address and Telephone Number	**Street or P.O. Box:** P.O. Box 700			
	City, Town, or Village: Piketon			
	State: Ohio	**Phone:** (740) 897-2336		
	Country: United States	**Zip Code:** 45661-0700		
4. Facility Existence Date	**Facility Existence Date (mm/dd/yyyy):** 01/14/1955			

5. Other Environmental Permits

A. Facility Type *(Enter code)*	B. Permit Number	C. Description
N	0 I O 0 0 0 0 0	LPP NPDES Permit
E	P 0 1 9	X-624 Groundwater Treatment Facility
E	P 0 2 7	X-749 Contaminated Materials Disposal Facility
E	P 0 1 8	X-623 Groundwater Treatment Facility
E	P 0 2 2	X-326 Glove Box
E	P 0 2 3	X-735 Landfill Cap and Venting System
E	T 1 0 4	X-627 Groundwater Treatment Facility Storage Tank
E	T 1 0 5	X-627 Groundwater Treatment Facility Storage Tank
E	P 4 7 4	X-627 Groundwater Treatment Facility Air Stripper

6. Nature of Business:

The Portsmouth Gaseous Diffusion Plant operated from 1954 through May 2001 enriching uranium for national defense and commercial nuclear reactors Since July 1, 1993 the uranium enrichment process has been leased to and operated by the United States Enrichment Corporation (USEC), a private corporation formerly owned by the government The uranium production facilities are currently in a cold standby mode DOE's continuing mission at Portsmouth is to safely and effectively manage the environmental restoration, environmental compliance, decontamination and decommissioning activities, waste management including treatment, storage and disposal of hazardous, low-level radioactive and mixed waste, uranium programs, and administration of lease agreements

7. Process Codes and Design Capacities – Enter information in the Section on Form Page 3

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item 8.

B. PROCESS DESIGN CAPACITY – For each code entered in Item 7.A; enter the capacity of the process.

1. **AMOUNT – Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.**
2. **UNIT OF MEASURE – For each amount entered in Item 7.B(1), enter the code in Item 7.B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.**

C. PROCESS TOTAL NUMBER OF UNITS – Enter the total number of units for each corresponding process code.

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
Disposal		
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectares-meter; Acres, Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters, Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
Storage		
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
Treatment		
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Metric Tons Per Hour; or Million BTU Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Short Tons Per Day; BTUs Per Hour; Gallons Per Day; Liters Per Hour; or Million BTU Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; or Million BTU Per Hour

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity (for T81 – T94)
Treatment (Continued)		
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; Liters Per Hour; Kilograms Per Hour; or Million BTU Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used in the Recovery of Sulfur Values from Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR 260.10	
T94	Containment Building Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour, BTU Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day, Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million BTU Per Hour
Miscellaneous (Subpart X)		
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; or Million BTU Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

Unit of Measure	Unit of Measure Code
Gallons	G
Gallons Per Hour	E
Gallons Per Day	U
Liters	L
Liters Per Hour	H
Liters Per Day	V
Short Tons Per Hour	D
Short Tons Per Day	N
Metric Tons Per Hour	W
Metric Tons Per Day	S
Pounds Per Hour	J
Kilograms Per Hour	X
Million BTU Per Hour	X
Cubic Yards	Y
Cubic Meters	C
Acres	B
Acre-feet	A
Hectares	Q
Hectare-meter	F
BTU Per Hour	I

ID Number | O | H | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 8 | 3 | OMB#. 2050-0034; Expires 7/31/2012

Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 7 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	1	S	0	2	533.788	G	001	
	1	S	0	1	161,920 [X-326]	G	001	
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
1	0							
1	1							
1	2							
1	3							

: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. ber the line sequentially, taking into account any lines that will be used for "other" process (i.e., D99, S99, T04, and X99) in Item 8.

8. Other Processes (Follow instructions from Item 7 for D99, S99, T04, and X99 process codes)

Line Number (Enter #s in sequence with Item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	2	T	0	4	100.00	U	001	

EPA ID Number | O | H | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 8 | 3 | OMB#: 2050-0034; Expires 7/31/2012

9. Description of Hazardous Wastes - Enter Information in the Sections on Form Page 5

A. EPA HAZARDOUS WASTE NUMBER – Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you wil handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Sub C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY – For each listed waste entered in Item 9.A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Item 9.A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE – For each quantity entered in Item 9.B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

***For listed hazardous waste:* For each listed hazardous waste entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all listed hazardous wastes.**

For non-listed waste: For each characteristic or toxic contaminant entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. **Enter the first two as described above.**
2. **Enter "000" in the extreme right box of Item 9.D(1).**
3. **Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 9.E.**

2. PROCESS DESCRIPTION: If code is not listed for a process that will be used, describe the process in Item 9.D(2) or in Item 9.E(2).

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. **Select one of the EPA Hazardous Waste Numbers and enter it in Item 9.A. On the same line complete Items 9.B, 9.C, and 9.D by estimating the total annual quantity of the waste and describing all the processes to be used to store, treat, and/or dispose of the waste.**
2. **In Item 9.A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Item 9.D.2 on that line enter "included with above" and make no other entries on that line.**
3. **Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.**

EXAMPLE FOR COMPLETING Item 9 (shown in line numbers X-1, X-2, X-3, and X-4 below) – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)									(2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

9. Description of Hazardous Wastes (Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)			
A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	(1) PROCESS CODES
D001	27,200	P	S01
D002	50,000	P	S01
D003	1,000	P	S01
D004	10	P	S01
D005	20	P	S01
D018	10,000	P	S01
D006	50,000	P	S01
D019	100	P	S01
D020	100	P	S01
D021	100	P	S01
D022	100	P	S01
D007	10,000	P	S01
D023	100	P	S01
D024	100	P	S01
D025	100	P	S01
D026	10	P	S01
D016	10	P	S01
D027	100	P	S01
D028	10,000	P	S01
D029	10,000	P	S01
D030	10,000	P	S01
D012	10	P	S01
D031	100	P	S01
D032	100	P	S01
D033	100	P	S01
D034	100	P	S01
D008	5,000	P	S01
D013	10	P	S01
D009	100	P	S01
D014	10	P	S01
D035	10,000	P	S01
D036	100	P	S01
D037	100	P	S01
D038	1,000	P	S01
D010	10	P	S01
D011	10	P	S01
D039	10	P	S01
D015	10	P	S01
D040	10	P	S01
D041	10	P	S01
D042	10	P	S01
D017	10	P	S01
D043	10	P	S01
D-XXXX	*	P	S01

*Represents any waste code not listed in this description.

9. Description of Hazardous Wastes (Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)			
A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	(D.1) Process Codes
F001	2,400	P	S01
F002	1,200	P	S01
F003	2,500	P	S01
F004	1,000	P	S01
F005	1,000	P	S01
F006	1,000	P	S01
F007	400	P	S01
F027	100	P	S01
F-XXX	*	P	S01
K-XXX	*	P	S01
P023	10	P	S01
P058	10	P	S01
P003	13	P	S01
P070	10	P	S01
P004	10	P	S01
P005	10	P	S01
P008	10	P	S01
P119	10	P	S01
P099	10	P	S01
P010	10	P	S01
P012	10	P	S01
P038	10	P	S01
P011	10	P	S01
P013	10	P	S01
P024	10	P	S01
P077	10	P	S01
P028	10	P	S01
P042	10	P	S01
P046	10	P	S01
P001	10	P	S01
P015	10	P	S01
P018	10	P	S01
P021	10	P	S01
P022	10	P	S01
P095	0.1	P	S01
P029	10	P	S01
P030	10	P	S01
P031	4.4	P	S01
P033	2 2	P	S01
P016	10	P	S01
P037	10	P	S01
P041	10	P	S01
P060	10	P	S01
P051	10	P	S01

*Represents any waste code not listed in this description.

9. Description of Hazardous Wastes (Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)			
A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	(D.1) Process Codes
P047	10	P	S01
P048	0.01	P	S01
P020	10	P	S01
P111	10	P	S01
P050	10	P	S01
P056	0.6	P	S01
P059	10	P	S01
P116	10	P	S01
P068	10	P	S01
P063	10	P	S01
P082	10	P	S01
P064	50	P	S01
P071	10	P	S01
P072	10	P	S01
P073	10	P	S01
P074	10	P	S01
P075	10	P	S01
P076	2.6	P	S01
P078	1.5	P	S01
P087	1.5	P	S01
P089	10	P	S01
P093	10	P	S01
P110	10	P	S01
P098	10	P	S01
P114	10	P	S01
P104	10	P	S01
P105	10	P	S01
P106	10	P	S01
P108	10	P	S01
P115	10	P	S01
P113	10	P	S01
P123	10	P	S01
P120	10	P	S01
P121	10	P	S01
P-XXX	*	P	S01
U001	10	P	S01
U034	10	P	S01
U240	500	P	S01
U112	10	P	S01
U144	10	P	S01
U214	10	P	S01
U002	10	P	S01
U003	10	P	S01
U004	10	P	S01

*Represents any waste code not listed in this description.

9. Description of Hazardous Wastes (Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)			
A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	(1) PROCESS CODES
U006	10	P	S01
U007	10	P	S01
U008	10	P	S01
U009	10	P	S01
U012	10	P	S01
U017	10	P	S01
U018	10	P	S01
U094	10	P	S01
U328	10	P	S01
U353	10	P	S01
U222	10	P	S01
U019	10	P	S01
U030	10	P	S01
U037	10	P	S01
U028	10	P	S01
U069	10	P	S01
U088	10	P	S01
U102	10	P	S01
U107	10	P	S01
U070	10	P	S01
U071	10	P	S01
U072	10	P	S01
U060	10	P	S01
U223	10	P	S01
U239	10	P	S01
U201	10	P	S01
U127	10	P	S01
U056	10	P	S01
U220	10	P	S01
U105	10	P	S01
U106	10	P	S01
U055	10	P	S01
U246	10	P	S01
U169	10	P	S01
U183	10	P	S01
U185	10	P	S01
U020	10	P	S01
U207	10	P	S01
U061	10	P	S01
U247	10	P	S01
U023	10	P	S01
U234	10	P	S01
U021	10	P	S01
U202	10	P	S01

9. Description of Hazardous Wastes (Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)			
A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	(1) PROCESS CODES
U141	10	P	S01
U064	10	P	S01
U248	10	P	S01
U022	10	P	S01
U197	10	P	S01
U073	10	P	S01
U225	10	P	S01
U128	10	P	S01
U031	10	P	S01
U159	10	P	S01
U160	10	P	S01
U074	10	P	S01
U032	10	P	S01
U215	10	P	S01
U033	10	P	S01
U211	100	P	S01
U036	10	P	S01
U026	10	P	S01
U039	10	P	S01
U042	10	P	S01
U044	10	P	S01
U046	10	P	S01
U047	10	P	S01
U048	10	P	S01
U050	10	P	S01
U051	10	P	S01
U052	10	P	S01
U129	10	P	S01
U057	10	P	S01
U130	10	P	S01
U063	10	P	S01
U066	10	P	S01
U075	10	P	S01
U078	10	P	S01
U079	10	P	S01
U081	10	P	S01
U082	10	P	S01
U084	10	P	S01
U108	10	P	S01
U086	10	P	S01
U092	10	P	S01
U096	10	P	S01
U101	10	P	S01
U109	10	P	S01

9. Description of Hazardous Wastes (Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)			
A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	(1) PROCESS CODES
U110	10	P	S01
U041	100	P	S01
U067	10	P	S01
U076	10	P	S01
U077	10	P	S01
U131	10	P	S01
U117	10	P	S01
U184	10	P	S01
U208	10	P	S01
U209	10	P	S01
U218	10	P	S01
U226	10	P	S01
U227	10	P	S01
U043	10	P	S01
U210	10	P	S01
U228	10	P	S01
U113	10	P	S01
U238	10	P	S01
U359	10	P	S01
U118	10	P	S01
U120	10	P	S01
U122	10	P	S01
U123	10	P	S01
U147	10	P	S01
U213	10	P	S01
U126	10	P	S01
U243	10	P	S01
U133	10	P	S01
U134	10	P	S01
U135	10	P	S01
U137	10	P	S01
U190	10	P	S01
U140	10	P	S01
U142	10	P	S01
U146	10	P	S01
U145	10	P	S01
U149	10	P	S01
U150	10	P	S01
U151	100	P	S01
U152	10	P	S01
U029	10	P	S01
U045	10	P	S01
U068	10	P	S01
U080	10	P	S01

9. Description of Hazardous Wastes (Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)			
A. EPA Hazardous Waste No.	B. Estimated Annual Qty of Waste	C. Unit of Measure	(D.1) Process Codes
U138	10	P	S01
U153	10	P	S01
U121	10	P	S01
U154	10	P	S01
U161	10	P	S01
U162	10	P	S01
U167	10	P	S01
U165	10	P	S01
U236	10	P	S01
U217	10	P	S01
U170	10	P	S01
U171	10	P	S01
U182	10	P	S01
U188	10	P	S01
U191	10	P	S01
U235	10	P	S01
U083	10	P	S01
U196	10	P	S01
U204	10	P	S01
U205	10	P	S01
U216	10	P	S01
U219	10	P	S01
U-XXX	*	P	S01

*Represents any waste code not listed in this description.

EPA ID Number | O | H | 7 | 8 | 9 | 0 | 0 | 0 | 8 | 9 | 8 | 3 |

OMB#: 2050-0034; Expires 7/31/2012

10. Map

Attached to this application is a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements. (See Comments)

11. Facility Drawing

All existing facilities must include a scale drawing of the facility (see instructions for more detail). (See Comments)

12. Photographs

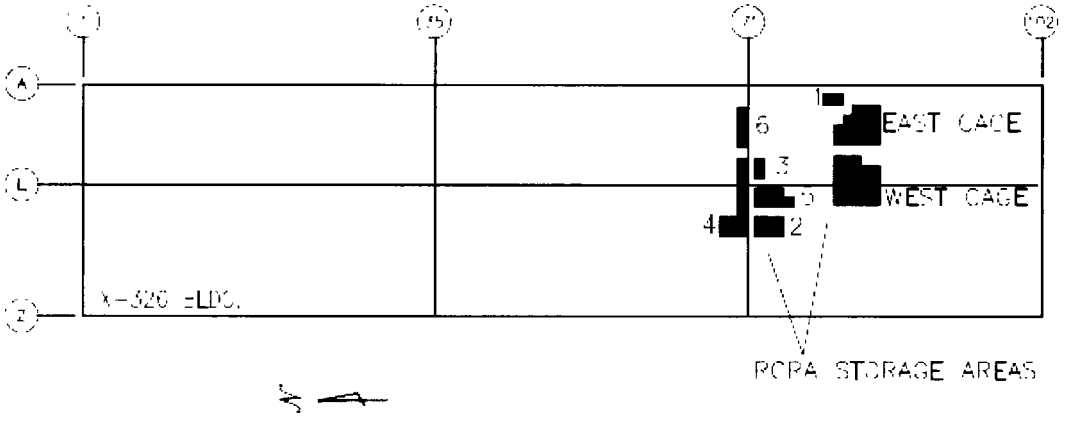
All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas (see instructions for more detail). (See Comments)

13. Comments

10. See Figure A-1. Site Map
11. See Figure A-2. Facility Drawing
12. See Figure A-3. X-326 Overview

FACILITY DRAWING

X-326 MIXED WASTE STORAGE UNIT



X 326 BUILDING

FLOOR PLAN

RCRA STORAGE AREAS

SCALE NONE

Figure A-2. Facility Drawing

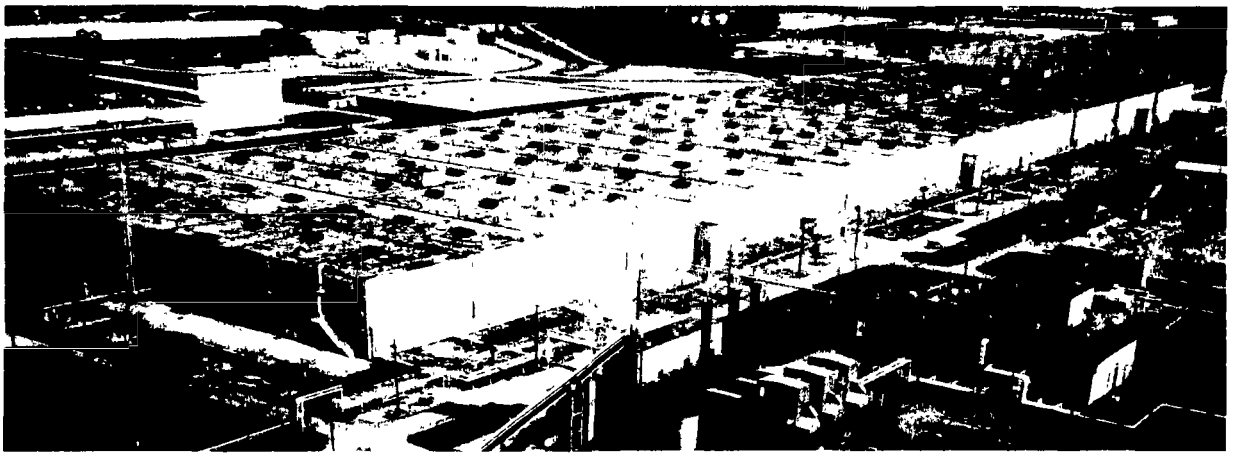


Figure A-3. X-326 Overview

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SECTION B

FACILITY DESCRIPTION

B-1 GENERAL DESCRIPTION [3745-50-44(A)(1)]

This facility description section is intended to provide the permit application reviewer with a general overview of the Portsmouth Gaseous Diffusion Plant (PORTS) facility and the activities conducted at the site by the U. S. Department of Energy (DOE). The RCRA Part B Hazardous Waste Permit Application that comprises this document is for a final permit for container storage unit X-326 and is divided into Sections A through N. Documents and information required to support a particular section are provided within that section. Section A of this permit comprises the requirements of the "Part A" permit application for the X-326 hazardous waste storage unit at PORTS.

PORTS is owned by DOE and is contractor managed by LATA/Parallax Portsmouth LLC. For the purposes of this permit application, DOE and LATA/Parallax Portsmouth LLC are Co-Operators of the X-326 Hazardous Waste Storage Units. The address for the facility is:

U.S. Department of Energy
Portsmouth Gaseous Diffusion Plant
3930 U.S. Route 23 South
Piketon, OH 45661

The mailing address for all correspondence is:

U.S. Department of Energy
Portsmouth/Paducah Project Office
Attention: William E. Murphie, Manager
1017 Majestic Drive, Suite 200
Lexington, KY 40513

The primary contact for hazardous waste storage activities at PORTS is:

U.S. Department of Energy
Attention: Kristi Wiehle
P.O. Box 700
Piketon, OH 45661

SUBMISSION DATE: SEPTEMBER 13, 2010

The U.S. EPA identification number for DOE Operations at PORTS is:

OH7890008983

PORTS is located at 39°00'30" N latitude and 83°00'28" W longitude on a federally owned reservation in Pike County, Ohio. Pike County, one of the state's lesser populated counties, encompasses an area of approximately 444 square miles. The site is located approximately equidistant between Chillicothe and Portsmouth, Ohio, as shown in Figure B-1. The plant site is approximately 4 miles southeast of Piketon, Ohio, 1.5 miles east of U.S. Route 23, 2 miles east of the Scioto River, and 70 miles south of Columbus, Ohio. Major site facilities are shown in Figure B-2. Figures B-3 through B-6 each present one-quarter of the site in greater detail with topographic contours.

PORTS began operating in1954, enriching uranium for national defense and commercial nuclear reactors. That enrichment is accomplished by the gaseous diffusion process.

Beginning in 1993, all uranium enrichment operations at PORTS were conducted by the United States Enrichment Corporation, formed as a government-owned corporation by the Energy Policy Act of 1992, that became private in July 1998. In May 2001, USDOE placed the gaseous diffusion plant in cold standby, through a contract with USEC, to maintain the facilities for possible restart within 18–24 months in the event of a significant disruption in the nation's supply of enriched uranium. USDOE continued the plant in cold standby through September 2005 and has since transitioned the gaseous diffusion plant into cold shutdown in preparation for future decontamination and decommissioning of the facilities. USEC continues to lease the facilities under the Nuclear Regulatory authorization. As such, DOE's mission at the PORTS site has changed to environmental restoration, waste management, removal of highly enriched uranium, decontamination and decommissioning of excess facilities, and operation of non-leased facilities.

As a result of historical and current operations at the site, a wide variety of hazardous wastes are generated. These include analytical laboratory wastes, spent solvents, electroplating wastes, paint wastes, sludges, corrosive wastes, and environmental restoration generated wastes. Table B-1 shows the status of active hazardous waste management units at PORTS and includes the hazardous waste container storage unit X-326. A description of the X-326 is provided in the paragraphs that follow. Table B-2 provides a listing of solid waste management units at PORTS.

X-326 HAZARDOUS WASTE CONTAINER STORAGE UNITS

The X-326 Storage Units are located in the central part of the PORTS site. The X-326 Building was used for the enrichment of uranium hexafluoride. The structure is 2,230 feet long, 552 feet wide, and 62 feet high. It contains 58 acres of floor space. The X-326 Building is totally enclosed with a built-up roof, transite walls, and concrete floors. There are seven areas of the building, totaling approximately 38,105 square feet, designated for the storage of hazardous wastes.

The storage areas are located on the first floor towards the south end of the building (Figure B-3). Waste types to be stored in the X-326 hazardous waste storage areas may include any or all of the waste codes specified in Part A of this permit application.

Seven areas have been delineated for the storage of hazardous wastes in the X-326 building. These are: Areas 1, 2, 3, 4, 5, and 6 and the "L" Cage (the "L" Cage consists of both the east cage and the west cage). Storage area floors are primed and finished with an urethane-based sealant. All storage areas are surrounded

by a 1" x 1" x 1/8" angle iron dike set in a chemically resistant elastomeric sealant. The floors are six to nine inches thick and constructed of concrete.

B-2 TOPOGRAPHIC MAP [3745-50-44(A)(19)]

The topographic contours for the PORTS site are presented in Figures B-3 through B-6 and indicate map scale, surface waters and intermittent streams, surrounding land uses, orientation, legal boundaries of the DOE reservation, access control to the limited area, buildings, barriers for drainage and/or flood control, as well as the location of the X-326 Building hazardous waste storage areas.

Figure B-2 shows the 100-year floodplain areas because they do not extend close enough to be included in the quadrant maps; in addition, the DOE boundary is shown with a margin that extends at least 1,000 feet beyond any unit boundary. The scale of 1 inch equals 450 feet was used to show the complete facility on one map. All units lie more than 1,000 feet from the boundary of the site. All other maps are rendered at the required scale. The surrounding land usage is farmland and timberland with scattered residences, as evidenced by the map.

All private withdrawal wells within 1,000 feet of the DOE boundary are shown on Figures B-3 through B-6. This information was obtained from the Ohio Department of Natural Resources.

B-3 FACILITY LOCATION - FLOODPLAIN [3745-50-44(A)(11)(c)]

A flood hazard boundary map for Pike County, Ohio, was obtained to determine whether the facility is located in a 100-year floodplain. The information from this map is depicted in Figure B-2 and was derived from the Federal Insurance Administration (FIA) map panels 110 and 125 of FIA map No. 39131C0000. As presented on Figure B-2, the X-326 hazardous waste storage units do not lie within a 100-year floodplain.

B-4 FACILITY LOCATION - SEISMIC [3745-54-18(A)]

Appendix VI of 40 CFR 264 lists political jurisdictions in which compliance with seismic standards must be demonstrated. Pike County, Ohio, is not listed in Appendix VI; therefore, seismic considerations need not be addressed.

B-5 TRAFFIC PATTERNS [3745-50-44(A)(10)]

Traffic associated with waste movement at PORTS is limited to on-site waste generation movement and off-site waste shipments to commercial and/or government treatment or disposal facilities.

Access to PORTS for off-site shipments is from five major roads: State Route 32 from the north; U.S. Route 23 from the west; Old Route 23 from the southwest; Big Run Road from the south; and Dutch Run Road from the east. Commercial carriers are instructed to use U.S. Route 23 or State Route 32.

The PORTS controlled area is traversed by approximately 17 miles of paved roads. These roadways provide vehicular access to all buildings and remote facilities and are capable of bearing heavy loads, such as construction equipment, tanker trucks, and trailers. The base of the road system at PORTS is comprised of 9-12

inches of aggregate base material meeting Ohio Department of Transportation specification 304 and also incorporates a minimum 3 inches of asphaltic concrete surface. This type of construction meets the American Association of State Highway Official specification for a roadway surface requiring an 18,000 pound per axle loading capacity.

All roadways at PORTS accommodate two-way traffic and have posted speed limits. Vehicular traffic at all intersections is controlled by traffic lights, stop signs or yield signs, as appropriate. The PORTS security police provide traffic control on the plant perimeter road. Traffic flow and volume at PORTS indicate a rise in morning traffic as the workforce arrives, a sustained level during the daylight hours, and a reduction in late afternoon as the day shift leaves. Volume estimates are supplied in Tables B-3 and B-4.

TABLE B-1 HAZARDOUS WASTE MANAGEMENT UNITS

UNIT	STATUS
X-326 Hazardous Waste Container Storage Unit	Operating as Permitted Storage Unit
X-744Y Radiological Waste Storage Yard	Unit integrated into RCRA Corrective Action Program
X-231B Land Treatment Unit	Unit integrated into RCRA Corrective Action Program
X-701B Surface Impoundment	Unit integrated into RCRA Corrective Action Program
X-735 North Landfill	Closure Completed: In Post-closure Care
X-749 Landfill	Closure Completed: In Post-closure Care
X-616 Surface Impoundment	Closure Completed: In Post-closure Care
X-230J7 Surface Impoundment	Unit integrated into RCRA Corrective Action Program
X-701C Neutralization Pit	Unit integrated into RCRA Corrective Action Program

SUBMISSION DATE: SEPTEMBER 13, 2010

TABLE B-2 SOLID WASTE MANAGEMENT UNITS

UNIT NUMBER	UNIT TITLE
X-231A	OIL BIODEGRADATION PLOT
X-231B	OIL BIODEGRADATION PLOT
X-701BP	NORTHEAST OIL BIODEGRADATION PLOT
X-614A	SEWAGE LIFT STATION
X-614B	SEWAGE LIFT STATION
X-614D	SEWAGE LIFT STATION
X-614P	SEWAGE LIFT STATION
X-615	ABANDONED SANITARY SEWAGE TREATMENT PLANT
X-616	EFFLUENT CONTROL FACILITY/FORMER CHROMIUM SLUDGE LAGOONS
X-617	pH ADJUSTMENT
X-622	SOUTH GROUNDWATER TREATMENT FACILITY
X-623	NORTH GROUNDWATER TREATMENT FACILITY
X-624	GROUNDWATER TREATMENT FACILITY
X-625	GROUNDWATER TREATMENT FACILITY
X-626	RECIRCULATING WATER PUMP HOUSE AND COOLING TOWER
X-627	GROUNDWATER TREATMENT FACILITY
X-630	COOLING TOWER BASIN
X-630-1 X-630-2 X-630-2	RECIRCULATING WATER PUMP HOUSE, COOLING TOWER, AND ACID HANDLING STATION
X-633	RECIRCULATING WATER PUMP HOUSE AND COOLING TOWER
X-701E	NEUTRALIZATION FACILITY
X-230G	RCW SYSTEM
X-6614E	SEWAGE LIFT STATION
X-6614J	SEWAGE LIFT STATION
X-6619	SEWAGE TREATMENT FACILITY

TABLE B-2 SOLID WASTE MANAGEMENT UNITS (CONTINUED)

UNIT NUMBER	UNIT TITLE
	SANITARY SEWER SYSTEM
	STORM SEWER SYSTEM
X-103	AUXILIARY OFFICE BUILDING
X-104A	INDOOR FIRING RANGE
X-114A	FIRING RANGE
X-120	OLD TRAINING FACILITY SITE
X-326	PROCESS BUILDING
X-330	PROCESS BUILDING
X-333	PROCESS BUILDING
X-343	FEED VAPORIZATION AND SAMPLING FACILITY
X-344C X-344D	HF STORAGE FACILITY AND HF NEUTRALIZATION PIT
X-600 X-600A	COAL FIRED STEAM PLANT AND COAL STORAGE YARD
X-700	CHEMICAL CLEANING FACILITY (SOILS ONLY)
X-700 X-705	PROCESS WASTE LINE SOILS
X-700T	TCE/TCA OUTSIDE STORAGE TANK (SOILS ONLY)
X-701C	NEUTRALIZATION PIT (SOILS ONLY)
X-705	DECONTAMINATION BUILDING (SOILS ONLY)
X-705A X-705B	RADIOACTIVE WASTE INCINERATION /CONTAMINATED BURNABLES STORAGE LOT (SOILS ONLY)
X-710	TECHNICAL SERVICES BUILDING AND NEUTRALIZATION PIT (SOILS ONLY)
X-720	MAINTENANCE BUILDING (SOILS ONLY)
X-736	CONSTRUCTION SPOILS AREA
X-744Y X-744G	WASTE STORAGE YARD AND BULK STORAGE BUILDING (SOILS ONLY)
X-744W	SURPLUS AND SALVAGE WAREHOUSE
X-749	CONTAMINATED MATERIALS DISPOSAL FACILITY (SOILS ONLY)
X-751	MOBILE EQUIPMENT GARAGE
X-760	PILOT INVESTIGATION BUILDING AND NEUTRALIZATION PIT (SOILS ONLY)

TABLE B-2 SOLID WASTE MANAGEMENT UNITS (CONTINUED)

UNIT NUMBER	UNIT TITLE
X-770	MECHANICAL TESTING FACILITY
X-3001	PROCESS BUILDING
X-3346	FEED AND WITHDRAWAL FACILITY
	BARREN AREA
	OLD NORTHWEST FIRING RANGE (RUBY HOLLOW)
	RAILROAD SPUR YARD STORAGE AREA
	TRANSFORMER CLEANING STORAGE PAD
X-530A X-530B X-530C X-530D X-530E X-530F X-530G	SWITCHYARD, SWITCH HOUSE, TEST AND REPAIR BUILDING, OIL HOUSE, VALVE HOUSE, AND GCEP OIL PUMPING STATION
X-533A X-533B X-533C X-533D X-533E X-533F X-533H	SWITCHYARD, SWITCH HOUSE, TEST AND REPAIR BUILDING, OIL HOUSE AND ASSOCIATED FRENCH DRAINS, VALVE HOUSES, AND GAS RECLAIMING CART GARAGE
X-747G	NORTHEAST CONTAMINATED MATERIAL STORAGE YARD (SOILS ONLY)
X-747F	MISCELLANEOUS MATERIALS STORAGE YARD
X-747H	NORTHWEST SURPLUS AND SCRAP YARD
	DON MARQUIS SUBSTATION (DRAINAGE COLLECTION PONDS) AND CONSTRUCTION SPOILS
X-326	CONTAINER STORAGE UNIT (L-CAGE)
X-326	PCB STORAGE UNIT
X-330	PCB STORAGE AREA
X-333	PCB STORAGE AREA
X-705B	CONTAMINATED BURNABLES STORAGE LOT
X-741	OIL DRUM STORAGE FACILITY

TABLE B-2 SOLID WASTE MANAGEMENT UNITS (CONTINUED)

UNIT NUMBER	UNIT TITLE
X-744G	UNRESTRICTED CONTAINER STORAGE UNIT
X-744G	RESTRICTED CONTAINER STORAGE UNIT
X-744P X-744N X-744Q	WAREHOUSES AND ASSOCIATED OLD CONSTRUCTION HEADQUARTERS
X-744S	WAREHOUSE
X-744T X-744U	WAREHOUSES
X-744RW	RETRIEVABLE WASTE STORAGE AREA
X-744Y	RAD WASTE STORAGE YARD
X-745B	ENRICHMENT PROCESS GAS YARD
X-745C	WEST CYLINDER STORAGE YARD
X-745E	NORTHWEST INTERNATIONAL PROCESS GAS YARD
X-745F	NORTH PROCESS GAS STOCKPILE YARD
X-752	HAZARDOUS WASTE STORAGE FACILITY
XT-847	WAREHOUSE
X-7725 X-7745R BFS FACILITY	RECYCLE & ASSEMBLY BUILDING, RECYCLE & ASSEMBLY STORAGE YARD, AND INITIAL CONSTRUCTION BULK FUEL STORAGE AREA (BULK FUEL STORAGE SWMU)
X-7725	CONTAINER STORAGE UNIT
X-7725	NON-HAZARDOUS WASTE CONTAINER STORAGE UNIT
X-7725R	STORAGE YARD
X-334	TRANSFORMER STORAGE AND CLEANING BUILDING
X-342A X-342B X-342C	FEED VAPORIZATION AND FLUORINE GENERATION BUILDING, AND FLUORINE STORAGE BUILDING AND WASTE HF NEUTRALIZATION PIT
X-344 X-344A	URANIUM HEXAFLUORIDE SAMPLING FACILITY AND SETTLING TANK
X-344D	HF NEUTRALIZATION PIT
X-700CT	CHEMICAL AND PETROLEUM STORAGE CONTAINMENT TANKS
X-701C	NEUTRALIZATION PIT
X-701E	NEUTRALIZATION FACILITY

TABLE B-2 SOLID WASTE MANAGEMENT UNITS (CONTINUED)

UNIT NUMBER	UNIT TITLE
X-710	RADIOACTIVE WASTE PIT
X-720	NEUTRALIZATION PIT AND SOILS
X-740	WASTE OIL HANDLING FACILITY
X-750	MOBILE EQUIPMENT MAINTENANCE SHOP, FUEL STATION, AND WASTE OIL TANK
X-751	MOBILE EQUIPMENT GARAGE
X-760	NEUTRALIZATION PIT
	CHEMICAL AND PETROLEUM CONTAINMENT BASINS (EAST OF X-533A) AND EMERGENCY CONTAINMENT TANKS
	GCEP UNDERGROUND STORAGE TANKS
X-230J3	RUNOFF POND
X-230J3	WEST ENVIRONMENTAL SAMPLING BUILDING AND INTERMITTENT CONTAINMENT BASIN
X-230J5	WEST HOLDING POND AND OIL SEPARATION BASIN
X-230J6	NORTHEAST HOLDING POND, MONITORING STATION, AND SECONDARY OIL COLLECTION BASIN
X-230J7	EAST HOLDING POND AND OIL SEPARATION BASIN
X-230K	SOUTH HOLDING POND
X-611A	NORTH, MIDDLE, AND SOUTH LIME SLUDGE LAGOONS
X-611B	LIME SLUDGE LAGOON
X-621	COAL PILE RUNOFF TREATMENT FACILITY
X-701B	HOLDING POND, CONTAINMENT PONDS AND RETENTION SOILS
X-2230M	SOUTHWEST HOLDING POND, WASTE PILE AND X-617 pH ADJUSTMENT UNIT
X-2230N	WEST HOLDING POND NO. 2
X-734 X-734A X-734B	OLD SANITARY LANDFILL, CONSTRUCTION SPOILS LANDFILL, AND OLD CONSTRUCTION SPOILS LANDFILL
X-735	RCRA LANDFILL
X-735 AND X-735A	SANITARY LANDFILL AND LANDFILL UTILITY BUILDING

TABLE B-2 SOLID WASTE MANAGEMENT UNITS (CONTINUED)

UNIT NUMBER	UNIT TITLE
X-749 NORTH	HAZARDOUS WASTE LANDFILL
X-749 SOUTH	SOLID WASTE LANDFILL
X-749A	CLASSIFIED MATERIALS DISPOSAL UNIT
X-749B	PETER KIEWIT LANDFILL
	BIG RUN CREEK
	EAST DRAINAGE DITCH
	LITTLE BEAVER CREEK
	NORTH DRAINAGE DITCH, X-230L NORTH HOLDING POND, AND UNNAMED CONSTRUCTION FILL AREA
	NORTHEAST DRAINAGE DITCH
	WEST DRAINAGE DITCH
	5-UNIT GROUNDWATER PLUME
	7-UNIT GROUNDWATER AREA
	X-701B AREA GROUNDWATER AREA
	X-740 WASTE OIL HANDLING FACILITY (GROUNDWATER ONLY)
	X-749/X-120 GROUNDWATER PLUME

TABLE B-3 TYPES OF VECHICLES OPERATING AT PORTS – 2010

Description	Number
Auto	59
Pickup	270
Van	133
Truck (1 ton and up)	33
Misc. Mobile Equipment	269
Total	764

TABLE B-4 VEHICLES OPERATING AT PORTS – 2010

Department	No. of Vehicles	Trips/Day	Miles/Day	Miles/Year
Administration	13	21	155	47,923
ESH&Q	59	233	1,061	186,288
Security	25	149	850	50,338
Maintenance	319	570	2,805	276,842
Operations	198	373	1,533	234,891
Management	52	165	682	74,738
Information Technology	8	26	76	7,533
Technical Services	37	79	545	36,890
Industril Health/Health Physics	30	68	340	17,680
Fire Department	22	30	135	6,994
Finance	1	8	8	416
Total	764	1,722	8,190	940,533

Excludes all vehicles that travel solely within a building or production area

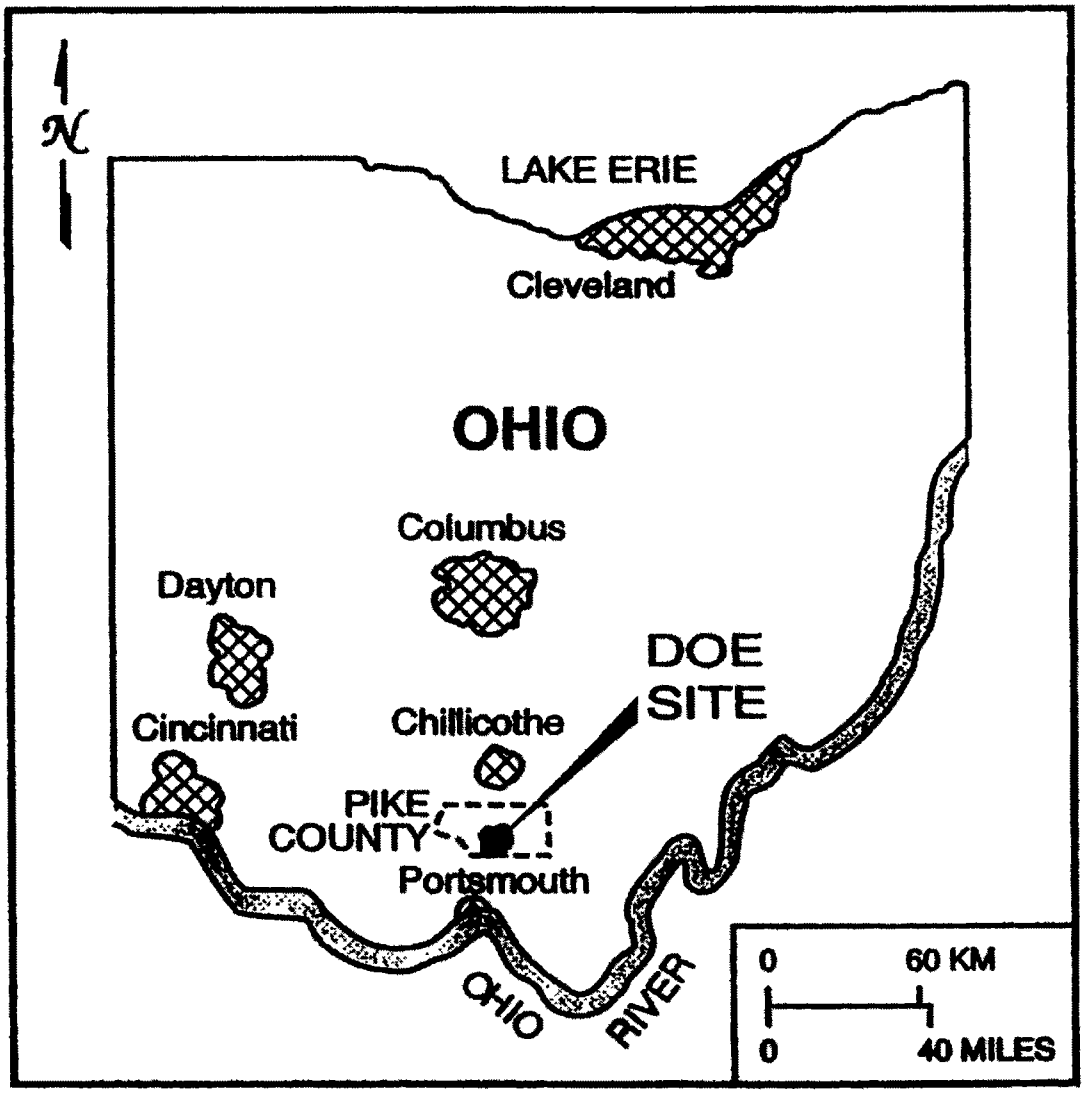

Figure B-1 Plant Site Location within State of Ohio.

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SUBMISSION DATE: SEPTEMBER 13, 2010

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SECTION C

WASTE CHARACTERISTICS

C-1 CHEMICAL AND PHYSICAL ANALYSIS [3745-50-44(A)(2), 3745-54-13]

The Portsmouth Gaseous Diffusion Plant (PORTS) is a large, industrial, chemical processing complex that generates a variety of wastes. The Department of Energy (DOE) is responsible for environmental restoration and waste management at the site. The gaseous diffusion process buildings and related facilities were leased to United States Enrichment Corporation (USEC) on July 1, 1993. USEC is responsible for the waste generated as a result of the cold shutdown activities associated with the gaseous diffusion plant. DOE has begun decontaminating and decommissioning of inactive facilities under CERCLA. DOE will be generating waste throughout the D&D process. The X-326 container storage unit is used to store waste generated by DOE from current environmental restoration and waste management activities and waste generated prior to the lease agreement with USEC. Some USEC-generated wastes are also stored in the container storage units. Limitations on the storage of USEC Land Disposal Restriction wastes are provided by a separate Director's Finding and Orders for USEC. DOE and LATA/Parallax Portsmouth, LLC (LPP) are not responsible for compliance with the USEC Order.

Waste managed by DOE includes a variety of closure and remediation wastes, such as excavated soils, wastewater treatment sludge, neat trichloroethylene, and decontamination and decommissioning waste.

All of the hazardous wastes generated at PORTS by DOE are currently assumed to include radioactive material from DOE operations and must be stored onsite as mixed (hazardous and radioactive) waste. Wastes determined to be mixed wastes are managed at the X-326 container storage units or shipped to a licensed facility until approved treatment and disposal methods for mixed wastes are available. If sufficient documentation is developed to demonstrate that a waste contains no added radioactive constituents, the waste will be shipped offsite to a commercial treatment, storage, disposal, or recycling facility.

The hazardous wastes generated by diffusion-related activities consist of oils, solvents, and other cleaning agents produced in decontamination and maintenance activities. These hazardous wastes are predominantly characterized on the basis of process knowledge. PORTS assumes that suspected contaminants are present until further investigation and/or analysis proves the constituents are not present or are present at concentrations below characteristic regulatory thresholds. All hazardous wastes are stored in the container storage units located within the X-326. A detailed description of these units is presented in Section D.

The following text and Table C-1 provide a brief description of each hazardous waste stream stored at PORTS. These descriptions include the following information for each waste stream: the hazardous characteristic or nature of each waste stream and the basis for characterization. The constituency and hazardous waste code designations provided represent a survey of the general nature of each waste stream. Proper storage of all wastes is ensured through the use of the waste stream review/analysis procedures provided in Section C-2.

Plant wide (PW) waste streams describe generated waste from PORTS activities. The PW waste streams are based on how the wastes are managed more than how and where the wastes were generated. For example, combustible liquids may be generated from similar processes in many PORTS buildings, but all combustible

liquids can be managed as one waste stream. Waste treatment technologies may vary within a waste stream depending on the type and concentration of the hazardous constituents and other regulatory concerns.

The list of waste streams presented in Table C-1 includes a brief explanation of the basis for characterization for each waste stream. PORTS most commonly uses its understanding of generating processes, manufacturer's knowledge and materials used to characterize its wastes, and Table C-1 reflects this characterization. PORTS often uses Material Safety Data Sheets (MSDSs) in support of its waste characterizations based on process knowledge. PORTS conducts analysis for wastes to confirm characterization. Table C-1 indicates whether or not analysis exists and example analytical reports are presented in Appendix C-1. In addition, representative MSDSs used to support waste characterization are presented in Appendix C-2. When new/additional products are used on-site, MSDSs for these products will be maintained as part of the Hazard Communication Program. When any of these MSDSs are used to support waste characterization, the MSDS will be added to the operating record. All data supporting waste characterizations are maintained in the facility operating record for a minimum of 3 years. Records may be maintained as a hard copy or as an electronic duplicate.

DEBRIS

This waste stream is a combination of all previous debris waste streams and encompasses wastes such as equipment components, filters, masonry, personal protective equipment, rags, wipes, plastic, glassware, radioactively contaminated light bulbs, and radioactively contaminated batteries. Debris may be generated from most PORTS processes, and may be contaminated with organics and/or metal constituents (PW-201). This waste stream does not include items containing elemental mercury or labpacks, which are addressed in other PORTS waste streams. The characteristics of the debris will be determined on a case-by-case basis. The waste stream description for debris is not intended to meet the definition for debris in OAC 3745-270-02. The quantities of waste generated annually and in storage will vary.

SOIL

Soils become contaminated as a result of hazardous material spills and environmental releases, and soil waste streams are generated through spill cleanup, environmental restoration, and decontamination and decommissioning activities. Soils may be contaminated with organics and/or metal constituents (PW-202). The characteristics of the soil will be determined on a case-by-case basis. The quantities of waste generated annually and in storage will vary.

AQUEOUS LIQUIDS

Most aqueous liquids are generated from equipment decontamination, de-watering operations, liquid spill recovery, and laboratory sample preparation and analysis. Aqueous liquids may be corrosive (D002) and contaminated with organics and/or metal constituents (PW-203). The characteristics of these liquids will be determined on a case-by-case basis. The quantities of waste generated annually and in storage will vary.

COMBUSTIBLE LIQUIDS

Combustible liquids are primarily waste fuels, oils, and solvents. These wastes are generated during equipment cleaning and maintenance activities and when equipment is removed from service during renovation or decontamination and decommissioning activities. These liquids may be ignitable (D001) and contaminated with organics and/or metal constituents (PW-204).The characteristics of these liquids will be determined on a case-by-case basis. The quantities of waste generated annually and in storage will vary.

SLUDGE

This waste stream encompasses the wet sediments and residues after liquids have been removed. These sludges generally have low solids content, and include oil residues, tank sediments, paint sludges, and chemical precipitates. Sludges may be contaminated with organics and/or metal constituents (PW-205). The characteristics of the sludges will be determined on a case-by-case basis. The quantities of waste generated annually and in storage will vary.

SOLID PROCESS RESIDUES

Solid process residues include trap material, incinerator ash, ion exchange media, evaporator solids and abrasive media. These wastes have very low moisture content and may be contaminated with organics and/or metal constituents (PW-206).The characteristics of these solid residues will be determined on a case-by-case basis. The quantities of waste generated annually and in storage will vary.

SPENT ACTIVATED CARBON

Activated carbon is used to remove organic contaminants from PORTS groundwater in the groundwater recovery and treatment facilities. The spent activated carbon (PW-207) may contain trichloroethylene, 1,1,1-trichloroethane, other groundwater organic contaminants, and related degradation products. The spent carbon can be regenerated by removing the organic contaminants, and then reused for groundwater treatment. The quantities of waste generated annually and in storage will vary.

MERCURY CONTAINING WASTES

Mercury containing items such as manometers, switches, pressure gauges, and mercury batteries are encountered during equipment maintenance, building decommissioning, and related activities. Waste containing elemental mercury (PW-208) that can not be recycled requires treatment by amalgamation in addition to any other required waste treatment for additional hazardous characteristics. The quantities of waste generated annually and in storage will vary.

LABPACKS

Small containers of hazardous wastes such as off-specification chemicals, unused paints, and other unused hazardous materials may be overpacked into a waste container and managed as a labpack (PW-209). The labpack characteristics will be determined through process knowledge from constituents identified on container labels and from material safety data sheets. The quantities of waste generated annually and in storage

will vary.

CONTAINERIZED GASES

Aerosol cans and gas cylinders that are declared waste and are still pressurized may exhibit characteristics of ignitability (D001), reactivity (D003), or other listed hazardous waste. These wastes will be managed as containerized gases (PW-210). The quantities of waste generated annually and in storage will vary.

UNIVERSAL WASTE

Universal waste generated and managed at the facility is regulated in accordance with the universal waste rules in OAC 3745-51-09 and 3745-273 and are not subject to be characterized by the waste analysis plan in Table C-2. The quantities of waste generated annually and in storage will vary.

C-1A CONTAINERIZED WASTE [3745-50-44(C)(1)(b)]

Hazardous waste storage areas are entirely surrounded by containment systems that meet the requirements of 3745-55-75(B). Accordingly, the requirements of 3745-50-44(C)(1)(b) are not applicable to PORTS.

C-2 WASTE ANALYSIS PLAN [3745-50-44(A)(3), 3745-54-13(B) & (C), 3745-270-07]

The waste analysis plan is detailed in Table C-2 and has been written for wastes that are generated at PORTS. The waste analysis plan includes the name of the waste stream, the parameters that are analyzed, frequency of analysis, and the rationale that governs each of the decisions in the plan. The waste analysis plan is applicable to wastes which are stored in container storage units in the X-326.

C-2A PARAMETERS AND RATIONALE [3745-54-13(B)(1)]

The parameters and rationale for waste analysis are based on the waste characterizations made by PORTS, which are in Section C-1, and are listed in the waste analysis plan in Table C-2. Analytical parameters identified in Table C-2 have been selected to perform three functions:

- To confirm PORTS waste characterizations as necessary for container storage.
- To confirm that sufficient information exists to comply with the Land Disposal Restrictions for wastes to be shipped offsite to a TSD Facility.
- To confirm that treatment residues resulting from the treatment of PORTS wastes received from offsite are identified correctly and determine whether such residues require further treatment before they may be land disposed.

In accordance with DOE management practices, wastes suspected to contain accountable elevated concentrations of enriched uranium are tested at each generating source for uranium. In addition, DOE policy requires that all wastes generated at PORTS that are commercially treated or disposed of be free of any

radionuclide that was added as a result of PORTS operations. All of the hazardous wastes generated by DOE at PORTS are currently assumed to include radioactive material from DOE operations and must be stored onsite as mixed (hazardous and radioactive) waste until radioactivity release criteria have been established. In addition, wastes determined to be mixed wastes will be managed at PORTS or another DOE Facility until approved treatment and disposal methods for mixed wastes are available.

C-2B TEST METHODS [3745-54-13(B)(2)]

Test methods used for waste analysis are from the latest revision of the approved methods annotated in "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods," U.S. EPA Publication SW-846 (incorporated by reference in rule 3745-50-11 of the Administrative Code), American Society for Testing and Materials (ASTM) standards, or other EPA-approved methods. PORTS has a detailed laboratory approval program that includes review and approval of the QA program maintained by each laboratory.

Additionally, PORTS selects off-site laboratories that participate in the Department of Energy Consolidated Audit Program (DOECAP). This program provides continuing oversight of subcontracted laboratories to ensure quality and defensible data. The program provides extensive assessment of laboratory programs and performance including but not limited to quality control, adherence to laboratory methods, data management/reporting, and training.

C-2C SAMPLING METHODS [3745-54-13(B)(3), 3745-51, APPENDIX I]

Hazardous wastes are generated at or near the work areas in amounts of 55 gallons or less and are moved to 90-day storage areas or the hazardous waste storage units in the X-326. Wastes are typically sampled prior to transport to a permitted container storage unit and may also be sampled for verification in the X-326 container storage units.

Numerous sampling techniques are used in collecting representative samples of hazardous wastes. The technique used will depend on the physical nature of the waste, the container from which the sample is taken, and other physical constraints. A discussion of methods appropriate for different waste types and physical states is provided in the following sections. Sampling and analysis plans are developed for sampling events. These plans are developed to comply with Chapter 9 of SW-846 and include but are not limited to the following information: the number of samples to be collected, the methodology for collecting representative samples, analytical requirements, quality control samples, decontamination of sampling equipment, maintenance of sampling equipment chain of custody, and records management.

LIQUIDS AND SLURRIES

A COLIWASA is a device used to sample contained liquids and slurries. A COLIWASA is an open tube of nominal length that can be lowered into a container, allowed to fill as it is lowered, then sealed at the bottom when the desired depth is reached thus obtaining a "core" sample. This provides a representative sample of layered or homogeneous materials. The COLIWASA may be a closed tube within a tube or an open tube with an external plug at its base and is usually made of glass.

SLUDGES, LOOSELY CONSOLIDATED SEDIMENTS, AND OTHER SOLIDS

A hand corer "back saver" is a device that consists of a thin-walled tube with a tapered nosepiece and a weighted "T" handle to facilitate driving the corer and any necessary extensions into sludges, sediments, or

solids. The thin-walled tube has a check valve at its upper end to prevent washout during retrieval of a sludge through an overlying water layer. The corer is introduced into the sludge or loosely consolidated sediment and then forced into the waste with a smooth continuous motion. After the corer is withdrawn, the nosepiece is removed and the sample is transferred to an appropriate container. This technique provides an undisturbed sample of the waste in question. A COLIWASA or an auger may also be used to sample sludges as an alternative to a corer.

Sample collection with a scoop or shovel provides a disturbed grab sample. Generally, these tools are used in collecting samples of the uppermost material. To obtain a sample, a scoop is simply inserted into the sludge or loosely consolidated material, removed with the sample, and then the sample is transferred to an appropriate container. When using a scoop or shovel, it is often desirable to remove the uppermost 1 to 2 inches of the waste and collect an unexposed sample.

A drum thief can be used to sample granular or other dry, loosely consolidated materials. The thief consists of two concentric metallic tubes (one tube inside the other) with elongated holes cut along the length of both tubes. The outer tube is fitted with a pointed, solid metallic end to facilitate penetration into the material. The sample is collected by forcing the thief into the material when the holes of the tubes are not aligned. When the pointed end of the thief reaches the bottom of the drum, the inner tube is twisted until the holes in both tubes are aligned allowing the material to enter the thief. When the thief is filled, the inner tube is again twisted in order to retain the sample. The sample is then transferred to an appropriate container.

RAGS, PROTECTIVE EQUIPMENT, AND OTHER MISCELLANEOUS WASTES

When sampling contaminated items such as rags, protective equipment (respirator cartridges, coveralls, etc.), and other miscellaneous wastes, it must be determined if the waste can be homogenized into a uniform or nearly uniform mass. If the waste can be homogenized, a grab sample is collected utilizing appropriate sampling equipment as described above for sludges, loosely consolidated sediments or other solids. Generally, homogenization of this type of waste cannot be accomplished and therefore, the sampling is aimed at retrieving the portion of the waste that exhibits the highest degree of contamination which provides for conservative hazardous waste determinations. Representative sampling of non-homogeneous waste such as rags, wipes, and personal protective equipment is particularly difficult. Samples of this type of waste will consist of small pieces of the material cut from several sections of larger pieces. The smaller pieces will be cut from the visibly soiled areas of the larger pieces. Samples will be obtained from as deep in the container as practical. An additional sampling method is to collect a core sample by compressing the waste and then using a hole saw attached to a drill to collect the sample.

C-2D FREQUENCY OF ANALYSES [3745-54-13(B)(4)]

Verification analysis of waste streams is performed on a periodic basis as specified in Table C-2. These analytical requirements are applicable to all waste streams sent to the X-326 container storage unit. Residues that are generated from activities being performed on existing waste streams, such as sludges remaining after decanting liquids, are not subject to the waste analysis plan, because the waste that the residue originated from was already subject to the waste analysis plan, as designated in Table C-2. Except for waste unused chemicals, a discrete number of containers from each waste stream will be sampled. The containers will be randomly selected, and sampling will be timed to extend throughout the year. Ten percent of each waste stream will be physically sampled; twenty percent will be visually inspected. The number of containers sampled will be derived from an estimated annual generation rate based on the volume generated during the preceding twelve

months. The type and frequency of sampling may be increased, as necessary, for wastes for which variability is a concern. An example of when such an increase could be necessary would be when raw materials change and when major maintenance or an unplanned shutdown occurs, particularly when such changes might affect the waste streams produced. Wastes will be re-evaluated when wastes characterized by a TSDF do not match the pre-approved waste profile or manifest.

PORTS may utilize analytical testing done under other regulatory mandated programs to supplement or replace the analytical requirements of the waste analysis plan. Ohio EPA will be consulted if a test method other than those in SW-846 or ASTM standard for waste analysis is to be used. Analyses of waste streams generated from those DOE facilities not leased by USEC are performed as specified in the waste analysis plan. Process knowledge and data from environmental restoration activities are used to characterize waste related to those activities.

WASTE UNUSED CHEMICALS

Processes used at PORTS that are identified in OAC 3745-51-33 produce listed hazardous wastes. Additionally, waste unused products may be characteristically hazardous per 3745-51-21 through 24. These wastes may be further characterized as necessary per 3745-52-11 and are then managed accordingly; however, waste unused chemicals will predominantly be characterized based on MSDS information and the knowledge of how they are generated.

C-2E ADDITIONAL REQUIREMENTS FOR WASTE GENERATED OFFSITE [3745-54-13(B)(5) &(C)]

Currently, PORTS does not accept any mixed waste for treatment, storage, or disposal from off-site locations. However, PORTS may accept residues from treatment processes applied to PORTS generated wastes. These waste residues may need to be returned to PORTS because the radiological constituents in the waste residue may prevent the waste from being further treated or stored at the facility that provided the treatment and the residue itself may need to be further treated in order to meet LDR standards. In this instance, there may not be sufficient capacity at a facility or the treatment technology may not yet be available; therefore, the waste residues would be returned to PORTS for storage pending availability of additional treatment. The residues from these treatment processes will be mixed wastes and may consist of any grouping from the PORTS listed waste codes (Table C-1).

Treatment residues from off-site treatment processes will be characterized based on the analytical results by the off-site processor prior to shipping. PORTS may request additional analysis as necessary to safely store the returned waste and to meet future disposal requirements. The results of these analyses will be forwarded to PORTS where they will be reviewed to determine if the treatment residues should be returned to PORTS. PORTS will perform fingerprint sampling and analysis on all incoming shipments of waste treatment residues for constituents based on knowledge of the waste sent off-site for treatment. The frequency will be consistent with that described in Section C-2d of the application. Test methods used are as specified in the latest revision of the approved methods in the U.S. EPA Publication SW-846, "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods," (incorporated by reference in rule 3745-50-11 of the Administrative Code), or other EPA approved methods. PORTS has a detailed laboratory approval program that includes review and approval of the Quality Assurance Program of the contracted laboratories.

PORTS will conduct the following additional activities for incoming shipments of treatment residues received from a treatment, storage or disposal (TSD) facility.

1. If the shipment is in drums, PORTS will count and weigh the drums to ensure they match the number and weight on the manifest.

2. If the shipment is in bulk waste boxes, PORTS will count and weigh the boxes to ensure that the weight matches (within 10%) the manifested weight.

3. For all containers, PORTS will inspect the containers to ensure there are no leaks, major dents, or other structural defects. If such defects are found, PORTS will immediately repack the container.

4. Prior to all return shipments, the TSD facility will sample containers of treatment residue, as detailed in "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods" (EPA SW-846), then affix chain of custody seals to ensure that the container has not been tampered with or had any material added to or removed from the container. The chain of custody seal will have a unique number assigned to it that will be reported on the manifest.

5. The following paperwork will be reviewed before PORTS signs the manifest accepting treatment residues from any treatment process for storage:

    - Hazardous waste manifests.

    - LDR notification stating whether the residue meets treatment standards or not.

    - Lab analysis results received from the treatment, storage or disposal facility confirming the LDR determination.

    - Back-up lab analysis, performed by PORTS, that confirms any other hazardous designations attached to the waste (i.e., because of treatment, heavy metals may have concentrated in the waste, thus causing the residue to become a TCLP characteristic hazardous waste).

6. PORTS will ensure that labeling of the drums is correct, i.e., that there are appropriate hazardous waste labels, radioactive labels, etc.

7. The paperwork, referenced in Paragraph 5 above, will be maintained in a file with all of the original shipping manifests and Waste Container Tracking forms. This file will provide for matching of documentation of waste that has been shipped off-site to the documentation of the proportion of waste that is returned as residues. The file will be for a specifically defined period of time and will collect all documentation for off-site shipments and residues returned during that period. This documentation will become a part of the operating record.

8. If a significant discrepancy is found (e.g., number of drums does not match the manifest, weight of the bulk waste containers is not within 10 percent of the manifested waste, chain of custody seals do not match or are broken, etc.), PORTS will accept the wastes and will contact the appropriate TSD facility personnel to resolve the discrepancy. PORTS waste management authorities responsible for the operation of the container storage units will determine whether a waste shipment can be accepted.

9. If PORTS accepts the wastes and the discrepancy is not resolved in 15 days, PORTS will immediately submit a letter to the director describing the discrepancy and all attempts to resolve it, as well as a copy of the manifest and/or shipping paper at issue. PORTS will notify in writing the Director of the

Ohio EPA and the Environmental Background Investigation Unit of the Ohio Attorney General's Office prior to receiving for storage any residual waste generated by any person other than DOE.

C-2F ADDITIONAL REQUIREMENTS FOR FACILITIES HANDLING IGNITABLE, REACTIVE OR INCOMPATIBLE WASTES [3745-54-13(B)(6), 3745-54-17]

Specific information regarding waste types stored at PORTS is provided in Section C-1. Ignitable, reactive and/or incompatible wastes are stored as described in Section D-1a(3). Additional requirements apply to the storage of ignitable, reactive, or incompatible wastes. The special precautions taken for these wastes are described in Sections D-1 and F-5 of this application, and are only summarized in this section.

In general, PORTS prevents the mixing of incompatible wastes in containers by only accumulating wastes from the same waste stream. Similarly, containers of wastes are only stored with other wastes of the same type wherever possible. Where it is necessary to store a variety of waste types in the same container (e.g., lab packs) or containers of different waste types in proximity to each other, the waste types are carefully reviewed by PORTS waste management personnel responsible for the operation of the storage areas to ensure compatibility and appropriate container storage configurations. This review involves investigation of the processes generating the wastes, researching of references including, but not limited to the latest editions of EPA manual No. 600/2-80-076, "A Method for Determining the Compatibility of Hazardous Waste," "Lange's Handbook of Chemistry," "Bretherick's Handbook of Reactive Chemical Hazards," "The Merck Index," "Handbook of Chemistry and Physics," "Hazardous Chemicals Desk Reference," "Dangerous Properties of Industrial Materials," 40 CFR 264 Appendix V, and other appropriate documents. Compatibility testing with very small amounts of wastes may be performed in the PORTS laboratory facilities. Compatibility testing will be limited to simple mixing procedures conducted under controlled conditions.

Special precautions are required for the management of ignitable or reactive wastes. Ignitable wastes are separated and protected from sources of ignition or reaction including but not limited to open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (i.e., from heat-producing chemical reactions), and radiant heat. "No Smoking" signs are conspicuously placed where there is a hazard from ignitable or reactive wastes.

C-3 LAND DISPOSAL RESTRICTIONS [3745-270]

Land Disposal Restrictions (LDRs) apply to hazardous wastes that require treatment prior to being land disposed. The Director's Final Findings and Orders that addresses the storage of land disposal restricted mixed wastes at PORTS and development/revision of the Site Treatment Plan were signed in 1995. Attachment C.1 provides the 1995 Director's Final Findings and Orders.

C-3A WASTE CHARACTERIZATION [3745-54-13(A)(1), 3745-270-03, 3745-270-07, 3745-270-31, 3745-270-34, 3745-270-37]

Each hazardous waste generated by and/or stored at PORTS is discussed in Section C-1 and summarized in Table C-1. Table C-1 notes whether the waste was characterized by analytical knowledge and/or process knowledge. Corresponding analytical results are provided in Appendix C-1. PORTS conservatively assumes that all hazardous wastes generated require treatment prior to land disposal until they are proven to meet treatment standards through analysis as described in Section C-2. This is done by determining if the hazardous waste meets the treatment standards in OAC 3745-270-40, 3745-270-45, or 3745-270-49.

C-3A(1) DILUTION PROHIBITION AS A SUBSTITUTE FOR TREATMENT [3745-270-03]

PORTS will not use dilution as a method to treat hazardous waste and treatment residues that are restricted from land disposal with the exception that characteristic liquid wastes may be treated in a unit that discharges to waters of the United States if approved by Ohio EPA.

C-3A (2) WASTE SPECIFIC PROHIBITIONS – DIOXIN CONTAINING WASTES [3745-270-31]

Laboratory operations at PORTS may generate waste unused chemicals including 2,4,5-TP (silvex), pentachlorophenol; 2,3,4,6-tetrachlorophenol; 2,4,5-trichlorophenol; 2,4,6-trichlorophenol, 2,4,5-T, 2,3,4,5-tetrachlorophenol, 2,4,5-trichlorophenol, and 2,4,6-trichlorophenol which can be identified as F027 hazardous wastes based on a knowledge of how they are generated. F027 hazardous wastes are prohibited from land disposal unless they are treated according to the treatment standards in OAC 3745-270-40 through 49.

C-3A(3) WASTE SPECIFIC PROHIBITIONS – TOXICITY CHARACTERISTIC METAL WASTE [3745-270-34]

PORTS may generate waste that exhibit toxicity characteristic for one or more metals and are prohibited from land disposal unless they are treated according to the treatment standards in OAC 3745-270-40 through 49. Waste determinations will be made by either lab analysis or process knowledge in order to determine if the wastes meet the treatment standards.

C-3A(4) WASTE SPECIFIC PROHIBITIONS – WASTES WITH IGNITABLE AND CORROSIVE CHARACTERISTICS [3745-270-37]

PORTS may generate waste that exhibit ignitable (D001) and corrosive (D002) characteristics. These wastes are not managed in systems that are regulated by the Clean Water Act nor are these wastes managed in injected wells These wastes are prohibited from land disposal until these wastes are treated to meet the requirements of 3745-270-40.

C-3B NOTIFICATION AND CERTIFICATION REQUIREMENTS: [3745-270-07]

The following sections present procedures that PORTS follows for preparing and maintaining applicable notifications and certifications for generators. Further, PORTS may ship hazardous waste offsite for treatment and have the associated treatment residuals returned to PORTS for further management. The procedure for preparing and maintaining applicable notifications and certifications for wastes to be further managed are also detailed in the following sections.

C-3B(1) RETENTION OF GENERATOR NOTICES AND CERTIFICATIONS [3745-270-07(A)]

PORTS has identified the wastes generated at the facility that are restricted from land disposal in the *Site Treatment Plan for Mixed Wastes*, as required by the Federal Facilities Compliance Act and the Ohio EPA Director's Findings and Orders. Further, as detailed in the waste analysis plan (Section C-2) all waste streams at PORTS except for unused laboratory and non-laboratory commercial products will be analyzed on a periodic basis. In addition, PORTS may be shipping hazardous wastes for treatment off-site, and may receive the associated treatment residues from the TSD Facility. Therefore, PORTS must re-review and maintain all notices and certification submitted by the original generator (PORTS) prior to acceptance and storage of this residue as part of the requirements of this section.

The generator of treatment residues that will be returned to PORTS is required to notify the PORTS storage facility in writing that the wastes being sent to the facility are subject to LDRs. At a minimum, this written notice will include the following information with each shipment of waste:

- U.S. EPA Hazardous Waste Number(s).
- The corresponding treatment standards and all applicable prohibitions set forth in OAC 3745-270.
- The manifest number associated with the shipment of waste.
- Waste analysis data as available.

For treatment residues returned to PORTS that PORTS determines could be land disposed without further treatment, each shipment of waste will be accompanied by a written notification and certification to the disposal facility. The written notification will contain the information detailed previously. The certification will be signed by an authorized representative and state the following:

> "I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in Rules 3745-270-40 through 3745-270-49 of the Administrative Code. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

PORTS will maintain information, in addition to what is provided in Appendix C-1, which was utilized to determine if the waste was subject to land disposal regulations onsite in the operating record. This information could include MSDS, process information, analytical testing, or other supporting data.

PORTS will maintain copies of all notices, certifications, demonstrations, waste analysis data, and other documentation as a part of this subsection in the operating record for at least 5 years after the waste that is the subject of the documentation was sent to an onsite or offsite treatment, storage, or disposal facility. PORTS

understands that the 5 year period is automatically extended during the course of any unresolved enforcement action regarding the regulated activity or as requested by the director.

NOTIFICATION AND CERTIFICATION OF WASTES TO BE FURTHER MANAGED [3745-270-07(A)(2)]

Many of the hazardous wastes generated at PORTS are required under the LDRs to meet specific treatment standards or are required to be treated in a specified manner. Wastes are subject to further regulation if it is determined that the waste belongs to one of several categories. The categories are as follows:

- Dioxin-containing wastes.
- Toxicity characteristic metal wastes.
- Ignitable and corrosive characteristic wastes.
- Newly identified organic toxicity characteristic wastes.

PORTS sends hazardous wastes offsite for treatment and anticipates shipment of wastes offsite for final disposal. Therefore, as required under this section, PORTS will ensure the receiving facilities will be notified that they are receiving a hazardous waste that is subject to further regulation, in accordance with OAC 3745-270-07(A). This is accomplished by utilizing a form that is provided by the disposal facility or by PORTS. The completed form identifies the U.S. EPA hazardous waste identification number, the corresponding treatment standards and applicable prohibitions, the manifest number associated with the waste shipment, and the waste analysis data where available. The information regarding applicable treatment standards will include those treatment standards for waste F001 through F005 and underlying hazardous constituents. Treatment standards for all other restricted wastes will either be included or be referenced by including on the notification the following information:

- The applicable wastewater or non-wastewater designation.
- The applicable subdivisions within a waste code based on waste-specific criteria (e.g., D003 reactive cyanides).
- The regulation(s) where the applicable standards appear.

Where the applicable treatment standards are expressed as specified technologies, the applicable five-letter treatment code (e.g., Incin, Wetox) will also be listed.

If it is determined that hazardous wastes from PORTS can be land disposed without further treatment, PORTS will submit to the treatment, storage, or land disposal facility a notice of certification stating that the waste meets the applicable treatment standards set forth in OAC 3745-270-40 through 3745-270-49. This will be accomplished by utilizing a form that is provided by the disposal facility or by PORTS. The completed form identifies the U.S. EPA hazardous waste identification number, the corresponding treatment standards and applicable prohibitions, the manifest number associated with the waste shipment, and the waste analysis data where available. The information regarding applicable treatment standards will include those treatment standards for wastes F001 through F005 and underlying hazardous constituents. Treatment standards for all other restricted wastes will either be included or be referenced by including on the notification the following information:

- The applicable wastewater or non-wastewater designation.

- The applicable subdivisions within a waste code based on waste specific-specific criteria (e.g., D003 reactive cyanides).
- The regulation(s) where the applicable standards appear.

Where the applicable treatment standards are expressed as specified technologies, the applicable five-letter treatment code (e.g., Incin, Wetox) will also be listed.

The certification statement shall be signed by a representative that is authorized by U.S. DOE for this purpose. The certification statement will read as follows:

> "I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in rules 3745-270-40 through 3745-270-49 of the Administrative Code. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

Copies of the certification and TSD facility notification will be maintained in the operating record at PORTS for a minimum of 5 years.

Current U.S. DOE policy requires that all wastes generated at PORTS that are commercially treated or disposed of be free of any radionuclide that was added as a result of PORTS operations. Consequently, all of the hazardous wastes generated at PORTS are currently assumed to include radioactive material from DOE operations and are stored onsite as mixed (hazardous and radioactive) waste. In addition, wastes determined to be mixed wastes are managed at PORTS or another DOE facility until approved treatment and disposal methods for mixed wastes are available. If sufficient documentation is developed to demonstrate that a waste contains no added radioactive constituents, the waste will be shipped offsite to a commercial treatment, storage, disposal, or recycling facility.

The storage of mixed waste will extend beyond 1 year, as allowed by the Federal Facilities Compliance Act and the Director's Findings and Orders in accordance with the *Site Treatment Plan for Mixed Wastes*. PORTS will make every effort to remove the waste from storage for shipment to treatment and/or disposal facilities, in a timely manner, as these options become available. The *Site Treatment Plan for Mixed Wastes* has been developed and approved by the Ohio EPA, and is updated annually. The *Site Treatment Plan* accounts for the mixed waste that will require storage for longer than one year and establishes milestones for dispositioning the waste.

PORTS conservatively assumes that all hazardous wastes generated require treatment prior to land disposal until they are proven to meet treatment standards through analysis as described in Section C-2. All waste analysis data will be maintained in the facility operating record for a minimum of 5 years.

From time to time, PORTS will manage a restricted hazardous waste subsequent to the point of generation that will be excluded from the definition of waste or hazardous waste or exempt from regulation under Chapters 3745-50 to 3745-69 of the Administrative Code. These wastes or hazardous wastes are excluded or exempted under OAC 3745-51-02 to 3745-51-06. In order to comply with OAC 3745-270-07(A)(5), a one-time notice-to-file will be placed in the facility operating record. The notice-to-file will state the generation, subsequent exclusion from the definition of waste or hazardous waste or exemption from regulation

under OAC chapters 3745-50 to 3745-69, and the disposition of the waste. An example of such an exclusion is a point source discharge from industrial wastewater treatment [OAC 3745-51-04 (A)(2)].

Examples of restricted wastes that will be further managed under the one-time notice-to-file are as follows:

- Solvent-contaminated groundwater that will be managed at the X-622, X-623, X-624, and X-627 water treatment facilities permitted by a National Pollutant Discharge Elimination System (NPDES) permit under the Clean Water Act. The groundwater will be processed through activated carbon treatment columns to remove solvents that contaminate the groundwater. The water will be discharged through an NPDES permitted discharge point. The carbon, when spent, will be managed as a hazardous waste.

All one-time notices-to-file will be maintained in the facility operating record for a minimum of 5 years.

PORTS has onsite laboratory facilities that use an extensive variety of laboratory chemicals. Additionally, a limited number of laboratory grade chemicals are utilized in the process or maintenance areas for specialized purposes. Small quantity commercial products are also used throughout the plant site. Periodically, there is a collection of these chemicals or products from throughout PORTS due to the chemicals no longer being used or the shelf life of the product has been exceeded. These wastes will often be packaged for disposal in a "labpack."

Regarding labpacks, compliance with OAC 3745-270-07(A)(9) will be demonstrated by entering a one-time notice-to-file into the operating record that states that chemicals listed under and OAC 3745-270-42 are properly packaged. Manifests and certification statements will be forwarded with the waste shipments to the TSD facility. The certification statements will contain the wording as stated in OAC 3745-270-07(A)(7), as appropriate, and will be signed by a person authorized by the U.S. DOE to perform that function.

Copies of the notice-to-file and the certification statement will be maintained in the facility operating record for a minimum of 5 years.

C-3C ADDITIONAL REQUIREMENTS PERTAINING TO STORAGE OF RESTRICTED WASTES [3745-270-50]

C-3C(1) RESTRICTED WASTES STORED IN CONTAINERS: [3745-270-50(A)(2)(a)]

All containers of restricted wastes are labeled or marked with, at a minimum, the words "Hazardous Waste", the accumulation start date, and the identity of the container contents. Example labels are shown in Figures D-4 through D-5. The identity of the container contents is given by the container identification numbers and/or bar code labels which are also applied to the containers for tracking purposes. Other labels and markings are applied as applicable and required.

C-3C(2) STORAGE OF LIQUID PCB WASTES [3745-270-50(F)]

Pursuant to OAC 3745-270-50(F), the owner/operator of a facility storing liquid hazardous wastes containing concentrations of PCBs greater than or equal to 50 ppm, must demonstrate that the facility meets the requirements of 40 CFR 761.65(B).

PORTS stores liquid hazardous wastes containing PCBs in concentrations greater than or equal to 50 ppm in the storage units in X-326. These storage units are completely enclosed and have been constructed with an adequate floor which has a continuous 6 inch high perimeter curb with the exception of the X-326 unit. The containment volume of all storage areas are equal to at least two times the internal volume of the largest PCB container or 25 percent of total internal volume of all PCB articles and PCB containers. There are no drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from the storage area. The floors and curbing have been constructed of continuous smooth and impervious materials to prevent or minimize penetration of PCBs. Existing expansion joints in the floor are sealed with an impervious flexible sealing compound.

Certain mixed wastes with Toxic Substance Control Act (TSCA) regulated PCBs are stored in five-inch polybottles in areas X-326 with one inch to one and a half inch curbing. These storage arrangements are necessary to avoid a potential nuclear criticality incident and are allowed under a DOE-EPA TSCA Federal Facilities Compliance Agreement.

A nuclear criticality incident is an uncontrolled self sustained chain reaction in a fissionable material. At PORTS, the fissionable material is the U-235 isotope of uranium. A nuclear criticality accident releases an intense, lethal burst of radiation and generates highly radioactive fission products. All nuclear facilities use strict, very formal control measures mandated by the DOE or the Nuclear Regulatory Commission (NRC) to prevent such accidents.

The control of storage geometry is commonly used to assure safety. Special geometries are carefully designed to make a criticality accident very unlikely. These configurations usually involve small cylinders and thin slabs that allow neutrons to escape rather than initiating fission. Wastes from fissile material areas must be assumed to contain unsafe amounts of fissionable material, and such wastes are necessarily stored in controlled geometries.

Fissionable wastes are usually stored in 5-inch internal diameter "polybottles" or cans with controlled geometries. These special containers are placed in carefully designed storage arrays, where geometry minimizes interaction from neutrons in adjacent containers. Credible accident scenarios are analyzed and controls are implemented to assure that spillage cannot create a nuclear safety hazard. Dike heights are limited so that a "slab" of spilled material cannot assume an unfavorable geometry. The fissionable materials processed at the Portsmouth Site dictate a maximum dike height of 1.0 to 1.5 inches, depending upon the materials and the storage geometries.

The arrangement of each storage area is rigidly maintained through a formal system of inspection and configuration control. The nuclear safety standards employed are those required by DOE, which are based upon the nationally accepted standards of the American Nuclear Society.

DOE signed a Federal Facilities Compliance Agreement (FFCA) with the U.S. Environmental Protection Agency on February 20, 1992, that recognizes the criticality concerns and the use of 5-inch polybottles for PCBs in waste from high uranium assay areas. Additionally, EPA is pursuing a proposed rulemaking that would authorize exceptions for storage requirements due to this criticality concern. The X-326 Unit is not

located below the 100-year flood elevation. The entire PORTS Site is located above the 100-year flood elevation, as discussed in Section B-3 of this application.

All non-radioactive restricted waste containing greater than 50 ppm PCBs that are accumulated for storage in the X-326 container storage unit will be removed for disposal or for treatment within one year of the date these wastes are first placed into storage. The Federal Facilities Compliance Agreement signed by PORTS, DOE, and EPA on February 20, 1992, authorizes DOE to store radioactive PCB waste longer than 1 year due to lack of disposal capacity.

C-3D EXEMPTION FROM LAND DISPOSAL RESTRICTIONS

The storage of mixed waste will extend beyond 1 year, as allowed by the Federal Facilities Compliance Act and the Director's Findings and Orders in accordance with the *Site Treatment Plan for Mixed Wastes*. PORTS will make every effort to remove the waste from storage for shipment to treatment and/or disposal facilities, in a timely manner, as these options become available. The *Site Treatment Plan for Mixed Wastes* has been developed and approved by the Ohio EPA, and is updated annually. The *Site Treatment Plan* accounts for the mixed waste that will require storage for longer than one year and establishes milestones for dispositioning the waste.

C-4 QUALITY ASSURANCE/QUALITY CONTROL

PORTS maintains a quality assurance/quality control program that complies with the requirements of Chapter 1 of SW-846 to ensure that the data collected under this sampling analysis plan is complete, accurate, and defensible in order to properly manage and dispose of waste in accordance with the RCRA Permit. In order to meet these requirements, PORTS has developed a systematic approach for developing and implementing sampling procedures that ensures that quality assurance and quality control (QA/QC) is integrated into the sample collection and data management process. The implementation of this approach is outlined below.

C-4A SAMPLING PROTOCOL

Prior to field activities, a sampling protocol is developed to document the number of samples to be collected, the waste containers or field locations to be sampled, and the number of samples to be collected for each location. The sampling protocol designates the analytical methods that will be used to analyze the samples. The sampling protocol will identify the sample hold times and preservation requirements that are required to meet the analytical method requirements. The sampling protocol will document the detection limits that are required in order to meet the waste verification program requirements. The sampling protocol will also designate the types and frequency of QA samples to be collected in the field. Field blanks, trip blanks, field duplicates, matrix spikes, surrogate spikes, and rinseate blanks will be used based on the analysis to be performed to identify issues with field contamination, laboratory contamination, sample handling/packaging problems, or other issues that may impact data quality. Corrective actions are taken when trends are identified. A laboratory readiness assessment is conducted to verify that both the laboratory and the sample collection team are aware of sample quantities, sample container requirements, number of samples to be collected, and hold time/preservation requirements.

C-4B SAMPLING PERSONNEL

Personnel performing sampling will be trained on sampling techniques, maintenance and decontamination procedures, sample management requirements, record keeping, safety requirements associated with the sampling event, and QA/QC requirements. Personnel performing sampling will maintain log books, chain-of- custody (COC), sample labels, and other records required to provide sufficient information to trace data back to sampled containers/locations, methods of sample collection, sampling dates/time, and preservation methods. Personnel performing field measurements will be trained on the field measurement method, proper calibration requirements for the device, and record keeping requirements for the field measurements. Sampling activities are assessed in the field on an annual basis to verify that sampling events conform to the applicable methods and QA/QC requirements.

C-4C CHAIN-OF-CUSTODY

To ensure the security of samples from collection to final disposition, a COC form is used. A COC form is completed before the transfer of sample custody. The COC form provides an accurate written record that can be used to trace the possession and handling of samples from the time of collection through data analysis and reporting. The basic components of the COC process include sample labels, field records, and COC forms.

C-4D DATA MANAGEMENT AND REVIEW

Analytical data are obtained from the analytical laboratory in written as well as digital format. These records are reviewed to ensure data completeness, detection limits are acceptable, hold times/preservation requirements were met, and that QA/QC samples indicate that the data is valid. Analytical records are maintained as either hard copy or scanned electronic records as part of the operating record for the permit.

The laboratory review of the analytical results include laboratory QA/QC samples (i.e. calibrations, holding times, spikes) required by analytical procedures. Analytical data not meeting the prescribed quality, as described in the analytical procedure, are qualified by the laboratory and reported. If an inquiry into a laboratory result is necessary, the laboratory is contacted and the QA file is reviewed.

SUBMISSION DATE: SEPTEMBER 13, 2010

TABLE C-1 SUMMARY OF GENERATED WASTE STREAMS

Plant-Wide Waste Streams (PW)					
Waste Stream and Identification Number	Waste Codes	Primary Constituents	Physical Form	Basis for Characterization	Treatment Standards for Hazardous Waste[1]
Debris (PW-201)	All Codes	Varies	S	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Soil (PW-202)	All Codes	Varies	S	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Aqueous Liquids (PW-203)	All Codes	Varies	L	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Combustible Liquids (PW-204)	All Codes	Varies	L	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Sludge (PW-205)	All Codes	Varies	S	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Solid Process Residues (PW-206)	All Codes	Varies	S	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Spent Activated Carbon (PW-207)	D018	Benzene	L,S	Analytical, Process knowledge	10 and meet 40 CFR 268.48 and OAC 3745-270-48 standards
	D019	Carbon tetrachloride	L,S	Analytical, Process knowledge	6.0 and meet 40 CFR 268.48 and OAC 3745-270-48 standards
	D022	Chloroform	L,S	Analytical, Process knowledge	6.0 and meet 40 CFR 268.48 and OAC 3745-270-48 standards
	D028	1,2-Dichloroethane	L,S	Analytical, Process knowledge	6.0 and meet 40 CFR 268.48 and OAC 3745-270-48 standards
	D029	1,1-Dichloroethylene	L,S	Analytical, Process knowledge	6.0 and meet 40 CFR 268.48 and OAC 3745-270-48 standards
	D040	Trichloroethylene	L,S	Analytical, Process knowledge	6.0 and meet 40 CFR 268.48 and OAC 3745-270-48 standards
	F001	1,1,1-Trichloroethane, Trichloroethylene	L,S	Analytical, Process knowledge	6.0

SUMMARY OF GENERATED WASTE STREAMS (continued)

Plant-Wide Waste Streams (PW)					
Waste Stream and Identification Number	Waste Codes	Primary Constituents	Physical Form	Basis for Characterization	Treatment Standards for Hazardous Waste[1]
	Or Other Codes	Varies	L,S	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Mercury Containing Wastes (PW-208)	D009	Mercury	S,L	Process knowledge	IMERC; or RMERC
	All Other Codes	Varies	S	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Labpacks (PW-209)	All Codes	Varies	L, S	Analytical, Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)
Containerized Gases (PW-210)	D001	Various Ignitables	G	Process knowledge	DEACT and meet 40 CFR 268.48 and OAC 3745-270-48 standards
	D003	Various Reactives	G	Process knowledge	DEACT
	VariousListed Waste Codes	RCRA Listed Products	G	Process knowledge	(reference 40 CFR 268.40 and OAC 3745-270-40)

[1] Concentration in mg/kg unless noted as "mg/L TCLP"; or Technology Code.
L = Liquid S = Solid G = Gas

SUBMISSION DATE: SEPTEMBER 13, 2010

TABLE C-2 WASTE ANALYSIS PLAN

WASTE STREAM TYPE AND IDENTIFICATION NUMBER	PARAMETERS	FREQUENCY OF ANALYSIS (Annual)	RATIONALE[a]
Debris PW-201	Visual Inspection Test for metals (including mercury) Test for volatile organic compounds Test for semi-volatile organic compounds Uranium Technetium	20% of containers. 10% of containers. As required for TSD acceptance.	Verify waste description Verify waste description and proper waste segregation Determine parameter concentration for waste acceptance criteria. Determine radioactive constituents.
Soil PW-202	Visual Inspection Test for metals (including mercury) Test for volatile organic compounds Test for semi-volatile organic compounds Uranium Technetium	20% of containers 10% of containers As required for TSD acceptance	Verify waste description Verify waste description and proper waste segregation Determine parameter concentration for waste acceptance criteria. Determine radioactive constituents.
Aqueous Liquids PW-203	Visual Inspection pH Test for metals (including mercury) Test for volatile organic compounds Test for semi-volatile organic compounds Uranium Technetium	20% of containers. 10% of containers As required for TSD acceptance	Verify waste description. Verify waste description. Determine characteristics of waste. Proper waste segregation. Determine parameter concentration for waste acceptance criteria Determine radioactive constituents.
Combustible Liquids PW-204	Visual Inspection Flash point Test for metals (including mercury) Test for volatile organic compounds Test for semi-volatile organic compounds Uranium Technetium	20% of containers. 10% of containers. As required for TSD acceptance	Verify waste description. Verify waste description. Proper waste segregation. Determine parameter concentration for waste acceptance criteria. Determination of radioactive constituents.
Sludge PW-205	Visual Inspection Test for metals (including mercury) Test for volatile organic compounds Test for semi-volatile organic	20% of containers. 10% of containers.	Verify waste description. Verify waste description and proper waste segregation.

WASTE STREAM TYPE AND IDENTIFICATION NUMBER	PARAMETERS	FREQUENCY OF ANALYSIS (Annual)	RATIONALE[a]
PW-205 (Cont)	compounds		Determine parameter concentration for waste acceptance criteria.
	Uranium Technetium	As required for TSD acceptance	Determine radioactive constituents.
Process Residue Solids (Trap material, incinerator ash, ion exchange resins, etc) PW-206	Visual Inspection (unless health and safety concerns dictate otherwise)	20% of containers.	Verify waste description, except in cases where exposure health and safety concerns dictate otherwise.
	Test for metals (including mercury) Test for volatile organic compounds Test for semi-volatile organic compounds	10% of containers.	Verify waste description and proper waste segregation. Determine parameter concentration for waste acceptance criteria.
	Uranium Technetium	As required for TSD acceptance	Determine radioactive constituents.
Spent Activated Carbon PW-207	Visual Inspection	20% of containers.	Verify waste description.
	Test for metals Test for volatile organic compounds Test for semi-volatile organic compounds	10% of containers.	Verify waste description and proper waste segregation Determine parameter concentration for waste acceptance criteria.
	Uranium Technetium	As required for TSD acceptance	Determination of radioactive constituents
Mercury Containing Wastes PW-208	Visual Inspection	20% of containers.	Verify waste description.
	Test for metals (including mercury)	10% of containers.	Determine parameter concentration for waste acceptance criteria. Determine parameter concentration for waste acceptance criteria.
	Uranium Technetium	As required for TSD acceptance	Determine radioactive constituents.
Labpacks PW-209	Visual Inspection	All containers.	Verify waste description.
	Characteristic compounds or solutions	Not analyzed.	Knowledge of materials based on containers labels and/or MSDS.
	Compounds listed in OAC 3745-51-33(E) and (F) [40 CFR 261.33(e) and (f)]	Not analyzed.	Knowledge of materials based on containers labels and/or MSDS.
Containerized Gases PW-210	Visual Inspection	All containers.	Verify waste description
	Characteristic compounds or solutions	Not analyzed.	Knowledge of materials based on containers labels and/or MSDS

[a] The rationale correlates to the purpose or reason that specific parameters are analyzed.

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ATTACHMENT C.1
1995 DIRECTOR'S FINAL FINDINGS AND ORDERS

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Issue Date: October 4, 1995

Effective Date: October 4, 1995

BEFORE THE
OHIO ENVIRONMENTAL PROTECTION AGENCY

In the Matter Of:

United States Department of Energy	:	Director's Final
Portsmouth Gaseous Diffusion Plant	:	Findings and Orders
P.O. Box 700	:	
Piketon, Ohio 45661-0700	:	

Respondent

It is hereby agreed by and among the parties hereto as follows:

I. JURISDICTION

These Director's Final Findings and Orders ("Orders") are issued to the United States Department of Energy ("Respondent" or "DOE") pursuant to the authority vested in the Director of Environmental Protection ("Director") under Chapters 3734. and 3745. of the Ohio Revised Code ("ORC").

II. PARTIES BOUND

These Orders shall apply to and be binding upon the Respondent, its assigns, and successors in interest. No change in ownership or operation of the Facility will in any way alter the Respondent's responsibilities under these Orders. Except as otherwise expressly provided herein, the Respondent's obligations under these Orders may be altered only by written approval of the Director.

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By: Mary Cavin Date 10-4-95

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III. DEFINITIONS

Unless otherwise stated below, all terms used in these Orders shall have the same meaning as used in Chapter 3734. of the ORC and the regulations promulgated thereunder.

Milestone:

A "milestone" is a fixed, firm, and enforceable date as set forth in the approved STP. A milestone is a requirement and is enforceable. Milestones correspond to the categories of milestones set forth in Order 1.B.

Revision:

A "revision" is a change to the approved STP which requires, for those affected portions of the STP, public notice by the Ohio EPA of availability of the revised STP, and consultation by Ohio EPA with affected states and U.S. EPA, pursuant to these Orders and Section 105 of the Federal Facility Compliance Act, 42 U.S.C. Section 6939c(b)(4). A revision shall include: (a) the addition or deletion of a treatment facility or a treatment technology with respect to the approved STP; and (b) an extension of milestone for a period greater than sixty (60) days. However, changes in waste volume, the addition or deletion of wastes or waste types, extensions of milestones for a period less than or equal to sixty (60) days, or changes to target dates shall not, by themselves, constitute revisions.

Target Date:

A "target date" is an anticipated completion date for a task that has not been designated as a milestone and shall be a goal for accomplishing a designated task. A target date is not a requirement and is not enforceable. Target dates correspond to the categories of target dates set forth in Order 1.B.

Unavoidable Delay:

An event of "unavoidable delay" means any event beyond the control of DOE which prevents or delays performance of any obligation required by the approved STP and these Orders, and which could not be overcome by due

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diligence on the part of DOE.

Funding Availability or Available Funds:

"Funding Availability" or "Available Funds" means: (1) DOE's-Ports Waste Management (WM) budget allocation, for determinations with respect to milestones for the current FY; and (2) DOE's-Ports Environmental Management (EM) budget allocation (i.e. Environmental Restoration and WM budget allocation or EM target funding level for the Facility), for determinations with respect to other schedules (e.g. FY + 1, FY + 2 milestones).

IV. FINDINGS OF FACT

1. The United States Department of Energy ("Respondent") owns the Portsmouth Gaseous Diffusion Plant, a uranium enrichment facility, located in Pike County, Ohio, approximately twenty (20) miles north of the City of Portsmouth ("Facility").

2. Lockheed Martin Energy Systems, Inc. fka Martin Marietta Energy Systems, a Delaware corporation, licensed to do business in the State of Ohio on March 2, 1984, co-operates Respondent's hazardous and mixed waste management storage facilities and activities at the Facility. The United States Enrichment Corporation ("USEC") has, since July 1, 1993, leased and operated the uranium enrichment facilities and activities at the Facility.

3. The Respondent is a "person" as defined in Sections 1.59 and 3734.01 of the ORC and rule 3745-50-10 of the Ohio Administrative Code ("OAC").

4. At the Facility, the Respondent and USEC generate "hazardous waste" as that term is defined by Section 3734.01 of the ORC and rules 3745-50-10 and 3745-51-03 of the OAC.

5. Mixed waste is defined as waste containing both a hazardous waste subject to the Resource Conservation and Recovery Act of 1976, 42 U.S.C. Section 6901 et seq, as amended ("RCRA"), and a source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954, 42 U.S.C. Section 2011 et seq, as amended ("AEA").

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6. The Ohio EPA received final authorization from the U.S. Environmental Protection Agency to regulate the hazardous waste component of mixed waste on June 30, 1989 (54 FR 27173).

7. At the Facility, Respondent and USEC has generated, continues to generate, and Respondent is storing mixed wastes subject to OAC rules 3745-59-30 (solvent wastes), 3745-59-32 (California list wastes), 3745-59-33 (first third wastes), 3745-59-34 (second third wastes), and 3745-59-35 (third third wastes), hereinafter referred to as land disposal restricted ("LDR") mixed wastes. Further, Respondent also stores mixed wastes generated by USEC.

8. The Respondent has represented to the Ohio Environmental Protection Agency ("Ohio EPA") that the treatment capability or capacity for these LDR mixed wastes is presently inadequate or unavailable.

9. Subject to certain conditions specified therein, OAC rule 3745-59-50 prohibits the storage of LDR mixed wastes at the Facility for longer than one (1) year. See also 42 U.S.C. Section 6924(j) and 40 Code of Federal Regulations, Part 268.

10. Section 105 of the Federal Facility Compliance Act of 1992 ("FFCA"), 42 U.S.C. Section 6939c, enacted October 6, 1992, requires the Secretary of Energy to develop and submit to the Ohio EPA, for review and approval, approval with modifications, or disapproval, a plan for the development of treatment capacities and technologies to treat all of the mixed waste at the Facility. Section 105 of the FFCA further provides for the Ohio EPA to consider the need for regional treatment facilities, to consult with the Administrator of the United States Environmental Protection Agency ("U.S. EPA") and any other state in which a facility affected by the plan is located, and to consider public comments in making its determination on the plan. Section 105 of the FFCA further provides for the Ohio EPA to approve, approve with modifications, or disapprove the plan within six (6) months after receipt of the plan (hereinafter, "Site Treatment Plan" or "STP").

11. Section 102(a) of the FFCA, 42 U.S.C. Section 6961(a), provides that each department, agency, and instrumentality of the executive, legislative, and

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judicial branches of the Federal Government (1) having jurisdiction over any solid waste management facility or disposal site, or (2) engaged in any activity resulting, or which may result, in the disposal or management of solid waste or hazardous waste shall be subject to, and comply with, all Federal, State, interstate and local requirements, both substantive and procedural, respecting control and abatement of solid waste or hazardous waste disposal and management in the same manner, and to the same extent, as any person is subject to such requirements, including the payment of reasonable service charges. Section 102(a) also provides that the United States expressly waives any immunity otherwise applicable to the United States with respect to such substantive or procedural requirements.

Further, Section 102(c) of the FFCA provides that, until October 6, 1995, the waiver of sovereign immunity contained in Section 102(a) of the FFCA, with respect to civil, criminal, and administrative penalties and fines, shall not apply to departments, agencies, and instrumentalities of the executive branch of the Federal Government for violations of Section 3004(j) of the Solid Waste Disposal Act ("SWDA"), 42 U.S.C. Section 6924(j), involving storage of mixed waste that is not subject to an existing agreement, permit, or administrative or judicial order, so long as such waste is managed in compliance with all applicable requirements.

Section 102(c) of the FFCA further provides that, after October 6, 1995, the waiver of sovereign immunity contained in Section 102(a) of the FFCA, with respect to civil, criminal, and administrative penalties and fines, shall apply to departments, agencies, and instrumentalities of the executive branch of the Federal Government for violations of Section 3004(j) of the SWDA, 42 U.S.C. Section 6924(j), involving storage of mixed waste, except that such waiver of sovereign immunity shall not apply after October 6, 1995 for violations by the Respondent of Section 3004(j) of the SWDA, involving storage of mixed waste, so long as the Respondent is in compliance with both: a plan that has been submitted and approved pursuant to Section 105 of the FFCA, 42 U.S.C. Section 6939c, and which is in effect; and an order requiring compliance with such plan which has been issued pursuant to Section 105 of the FFCA, and which is in effect.

12. On April 6, 1993, Respondent published a *Federal Register* notice (58 FR

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17875) describing its proposed process for developing the Site Treatment Plan ("STP") in three phases: the conceptual site treatment plan ("CSTP"), the draft site treatment plan ("DSTP"), and a proposed site treatment plan ("PSTP").

13. On October 29, 1993 and September 1, 1994 the Respondent submitted to the Ohio EPA a CSTP and a DSTP, respectively.

14. By letter dated February 17, 1994, the Ohio EPA provided comments to Respondent on the CSTP.

15. By letters dated October 19, 1994 and October 25, 1994, the Ohio EPA provided comments to Respondent on the DSTP.

16. On April 4, 1995, Respondent submitted to Ohio EPA the PSTP for the Facility.

17. On April 27, 1995, the Ohio EPA published a notice of availability of the PSTP, and has made the PSTP available to the public upon request; on May 24, 1995 the Ohio EPA held a public hearing to take public comment on the PSTP for the Facility.

18. The Ohio EPA has reviewed the PSTP, has considered the need for regional treatment facilities, has consulted with U.S. EPA and states in which a facility affected by the PSTP is located, and has considered all public comments received by Ohio EPA regarding the PSTP. Based upon such review, consultation, and consideration, the Ohio EPA transmitted written comments on the PSTP to Respondent on July 6, 1995.

19. On October 2,1995, the Respondent submitted an amended PSTP to Ohio EPA in an effort to address Ohio EPA's comments on the PSTP.

20. The Background Volumes of the PSTP and Amended PSTP contain background information and underlying assumptions regarding the schedules and treatment technologies proposed in the PSTP and amended PSTP.

21. The Ohio EPA has reviewed the Respondent's amended PSTP, has considered the need for regional treatment facilities, has consulted with U.S. EPA and other affected states, and has reconsidered public comments received regarding

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the Respondent's PSTP.

22. Pursuant to ORC Section 3734.02(G), the Director of Ohio EPA may by Order exempt any person generating, storing, treating, transporting or disposing of hazardous waste in such quantities or under such circumstances that, in the Director's determination, it is unlikely that public health or safety or the environment will be adversely affected thereby, from any requirement to obtain a permit or license or comply with the manifest system or other requirements of ORC Chapter 3734.

23. Pursuant to ORC Section 3734.02(G), the Director has determined that it is unlikely that public health or safety or the environment will be adversely affected by the Respondent's storage of LDR mixed waste at operation of the Facility provided that the Respondent complies with the requirements set forth in the following orders.

24. The Respondent's submittal of the PSTP and the amended PSTP, the Director's approval of the amended PSTP, and the Director's issuance of these Orders fulfill the requirement of section 105(b) of the FFCA, 42 U.S.C. Section 6939c(b) with respect to the Facility.

V. ORDERS

The Director hereby issues the following Orders:

1. The Compliance Plan Volume of the amended PSTP submitted to Ohio EPA on October 2,1995 (Attachment 1) is hereby approved, subject to the terms and conditions specified in these Orders. The Compliance Plan Volume of the amended PSTP will hereafter be referred to as the "approved STP". **Respondent shall implement and comply with the approved STP, in accordance with the approved schedules contained therein, and shall comply with the following terms and conditions:**

A. Covered Matters:

i. The approved STP and these Orders address storage and treatment of all

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mixed wastes at the Facility, (excluding wastes generated by USEC, except as provided in Order no. 2), which are not being stored in accordance with the LDR requirements of OAC rule 3745-59-50, whether such wastes were generated or accumulated in the past, are currently generated or accumulated, or will be generated or accumulated in the future.

ii. Notwithstanding Order 1.A.i, above, the approved STP and Order 1 of these Orders do not address the storage or treatment of wastes that are exempt under the provisions of 42 U.S.C. Section 6939c(b)(1)(A)(ii) from the requirement to prepare a STP, (unless otherwise agreed to by DOE and Ohio EPA). Exempted wastes include environmental restoration mixed wastes, derived from corrective action and remedial action activities, the treatment and storage of which, are governed by the Consent Decree entered by the U.S. District Court on September 1, 1989, in the State of Ohio v. United States Department of Energy, et al., Civil Action No. C2-89-732 and the Administrative Order by Consent, EPA Docket No. V-W-90-B-03, effective August 4, 1994, to which Ohio EPA is a party.

B. Compliance Schedules:

i. Establishment of Milestones and Target Dates:

Milestones shall be established for a three year rolling period consisting of the current federal fiscal year (FY) plus two additional federal fiscal years (FY+1 and FY+2). On the effective date of these Orders, enforceable milestones in the approved STP are established for the next three federal fiscal years: FY (October 1, 1995 - September 30, 1996); FY+1 (October 1, 1996 - September 30, 1997); and FY+2 (October 1, 1997 - September 30, 1998). After expiration of the current fiscal year, what were previously FY+1 milestones will become the current fiscal year (FY) milestones, what was previously FY+2 milestones will become FY+1 milestones. The planning schedule activities identified in the approved STP as FY+3 target dates shall be converted to FY+2 milestones. All conversions will be automatic and remain in effect, unless Respondent notifies Ohio EPA of any need to amend the

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milestones, pursuant to Order I.D.

Target dates shall be established for the out-years beyond the three year rolling milestone period. On the effective date of these Orders, non enforceable target dates in the approved STP are established for the out-years beyond FY + 2.

In accordance with Section X, Funding, Ohio EPA will consider funding availability in reviewing DOE proposals for establishing and adjusting milestones and target dates pursuant to these Orders.

ii. Categories of Milestones and Target Dates:

The categories of activities for which milestones and target dates are established in the approved STP are listed in the following tables.

Depending upon the status of the facility or treatment options (e.g. operations under interim status or at differing stages of development), certain types of target dates or milestones may not be necessary, or an alternative activity that is more appropriate to the facility or treatment approach may be designated, as agreed to by the Parties.

Table 1. Typical schedule for treatment of wastes with existing treatment technologies

Type of Activity Selected for Scheduling as a Target Date and Milestone
a) submit permit applications (or other documentation) to the appropriate agency(ies)
b) procure contract with vendor
c) initiate construction of facilities necessary for vendor operations
d) commence system testing
e) commence operations
f) submit for approval a treatment schedule for backlogged and currently generated mixed waste

Table 2. Typical schedule for treatment of mixed waste for which no existing treatment technology exists

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Type of Activity Selected for Scheduling as a Target Date and Milestone
a) identify funding requirements for identification and development of appropriate technology
b) identify and develop technology
c) submit treatability study exemption(s) application, where applicable
d) submit research and development permit application(s), where applicable
e) submit for approval a schedule for treatment in accordance with Table 2.1 of a new schedule for development of alternative treatment technologies in accordance with this section.

Table 3. Typical Schedule for separation of mixed wastes

Type of Activity Selected for Scheduling as a Target Date and Milestone:
a) complete an estimate of the volume of waste generated by each case of radionuclide separation
b) complete an estimate of the volume of waste that would exist or be generated without radionuclide separation
c) complete an estimate of the costs of waste treatment and disposal of radionuclide separation is used compared to the estimated costs if it is not used
d) provide the assumptions underlying such waste volume and cost estimates
e) submit a plan for treatment or management of residues, as appropriate, in accordance with this section

Table 4. Typical schedule for mixed wastes to be shipped off-site for treatment

Type of Activity Selected for Scheduling as a Target Date and Milestone
a) receive site agreements
b) initiate preparation of wastes for transport
c) complete shipment of mixed wastes for off-site treatment

iii. Notwithstanding the Tables of Order 1.B.ii, the provisions of Section 4 of the approved STP shall apply to Transuranic Waste (TRU) at the Facility.

iv. For newly identified mixed waste streams generated or stored at the Facility, the notification of a need to amend the approved STP need only identify the waste streams. If sufficient information on the newly identified mixed waste streams is not currently available to DOE, including those mixed waste streams that are not sufficiently characterized to allow

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identification of appropriate treatment in order to submit an amended STP within the timeframes set out in accordance with Order 1.D.iii of these Orders, DOE in its written notification may propose an alternative schedule for submitting the amended STP that addresses the proposed amendment, including a proposed schedule for characterization where necessary. The final milestone/target date of the characterization schedule will be the requirement for Respondent to identify the method and location for the treatment of such wastes and a proposed schedule for that to occur.

v. For mixed waste that need technology adaptation, the notification of a need to amend the approved STP, shall contain proposed schedules for identifying (1) the necessary treatment adaptation, and (2) the method and location for the treatment of such wastes and a proposed schedule for that to occur.

C. Annual Report:

On or before the 31st day of December, of each year these Orders remain in effect, DOE shall submit to Ohio EPA a written STP Annual Report for the previous federal fiscal year, and an updated STP which incorporates all approved amendments of the approved STP made during the previous fiscal year, for the Facility. The STP Annual Report shall include the following information: an accounting of the status of the projects described in the approved STP, an updated Table 3 - "Low-Level Mixed Waste Streams" from the Background Volume of DOE's amended PSTP; a statement regarding compliance with the milestones contained in the approved STP; a description of any projected difficulties in achieving compliance with future milestones and target dates; an index or chart that clearly indicates all pages of the approved STP affected by approved amendments of the approved STP a summary of new waste streams generated or identified within the previous fiscal year; and a summary of any additional waste characterization information regarding existing, new or projected waste streams. DOE may, at its option, delay submittal of its updated Table 3 - "Low-Level Mixed Waste Streams" from the Background Volume of DOE's amended PSTP-until the 31st day of March of each year following a federal fiscal year for which an STP Annual Report is required to be submitted pursuant to these Orders.

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D. Amendments:

i. If Respondent or Ohio EPA identifies a need for DOE to amend the approved STP, except for changes in volumes of wastes identified in the Background Volume of the amended PSTP, or in the approved STP, the Respondent or Ohio EPA shall provide written notification within 30 days of the identification of such need and the reasons therefor. The notification shall be of sufficient detail to fully explain the rationale for an amendment of the approved STP, including an accounting of the circumstances that justify an STP amendment. If sufficient information on the proposed amendment is not currently available to DOE in order to submit an amended STP within the timeframes set out in accordance with Order 1.D.iii. below; DOE in its written notification, may propose an alternative schedule for submitting the amended STP that addresses the proposed amendment.

ii. Ohio EPA agrees to consider, in its review, all reasons provided by DOE in its proposal to amend the approved STP.

iii. DOE shall submit an amended STP: a) within thirty (30) days from the date of the written notification to address a proposed extension of a milestone, or a proposed change of a treatment facility or treatment technology; b) within ninety (90) days from the date of the written notification to address a proposed change in target date, or any other aspect of the approved STP; and c) annually, (with the annual report pursuant to Order 1.C.) to address changes in volumes of wastes identified in the Background Volume of the amended PSTP or in the approved STP.

iv. If DOE disagrees with an Ohio EPA notification of the need to amend the approved STP, DOE shall, within 30 days, so notify the Ohio EPA, in writing of the reasons for such disagreement. If DOE and the Ohio EPA are unable to resolve their disagreement, either DOE or Ohio EPA may invoke the dispute resolution procedures of Section IX. During the pendency of the dispute resolution process as set forth in Section IX for a good faith dispute over the Ohio EPA notification of the need to amend the approved STP, the time period for completion of work affected by the dispute shall

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be extended for a period of time not to exceed the actual time taken to resolve any good faith dispute in accordance with Section IX.

v. The Ohio EPA will determine whether the Respondent's amended STP constitutes a "revision" of the approved STP, within the meaning of Section 105 of the FFCA, 42 U.S.C. Section 6939c(b)(4) and as further defined in Section III of these Orders. If the Ohio EPA determines that the amended STP constitutes a "revision" of the approved STP, within the meaning of Section 105 of the FFCA, 42 U.S.C. Section 6939c(b)(4) and as further defined in Section III of these Orders, the Ohio EPA will in a timely manner, 1) publish a notice of the proposed revision of the approved STP and 2) notify the Respondent in writing, of such determination.

vi. Based on the Ohio EPA's review of the proposed revision to the STP, the Ohio EPA's consideration of the need for regional treatment facilities, the Ohio EPA's consultation with U.S. EPA and other affected states, and the Ohio EPA's consideration of all public comments received by Ohio EPA regarding the revised STP, the Ohio EPA will approve, approve with modifications, or disapprove the revised STP, in a timely manner, and will notify Respondent accordingly.

vii. If the Ohio EPA determines that the Respondent's amended STP does not constitute a "revision" of the approved STP, within the meaning of Section 105 of the FFCA, 42 U.S.C. Section 6939c(b)(4) and as further defined in Section III of these Orders, the Ohio EPA will in a timely manner, provide written notification to Respondent of Ohio EPA's approval, approval with modifications, or disapproval of the proposed amended STP.

viii. Prior to approving with modifications or disapproving a proposed amendment to the approved STP, Ohio EPA will consult with DOE regarding the proposed amendment. DOE and Ohio EPA shall attempt to resolve any disagreement with respect to a proposed amendment, including a proposed extension of a milestone, pursuant to the provisions of Section IX, Dispute Resolution. Determinations by Ohio EPA to approve with modifications or to disapprove a proposed amendment will be accompanied by a written statement detailing the reasons for modifications or disapproval.

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E. Duty to Perform; Extensions

i. Except as expressly provided in these Orders, DOE shall cause all work to be performed in accordance with the milestones established in the approved STP.

ii. Pursuant to Order 1.D. of these Orders, DOE may request that a milestone be extended. Upon receipt of a proposed amendment to the approved STP that requests that a milestone be extended, the Ohio EPA will determine whether good cause for the requested milestone extension exists, and shall approve the proposed STP amendment if good cause for the requested milestone extension exists.

iii. For purposes of Order 1.E. of these Orders, good cause for an extension of a milestone may include a delay caused by, or likely to be caused by: (a) an event of unavoidable delay; (b) Ohio EPA's failure to timely take any action contemplated by these Orders; (c) the good faith invocation of dispute resolution or the initiation of administrative or judicial action; (d) the Ohio EPA's approval of a proposed STP amendment to extend another milestone; (e) additional work agreed to by DOE and Ohio EPA; (f) an inconsistency or conflict between such milestone and the requirements of any other existing agreement, order or permit to which DOE is a party; (g) the failure of an off-site treatment facility [identified as a preferred option in the approved STP] to accept or treat wastes subject to these Orders as scheduled in the approved STP; or (h) the failure of a mobile treatment facility [identified as a preferred option in the approved STP] to become available for treatment of wastes subject to these Orders as scheduled in the approved STP.

iv. The Ohio EPA's determination of whether good cause for extension of a milestone exists is necessarily a fact specific determination. The foregoing examples of circumstances that may constitute good cause for extension of a milestone shall not be construed to create a presumption that such circumstances will, in any particular instance, be determined by Ohio EPA to constitute good cause for extension of a milestone.

2. An exemption from the prohibition on storage of LDR mixed wastes, as set forth in OAC rule 3745-59-50, is hereby granted to Respondent and its contractor,

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LMES, to store at the Facility LDR mixed wastes generated by Respondent or USEC, at the Facility, provided that the Respondent complies with these Orders.

VI. LIMITATIONS OF DIRECTOR'S APPROVAL

These Orders shall not be construed as the Ohio EPA's authorization to Respondent to construct or operate facilities or to initiate treatment activities as proposed in the approved STP, unless otherwise expressly stated in Order number 1 or 2. Nothing in these Orders shall be construed as limiting applicable laws regarding the construction of facilities, operation of treatment facilities associated with the approved STP, or regarding approvals required for such construction of facilities, operation or treatment activities.

VII. NOTICE

All documents to be submitted pursuant to these Orders shall be submitted to the following persons at the following addresses:

Ohio EPA:

Ohio Environmental Protection Agency
Southeast District Office
Division of Hazardous Waste Management
2195 Front Street
Logan, Ohio 43138
Attn: RCRA Group Leader and Project Manager

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and

Ohio Environmental Protection Agency
Division of Hazardous Waste Management
Attn: Michael A. Savage, Assistant Chief
1800 WaterMark Drive
Columbus, Ohio 43216-1049

DOE:

U.S. DOE, Portsmouth Gaseous Diffusion Plant
P.O. Box 700
Piketon, Ohio 45661-0700
Attn: Portsmouth Site Manager and FFCA Project Manager

or to such persons and addresses as may hereafter be otherwise specified in writing.

VIII. PROJECT MANAGERS

Within ten (10) business days of the effective date of these Orders, Ohio EPA and DOE shall each designate a Project Manager. Each Party shall notify the other party in writing of the designated Project Manager. Either Party may change its designated Project Manager by notifying the other Party, in writing, ten (10) business days before the change, if possible.

Each Project Manager shall be the primary contact regarding the implementation of these Orders. Except as otherwise provided in Section VII of these Orders, communications between the Parties concerning these Orders shall be directed through the Project Manager, for further dissemination to the respective Project Manager's organization.

The Project Managers shall represent their respective organization regarding the implementation of these Orders, including changes to schedules and requirements, except as otherwise provided in Order 1.D. (Amendments), or Section IX (Dispute Resolution). The Project Managers shall meet periodically, as appropriate, to discuss

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progress and problems regarding the implementation of these Orders.

IX. DISPUTE RESOLUTION

A. If a dispute arises regarding the approved STP or these Orders, the procedures of this Section shall apply. For purposes of this Section, the term "Parties" means DOE and Ohio EPA.

B. Respondent and Ohio EPA shall make reasonable efforts to informally resolve any good faith dispute regarding these Orders at the Project Manager level, within thirty (30) days following the occurrence of the actions or circumstances giving rise to the dispute. If resolution cannot be achieved informally, the disputing party may elevate the dispute for resolution pursuant to this section. If Respondent does not submit a written notification of dispute to Ohio EPA within thirty (30) days following the occurrence of the actions or circumstances giving rise to the dispute, Respondent shall be deemed to have accepted the position of the Ohio EPA.

C. To initiate formal dispute resolution, the disputing party shall submit to the other party a written notification of any good faith dispute regarding these Orders. The written notification of dispute shall specify the nature of the dispute, the work affected by the dispute, the disputing party's position with respect to the dispute and the information the disputing party is relying upon to support its position. The Project Managers and designated representatives of the Parties shall attempt to resolve such dispute within thirty (30) days of written notification of the dispute. For DOE, the designated representatives shall include the DOE-Portsmouth Site Manager. For Ohio EPA, the designated representatives shall include the Chief of the Division of Hazardous Waste Management.

D. If the Project Managers and designated representatives of the Parties are unable to resolve such dispute, within thirty (30) days of written notification of the dispute, then either Party may submit a written statement of the dispute to the Ohio EPA's Deputy Director of Programs (the Director's designee, duly delegated with the authority to resolve disputes under this Section of these Orders). The Deputy Director may meet with the Project Managers and designated representatives of the Parties, and may request additional information regarding the nature of the dispute and the respective positions of the parties. Within

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thirty (30) days of receipt of the written statement of dispute, the Deputy Director will consult with the Manager of the DOE Oak Ridge Field Office (or the Manager's designee) and will notify the Project Managers and designated representatives of the Parties in writing of the Director's final decision regarding the dispute. The final decision shall be signed by the Director and shall be binding on the Parties, subject to administrative or judicial appeal or review according to applicable law.

E. Except as provided in this Section, the Respondent shall maintain compliance with these Orders. However, if the Parties agree that there is a good faith dispute, the time period for completion of work affected by dispute shall be extended for a period of time not to exceed the actual time taken to resolve such good faith dispute in accordance with this Section. The time periods designated in this Section of these Orders may be extended by mutual written agreement of the Parties. The Parties may consult with and invite the participation of U.S. EPA and other states affected by a dispute during the dispute resolution process, as appropriate.

F. Unless timely appeal is sought, DOE shall incorporate the resolution and final decision of the Ohio EPA into the appropriate plan, schedule or procedure and shall proceed with implementation in accordance with Order 1.D. (Amendments) and the amended plan, schedule or procedure, within thirty (30) days of such resolution and final decision.

X. FUNDING

DOE shall take all necessary steps to obtain sufficient funding to comply with the provisions of the approved STP and these Orders. DOE shall consult with the Ohio EPA in formulating its annual EM budget request as set forth in this section.

By March 31 of each year following issuance of these Orders, DOE shall provide Ohio EPA with information or a briefing on the proposed EM budget request for the Facility, including appropriate supporting documents. In the process of formulating its annual budget request, DOE may be subject to target funding guidance directed by the Office of Management and Budget (OMB). The information or briefing shall address the impacts of such OMB target funding guidance. The Ohio EPA agrees,

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subject to the Ohio Public Records Law, ORC Section 149.43, not to release confidential budget information to any other person or entity prior to submission by the President of his budget request to Congress unless required to do so by court order. DOE may seek to intervene in any proceeding brought to compel or enjoin release of this information. If allowed to intervene, DOE may assert its interest in, and the legal basis for, maintaining the confidentiality of this information.

DOE and Ohio EPA shall discuss work scope, priorities, milestones and target dates,, and Activity Data Sheet (ADS) funding levels required to comply with the approved STP and these Orders. These discussions shall be conducted before DOE Portsmouth submits its annual budget request and supporting ADS to DOE-OR. Ohio EPA will consider funding availability in reviewing DOE proposals for establishing and adjusting milestones and target dates pursuant to these Orders. Ohio EPA's comments to DOE may include those additional or accelerated activities recommended by Ohio EPA are believed by Ohio EPA to be outside of EM target funding levels for the Facility. DOE may revise its budget request and supporting documents to resolve the comments of Ohio EPA. DOE reserves the right to identify which activities it believes cannot be accomplished within the established EM target funding levels for the Facility. Nothing here in shall effect DOE's ultimate responsibility and authority to formulate and submit to the President appropriate budget requests and to allocate appropriate funds to serve DOE's missions.

XI. OTHER APPLICABLE LAWS

Nothing in these Orders shall be construed as waiving or compromising in any way the applicability and enforcement of any other statutes or regulations applicable to the Respondent's activities at the Facility. The Ohio EPA reserves all rights and privileges except as specified herein.

XII. RESERVATION OF RIGHTS

Nothing contained herein shall be construed to prevent the Ohio EPA from seeking legal or equitable relief to enforce the terms of these Orders or from taking other administrative, legal or equitable action as deemed appropriate and necessary, including seeking penalties against the Respondent for noncompliance with these

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Orders. Nothing contained herein shall be construed to prevent the Ohio EPA from exercising its lawful authority to require the Respondent to perform additional activities at the Facility pursuant to Chapter 3734. of the ORC or any other applicable law in the future. Nothing in these Orders shall be construed to limit the authority of the Ohio EPA to seek relief for violations not addressed in these Orders. Nothing herein shall restrict the right of the Respondent to raise any administrative, legal or equitable claim or defense with respect to such further actions which the Ohio EPA may seek to require of the Respondent. Nothing contained herein shall restrict the right of the Respondent to raise any administrative, legal or equitable claim or defense (including lack of authority) with respect to any administrative or judicial appeal or review of any Ohio EPA notification of need to amend the approved STP. The Director reserves the right to revoke these Orders upon a finding that such revocation is necessary to protect human health or safety or the environment. DOE reserves the right to seek administrative or judicial review of any such revocation.

It is the position of the Ohio EPA that the federal Anti-Deficiency Act, 31 U.S.C. Section 1341, as amended, does not apply to any obligations set forth in these Orders, and except as otherwise provided in these Orders, obligations hereunder are unaffected by the Respondent's failure to obtain adequate funds or appropriations from Congress. It is Respondent's position that the obligations set forth in these Orders are subject to the provision of the Anti-Deficiency Act and are subject to funding availability. The Parties agree that it is premature to raise and resolve the validity of such positions at this time.

XIII. MODIFICATION

Except as provided in Section XII - Reservation of Rights, regarding revocation of these Orders, these Orders may be modified only by mutual agreement of Respondent and Ohio EPA. Any modification of these Orders shall be in writing, shall be effective upon signature and issuance by the Director, and shall be incorporated into these Orders and be enforceable in the same manner as any requirement of these Orders.

In February of 1999, and periodically (e.g., every three (3) years) thereafter, as appropriate, unless DOE and Ohio EPA mutually agree that no modification of these Orders is warranted, DOE and Ohio EPA shall conduct a good faith dialogue to determine whether the compliance schedule and funding structure of these Orders should be modified. Such dialogue shall consider the experiences and perspectives of

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DOE and Ohio EPA regarding the implementation of these Orders during the previous three federal fiscal years, the most recent information on current and projected funding availability, and the status of major technical issues that are expected to affect the management of the Facility's mixed waste. If DOE and Ohio EPA agree that modification of these Orders is warranted, DOE and Ohio EPA shall endeavor to complete and implement such modifications within six (6) months of the initiation of such dialogue. Subject to the first paragraph of this Section, if DOE and Ohio EPA disagree as to whether modification of these Orders is warranted, or regarding the extent to which these Orders should be modified, either DOE or Ohio EPA may invoke formal dispute resolution, pursuant to Section IX to facilitate agreement.

XIV. TERMINATION

The Respondent's obligations under these Orders shall terminate when the Respondent demonstrates in writing and certifies to the satisfaction of the Ohio EPA that all obligations under these Orders have been performed or that all mixed wastes subject to these Orders are being stored and will continue to be stored in compliance with OAC Rule 3745-59-50, and the Ohio EPA Division of Hazardous Waste Management acknowledges, in writing, Ohio EPA's acceptance of this demonstration and certification.

XV. OTHER CLAIMS

Except as otherwise expressly provided in Order No. 2, nothing in these Orders shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person, firm, partnership or corporation, not a signatory to these Orders, for any liability arising out of or relating to the operation of the Respondent's facility.

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By: Mary Cavin Date 10-4-95

IT IS SO ORDERED:

Donald R. Schregardus, Director

October 4, 1995
Date

XVI. SIGNATORIES

Each undersigned representative of a party signatory to these Orders certifies that he or she is fully authorized to enter into the terms and conditions of these Orders and to legally bind such signatory to this document.

XVII. WAIVER

The Respondent agrees that these Orders are lawful and reasonable and that the times provided for compliance herein are reasonable. The Respondent, by acceptance of these Orders, agrees to comply with all conditions of these Orders and acknowledges that the Respondent's failure to do so may result in immediate revocation of these Orders and further legal action by Ohio EPA.

The Respondent hereby waives the right to appeal or otherwise challenge the issuance, of these Orders. Nothing in these Orders shall affect DOE's rights to seek administrative or judicial review of final decisions by the Ohio EPA Director pursuant to Section IX (Dispute Resolution), or final actions by the Director pursuant to ORC Section 3745.04 or other applicable law.

The Ohio EPA and the Respondent agree that in the event that these Orders are appealed by any other party to the Environmental Board of Review, or any court, the Respondent retains the right to intervene and participate in such appeal in support of these Findings and Orders. In such event, the Respondent shall continue to comply with these Orders notwithstanding such appeal and intervention unless these Orders are stayed, vacated, or modified.

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By: Mary Cavin Date 10-4-95

IT IS SO AGREED:

United States Department of Energy

By: _____ 10/2/95
Date

Manager, Oak Ridge Operations
Title

Ohio Environmental Protection Agency

_____ October 4, 1995
Donald R. Schregardus, Director Date

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SECTION D

CONTAINERS

D-1 CONTAINERS

D-1A CONTAINERS WITH FREE LIQUIDS [3745-55-75]

The physical form of the wastes that are managed in the hazardous waste storage units was described in Section C-1. In general, the waste form can be described as a solid, liquid, gas, or sludge. For the purpose of storage unit design and construction, all RCRA storage areas within X-326 meet the requirements for storage of containers with free liquids. Thus, all wastes are stored within a secondary containment system. All floors are sealed with a coating which is impervious to attack by all wastes listed in Section C and the base is free of cracks or gaps.

D-1A(1) DESCRIPTION OF CONTAINERS [3745-55-71, 3745-55-72]

Information describing the containers used to store waste at the facility is provided in Table D-1. This information includes the dimensions and usable volume, type, material of construction, DOT or other specification, and the approximate number of each type of container on hand.

Most containers used in the storage areas are new. When possible, to minimize waste, polyethylene 10-liter polybottles, 20-gallon labpacks, and 55-gallon polyethylene drums are reused for waste storage after being emptied. Prior to their reuse, however, they are cleaned, decontaminated, and visually inspected to ensure no residue from past use remains.

All containers are labeled or marked with, at a minimum, the words "hazardous waste", the accumulation start date, and the identity of the container contents. Example labels are shown in Figures D-2 and D-3. Container identification numbers and/or bar code labels are applied to the containers for identification and tracking purposes. Other labels and markings are applied as applicable and required.

D-1A(2) CONTAINER MANAGEMENT PRACTICES [3745-55-73]

CONTAINER INFORMATION

As discussed in Section C-1, waste generators use process knowledge and standard operating guidelines to select the proper container and ensure material compatibility. PORTS uses various sizes of bottles, pails, cans, drums, and boxes which may be made of steel, stainless steel, glass, or polyethylene. Wastes are typically placed in appropriate DOT specification drums or other containers listed in Table D-1. Corrosive liquids are generally stored in polyethylene drums. Polyethylene liners are used in metal containers for waste solids which may tend to corrode drums over extended periods of storage (e.g., radioactive hazardous sludge

from wastewater treatment processes). Storage of waste in compatible five-gallon containers is practical to ensure nuclear criticality safety. Glass containers of various sizes are used to contain discarded commercial chemicals packaged by the manufacturer/supplier. In the unlikely event that an orphaned container is found onsite, the contents are analyzed to determine proper container compatibility and possible recontainerization of the wastes. Orphaned containers are isolated from other containers until their contents are determined and compatibility issues resolved.

In addition, procedures are in place requiring the review of new processes, modification to existing processes, emergency response actions generating waste, or repackaging of existing waste containers. These procedures require review of the container selection by qualified personnel to ensure the proper containerization of these waste streams. The generator of a hazardous or mixed waste is responsible for ensuring the waste container is marked with the words "hazardous waste", the accumulation start date and the identity of the container contents. All containers are kept closed while in the container storage units except when it becomes necessary to sample the container for analytical purposes or during corrective actions.

MOVEMENT OF CONTAINERS

A waste generator at PORTS begins the process for disposal of wastes by filling out the generator portion of the Waste Container Tracking (WCT) form which bears a unique identifying number. This number is also placed on the waste container(s). A copy of the form is shown in Figure D-4. The generator portion of the form identifies the generator, the waste materials type and form, the type of waste container, accumulation start date and labels affixed to the container.

Upon receipt of the WCT, qualified personnel review the information provided by the generator for completeness, approve the waste for transportation, and designate the storage location of the waste. If there are deficiencies regarding incomplete information or other questions about the waste, the generator is contacted to obtain resolution to all deficiencies and questions prior to approving the waste for transportation to the storage facility. Following approval of the WCT and the acceptance by the facility superintendent, a waste pickup request is created by the waste generator.

The waste is transported to the designated storage facility according to procedures designed to minimize potential spills or releases. Upon arrival at the storage facility, qualified personnel will inspect the waste containers for container integrity, check the container identification numbers against the approved WCT, off-load and weigh the containers and place the waste containers in the appropriate storage areas. The qualified personnel will sign the Waste Pickup Request form as having received the waste. In addition, the container is identified with a container identification number and/or a bar code label. Completed Waste Pickup Request forms are distributed to the operating record.

Waste container movements within the container storage units are accomplished with a barrel truck, polybottle cart, forklift, barrel lift, a forklift with a barrel attachment, or on a pallet (up to 4 drums per pallet) with a forklift. The choice of conveyance is based on the minimization of potential spills or releases. Containers may also be moved by overhead cranes or movable gantry cranes utilizing barrel hooks or lifters within an individual storage area. Containers are kept in an upright position except as necessary during repackaging operations. Ramps over diking are provided to ensure the integrity of the dikes is maintained, and to facilitate the safest movement of containers. Temporary ramps may be used to facilitate container movement. If temporary ramps are used, the ramps will be removed by the end of the shift in which they are used.

CONTAINER INSPECTION

Inspection of waste containers occurs when the container is received in the staging area and prior to transport to its storage area. All containers within storage areas and staging areas within the container storage units are inspected at least weekly. Daily inspections are conducted in areas of loading and unloading operations. Results of the inspections, as well as any required corrective actions, are recorded on an inspection log sheet and filed in the operating record. Corrective actions may include the transfer of the waste to a container in good condition or overpacking the defective container into a larger container in good condition. Corrective actions for defective containers are taken as soon as possible and always initiated within 24 hours of discovery. See RCRA Part B Permit Renewal Application Volume 1 Section F for additional information.

MANAGEMENT PRACTICES

Adequate aisle space is maintained between adjacent double rows of waste containers to allow visual container inspections, necessary emergency response actions, and conduct of routine operations. Geometrically subcritical containers (i.e., containers with diameters less than six inches) in X-326 storage areas will have a minimum of 18 inches between containers. Single drums with high uranium content in these areas will have a minimum aisle space of 22 inches between containers. The minimum aisle space between single or double rows of all containers is 28 inches. Typical arrangements are shown in Appendix D-1 [Drawings DX761-997-A]. Maximum stack height of various containers and materials are given in Table D-2. These stacking heights are designed to ensure container integrity.

The maximum number of containers of each type expected to be stored is given in Tables D-3 and D-4. The maximum storage volume for the X-326 is 161,920 gallons. This volume is discussed in more detail in Section D-1A(3)(c).

D-1A(3) SECONDARY CONTAINMENT SYSTEMS DESIGN AND OPERATION [3745-50-44(C)(1)(a), 3745-55-75(A) AND (D)]

Figure D-1 provides the plan view of the X-326 container storage areas. Design and profile drawings for each of these areas are contained in Appendix D-1. For the X-326 Storage Unit, drawing number DX-761-997-A illustrates the following information:

- location and horizontal extent of each storage area;
- plan view of limits of containment systems and access ramps for each area;
- profile details of typical dike and access ramp details.

As the floor of the X-326 Storage Unit is essentially level, no elevation (profile), drawing of the floor is provided.

Flammable wastes are stored in flammable storage cabinets in the X-326 unit. Incompatible wastes could be stored in all areas if separated by a dike, wall, berm, or other device such as a polyspill pallet. Containers having these wastes will also be located a minimum of one aisle width away from each other and will not be stored in the same row. Sodium wastes are stored in containers filled with organic liquids such as kerosene. Additional segregation is provided by the use of spill containment pallets for most liquid waste containers except where the use of spill pallets is not allowed due to nuclear criticality safety controls.

D-1A(3)(a) REQUIREMENTS FOR THE BASE OR LINER TO CONTAIN LIQUIDS [3745-55-75(B)(1)]

The base structure of the X-326 Container Storage Unit is constructed from concrete and is free of cracks and gaps. Rough or spalled areas of the floor have been repaired with a polymer modified Portland cement. Cracks in the floor have been sealed with a modified methacrylate crack healer/penetrating sealer, or an epoxy injection adhesive as appropriate for the number and size of the cracks. Expansion joint gaps have been filled with a polyurethane elastomeric sealant. Control joint gaps have been filled with a flexible epoxy control joint sealer/adhesive. Typical construction details regarding this work are provided in Appendix D-1, drawing number DX-761-997A. The concrete floor would be expected to have permeability in the range of 1×10^{-7} cm/sec with this treatment. To further ensure the base is capable of containing any liquids which may accumulate and to enhance compatibility of the base with the stored waste, the concrete surfaces in all storage areas have been sealed with a chemically resistant sealant. This sealant is compatible with all waste types listed in Section C. Tennant 122 was used in the X-326 storage areas.

The floor of the X-326 Building consists of a six to nine inch concrete slab reinforced with 6 x 6 welded wire fabric (drawing DX-761-997-A, Appendix D-1). The slab was placed over an engineered fill of at least one foot in depth. Design allowable floor loading is 550 pounds per square foot (psf) with a calculated 3.0 factor of safety. The maximum expected loading for the unit is 327 psf based on stacked 4' x 4' x 6' boxes stacked two high.

D-1A(3)(b) CONTAINMENT SYSTEM DRAINAGE [3745-50-44(C)(1)(a)(ii), 3745-55-75(B)(2)]

The containers in X-326 container storage areas are elevated to protect them from contact with any accumulated liquids resulting from potential leaks or spills. The containers will be elevated through the use of containment pallets, wooden or metal pallets, metal rails, metal shelving (for laboratory chemicals) or polybottle holders. Typical storage arrangements are shown in Appendix D-1 [drawings DX-761-997-A].

D-1A(3)(c) CONTAINMENT SYSTEM CAPACITY [3745-50-44(C)(1)(a)(iii), 3746-55-75(B)(3)]

The containment capacity provided for the storage areas in the X-326 storage units is adequate to contain 10 percent of the total waste volume stored and 25 percent where TSCA wastes are stored. Specifically, the X-326 container storage unit has a design capacity of 161,920 gallons and a containment capacity of 16,319 gallons or 10.1 percent. Containment capacities and the maximum storage capacity of each storage area in the container storage units and supporting calculations, including area, volume and displacement volume, are provided in Table D-4. Detailed drawings are shown in Appendix D-1 [drawing DX-761-997-A]. This drawing provides information on the layout of the container storage units including containment systems dimensions, typical container arrangements, structures which reduce containment volume, and diking dimensions.

D-1A(3)(d) CONTROL OF RUN-ON [3745-50-44(C)(1)(a)(iv), 3745-55-75(B)(4)]

The X-326 container storage areas are totally enclosed within buildings. Roof and wall design features, which provide protection from precipitation, are shown in Appendix D-1 [drawings X-326-13-A AND X-326-23-A]. Thus, no provisions for run-on control are required. Further, totally enclosed secondary

containment devices are in use at X-326. Therefore, no capacity for run-on need be provided by the secondary containment systems.

Surface water flow in the area of the container storage units is shown in Section B (Figures B-3 through B-6). Thunderstorms are common from April to August and locally heavy rains may accompany these storms. The 24-hour totals of 2.69, 3.31, 3.80, 4.48, 5.04 and 5.61 inches of rain can be expected every 2, 5, 10, 25, 50, and 100 years, respectively. The stormwater drainage system design is sufficient to handle this run-off. Thus, no flooding (run-on) is anticipated to occur with design storm events of 100 years or less.

Various procedures are followed depending on the quantity of waste released. Small releases are removed by mops, absorbents, and shovels; the residue is placed in containers; treated as a hazardous waste and analyzed

D-1A(3)(e) REMOVAL OF LIQUIDS FROM CONTAINMENT SYSTEM [3745-50-44(C)(1)(a)(v), 3745-55-75 (B)(5)]

All the storage areas are completely enclosed. Exclusive of roof leaks and fire water sprinkler system leaks handled under separate procedures, any liquid present within the secondary containment systems would be from spilled or leaked hazardous waste. Since the storage areas are inspected weekly, any leak or spill would be discovered in a timely manner eliminating the potential for overflow of the containment system.

Should a leak or spill occur, if required. For larger releases, initial removal of the material would be through the use of electric powered industrial wet/dry barrel vacuum, electric drum pumps, and/or air powered diaphragm pumps. Then absorbents or mops are used as required for removal. All recovered material would be recontainerized, treated as a hazardous waste, and analyzed, as required. The Contingency Plan, (Section G) will be implemented if there is a threat to human health or the environment. All powered equipment used for emergency response purposes in the storage units for flammable materials meet the Class 1 - Division 1 codes of the NFPA fire prevention standards.

Other non-leaking containers in the area of a spill should not come in contact with the spilled material since they are elevated. Containers which do contact the spilled material would be lifted with a barrel lift or a crane and barrel hooks, and cleaned. Clean-up material is handled as hazardous waste as noted previously.

D-1B CONTAINERS WITHOUT FREE LIQUIDS [3745-50-44(C)(1)]

All hazardous wastes in the container storage units are stored within the containment system described in D-1A(3)(c).

D-2 TANK SYSTEMS THROUGH D-8 MISCELLANEOUS UNITS

PORTS is not applying for an operating permit for a tank system, a waste pile system, a surface impoundment, an incinerator, a landfill, or any other type of land treatment system to treat, store or dispose hazardous waste.

TABLE D-1 EXAMPLE CONTAINER INFORMATION

Volume	Type	Material	Dimensions[1]	Specification	Thickness	Approx. No. Containers on-hand (000)
110 Gal.	Drum	Steel	30"id, 41"ih	49 CFR 178 Subpart D	16 gauge	0.259
85 Gal.	Drum	Steel	26"id, 36.375"ih	49 CFR 178 Subpart D	16 gauge	1.137
55 Gal.	Drum	Steel Steel ss Ple	22.5", 35" ih 22.5"id, 35"ih 22.5"id, 35"ih 22.5"id, 35"ih	HM181,1A2 DOT17c,h,e DOT17c,e DOT34	16 16 & 18 gauge	4.644
30 Gal.	Drum	Steel Ple	18.25"id, 29"oh 18.5"id 31.875"oh	DOT17h DOT34	0.18"	0.061
20 Gal.	Drum	Ple	21.25"id, 17.5"oh	49CFR 178 Subpart D	0.1875"	0.083
10 Gal.	Drum	Steel	14"id, 19"oh	1A2/X120/S & 1A2/Y1.8/150	0.037"	0.034
7 Gal.	Drum	Steel	11.25"od, 16.19"oh	6HA1	0.38"	0.007
5 Gal.	Pail	Steel Ple	11.25"id, 13"oh	DOT17c,e DOT34	0.2"	0.477
10 Liter (2.64 Gal.)	Bottle	Ple	5"id, 50"ih	Drawing no.: DX-761-2340-M	0.195"	0.209
2.0 Gal.	Can	Tin	5.25"id, 24"ih	Drawing no.: DX-761-M-981-Z	0.010" Head 0.015" Body	0.358
2.0 Gal.	Bottle	Ple	5.15"id, 23.75"ih	Drawing no.: DX-761-2586-M-Z	0.32"	0.154
CH Can	Can	Tin	4.25"id, 10"ih (typical configuration)	Drawing no.: AX-761-2869-M	0.010" Head 0.015" Body	0.022
83.7 Cu. Ft.	Box	Steel	4' X 4' X 6'	Drawing No.: DX-761-2265-M liner-10mil ple	12 Gauge	0.188

TABLE D-1 EXAMPLE CONTAINER INFORMATION – (CONTINUED)

Volume	Type	Material	Dimensions[1]	Specification	Thickness	Approx. No. Containers on-hand (000)
96 Cu. Ft.	Box	Steel	4' X 4' X 6'	49 CFR Subpart D	12 Gauge	0.002
275 Cu. Ft.	Box	Steel	6' X 6' X 8'	Drawing No.: DX-761-2286-M	12 Gauge	0.001
Various	Cylinder	Steel	Various	49 CFR 178 Subpart C	Various	0.01
Various	Bulk	Stainless Steel	Various	49 CFR 178 Subpart H	Various	0.01
Various	Bottle	Glass	Various	N/A	Various	40
Various	Self Contained	Various	Various	N/A	Various	0.003

[1] id-inside diameter, od-outside diameter, ih-inside height, oh-outside (overall) height, ss-stainless steel, and ple-polyethylene

TABLE D-2 MAXIMUM CONTAINER STACKING

Material	Container Type	**Stacking Height**	**Aisle Space**
Solids	110 gallon drums	2 high	28"
Solids	85 gallon drums	2 high	28"
Overpacked solids	85 gallon drums	2 high	28"
Solids[1]	55 gallon drums	2 high	28"
Liquids	55 gallon drums	1 high	28"
Solids	30 gallon drums	3 high	28"
Liquids	1,2,30 gal. drums	1 high	28"
Liquids	20 gallon labpacks	5 high	28"
Liquids	5 gallon containers	1 high	28"
Liquids	10 liter polybottles	1 high	28"
Solids	5" cans	1 high	28"
Solids	4' x 4' x 6' boxes	2 high	28"
Solids	6' x 6' x 8' boxes	1 high	28"
Chemicals	laboratory bottles	1 layer per shelf	
Gas	Cylinder	1 high	28"
Liquids	bulk containers	1 high	28"

NOTE:
1. Top level of stack is banded (non NCS wastes).

TABLE D-3 MAXIMUM NUMBER OF CONTAINERS, X-326 UNIT

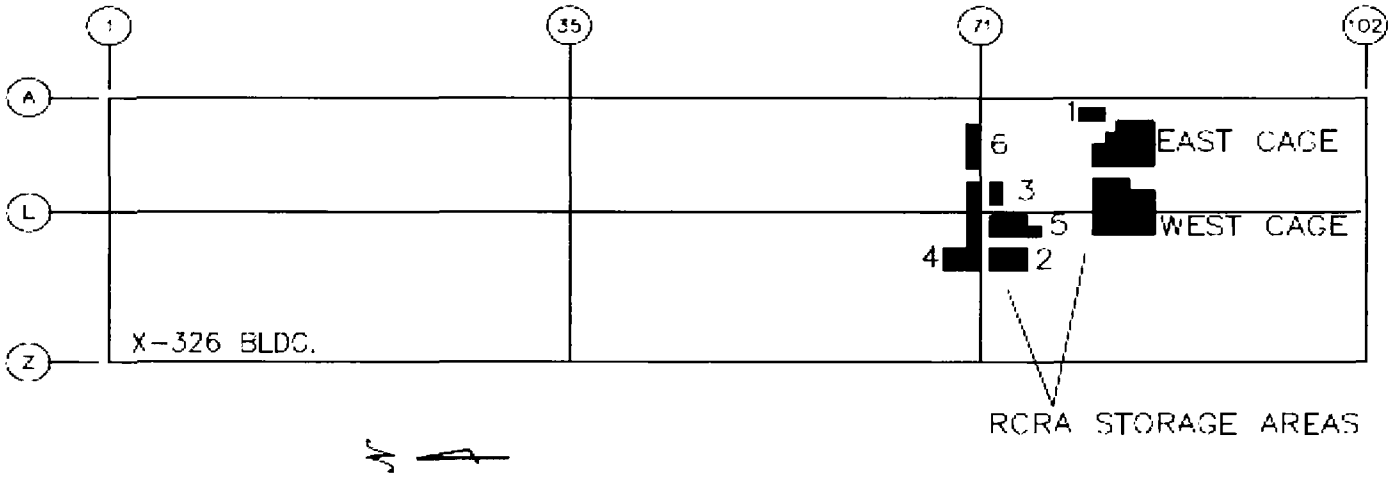
Container Volume	Maximum Number
110 Gallon	1,470
85 gallon	1,800
55 gallon	2,800
30 gallon	2,900
20 gallon	2,900
5 gallon	2,900
2.47 gallon (polybottle)	7,000
1.7 gallon	7,000
83.7 cu. Ft.	250
96 cu. Ft.	220
275 cu. Ft.	70
gas cylinders	30
glass bottles	720
cardboard boxes	290

TABLE D-4 X-326 CONTAINMENT CAPACITY CALCULATIONS

Area Designation	1	2	3	4	5	6	WEST L	EAST L
Total square feet	968	3082	2372	5947	3520	1917	11876	8928
Area deductions	18	24	9	58	40	9	64	284
Available square feet	950	3058	2363	5890	3481	1908	11812	8644
Pallet area required	51.48	51.48	51.48	51.48	51.48	51.48	51.48	51.48
Maximum number pallets	18	59	45	114	67	37	229	167
Maximum gallons stored	3960	12980	9900	25080	14740	8140	50380	36740
Containment gallons required	396	1298	990	2508	1474	814	5038	3674
Gross volume in gallons	589	1895.96	1467.36	3657.20	2161	1185	7323.44	5359.28
Gallon reduction for pallets	179.10	587.05	447.06	1132.56	666	367.59	2278.55	1661.65
Available containment gallons	409.9	1308.91	1020.29	2524.63	1495	816.98	5044.89	3697.63
Containment capacity percent of maximum volume stored	10.4%	10.0%	10.3%	10.0%	10.1%	10.0%	10.0%	10.0%

Therefore, the containment capacity meets the requirements of 40 CFR 270.15(A)(3).

Maximum Volume Stored = 21,644 Cubic Feet
= 161,920 Gallons



X-326 BUILDING

FLOOR PLAN

RCRA STORAGE AREAS

SCALE: NONE

Figure D-1 X-326 Building Floor Plan

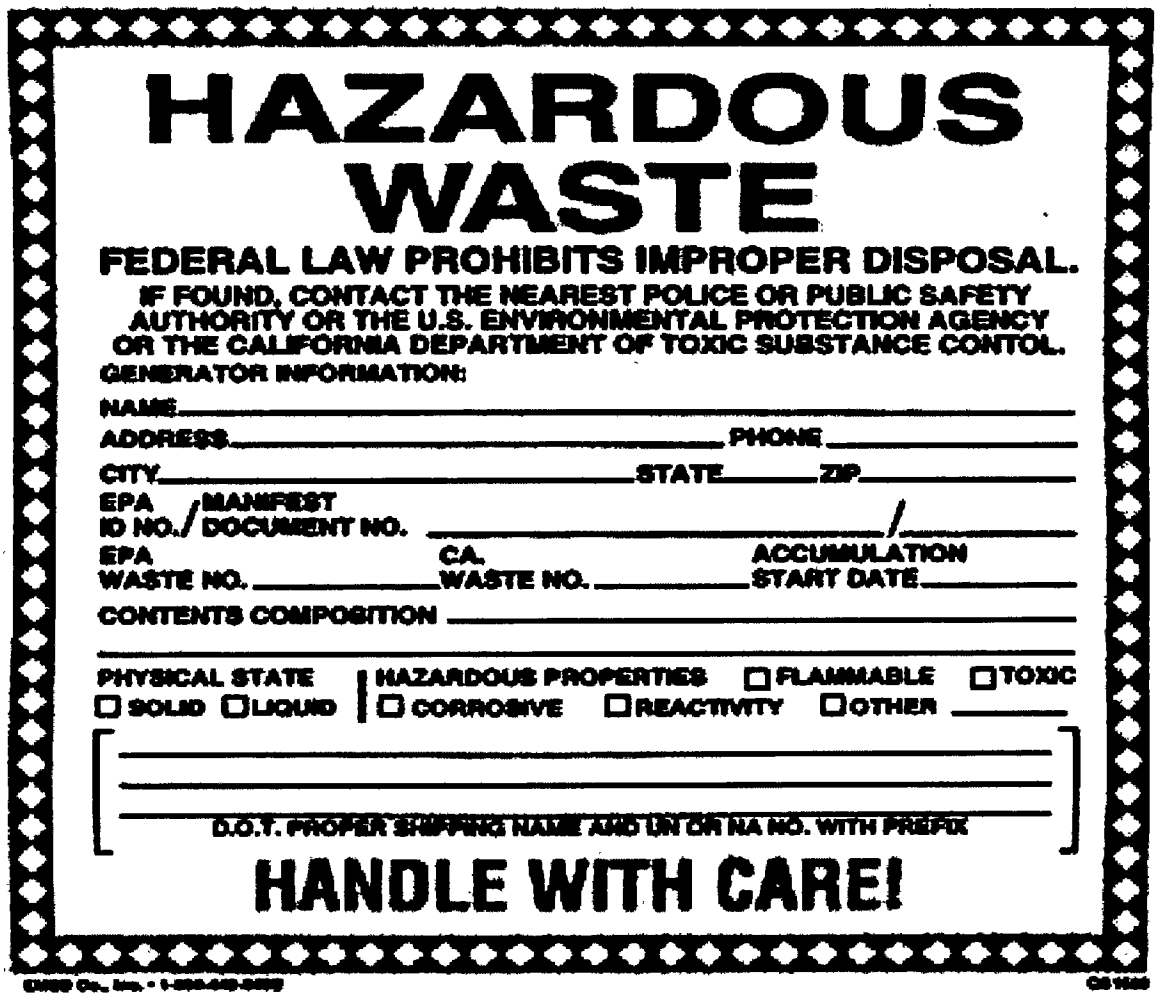


Figure D- 2 Hazardous Waste Label

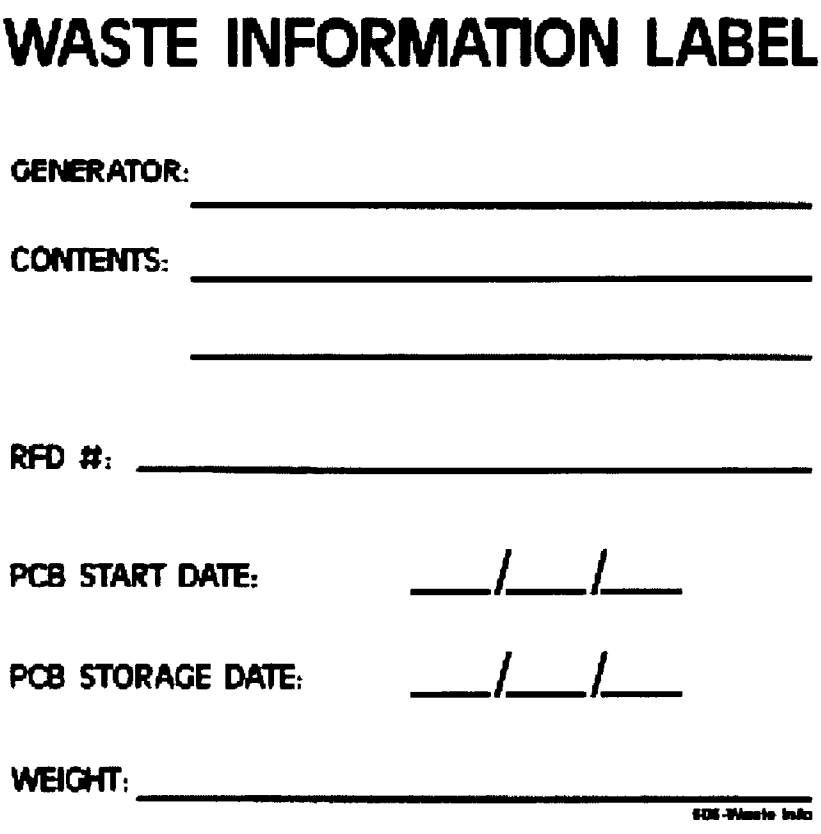


Figure D-3 Waste Information Label

LATA Parallax

Container ID

WASTE CONTAINER TRACKING FORM

Project ID	Facility	Area / Location	Company	Owner ☐ DOE ☐ USEC	Secondary ID (serial number)
Waste Stream Code	Waste Stream Name				

Empty Container Pre-Inspection

Receipt inspections performed to verify conformance of components received to the procurement documents and design criteria? ☐ Yes ☐ No	Empty container, lid, and gaskets are in good condition, free of dents, holes, and rust, with operable closure tightening mechanism? ☐ Yes ☐ No (Note List any container integrity deficiencies in Comments section below)

Container Type	Container Specification	Container Weight
☐ Intermodal ☐ Roll-off Bin ☐ B-25 ☐ 110-gal ☐ 85-gal ☐ 55-gal ☐ 30-gal ☐ 10-gal ☐ 5-gal ☐ Other.	☐ IP-1 ☐ DOT 7A TYPE A ☐ NA ☐ 1A1 ☐ 1A2 ☐ 1H1 ☐ 1H2 1A = Steel Drum 1H = Plastic Drum 1 = Closed Head 2 = Open Head	Tare Weight (empty, lbs)

Container Preparation

Container Liner? ☐ Yes ☐ No	Liner Type ☐ NA	Absorbents in Container Bottom? ☐ Yes ☐ No	Absorbents Type ☐ NA

Waste Characteristics

Physical Form	Type (Check all that apply)	RCRA ☐ NA	TSCA ☐ NA
☐ Solid ☐ Liquid ☐ Gas	☐ LLW ☐ RCRA ☐ TSCA ☐ Haz. Pending Analysis ☐ Asbestos ☐ Recyclable ☐ Universal Waste ☐ Landfill ☐ Other	Start Date EPA Codes	Start Date PCB Level (ppm)

Waste Contents

% or Item	List Waste Added to the Package

Free Liquids? ☐ Yes ☐ No	Free Liquids Absorbed/Removed? ☐ Yes ☐ No ☐ NA		Verified No Prohibited Items? ☐ Yes ☐ No		
Verified minimum void space prior to closure? ☐ Yes ☐ No ☐ NA		Verified no loss of container or condition after filling? ☐ Yes ☐ No			
Verified container closure was performed per the manufacturer's instructions and all work control documents? ☐ Yes ☐ No					
Gross Weight (full, lbs)	Scale ID:	Scale Calibration Date			

Comments:

External Surface Radiological Information

Surface Contamination level: (dpm/100cm2)			Dose Rate: (mR/hr)		
	Fixed	Removable		at Surface	at 1 Meter
Alpha			Beta/Gamma		
Beta/Gamma					
Radiological Survey Number(s):			RCT Initials:	RCT Badge No	

Waste Generator: I certify that the above information on this form is true and accurate			
Printed Name:	Badge No:	Signature:	Date:
TIDs Installed? ☐ Yes ☐ No ☐ NA	TID Numbers:		
Waste Package Certifier: I certify that the information on this form is true and accurate			
Printed Name:	Badge No:	Signature:	Date:

LLPF-N0095 eMWaste Version (p)

Figure D- 4 Example Waste Container Tracking Form

SECTION E

GROUNDWATER MONITORING

This section is not applicable because groundwater monitoring is not required for the permitted container storage units at PORTS.

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SECTION F

PROCEDURES TO PREVENT HAZARDS

F-1 SECURITY [3745-54-14, 3745-50-44]

F-1A SECURITY PROCEDURES AND EQUIPMENT [3745-54-14, 3745-50-44]

Security procedures and equipment at PORTS that prevent the unknowing entry and minimize the possibility for unauthorized entry of persons or livestock onto the active portion of the facility are discussed below.

F-1A(1) 24-HOUR SURVEILLANCE SYSTEM [3745-54-14]

Security at PORTS is maintained by a staff of trained security guards. Routine patrols of the main complex provide continuous surveillance of the entire facility, including the container storage units. All security guards are equipped with two-way radios and have direct communications with other PORTS plant protection personnel (i.e., fire department, plant shift superintendents, and the plant communications center).

F-1A(2) BARRIER AND MEANS TO CONTROL ENTRY [3745-54-14]

PORTS is a controlled access facility surrounded by a seven foot high chain-link fence, complete with three strand barbed wire and angled top stanchions, gates, and numerous other features that contribute to the safety and security of the facility.

The container storage units for the PORTS site are located in the X-326 Building. The X-326 Building is in the west central portion of the site which is located within the plant security fence.

Employees are required to show identification badges to security guards when entering all gates. Visitors and contractors entering the plant must obtain proper passes.

F-1A(3) WARNING SIGNS [3745-54-14]

Signs bearing the legend "Danger-Unauthorized Personnel Keep Out" are posted inside the X-326 building at each entrance to the hazardous waste storage units and are visible from all angles of approach. The signs are written in English and are legible from a distance of twenty-five feet. Existing signs with a legend other than "Danger - Unauthorized Personnel Keep Out" may be used if the legend on the sign indicates that only authorized personnel are allowed to enter and that entry into the active portion can be dangerous.

SUBMISSION DATE: SEPTEMBER 13, 2010

F-2 INSPECTION SCHEDULE [3745-50-44, 3745-54-15]

F-2A GENERAL INSPECTION REQUIREMENTS [3745-50-44, 3745-54-15, 3745-54-73]

The X-326 Storage Units are inspected to detect conditions that may be causing or may lead to the release of hazardous waste constituents to the environment or a threat to human health. Inspection frequencies, items inspected, and types of potential problems that are to be reviewed during inspections are listed in Table F-1. Problems identified during the inspections are documented and corrected on a schedule that ensures the problem does not lead to an environmental or human health hazard. The inspection record will include, at a minimum, the date and time of the inspection, name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions. Completed inspection checklists, or inspection summaries, are filed in the operating record in accordance with Section J of the permit application. The inspection records are retained a minimum of 3 years from the date of the inspection.

F-2A(1) TYPES OF PROBLEMS [3745-54-15]

Equipment items inspected, types of potential problems checked, and inspection frequencies are tabulated in Table F-1, Inspection Schedule.

F-2A(2) FREQUENCY OF INSPECTIONS [3745-54-15]

The X-326 Storage Units are inspected by designated facility personnel on a weekly basis (within 7 days of the previous inspection). See Table F-1. Loading/unloading areas are inspected on a daily basis by designated facility personnel when in use. See Table F-1. Problems identified during routine inspections and corrective actions taken to correct the problems are documented on the inspection checklists. Corrective actions are initiated within 24 hours of discovery. Imminent hazards are addressed with immediate remedial action. Each checklist will include the information specified in F-2A General Inspection Requirements.

Emergency equipment inspections are conducted on a periodic basis in accordance with Table F-1. The frequency of inspections is based on the rate of possible deterioration of equipment and the probability of an environmental or human health incident if the deterioration malfunction or operator error goes undetected between inspections.

F-2B SPECIFIC PROCESS INSPECTION REQUIREMENTS [3745-50-44, 3745-54-15]

F-2B(1) CONTAINERS [3745-55-74]

Waste containers are inspected weekly during the container storage area inspections conducted by designated facility personnel. The items inspected and types of potential problems checked for are listed in Table F-1.

F-2C REMEDIAL ACTION [3745-54-15]

If inspections reveal that non-emergency maintenance is needed, the maintenance will be completed as soon as possible to minimize further damage and reduce the need for emergency repairs. If a problem is imminent or has already occurred during the course of an inspection or at any time between inspections, remedial actions will be taken immediately. Plant personnel will notify the appropriate authorities and initiate remedial actions. In the event of an emergency involving the release of hazardous constituents to the environment, the contingency plan will be implemented.

F-3 WAIVER OF PREPAREDNESS AND PREVENTION REQUIREMENTS [3745-50-44]

PORTS does not request a waiver of preparedness and prevention requirements. Requirements of this Subpart are addressed in Sections D, F, and G of this application.

F-3A EQUIPMENT REQUIREMENTS [3745-54-32]

F-3A(1) INTERNAL COMMUNICATIONS [3745-54-32]

The X-326 Storage Unit is equipped with internal and external fire alarm systems that, when activated, provide for immediate response of emergency personnel. Personnel have immediate access to this alarm at all times. Emergency response services are provided by onsite emergency responders.

Sprinklers are located in the ceiling of the X-326 units and will activate in the event of a fire. The sprinkler system also activates the fire alarm systems described above.

The fire alarm box can be activated at any time and will provide for immediate response by emergency personnel.

Building horns are available in the X-326 Storage Unit. Hand held two-way radios are used by waste handling personnel during all waste transport activities and can be utilized to notify emergency personnel. Telephones are also available for emergency use. PORTS maintains an internal emergency telephone number (911) to contact the onsite emergency responders. The telephone designated for use in the storage unit are checked weekly to ensure that they are operable (Table F-1). See Section G for more information.

F-3A(2) EXTERNAL COMMUNICATIONS [3745-54-32]

Telephones are located at the X-326 Storage Unit for emergency use. The telephones designated for use in the storage units are checked weekly to ensure that they are operable (Table F-1). PORTS maintains an internal emergency telephone number (911) to contact the onsite emergency responders. Upon notification, appropriate personnel will respond. External emergency response agencies can be contacted by the onsite emergency personnel, if necessary. See Section G for more information.

F-3A(3)EMERGENCY EQUIPMENT [3745-54-32]

Portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment are available for use in the storage units.

The Fire Department is fully equipped with emergency response equipment and maintains a supply of fire extinguishing media. Equipment is maintained as necessary to ensure proper operation in the event of an emergency (Table F-1). See Section G for more information.

F-3A(4) WATER FOR FIRE CONTROL [3745-54-32]

PORTS has an on-site water supply of adequate volume and pressure for fire control at the container storage units. Inspections and testing of the fire water supply systems are completed by USEC.

Fire hydrants are located in the immediate vicinity of the X-326 Storage Unit. See Section G for more information.

F-3B AISLE SPACE REQUIREMENT [3745-54-35]

Adequate aisle space is maintained to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment. Specific aisle space specifications are presented in Section D-1A(2).

F-4 PREVENTION PROCEDURES, STRUCTURES AND EQUIPMENT [3745-50-44]

Procedures, structures, and equipment used at the storage units to prevent hazards in unloading operations, run-off from hazardous waste handling areas to other areas of the facility or environment, contamination of water supplies, mitigate effects of equipment failure and power outages, and the undue exposure of personnel to hazardous waste are described in the following sections.

F-4A UNLOADING OPERATIONS [3745-50-44]

Containerized hazardous wastes are transported by trained personnel to hazardous waste storage units by a method of transport that minimizes the potential for spills or releases of hazardous waste constituents. Transportation methods include, but are not limited to, a barrel truck, multi-position transfer cart, forklift, a roll-off truck, a flat bed truck, or barrel lift. A spill control kit is available on each vehicle for use in mitigating the effects of spills or leakage. Operations are typically conducted during the normal business hours of the operator of the storage facility.

Equipment used in loading/unloading operations includes, but is not limited to, cranes, barrel lifts, forklifts (both with and without special barrel attachments), barrel hooks and clamps, hand carts, and platform lifts. All equipment is inspected daily, when in use (Table F-1). Ramps are used to facilitate the safe movement of containers into diked areas.

F-4B RUNOFF [3745-50-44]

The X-326 storage units are located within an enclosed building. All activities within the storage units are within diked areas. Any liquids resulting from container leakage or spills will be contained within the diked area.

An overall site drainage map, located in Section B, depicts paths of potential runoff from the X-326 Storage Unit.

F-4C WATER SUPPLIES [3745-50-44]

Hazardous wastes stored at the X-326 Storage Unit are contained in DOT-approved containers and other containers as specified in Section D, Table D-1. Secondary containment for all wastes is provided by concrete or metal dikes and sealed concrete floors. Groundwater contamination is prevented by eliminating the discharge of hazardous materials onto the unprotected ground.

F-4D EQUIPMENT AND POWER FAILURE [3745-50-44]

No special equipment requiring external electrical power is needed at the storage units for normal operations. Emergency lighting is installed in the storage units and is maintained and inspected (Table F-1). Personnel will cease activities involving waste loading, unloading, or transfers until power is resumed.

Replacement material-handling equipment is readily available from other departments for use until repairs can be accomplished or permanent replacements procured. Facility equipment has either a redundant system, such as two separate exhaust systems, or has emergency backup power.

F-4E PERSONAL PROTECTION EQUIPMENT [3745-50-44]

Personal protective equipment is available in the storage units to all personnel, and proper use of the protective equipment is addressed by procedures available in each department involved in hazardous waste handling. These procedures and proposed changes are reviewed by industrial hygienists to ensure that the proper personal protective equipment has been specified.

Personal protection and required safety gear for the safe handling of hazardous wastes are addressed in the hazardous waste handling training program, as well as in procedures for the storage units. Personnel wear protective coveralls, safety shoes, safety glasses, gloves (type dependent on waste handled), and, if necessary, a respirator, as specified in procedures or for special cases as determined by supervision in consultation with industrial hygiene personnel. Hazardous chemical data and material safety data sheets are used to gather information on the characteristics of chemical components of the waste, including toxicity, ignitability, reactivity, corrosivity, route of exposure and other hazard information. See Section G for available response equipment. See Section H for a description of employee training.

F-5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE AND INCOMPATIBLE WASTES [3745-50-44, 3745-54-17]

F-5A PRECAUTIONS TO PREVENT IGNITION OR REACTION OF IGNITABLE OR REACTIVE WASTE [3745-54-17]

Wastes stored at the X-326 Storage Units are segregated according to the characteristics of the various wastes to prevent heat-producing chemical reactions. In areas where ignitable or reactive wastes are stored, "No Smoking or Open Flames" signs are prominently displayed.

Segregation of incompatible wastes is accomplished through the use of walls, dikes, or other effective methods for maintaining physical separation. See Section D-1 for more information.

F-5B GENERAL PRECAUTIONS FOR HANDLING IGNITABLE OR REACTIVE WASTES AND MIXING OF INCOMPATIBLE WASTES [3745-50-44, 3745-54-17]

Segregation of wastes and the use of containers (as specified in Section D) minimizes the possibility of fire, explosion or unplanned sudden or non-sudden release of hazardous wastes caused by the incompatibility of the material with waste residues.

In X-326, small quantities of ignitable wastes are stored in flammable cabinets which are regulated under NFPA standards. Containers are stored in areas where adequate climate controls are available. Procedures for packaging and handling of laboratory waste chemicals are implemented by qualified commercial contractors or facility personnel.

Waste storage units are managed by trained waste handlers. Waste segregation is an integral part of the design and operation of the waste storage units. These units include features such as diking and containment systems and segregation by waste category, which prevent mixing of ignitable, reactive, and/or incompatible materials. Containers within these units are closed and stored in appropriate areas and meet labeling and spacing requirements. The waste storage units have climate controls, as required. Explosion-proof tools and other safety devices are used in these units to ensure safe, environmentally sound handling of wastes.

F-5C MANAGEMENT OF IGNITABLE OR REACTIVE WASTES IN CONTAINERS [3745-54-17]

Specific container management practices are presented in Section D.

F-5D MANAGEMENT OF INCOMPATIBLE WASTE IN CONTAINERS [3745-50-44, 3745-55-77]

Specific container management practices are presented in Section D.

TABLE F-1 INSPECTION SCHEDULE

Inspection or Equipment	Element of Inspection	Frequency
Container Storage Unit Inspections		
"Danger Unauthorized Personnel Keep Out," or equivalent, signs posted	missing or damaged signs	Weekly
Dikes	broken/cracked dikes or ramps	Weekly
Floors	cracked floor coating; spills, leaks, stains or other evidence of hazardous waste released	Weekly
Container Labeling (hazardous waste identification label)	damaged or missing labels, improper or incomplete information	Weekly
Container Integrity	corrosion, leaks, bulges, missing bungs, dents which jeopardize structural integrity	Weekly
Secondary Containment for liquid hazardous waste	absence of secondary containment for liquid hazardous waste	Weekly
Personal Protective Equipment	inadequate materials available, inventory not replaced	Weekly
Spill Control Equipment	inadequate materials available, inventory not replaced	Weekly
Aisle Space	aisle space blocked by containers or equipment	Weekly
Telephone system	power failure, equipment malfunction	Weekly
Loading/Unloading Areas		
Operating Equipment	malfunction, safety lights, horns, brakes	Daily, when in use
Container Integrity	corrosion, leaks, bulges, missing bungs, dents which jeopardize structural integrity	Daily, when in use
Container Labeling (hazardous waste identification label)	damaged or missing labels, improper or incomplete information	Daily, when in use
Dikes	broken/cracked dikes or ramps	Daily, when in use

Inspection or Equipment	Element of Inspection	Frequency
Floors	cracked floor coating; spills, leaks, stains or other evidence of hazardous waste released	Daily, when in use
Building Inspections and Surveys		
Fire Prevention Inspection	housekeeping, fire hazards, blocked fire lanes and/or fire doors, access to equipment, etc.	Semi-annually
Automatic Sprinkler Systems		
Visual Inspection of wet pipe sprinkler	control valve status, gauge pressure, system hardware and associated equipment	Monthly
Main drain flow	flow test	Biannually
Inspector's test valve	flow and alarm test	Biannually
Operational inspection of sprinkler control valves	cycle valves	Biannually
Fire Alarm Systems		
Manual pull stations	operational test	Annually
Water Supply Systems		
Electric fire pump	operational test	Annually
Diesel fire pump	operational test and battery test	Annually
Diesel pump fuel supply level	check amount, refill as needed	Quarterly
Automatic starting test	operational test	Annually
Water flow test (underground piping)	hydraulic gradient	Every three (3) years
Hydrants	damage; flush	Annually
Capacity test (pumps)	functional test	Every three (3) years

Inspection or Equipment	Element of Inspection	Frequency
Underground valves	cycle valves	Every three (3) years
Water storage tanks (exterior)	damage or leaks	Every three (3) years
Portable Fire Extinguishers		
Visual Inspection	operational test	Monthly
Carbon dioxide extinguisher hose	Continuity test	Annually
Container hydrostatic test	per manufacturer's instructions	per manufacturer's instructions
Building Equipment and Facilities		
Hose Rollers	damage	Annually
Mobile Fire Apparatus		
Routine inspections and test	road test, equipment operational test, inventory	Weekly
Fire pump capacity test	functional test	Annually
Pumper truck hoses	hydrostatic test	Annually

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ACRONYMS

DOE	United States Department of Energy
OAC	Ohio Administrative Code
PORTS	Portsmouth Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act
USEC	United States Enrichment Corporation

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SECTION G

RCRA HAZARDOUS WASTE CONTINGENCY PLAN [OAC 3745-50-44 (A)(7), 3745-54-50 through 56]

OVERVIEW AND PURPOSE OF PLAN

This Contingency Plan describes the actions facility personnel will take in response to fire, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents, mixed waste or mixed waste constituents to air, soil, or surface water. To fulfill this purpose, the plan will be implemented immediately whenever one or more of these occurrences could threaten human health or the environment.

This document, as Section G of the Portsmouth Gaseous Diffusion Plant (PORTS) Part B Permit Application, is being provided as a stand-alone document which amends the facility's emergency plan (Portsmouth Emergency Plan) as allowed for in OAC 3745-54-52 (b) and 40 CFR 264.52 (B). While the Portsmouth Emergency Plan integrates the plant's planning processes into a single document designed to mitigate the consequences of an emergency, this Contingency Plan stands alone for response to hazardous waste incidents.

This Hazardous Waste Contingency Plan contains the following elements:

- Designation and responsibilities of personnel who are to act as emergency coordinators,
- Implementation procedures for instructions on how and when the plan will be followed,
- Descriptions of both plant internal and external alarms and notification systems,
- Assessment methods and control actions should an emergency occur,
- Location, description and capabilities of emergency equipment at the facility,
- Agreements with USEC and with local authorities and medical centers, for providing emergency management and fire protection,
- Details of evacuation plans, and
- Record keeping and incident reports

PHILOSOPHY

At PORTS, the shared philosophy on emergencies is to prepare and maintain emergency plans dedicated to principles of personnel safety, environmental protection and safe equipment operation. Consequently, the response measures provided within this plan are designed to provide maximum protection for both onsite and offsite personnel, limit damage to facilities and equipment, limit adverse impacts on the environment and minimize impacts on site operations and security. The following PORTS philosophy indicates our commitment to personnel safety and the protection of the environment.

"The emergency philosophy of the Portsmouth Gaseous Diffusion Plant (PORTS) is to provide and maintain emergency plans that are dedicated to the following principles; in order, personal safety, environmental protection, and safe equipment operation."

Contamination control issues and environmental protection concerns are to be addressed by emergency responders following the identification, recovery and condition assessment/treatment of ill or injured personnel.

This policy shall be applied and enforced comprehensively; however, provision must be made for deviations during emergency operations -- thus allowing the Emergency Coordinator to be in a position to make decisions based upon circumstances found at the time of an emergency.

COPIES OF CONTINGENCY PLAN [OAC 3745-54-53]

Although not listed on the Part B Permit Application checklist, this section is required by the referenced regulations. A copy of the Contingency Plan and all revisions are provided to all applicable departments at PORTS. These include: custodians of hazardous waste storage units, the United States Enrichment Corporation (USEC) Emergency Preparedness Department, the USEC Fire Department, the USEC Police Department and the USEC Plant Shift Superintendent's office.

USEC, as part of an agreement to provide emergency management and fire protection service, obtains Letters of Agreement (LOAs) with offsite emergency planning and/or response organizations that have agreed to assist in the event of an emergency at PORTS. The Department of Energy (DOE)/LATA/Parallax Portsmouth LLC provides copies of the RCRA contingency plan to these organization as well as other interested stakeholders. This combined distribution list includes the following:

Adams County

Peebles Fire Department

Scioto Count

Southern Ohio Medical Center
Post 73, Ohio State Highway Patrol Scioto County Emergency Mgmt. Agency
Scioto County Sheriff
Scioto County Local Emergency Planning Committee
Valley Local Schools

Pike County

Pike Community Hospital
Pike County Sheriff
Pike County Emerg. Medical Service (6)
Scioto Township Volunteer Fire Dept
Beaver Volunteer Fire Department
Piketon/Seal Township Volunteer Fire Dept
Elm Grove Volunteer Fire Department
Stockdale Volunteer Fire Department
Waverly City Schools
USEC
Pike County Fire Fighters Association
Pike County Local Emerg. Plng. Com.
Ohio Division of Forestry - Pike State Forest
Waverly Fire Department
Benton Township Volunteer Fire Department
Jackson Township Volunteer Fire Department
Camp Creek Township Fire Department
Pebble Township Vol. Fire Department
Pike County Schools
Brush Creek Township Volunteer Fire Department

Word Alive Fellowship

Franklin Township Volunteer Fire Department

Ross County

Adena Regional Medical Center Hospital

Others

Ohio Environmental Protection Agency (2)
United States Environmental Protection Agency
United States Department of Energy
Ohio Emergency Management Agency (OEMA)

AMENDMENT OF CONTINGENCY PLAN [OAC 3745-54-54]

When the Contingency Plan is revised, PORTS provides documentation to U.S. Department of Energy (DOE), and regulatory agencies, and all departments and organizations currently on the above plan distribution list The correspondence for distribution of a revised Contingency Plan includes an offer to familiarize the receiving organization with the changes in the plan.

G-1 GENERAL INFORMATION [OAC 3745-54-52]

The container storage units at PORTS are owned by DOE and are co-operated by DOE and LATA/Parallax Portsmouth LLC. The address for the facility is:

U.S. Department of Energy
Portsmouth Gaseous Diffusion Plant
3930 US 23 South
Piketon, OH 45661

The mailing address for all correspondence is:

Department of Energy
William E. Murphie, Manager
Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513

The primary contact for hazardous waste storage activities at PORTS is:

U.S. Department of Energy
Attention: Kristi Wiehle
P.O. Box 700
Piketon, OH 45661

The U.S. EPA Identification Number for DOE Operations at the Portsmouth Gaseous Diffusion Plant is:

OH7890008983

The Uranium Enrichment process and support facilities at PORTS are leased and operated by USEC. Emergency Response Services are available to LATA/Parallax Portsmouth LLC from USEC through a service agreement incorporated into the lease.

LOCATION AND SITE PLAN

PORTS is located near Piketon, in Pike County, Ohio, approximately 70 miles south of Columbus, on federally-owned property. The plant is two miles east of the Scioto River and one-half mile east of U.S. Route 23. The plant site consists of industrial facilities, including process buildings, several electrical switchyards, cylinder storage areas, cooling towers, a steam plant, a water treatment plant, a sewage disposal plant and pollution abatement facility, service and maintenance buildings and facilities for administrative, medical, fire and security activities. (See Figure G-1.)

PORTS is a former Uranium Processing Facility with an end product being enriched uranium, used to produce fuel for the nuclear power industry. Obtaining the end product required the use of numerous hazardous chemicals.

Figure G-1 presents a layout of plantsite and shows the location of the X-326 Container Storage Units, the location of onsite Emergency Response Facilities, and roads and entrances inside the facility. The evacuation plans and routes are presented in Section G-7 of this Contingency Plan. USEC provides emergency response and fire protection services for the container storage units through a service agreement incorporated into the lease.

PLANNING AREA

For the purpose of planning and response, a two-mile planning area has been established for the areas immediately surrounding the plant which could be affected by releases of hazardous substances and toxic chemicals, hazardous waste or hazardous waste constituents, mixed waste or mixed waste constituents. This area is the two-mile immediate notification area (INA), within a two-mile radius of the center of the plant. This area extends out from the center of the plant. If a protective action is recommended, a public warning system alerts persons residing within the immediate notification area to seek shelter and tune to an Emergency Alert System Radio Station Broadcast Station (EBS) for further information. (See Figure G-2.)

Topographical features within the planning area include the Scioto River two miles to the west and numerous wooded hills. Sensitive facilities located within the planning area include a nursing home and an electric utility.

No schools are located within the immediate notification area. However, county school buses frequently travel all roads within this area.

Since PORTS is not a nuclear reactor site, emergency planning requiring an "ingestion exposure pathway" has not been considered. Such accidents would involve sequences of successive failures more severe than those postulated during the design of this plant. The Ohio Emergency Management Agency, the Pike County Emergency Management Agency, DOE, and the PORTS Emergency Management Department have determined that emergency planning is only necessary to a two-mile radius of the plant.

LAND USE

A number of businesses are located west of the facility, just inside the immediate notification area. To the south and east is an area of wooded hills with scattered homes in the valleys. Land use on the western boundary of the immediate notification area is primarily agricultural, with scattered farmhouses and outbuildings amid the fields. The area north of PORTS includes residential and commercial development as well as an area of undeveloped woods and farmland.

TRANSPORTATION ROUTES

A north-south transportation corridor containing both the Norfolk Southern Railroad and U.S. Route 23 is located approximately one-half mile west of the facility. State Route 32, an east-west highway, is located to the north of the facility outside the immediate notification area.

HAZARDOUS WASTE STORAGE

The X-326 Storage Unit (See Figure G-1) is located in the central part of the DOE Facility. The X-326 Building has been in use since 1956. The structure is 2,230 feet long, 552 feet wide, 62 feet high and contains 58 acres of floor space. The X-326 Building is totally enclosed with a built up roof, transite walls and concrete floors. There are seven areas of the building, totaling approximately 38,105 square feet, designated for the storage of hazardous waste. The storage areas are located on the first floor towards the south end of the building.

The wastes are stored in a variety of containers, but are usually stored in DOT approved 55-gallon drums or 5-inch diameter/10-liter polyethylene bottles. Other containers as listed in Table D-2 of Section D of this application may also be used. The containers are stored on steel supports or are placed into support sleeves which are raised above the floor to prevent contact with potentially inadvertent standing liquid introduced into the area.

The X-326 Storage Unit is located in the south end on the first floor of the X-326 Process Building. Figure D-1 shows the floor plan for the X-326 Storage Unit. The X-326 Building is totally enclosed with a built-up roof, transite walls and concrete floors. Heating and cooling is provided as needed in the RCRA-permitted storage areas. The area around the building is sloped to direct run-on and run-off water to the PORTS storm sewer system.

The X-326 RCRA storage space will be used as required until final-closure is initiated.

Seven waste areas in the X-326 Building are delineated for storage: Areas 1, 2, 3, 4, 5, 6 and the "L" Cage (the "L" Cage consists of both the east cage and the west cage). Storage area floors for 1, 2, 3, 4 and 5 were cleaned, sealed, primed and finished with a urethane-based sealant in 1992. The "L" Cage area was cleaned, any existing concrete cracks (these are "cosmetic" cracks in the surface of the concrete and not significant structural faults) sealed with a sealant (Silka Pronto 19 or equivalent), and recoated with one coat of urethane sealant (Tennant No. 122). All storage areas are surrounded by a 1" x 1" x 1/8" angle iron dike set in a chemically resistant elastomeric sealant. The floors are six to nine inches thick and constructed out of concrete.

G-2 EMERGENCY COORDINATORS [OAC 3745-54-52 (D), 3745-54-55]

The primary contact as Emergency Coordinator is Darl Anderson. However, at PORTS alternates are referred to as Plant Shift Superintendents, who are on duty 24-hours a day and serve as Emergency Coordinator while on duty. The Plant Shift Superintendent is a USEC employee and serves as an alternate through an agreement between LATA/Parallax Portsmouth LLC and USEC. A Plant Shift Superintendent is on duty 24 hours a day. When the Plant Shift Superintendent responds to an incident scene and takes charge, he becomes the Incident Commander. The Plant Shift Superintendent is the on-site expert in emergency response procedures and has the responsibility of notifying the proper authorities for assistance. The responsibilities of the Incident Commander, as well as the notification procedures, are stated in this contingency plan. The Incident Commander has full authorization to commit all necessary resources to alleviate the emergency. Additionally, individuals have been identified by the primary contact that will respond if additional personnel are needed.

In the event of an emergency, the telephone number that will reach the on-duty Plant Shift Superintendent from an offsite phone is (740) 897-3025. If the caller is onsite, he/she would call the Plant Shift Superintendent at extension 3025. Onsite personnel can notify emergency responders by calling the plant emergency extension, 911 on any plant telephone.

The Plant Shift Superintendent is delegated the responsibility by PORTS management, to supervise site emergency response activities on all shifts. The Plant Shift Superintendent is authorized to make protective action recommendations for both onsite personnel and offsite populations.

The PORTS Emergency Response Organization (ERO) is staffed with trained personnel with expertise in responding to emergency situations. The Emergency Response Organization is at the service of the Plant Shift Superintendent when acting as the Incident Commander.

United States Enrichment Corporation Plant Shift Superintendents provide coverage at PORTS. The names of the Emergency Coordinators (Plant Shift Superintendents) are shown in Table G-1.

G-3 IMPLEMENTATION [OAC 3745-54-51(B), 3745-54-56(A), 3745-54-56(D)]

The Contingency Plan is to be implemented immediately whenever a condition arises that may threaten human health or the environment as a result or potential result of the involvement of hazardous wastes. These conditions include unplanned sudden or non-sudden releases, fires, or explosions.

Any person discovering an emergency involving hazardous waste onsite should immediately implement the Contingency Plan by alerting the Plant Shift Superintendent/Incident Commander and the Plant Emergency Response Organization. Methods used to alert the Plant Shift Superintendent and thereby implement the plan include:

- Radio to X-300 Plant Shift Superintendent; or,
- Dial 911 on any plant phone or (740) 897-2444 on cell phones and report to answering party; or
- Pick up red emergency phone (in selected areas); or,

- Dial 3025 for the Plant Shift Superintendent (cell phone users dial (740) 897-3025), or
- Pull fire alarm box. Remain near the alarm box, if possible, until the Plant Shift Superintendent/Incident Commander or Fire Services arrives; then provide details.
- Dispatch someone to summon assistance.

After implementing the Contingency Plan, the person discovering the emergency should do whatever can safely be done to minimize the impact of the emergency, including but not limited to performing local evacuation, equipment shutdown or valving isolation, and performing necessary first-aid, if appropriate.

This Contingency Plan will be implemented in the following situations:

1. Fire and/or explosion
   - A fire causes the release of toxic fumes, hazardous waste or hazardous waste constituents, mixed waste or mixed waste constituents.
   - A fire spreads and could possibly ignite materials at other locations onsite, thus releasing hazardous waste or hazardous waste constituents, mixed waste or mixed waste constituents or could cause heat induced explosions, thus releasing hazardous contaminants.
   - Use of water or water and chemical fire suppressant could result in contaminated runoff.
2. Spills or release of hazardous waste or hazardous waste constituents, mixed waste or mixed waste constituents.
   - The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.
   - The spill could cause the release of toxic liquids or fumes.
   - The spill can be contained onsite, but the potential exists for groundwater contamination.
   - The spill cannot be contained onsite, resulting in offsite soil contamination and/or ground or surface water pollution.

Regardless of the unit involved or source of hazardous waste or hazardous waste constituents, mixed waste or mixed waste constituents or any release posing an imminent danger to human health or the environment will result in plan implementation. If the Plant Shift Superintendent/Incident Commander determines that the facility has had a fire, explosion, or any unplanned sudden or non-sudden release of hazardous wastes or hazardous waste constituents to air, soil, or surface water, posing an imminent or actual harm or hazard to human health, or the environment, he will report his findings as follows:

1.To local authorities if an evacuation offsite is requested, and must be available for their consultation

2.To government officials or the National Response Center (using (800) 424-8802) and include:

A. Name and phone number of reporter;
B. Name and address of facility;
C. Time and type of incident;
D. Name and quantity of material(s) involved, to the extent known;
E. The extent of injuries, if any; and
F. The possible hazards to human health, or the environment, outside the facility.

3. To Ohio Emergency Response Team at (800) 282-9378.

G-4 EMERGENCY RESPONSE PROCEDURES [OAC 3745-54-52 (A)]

The PORTS USEC Emergency Response Organization is prepared to respond by agreement to emergencies involving DOE facilities or requiring DOE assistance. The Emergency Response Organization is responsible for taking immediate mitigative and corrective actions to minimize the consequences of an incident to workers, public health and safety, and the environment.

The Emergency Response Organization is staffed with trained personnel who are required to participate in formal training, drills and exercises and respond if notified of an incident. The incident type and severity dictate the level of Emergency Response Organization activation.

The Emergency Response Organization has the following specific functions and responsibilities depending on the incident and level of response needed to mitigate the problem: event categorization, determination of emergency class, notification, provision of protective action recommendations, management and decision making, control of onsite emergency activities, consequence assessment, protective actions, medical support, public information, activation and coordination of onsite response resources, security, communications, administrative support and coordination and liaison with offsite support and response organizations.

FIELD RESPONSE

The Plant Shift Superintendent is delegated the responsibility by PORTS Environmental Management & Enrichment Facilities Site Manager to supervise site emergency response activities on all shifts. The Plant Shift Superintendent is authorized to make protective action recommendations for both onsite personnel and offsite populations.

The Incident Command System (ICS) is used by PORTS response for managing an incident at the scene. The Incident Command System provides a standard system for responding to all types of incidents. The two major functions of the Incident Command System are safety and efficiency. The system consists of personnel, facilities, equipment, communications and procedures operating within an organized structure to accomplish control of the incident.

When the Plant Shift Superintendent responds to the incident scene and takes charge, the Plant Shift Superintendent becomes the Incident Commander. The Incident Commander establishes a command post at a safe distance away from the incident scene in an upwind direction. All requested field response units report to the command post and receive directions from the Incident Commander for response actions.

All emergency personnel should be provided with as much information as possible, concerning the nature and hazards of the incident they are responding to. This information should include wind direction and speed,

possible location of the Command Post, and any areas to avoid. Any changes in the conditions at the incident scene must be passed quickly to all responders.

The Plant Shift Superintendent/Incident Commander is located in the X-300 Plant Control Facility which serves as the 24-hour point of contact for all emergency notifications. The Plant Shift Superintendent/Incident Commander:

- Provides continuous site-wide emergency direction;
- Directs the effort to respond to an incident;
- Assesses the incident and makes initial categorization/classification;
- Alerts and mobilizes sufficient response forces, including technical assistance, to respond to the requirements of the emergency;
- Directs plant or facility shutdown, if necessary, in accordance with existing plans and procedures; and
- Ensures communications with the Emergency Operations Center (EOC), when appropriate.
- Emergency responders who routinely report to the Command Post include:
- Plant Shift Superintendent/Incident Commander
- Response Safety Officer
- Police Force
- Local Emergency Director
- Fire Department

The following organizations are called on by the Incident Commander, when necessary:

- Environmental Compliance
- Industrial Hygiene
- Nuclear Safety
- Maintenance
- Waste Management
- Health Physics
- Medical
- Utilities
- Facility Operations

In addition, offsite Emergency Response Organizations are available to assist the onsite Emergency Response Organization when needed.

EMERGENCY OPERATIONS CENTER

When the Emergency Operations Center becomes operational, overall command and control of the PORTS Site Emergency Response is transferred to the Crisis Manager, allowing the Incident Commander to focus on conditions and mitigation at the emergency scene. The Emergency Operations Center is located in the X-1020 Building and becomes the primary facility for coordinating onsite response and mitigation and offsite interface activities. The Emergency Operations Center is composed of an emergency information center where members of Senior Management and advisors operate, coordinate activities and communicate with onsite and offsite personnel; a Crisis Management Room (CMR) where the Crisis Management Team (CMT) is stationed to follow events and direct actions; a Technical Support Room (TSR) where the TSR Coordinator advises and directs the activities of the technical support group; a radio room where personnel monitor and transmit information; a computer room which houses the information management system; and an area where security personnel coordinate the activities of the protective force. The emergency line of executive succession for the Crisis Manager's position is shown in the next section.

The Plant Shift Superintendent will activate the Emergency Operations Center in the event of any emergency classification: alert or site area emergency. The Emergency Operations Center may be activated at any classification level or when deemed necessary. The Plant Shift Superintendent or alternate or the Enrichment Plant Manager or alternate are authorized to activate the Emergency Operations Center. Alternate Emergency Operations Centers include the X-300 Plant Control Facility and the Mobile Communications Vehicle. Emergency Operations Center service is by an agreement between USEC and LATA/Parallax Portsmouth LLC.

EMERGENCY LINE OF EXECUTIVE SUCCESSION

In the event of a significant emergency at PORTS, emergency executive succession of command shall be in the order listed below. If none of the management listed are available in the plant, the Plant Shift Superintendent shall assume command as well as fulfill his responsibilities as Incident Commander. The Plant Shift Superintendent will be relieved of the executive command duties by the first person to arrive as identified from the list below. PORTS does not consider those named on the list of "Emergency Line of Executive Succession" to be Emergency Coordinators. The Plant Shift Superintendent/Incident Commander continues his obligations for oversight of the emergency response.

- General Manager
- Plant Manager
- Other personnel as designated by the General Manager and trained and qualified as Crisis Manager

G-4A NOTIFICATION [OAC 3745-54-56 (A)]

This section describes the methods used for notifying PORTS Emergency Response Forces, other plant personnel and appropriate Local, State and Federal Agencies in time of an emergency.

Notification refers to required communication within mandated time frames and according to a predetermined sequence, of general information on the nature and severity of an emergency event. Notification is different from reporting because it must occur without delay for the purpose of alerting or activating, rather than informing. Notification requirements vary according to reported event level and may continue to change depending upon preliminary classification, ongoing assessments, full classification and any changes in classification.

The Plant Shift Superintendent is responsible for categorizing an event as an emergency and assigning an emergency classification. The Plant Shift Superintendent is responsible for initial notifications in accordance with Federal and State Regulations. Subsequent notifications may be the responsibility of the Plant Shift Superintendent in his role as Incident Commander or the Crisis Manager after the PORTS Emergency Operations Center becomes operational.

In any event, a prearranged format is used to ensure that the content of the notification message(s) includes the emergency classification, whether a hazardous substance and toxic chemical, hazardous waste or hazardous waste constituent, mixed waste or mixed waste constituent release is occurring or expected and identification of the response and/or protective actions taken or recommended.

Figure G-3, Emergency Notification Form (or a similar form that meets RCRA regulatory requirements), is used for notification of an emergency. Predesignated offsite agencies are notified within 15 minutes of classification of an emergency.

PRIMARY AND ALTERNATE SYSTEMS

Primary and alternate systems are in place for notifications to the Emergency Response Organization and offsite agencies. Periodic testing is conducted according to site Emergency Preparedness Implementing Procedures.

NOTIFICATION OF ONSITE PERSONNEL

Members of the PORTS Emergency Response Organization are notified of a need to respond to an emergency by a variety of ways including automatic alarms, pagers, radios, public address system and telephones.

Plant personnel not assigned to the Emergency Response Organization receive notification of an onsite emergency condition by one of eight different alarms followed by announcements over the plant's public address system. An example of plant alarms includes a continuous sounding alarm that means for plant personnel to evacuate a building and go to their assigned assembly area. To account for all plant personnel, the accountability alarm consists of seven (7) short blasts repeated three (3) times.

NOTIFICATION OF STATE AND COUNTY GOVERNMENTS

Telephone notification is made to the Pike County 24-hour Contact Point and the Ohio Emergency Management Agency and the Ohio Environmental Protection Agency. When a site area emergency is declared, the notification to the county's 24-hour Contact Point will include a reminder that at upon the site area emergency classification, the public warning system will be activated to notify the residents in the two-mile immediate notification area (INA).

The public warning system consists of five outdoor warning sirens, tone alert radio receivers, and the Emergency Broadcast System (EBS).

NOTIFICATION OF DOE

Notification to DOE Headquarters, the Portsmouth/Paducah Project Office, and the DOE Oak Ridge Field Office is made by telephone or verbal or facsimile messages.

NOTIFICATION OF LATA/PARALLAX PORTSMOUTH LLC CORPORATE PERSONNEL

Corporate personnel are notified of an emergency at PORTS by telephone or verbal or facsimile messages.

G-4B IDENTIFICATION OF HAZARDOUS SUBSTANCES AND TOXIC CHEMICALS [OAC 3745-54-56(B)]

Upon arrival at the scene of an emergency, the Plant Shift Superintendent/Incident Commander will immediately make an assessment of the character, source, amount and extent of the release that has occurred.

In the event of a release, fire, or explosion, the identification of hazardous substances and toxic chemicals, hazardous waste or hazardous waste constituents, mixed waste or mixed waste constituents in the X-326 Waste Storage Units would be accomplished by direct observation of the leaking container or by the container inventory system maintained by the Waste Management (WM) Division.

This system maintains accountability for each container. The record for a container includes the generator data, analytical results and location in the storage unit. Because the wastes are segregated by compatibility and type, the location of the emergency may identify the material. The accountability systems are updated as frequently as necessary (often daily) to maintain an accurate container inventory.

The container inventory system is computerized with backup of data in a filing system. The data for any given container can be accessed from a computer terminal within five (5) minutes. Communications with Waste Management would be by telephone or radio. Should power be interrupted, and the computer system become inoperable, the paper back-up filing system would be used. By the location of the incident, Waste Management personnel could locate the proper files which will reveal the contents of the containers involved. A third method of identification is the collection and analysis of samples. All sampling of air, soil, water, or pooled wastes will be performed in accordance with established standards, such as SW-846, ASTM, or others. All analyses will be performed in accordance with regulatory agency approved methods, such as SW-846 or in the case of radioactive contamination, in accordance with laboratory analytical methods/standard operating procedures.

G-4C HAZARD ASSESSMENT [OAC 3745-54-56 (C)]

In the event of an emergency, the Plant Shift Superintendent/Incident Commander has at his disposal any and all personnel and resources to assist and/or advise in the assessment of the situation and its amelioration. The Plant Shift Superintendent/Incident Commander will base the assessment on all available information including process knowledge, material safety data sheets, models of air, surface water or groundwater flow patterns, and specific health based environmental criteria or limits which may be exceeded. Environmental surveillance air sample data, at a minimum, will be collected and evaluated. By utilization of this existing database and trained personnel, the Plant Shift Superintendent/Incident Commander will be able to assess both the direct and indirect effects potentially caused by the emergency. Personnel routinely available to the Plant Shift Superintendent/Incident Commander for advice and consultation include those with skills and experience in chemistry, biology, engineering, industrial hygiene, safety, regulatory compliance, process engineering and operations, health physics, medicine and other sciences. Key personnel are on call to respond to the Plant Shift Superintendent/Incident Commander at any time. If the appropriate personnel are not promptly available, the Plant Shift Superintendent/Incident Commander has been granted the authority by plant management to act on the available information and to utilize his best judgment. Existing plant emergency procedures, methods, and policies, with which the Plant Shift Superintendent/Incident Commander and the Shift Emergency Response Organization are routinely trained and exercised, provide the Plant Shift Superintendent/Incident Commander with the assistance to exercise his best judgement with confidence.

If the assessment of the emergency situation indicates that evacuation of plant personnel is required, the Plant Shift Superintendent/Incident Commander will notify the necessary personnel and area or building evacuation will be initiated. If it is determined that offsite populations must be evacuated, the Plant Shift

Superintendent/Incident Commander will follow the guidelines as set forth in this contingency plan and local community response plans.

This Section also describes the protective actions developed to limit exposure of plant personnel and the public during an emergency at PORTS.

PROTECTIVE ACTIONS FOR ONSITE PERSONNEL

Protective actions for onsite personnel (including visitors and contractor personnel) includes: alerting, assembly and accountability, evacuation, monitoring and decontamination.

Plans have been developed for protection and accountability of onsite personnel within 45 minutes (not to exceed 60), including identification of special conditions, locations of assembly areas and provisions for onsite sheltering-in-place. Upon notification of an emergency by the Plant Shift Superintendent, emergency response forces proceed to their response locations. Plant personnel not assigned an emergency response position and contractors proceed to a designated monitoring station or assembly point. Visitors remain with their escorts and are accounted for.

Evacuation of personnel is ordered by the Plant Shift Superintendent or Crisis Manager whenever it is determined that a threat to the safety of plant personnel exists. Directions on the specific evacuation routes are provided. The appropriate decision of an assembly point and evacuation route is determined based upon plant conditions, wind direction and weather.

Decontamination can be conducted by the Medical Department at an established decontamination area. Decontamination is conducted at the hospital or at an established area directed by the Plant Shift Superintendent.

PROTECTIVE RESPONSE FOR THE PUBLIC

The Plant Shift Superintendent or Crisis Manager (after activation of the Emergency Operations Center) is responsible for providing protective action recommendations to local officials as part of initial notifications and follow-up communications. These recommendations are based on assessment actions and a thorough understanding of the actual or potential plant conditions. These recommendations can follow the three broad pathways of exposure:

- Airborne radioactive exposure (inhalation)
- Food chain exposure (ingestion)
- Deposition exposure (external whole body).

Recommendations may address protective actions during the emergency, restorative actions following cessation of emergency conditions, and return to "normal" in the affected areas.

EMERGENCY EXPOSURE DURING RESCUE AND RECOVERY OPERATIONS

Controlling exposure to radiation during rescue and recovery actions is extremely complex. Multiple hazards and alternate methods are to be taken into account; prompt, sound judgment and flexibility of action are

crucial to the success of any emergency actions. The risk of injury to those persons involved in the rescue and recovery activities should be minimized to the extent practical. The control of radiation exposures should be consistent with the immediate objectives of saving human life, protecting health and property, and recovering deceased victims.

ON-SITE SHELTERING IN-PLACE

Notification of a recommendation of sheltering-in-place is carried out by the Plant Shift Superintendent on the public address system and other available communication systems. Sheltering-in-place calls for employees to:

- Go indoors immediately;
- Close all windows and doors;
- Turn off all sources of outdoor air (fans, air conditioners); and
- Remain indoors and listen for additional information on the public address system.

OFFSITE SHELTERING IN-PLACE

The two-mile immediate notification area is established around PORTS to assist in notifying the public to shelter-in-place or to provide instructions for the public to evacuate the area.

When it is determined that sheltering-in-place is the recommended action for residents living within the immediate notification area, the Pike County Sheriff's Dispatcher or the Plant Shift Superintendent activates the public warning system. This system consists of five outdoor warning sirens, tone alert radio receivers and the area Emergency Broadcast System (EBS). The five electronic sirens can produce five different alerting tones as well as broadcast voice messages over the public address system. The activation of the warning system is a signal for the neighboring residents to go indoors, shelter-in-place and tune to the area Emergency Broadcast System radio and television stations for further instruction.

EVACUATION OF LOCAL POPULATIONS

In case of a gradually developing emergency event or advance warning of a potential emergency event with significant risk if the public remains in place, Pike County officials may issue evacuation orders. This information is disseminated by using the public warning system. Any residents living outside the immediate notification area who are in the path of any hazardous substances and toxic chemicals plume will be warned by county emergency forces going door to door. Evacuation routes and emergency shelters, based upon the situation and assumptions, will be announced when the public warning system is activated.

G-4D CONTROL PROCEDURES [OAC 3745-54-52 (A)]

General responsibilities of personnel and procedures to be taken in the event of fire, explosion or release of a hazardous substance and toxic chemical, hazardous waste or hazardous waste constituent, mixed waste or mixed waste constituent to air, land, or water are delineated in this Contingency Plan, which is distributed to all appropriate onsite emergency response departments and offsite response organizations. Each PORTS department has specific responsibilities and duties established in departmental procedures.

A summary of the Plant Shift Superintendent/Incident Commander minimum response to emergencies follows:

Because of the variety of potential hazards and conditions encountered, the most effective emergency control is supplied through prompt appropriate action. The action is initiated by the Plant Shift Superintendent. Certain duties and responsibilities of the Plant Shift Superintendent/Incident Commander are spelled out in various manuals and procedures. The duties and responsibilities listed hereunder are the minimum actions to be taken by the Plant Shift Superintendent/Incident Commander immediately following receipt of warnings or knowledge of emergency incidents. It is expected that the Plant Shift Superintendent/Incident Commander will make additional decisions during any incident in keeping with information available to him at the time and for occurrences peculiar to a particular incident not covered herein. The Plant Shift Superintendent/Incident Commander will arrange for suitable communications for all emergencies.

The container storage unit has an individual designated as the local emergency director (LED). This person has responsibility in emergencies for the initial actions to protect the personnel within that building. These responsibilities include knowledge of processes and how to control them, access and evacuation routes, and overall security of that area.

Should the emergency occur in only a small area of the facility (e.g., one section of a building), the Plant Shift Superintendent/Incident Commander has the option of leaving the Command Post where initiated or moving it to a more controlled area. This Command Post becomes the focal point of emergency operations.

In order to facilitate the coordination of field activities during any major incident, the Plant Shift Superintendent/Incident Commander will, at the first opportunity, call in an additional Plant Shift Superintendent. Upon arrival, the additional Plant Shift Superintendent will assist as requested by the Plant Shift Superintendent/Incident Commander already on duty.

WARNINGS (ALL TYPES)

If the situation does not warrant plantsite evacuation:

A. Direct activation of the X-1020 Emergency Operations Center, including notifying the necessary Emergency Operations Center support personnel.

B. Implement applicable operating methods.

C. Maintain communications with the Emergency Operations Center.

If the situation warrants plantsite evacuation:

A. Direct notification to plant management to prepare for plantwide evacuation.

CRITICAL REACTION

A. Request evacuated personnel to report to monitoring stations and await arrival of monitoring station directors then assign monitoring station directors to occupied stations.

B. Notify the General Manager and activate the Emergency Operations Center.

D. Notify the Police Department to establish traffic control.

FIRE ON PLANTSITE

A. Arrange suitable communication with the local emergency director and the Command Post.

B. Coordinate and direct the activities of the various service groups through the supervision of those groups.

C. Request mutual aid from community fire departments, if required.

D. Determine the termination of the "state of emergency."

E. Cause the "all clear" signal to be broadcast over all plantsite radio networks and the plant public address systems.

Whenever it becomes apparent or it has been reported that an employee has been seriously exposed to a hazardous, toxic, and/or radioactive gas or aerosol, without proper respiratory protection, that employee should be treated in the same manner as a physically injured employee, (i.e., the employee should be transported to a medical facility immediately).

Whenever an employee is involved as above in a plant emergency, it will be the responsibility of the Plant Shift Superintendent/Incident Commander to expedite the employee's delivery to a medical facility. When plant medical facilities are not occupied by medical personnel, a doctor or a nurse should be contacted immediately. If necessary, the patient should be transported immediately to an offsite medical facility. The person in charge of the medical facility must be given the following information for each patient involved:

A. Type of material(s) to which employee was exposed.

B. Relative severity of exposure.

C. Patient symptoms observed.

D. Time of exposure and total time patient was exposed.

E. Treatment given (if any).

In order to assure complete coverage, the Plant Emergency Response Organization (Fire Department, Police Department, Health Physics, E-squad, and other responding personnel) will be depended upon by the Plant Shift Superintendent/Incident Commander to be ever alert for potential patients and to advise the Plant Shift Superintendent/Incident Commander accordingly.

It will be the responsibility of the person in charge of the medical facility to determine the kind of treatment necessary and to expedite treatment to the patient.

The medical director will be responsible to assure adequate training of plant medical facility personnel and insure agreement for proper treatment at offsite hospitals.

G-4E PREVENTION OF RECURRENCE OR SPREAD OF FIRES, EXPLOSIONS, OR RELEASES [OAC 3745-54-56 (E)(F)]

During an emergency response at the X-326 Storage Units, the Plant Shift Superintendent/Incident Commander is required to order action deemed necessary to prevent the occurrence, recurrence or spread of fire, explosion or release of hazardous substances and toxic chemicals, hazardous waste or hazardous waste constituents, mixed waste or mixed waste constituents. These actions may include but are not limited to: removal of waste containers, environmental and health physics monitoring, and the sealing off of the building from the drainage system (preventing the runoff from entering the drainage system) for the purpose of containing hazardous and/or radioactive materials and surface runoff.

The West Drainage Ditch and the X-230K South Pond have emergency containment capacity and this capacity can be utilized if the Plant Shift Superintendent/Incident Commander deems necessary. Note: heavy precipitation, primarily rainfall episodes, can result in significant reduction of emergency effluent impoundment holding times.

The Plant Shift Superintendent/Incident Commander is also responsible for ensuring that monitoring for leaks, pressure or level buildup, gas generation, or rupture is provided if operations in the storage unit must be stopped. This monitoring may be carried out by direct observation, process knowledge, chemical analysis if necessary, and any other procedures deemed necessary.

G-4F STORAGE AND TREATMENT OF RELEASED MATERIAL [OAC 3745-54-56(G)]

Immediately after the emergency, all intact waste containers (polybottles/drums) will be inspected for leaks, bulges, or any other indication that the container may have been compromised. If the container is in good condition, it will be moved to a temporary location where containment and weather protection are afforded.

If the container has been compromised, the remaining contents will be transferred to a new container and will be placed in the temporary location. Detailed steps for repacking are provided in Waste Management operating procedures. All labeling will be replaced as necessary.

In the event a spill or release of hazardous waste or hazardous substance and toxic chemical, hazardous waste or hazardous waste constituent, mixed waste or mixed waste constituent escapes the building and contaminates the soil, the following steps will be taken to assure that all soil containing hazardous constituents has been removed and containerized.

1. Soil showing visible contamination will be excavated immediately.

2. A statistically valid sampling plan that considers the soil type, properties of the spilled material, area affected, volume of the spill and other factors will be developed.

3. This sampling plan will guide the confirmatory sampling and any additional excavation.

4. Background will be determined by applying the sampling plan to a similar but unaffected area nearby.

5. Excavation will cease when the analyses show results less than the mean plus two sigma of the background.

Any recovered waste, contaminated water, or other contaminated material will be characterized and placed in containers as specified in Table D-1. Contaminated water may also be treated in one of PORTS groundwater treatment facilities and released through a PORTS permitted NPDES outfall.

The temporary storage location will be located within an unaffected area of the X-326 storage units and be used until repairs are completed or a new permanent site is located. No new hazardous waste storage operations or activities, beyond recovery activities, will be initiated without obtaining prior DOE and regulatory agency approval.
In the event of a fire at any RCRA facility, the primary goal following the fire extinguishment is the containment of the contaminated runoff to the maximum extent possible. In order to attain that goal, the following steps will be taken:

1 As soon as possible after the notification of the fire is received, the Plant Shift Superintendent/Incident Commander will order the closure of the appropriate holding pond. For the X-326 Storage Unit, flow through the South Holding Pond and/or the West Drainage Ditch can be stopped by closing effluent control valves. It should be noted heavy precipitation, primarily rainfall episodes, could result in the significant reduction of effluent impoundment holding times.

2. If necessary, an earthen dam is to be constructed as near the facility as practical as soon as human resources and equipment are available. The purpose of this action is to minimize the spread of contamination and to provide extra containment runoff.

3. If additional containment capacity is required, available inflatable tanks, railroad tank cars, and tank trailers can be utilized.

4. Following abatement of the emergency, all impounded runoff will be characterized. Sampling and analysis, if necessary, will be performed in accordance with agency-approved methods such as SW-846, or, in the case of radioactive contamination, in accordance with laboratory analytical methods/standard operating procedures.

5. If the runoff is determined to be hazardous, the runoff will be treated or disposed of in accordance with applicable RCRA regulations.

6. Following removal of the water from the containment areas, a soil sampling program will be initiated to determine if the soil has become contaminated.

G-4G INCOMPATIBLE WASTES [OAC 3745-54-56(H)(1)]

Determinations of chemical characteristics and incompatibilities by the Plant Shift Superintendent/Incident Commander can be done with visual inspections, field sampling and by knowledge of the waste origination. The analytical procedures of the waste analysis plan and the waste management and

segregation procedures of the storage units and their procedures to prevent hazards are also applicable to ensuring that there will be no incompatibility problems.

G-4H POST EMERGENCY EQUIPMENT MAINTENANCE [OAC 3745-54-56(H)(2) AND (I)]

Following its use in an emergency or routine maintenance situation, all equipment is cleaned/decontaminated of hazardous substance and toxic chemical or residual excavated materials prior to being placed into storage for reuse as necessary. The purpose of the cleaning is twofold: 1) to maintain the equipment in usable condition; and 2) to prevent the spread of and/or unnecessary exposure to hazardous and/or radioactive materials.

Expendable supplies such as disposable personal protective equipment are inventoried and replaced as required as part of the decontamination activities. These decontamination activities are performed after the generated residues are containerized and sampled (as necessary) to ensure only compatible materials are stored together. The completion of the site cleanup is to include the maintenance of equipment and the replenishment of supplies, which will then be reported to the Administrator of Environmental Protection Agency (EPA) Region V, the Director of Ohio EPA and any other applicable state or local agency prior to the resumption of normal operations.

G-4I CONTAINER SPILLS AND LEAKAGE [OAC 3745-54-52(A)-(E), 3745-55-71]

Spill control equipment shall be located and available in the hazardous waste storage units at all times. Waste Management operating procedures provide detailed steps for handling and replacing leaking containers.

The general procedure that is followed is:

1. The spill or leak is contained using an inert absorbent if it can be safely done by personnel detecting the spill or leak. Once the spill or leak is safely contained, clean-up activities shall begin immediately.

2. Chemical Operations personnel, Environmental Compliance personnel, the Plant Shift Superintendent/ Incident Commander, and, if necessary, emergency response personnel are notified to provide safe clean-up guidelines and equipment.

3. The contents of the drum will be transferred to a container as specified in Table D-1 or the drum and contents will be placed in an overpack drum as stated in the procedure.

Regulatory Compliance will evaluate the occurrence against current regulations and determine the reporting requirements and, if necessary, draft appropriate notifications.

After the emergency has been abated, the transfer of additional hazardous wastes into the storage area will be discontinued until the area is properly cleaned. There is sufficient space in other onsite storage areas to accommodate this material for several weeks.

G-4J TANK SPILLS AND LEAKAGE [OAC 3745-55-93]

PORTS is not seeking a permit for any tanks; therefore, this section does not apply.

SUBMISSION DATE: SEPTEMBER 13, 2010

G-4K SURFACE IMPOUNDMENT SPILLS AND LEAKAGE [OAC 3745-56-27]

PORTS is not seeking a permit for any surface impoundments; therefore, this section does not apply.

G-5 EMERGENCY EQUIPMENT [OAC 3745-54-52(E)]

FIRE EXTINGUISHING EQUIPMENT

The closest fire department is operated by USEC. This fire department maintains a full time dedicated fire department, which includes three pumpers: 1 - with a 1500 gallons per minute (gpm) pump and 1000 gallon tank; 1 - with a 1500 gpm pump and a 500 gallon tank and 1 - with a 1200 gpm pump and a 500 gallon booster tank; 1 - mini-pumper with 300 gpm pump and a 300 gallon booster tank, and a 4-wheel drive heavy rescue vehicle, and two ambulances. The department has a truck; for carrying all types of miscellaneous emergency equipment. In addition, the department operates several pickup trucks. Each vehicle and its complement of equipment is checked at the start of each shift and a complete inventory is taken each week. This equipment and staff are housed in a modern, eight bay, brick building known as the X-1007 Fire Station. Included in the fire station is a modern, computerized alarm room.

There are two separate firewater distribution systems at PORTS. The high-pressure fire water system services all sprinkler systems and the fire hydrants in the newer areas of the plant. It has a 4-hour fire flow of 16,000 gpm at 125 pounds per square inch (psi). The low-pressure system is also known as the sanitary water system and services the fire hydrants in the older area of the plant. It has a 4-hour fire flow of 5,000 gpm at 75 psi. Fire hydrant spacing on both systems is nominally 300 feet. The fire hydrants in the area of X-326 are on the low-pressure system. The PORTS Fire Department is located in Building X-1007, about 1,000 feet from the X-326 Storage Units.

Along with the fire protection systems at PORTS, the X-326 building has a set of portable fire extinguishers available. Each unit is inspected on a routine basis. NFPA Class A, B, C or combination extinguishers can be found in most areas and are generally located 75 feet apart or approximately one for each 1250 ft^2 of floor space per NFPA standards. These units are to be used for small fires (e.g. waste baskets, paper on desk) only, as general personnel are not trained to fight significant fires.

EMERGENCY AND SPILL CONTROL EQUIPMENT

The container storage units have an extensive array of emergency and spill control equipment available for routine and emergency use. All equipment is maintained on a preventative maintenance schedule as recommended by the manufacturer. The list of equipment is presented as Table G-2.

In addition to the emergency equipment, DOE/LATA/Parallax Portsmouth LLC has a wide variety of heavy equipment (lifting and earth moving) available for use, in an emergency, by agreement with USEC.

PERSONAL PROTECTIVE EQUIPMENT

PORTS maintains a wide variety of personal protective equipment including respiratory protection; protective clothing, including chemical-resistant encapsulating suits; and self-contained breathing apparatus.

The types of respiratory protection available include organic vapor half-face, full-face and, fresh air respirators; and the aforementioned self-contained breathing apparatus. Protective clothing includes cloth coveralls, aprons, shoes, boots, various types of gloves and headgear. The chemical-resistant encapsulating suits are maintained by the USEC Fire Department Personnel who receive special training in the use, testing and inspection of such equipment.

Emergency response personal protective equipment consisting of both Level A and Level B Equipment is assigned to and is either carried on fire vehicles or is stored in the X-1007 Fire Station.

Level A Equipment consisting of positive-pressure self-contained breathing apparatus, full-encapsulating chemical resistant suits with built-in gloves, steel shank boots, a hard hat and extra gloves are carried on the fire department emergency truck. Extra positive-pressure self-contained breathing apparatus and extra air bottles are also stored on this vehicle.

Level B Equipment is worn by all responding firemen and consists of complete fire turnout gear and self-contained breathing apparatus. Additional positive-pressure self-contained breathing apparatus is available on all fire apparatus except the two ambulances. These responders normally wear white cotton gloves under their regular work gloves, and have available to them plastic booties to wear over their boots, if such protection is needed.

Tyvec coveralls, cotton gloves, skull caps, respiratory protection, plastic booties, and extra air bottles are also carried on the emergency truck. An additional supply of these items are stored in supply cabinets in the X-1007 Fire Station.

Once the situation has been stabilized by the immediate response of the fire department and the potential hazards of fire and explosion have been reduced to an acceptable level, cleanup is completed by the USEC Chemical Operations Department with the Fire Department on standby. The personal protective equipment of the chemical operators is normally Level D and occasionally Level C. The level of protection is determined by the Industrial Hygienist after determining the nature of the material spilled, taking and evaluating instrument readings for that material, and consulting with the Plant Shift Superintendent/Incident Commander, fire captain and safety personnel so that all potential hazards are considered.

INTERNAL COMMUNICATIONS AND ALARM SYSTEMS

PORTS emergency communications and alarms are established in a variety of methods. The most familiar and easily usable is the telephone. The dialing of the emergency number (911) on any plant telephone will automatically connect the caller with the USEC Fire Department. The caller will be requested to describe the nature of the emergency and location and be told to remain, if possible, at the scene until emergency personnel arrive.

Another familiar alarm device is the fire alarm boxes located in virtually every building on plantsite. When tripped, the alarms will sound in the fire department. Personnel sounding the alarm should remain as close to the alarm box as is safely possible in order to guide emergency response personnel to the occurrence scene.

Other alarms include bells, whistles, and horns which sound in a variety of ways depending on the nature and extent of the emergency. For example, in the event of an emergency, a personnel accountability alarm may

be sounded (seven rings on a bell, repeated three times) and/or, if an evacuation is necessary, a horn will sound with a continuous blast.

Emergency communications may also be accomplished by means of hand held two-way radios. A dedicated emergency frequency is assigned, and an alternate frequency may be utilized, if necessary. All personnel who may have use of a two-way radio are instructed as to its proper use.

EXTERNAL

The telephone is the primary means of external communication. Both hazardous waste storage units have telephones. The Plant Shift Superintendent, Fire Department and Police Department have radio capability to monitor and communicate directly with the area emergency responders. PORTS also has facsimile and electronic information transfer capability to communicate with those who have compatible equipment.

FIRST AID AND MEDICAL EQUIPMENT

PORTS has a doctor and nurses who can administer the full range of first aid and stabilization techniques to injured or ill personnel. The PORTS Hospital has an emergency room, examination suites and three holding beds. It is staffed on day-shift Monday through Friday excluding holidays with a physician on day-shift. The Fire Department maintains two fully equipped ambulances and most fire department personnel are certified Emergency Medical Technicians or Paramedics. These services are available through an agreement with USEC.

DECONTAMINATION EQUIPMENT

Emergency decontamination equipment for injured personnel and responder decontamination is carried on the plant emergency truck, ambulances, and fire apparatus. Additional equipment and neutralizing solutions are stored in the X-1007 Fire Station or the X-101 Hospital. This equipment generally consists of responder protective equipment, decontamination solutions, solution containment devices, and contaminated clothing storage bags.

Gross decontamination of responders is generally accomplished by using safety showers or sanitary showers in affected buildings, with decontamination solutions being stored in proper containers awaiting characterization or by decontamination with portable hoses and/or sprayers. Decontamination solutions can be collected in portable pools for proper characterization, treatment and disposal.

Heavy equipment may be decontaminated by use of water hoses, portable high pressure water or steam cleaners. Prior to this step, all gross contamination is brushed off of the affected surfaces, to limit the concentration in the decontamination solutions. Solutions and solids potentially contaminated with hazardous constituents are collected, sampled and properly disposed of following analytical data review.

G-6 COORDINATION AGREEMENTS [OAC 3745-54-37, 3745-54-52(C)]

An agreement with USEC provides the services of an onsite hospital, fire department, and police department. As the primary provider of emergency services to DOE/LATA/Parallax Portsmouth LLC, USEC

obtains and is responsible for updating mutual aid agreements with several surrounding communities for joint support for emergencies at PORTS or within the communities. Copies of the mutual aid agreements and other letters of understanding with the following agencies are attached.

Mutual Aid Agreement

Piketon-Seal Township Volunteer Fire Dept
Benton Township Volunteer Fire Dept
Camp Creek Township Volunteer Fire Dept
Elm Grove Volunteer Fire Dept
Jackson Township Volunteer Fire Dept
USEC Fire Dept
Peebles Fire Dept
Beaver Volunteer Fire Dept
Pebble Township Volunteer Fire Dept
Stockdale Volunteer Fire Dept
Waverly Fire Dept
Scioto Township Volunteer Fire Dept
Brush Creek Volunteer Fire Dept
Franklin Township Volunteer Fire Dept
Pike County Fire Fighters Association (fire departments listed are part of this association)
Ohio Division of Forestry – Pike State Forest
Pike County Sheriff's Department

Hospitals (LOA)

Pike County Emergency Medical Service, Waverly, Ohio
Pike Community Hospital, Waverly, Ohio
Southern Ohio Medical Center, Portsmouth, Ohio
Adena Regional Medical Center, Chillicothe, Ohio

Schools (LOA)

Pike County Schools
Valley Local Schools
Waverly City Schools, Waverly, Ohio

The remoteness of the plant from local communities would delay their emergency personnel's response time to PORTS in the event of an emergency. Therefore, USEC will be the primary emergency authority.

The Site Emergency Plan for an emergency at PORTS includes participation of county emergency forces. The plan also provides site orientation tours and classroom training biennially. The PORTS initial responders are intimately familiar with the facility and will have assessed the hazards and support needs prior to the arrival of offsite aid. For these reasons, PORTS will have the lead on any onsite emergency response and all of the offsite aid will be supportive in nature. PORTS will direct the offsite support units so that all parties will understand their responsibilities.

In order to provide additional medical support for employees, contractors and visitors, USEC maintains Letters of Agreement (LOA) with three area hospitals. These letters indicate that the hospitals will accept PORTS patients for treatment. Additional emergency medical services are provided by a LOA with the county emergency medical service.

PORTS has designated and equipped a Joint Public Information Center (JPIC) to provide a single facility from which multi-organizational emergency public information can be coordinated and disseminated during emergencies at the plant which involve, or could involve, offsite emergency actions to protect the public.

The facility for the Joint Public Information Center is the Word Alive Fellowship facilities. Agreements are in place to support this effort. Agreements are in place to support this effort. These agreements, Letters of Understanding, and copies of fire mutual aid agreements are provided in Attachment G.1.

Due to the security required, special circumstances of the operations at this facility, and the possible nuclear contamination involved with any emergency at PORTS, it is assumed that outside contractors and Ohio EPA Response Teams will not be required to respond to emergencies occurring here. No agreements have been solicited from either contractors or Ohio EPA for this reason. Should Ohio EPA choose to attend drills or training sessions with local mutual aid organizations, arrangements can be made for their inclusion.

G-7 EVACUATION PLAN [OAC 3745-54-52(F)]

The Emergency Evacuation Organization for each building onsite will consist of a Local Emergency Director (LED) and as many assistant local emergency directors and/or Building Wardens as may be deemed necessary. Normally, the local emergency director will be the supervisor in charge of the area requiring evacuation. The number of personnel in the evacuation organization may be varied at the direction of the local emergency director or Plant Shift Superintendent/Incident Commander according to the following:

a. Size of building;

b. Number of employees and presence of physically impaired employees;

c. Type and location of exit doors;

d. Emergencies requiring evacuation shall include, as a minimum:

1. Explosions, fires, spills or releases of a volume of hazardous waste or hazardous waste constituent, mixed waste or mixed waste constituent sufficient to threaten human health in the vicinity,

2. Releases causing concentrations in the air to exceed the Threshold Limit Value (TLV) concentration, and

3. Releases for which a rapid determination of contaminant concentrations cannot be made.

EVACUATION CRITERIA

The authority for determining the necessity and scope of an evacuation is vested in the local emergency director who is on the scene. The Plant Shift Superintendent/Incident Commander may expand the scope of the evacuation. There are a number of specific events that require evacuation such as fires, release of process or toxic gas, explosions, pressure ruptures, and large spills. In any real or potential emergency, the local emergency directors and the Plant Shift Superintendent/Incident Commander are to take the necessary actions to protect human life and provide for their safety and health.

EVACUATION ALARM SIGNALING SYSTEMS

The signal for employees to evacuate any building on plant site will be the continuous sounding of the emergency evacuation horns.

In case of emergencies requiring the evacuation of more than a single building such as a fire zone or the need for a complete plant wide evacuation, additional instructions will be issued over the plant public address system and other available means of communication.

Personnel who are in areas other than their own should follow the personnel who are assigned in that area. Personnel who are conducting meetings, in training classes, or who are acting as escorts for uncleared or cleared visitors shall be responsible for seeing to it that all these personnel evacuate the affected building/buildings per established evacuation procedures. DOE prime contractor personnel shall ensure that all contractor personnel are advised of evacuation procedures applicable to the areas in which they are to be working.

In order to prevent congestion near the exit doors and to provide clear passage for responding plant emergency service groups, personnel leaving the building will proceed promptly to pre-assigned assembly area(s) or to an assembly area that may be designated over the plant public address system.

EVACUATION ROUTES

The X-326 building has established evacuation procedures specific to that building. Upon hearing the continuous blast of a horn or ringing of a bell, all personnel are to promptly evacuate the building following designated routes. The evacuation routes are conspicuously posted on walls and doorways with evacuation direction(s) indicated by arrows. In those buildings where designated evacuation routes cannot be feasibly marked (e.g. Process Buildings), personnel are to evacuate via the nearest available exits.

The evacuation routes to assembly areas are dependent on wind direction and the location of an incident. Personnel are trained to note the wind direction and then to proceed to an upwind assembly area. See Figure G-4.

X-326 STORAGE UNIT

Exit Points - Scioto Avenue - Roto Gates

Evacuation Routes:

Primary

Persons evacuating through these emergency egress roto gates will proceed north on Scioto Avenue, turn left and proceed west on 17th Street and assemble at the X-109A, Monitoring Station #6.

Alternate

Persons evacuating through these emergency egress roto gates will proceed south on Scioto Avenue, turn right and proceed west on 2nd Street, turn left and proceed south on Falcon Avenue and assemble at the X-1007 Fire Station, Monitoring Station #7.

Exit Points -15th Street - Roto Gates and X-111B Portal

Evacuation Routes:

Primary

Persons evacuating through these emergency egress roto gates will proceed west on 15th Street, turn right and proceed north on Scioto Avenue, turn left and proceed west on 17th Street and assemble at the X-109A, Monitoring Station #6.

Alternate

Persons evacuating through these emergency egress roto gates will proceed east on 15th Street, turn right and proceed south on Pike Avenue, turn left and proceed east on 11th Street and assemble at the X-106, Monitoring Station #2.

Exit Points - 5th Street- Roto Gates

Evacuation Routes:

Primary

Persons evacuating through these emergency egress roto gates will proceed east on 5th Street, turn left and proceed north on Pike Avenue, turn right and proceed east on 6th Street, turn left and proceed north on Mahoning Avenue, turn right and proceed east on 7th Street and assemble at the X-109C, Monitoring Station #1.

Alternate

Persons evacuating through these gates will proceed west on 5th Street, turn left and proceed south on Scioto Avenue, turn right and proceed west on 2nd Street, turn left and proceed south on Falcon Avenue and assemble at the X-1007 Fire Station, Monitoring Station #7.

Exit Points - Pike Avenue - Roto Gates and X-111A Portal

Evacuation Routes:

Primary

Persons evacuating from Emergency Roto Gates and X-111A Portal will proceed south on Pike Avenue; persons evacuating Emergency Roto Gates Pedestrian Gate-15 and Pedestrian Gate-13 will proceed north. They will then proceed east on 9th Street, turn right and proceed south on Mahoning Avenue, turn left and proceed east on 7th Street and assemble at X-109C, Monitoring Station #1.

Alternate

Persons evacuating from these Emergency Egress Roto Gates will proceed south on Pike Avenue, turn right and proceed east on 11th Street and assemble at the X-106, Monitoring Station #2.

Exit Points - Pike Avenue - Roto Gate

Evacuation Routes:

Primary

Persons evacuating from Emergency Egress Roto Gate Pedestrian Gate-7 will proceed north on Pike Avenue, persons evacuating from Emergency Egress Roto Gates will proceed south on Pike Avenue. They will then proceed east on 11th Street and assemble at the X-106, Monitoring Station #2.

Alternate

Persons evacuating from these Emergency Egress Roto Gates will proceed south on Pike Avenue, turn left and proceed east on 10th Street, turn right and proceed south on Mahoning Avenue, turn left and proceed east on 7th Street and assemble at the X-109C, Monitoring Station #1.

G-8 REQUIRED REPORTS [OAC 3745-54-56(J)]

Within 15 days of the incident, PORTS will provide a written report on the occurrence to the Region V Administrator and the Director of Ohio Environmental Protection Agency through DOE. Copies will be included in the operating record. The report will include at a minimum:

1. Name, address and telephone number of the owner or operator;
2. Name, address and telephone number of the facility;
3. Date, time and type of incident (e.g. fire, explosion);
4. Name and quantity of material(s) involved;
5. The extent of injuries, if any;
6. An assessment of the actual or potential hazards to human health or the environment, Where applicable;
7. Estimated quantity and disposition of recovered material that resulted from the occurrence;
8. Any other information as the director may require.

SUBMISSION DATE: SEPTEMBER 13, 2010

TABLE G-1 PORTSMOUTH GASEOUS DIFFUSION PLANT EMERGENCY COORDINATORS (PLANT SHIFT SUPERINTENDENTS)

NAME	ADDRESS	HOME TELEPHONE NUMBER	PAGER TELEPHONE NUMBER
PRIMARY CONTACT[1]			
Darl Anderson	Non-responsive	Non-responsive	Non-responsive
PLANT SHIFT SUPERINTENDENTS (PSS)			
Keith Williamson	Non-responsive	Non-responsive	Non-responsive
Ron P. Crabtree			
Gary Salyers			
Kurt Sisler			
Steven W. May			
Eric (Rudy) Spaeth			
Keith Vanderpool			
Jim McCleery			
Bryan Miller			

[1]After the Primary Contact, the Plant Shift Superintendent on duty at the time of an incident will be the Emergency Coordinator.

TABLE G-2 SITE EMERGENCY EQUIPMENT

Equipment Description	Amount	Location	Purpose
Sprinkler systems	~ 80	X-326	Capable of controlling fires by water flow.
Fire extinguishers	~ 350	X-326	For use in extinguishing Class A, B, or C fires.
Building horns	> 10	X-326	For activating the Emergency Response Organization, alerting employees to respond according to the nature of the emergency.
Plant radio frequencies	5	X-326	Allows two way communications between employees, emergency response organizations, etc.
Commercial telephones	> 6	X-326	Capable of notifying on-site employees and off-site agencies.
Towels, mops, buckets, etc.	1	X-326	Spill clean-up.
Drum pump	1	X-326	Liquid waste transfer.
Large spill cabinet	1	X-326	For spill control materials (absorbent, PPE, etc.)

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April 8, 2010

PORTSMOUTH GASEOUS DIFFUSION PLANT EMERGENCY PLAN MAP

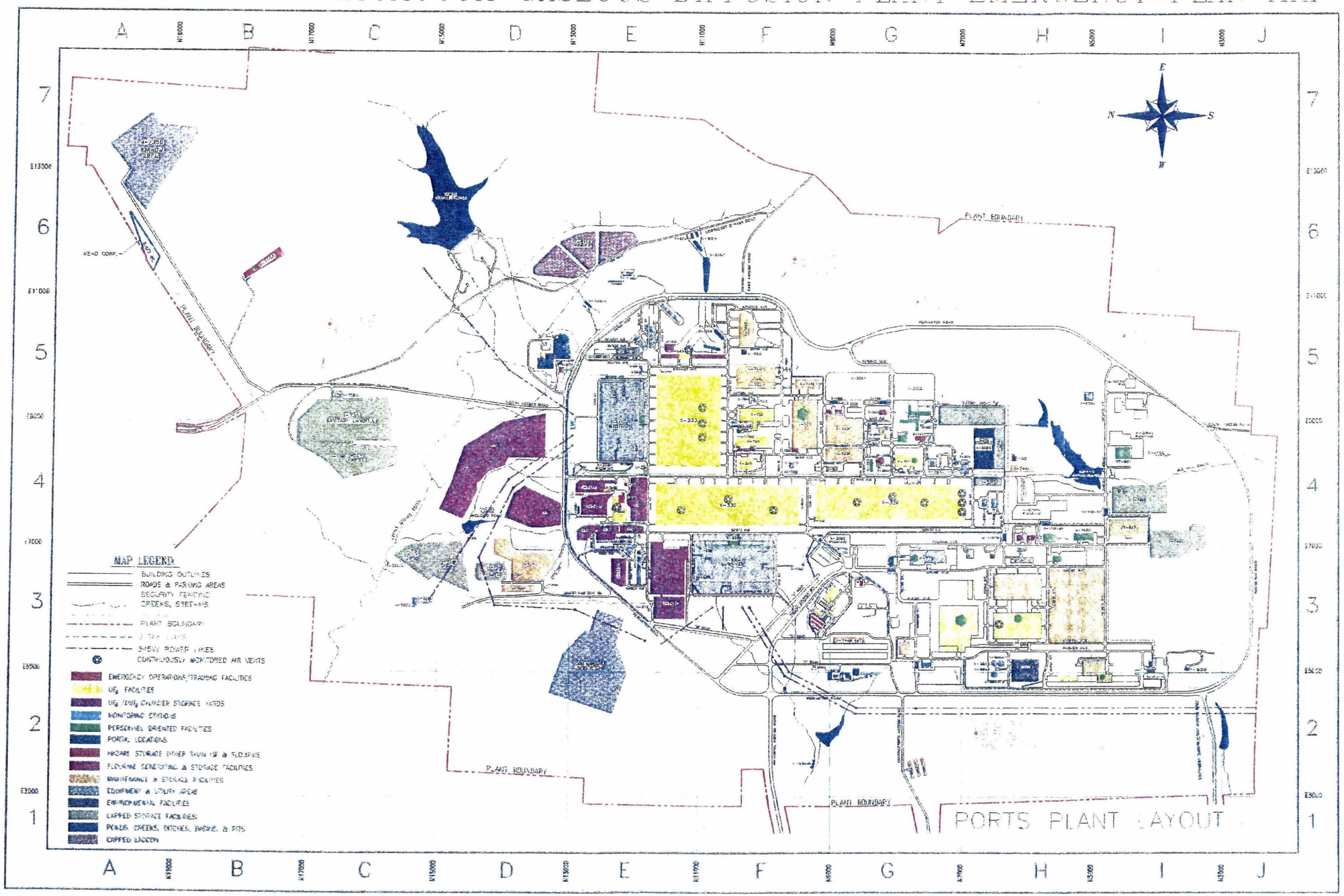


Figure G-1 PORTS Emergency Response Facilities

EMERGENCY PLAN – PORTS
REV 101

April 8, 2010

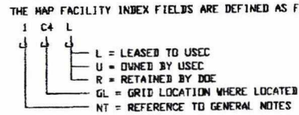
PORTSMOUTH GASEOUS DIFFUSION PLANT EMERGENCY PLAN MAP INDEX

FAC #	FAC DESCRIPTION	NT	GL	LS
X-100	ADMINISTRATION BLDG		G5	L
X-100B	AIR CONDITIONING EQUIP BLDG		G4	L
X-101	HEALTH SERVICES		G4	L
X-102	CAFETERIA		G4	L
X-103	AUX OFFICE BLDG		G4	R
X-104	GUARD HEADQUARTERS		G5	L
X-104A	INDOOR FIRING RANGE		G5	L
X-106	TACTICAL RESPONSE BLDG		G4	L
X-106C	NEW FIRE TRAINING BLDG		G3	L
X-108A	S PORTAL & SHELTER		G5	L
X-108B	N PORTAL & SHELTER		G5	L
X-108E	CONSTRUCTION PORTAL		F4	L
X-108H	PIKE AVE PORTAL		E4	L
X-109A	PERSONNEL MONITORING STA		F3	L
X-109B	PERSONNEL MONITORING STA		F5	L
X-109C	PERSONNEL MONITORING STA		G5	L
X-111A	SNM MONITORING PORTAL (X-326)		G4	L
X-111B	SNM MONITORING PORTAL (NW X-326)		F4	L
X-112	DATA PROCESSING BLDG		H4	L
X-114A	OUTDOOR FIRING RANGE		B6	L
X-120H	NEW WEATHER STA		I4	L
X-206A	N MAIN PARKING LOT		G5	L
X-206B	S MAIN PARKING LOT		G5	L
X-206E	CONSTRUCTION PARKING LOT		G4	L
X-206H	PIKE AVE PARKING LOT		E4	L
X-206J	S OFFICE PARKING LOT		I4	L
X-230J-2	S HOLDING POND EFFLUENT MONITORING STA		I4	L
X-230J-3	W ENVIR MONITORING STA		F2	L
X-230J-5	W HOLDING POND & ENVIR SAMPLING BLDG		F2	L
X-230J-6	NE HOLDING POND & MONITORING STA		E6	L
X-230J-7	E HOLDING POND & MONITORING STA		F6	L
X-230J-9	N ENVIR SAMPLING STA		C3	R
X-230K	S HOLDING POND		H4	L
X-230L	N HOLDING POND		D4	L
X-230N	CLEAN SITE NE OF XT-801		H5	R
X-231A	SE OIL BIODEGRADATION PLOT		H4	R
X-231B	SW OIL BIODEGRADATION PLOT		H4	R
X-300	PLANT CONTROL FAC		G4	L
X-300A	PROCESS MONITORING BLDG		G4	L
X-300B	PLANT CONTROL FAC CARPORT		G4	L
X-326	PROCESS BLDG		G4	L
X-326L	L-CAGE, L-CAGE GLOVE BOX & STORAGE AREA		G4	R
X-330	PROCESS BLDG		F4	L
X-333	PROCESS BLDG		E5	L
X-334	TRANSFORMER CLEANING BLDG		E4	R
X-342A	FEED, VAPORIZATION & FLUORINE GENERATION BLDG		E4	L
X-342B	FLUORINE STORAGE BLDG		E4	L
X-343	FEED, VAPORIZATION & SAMPLING BLDG		E5	L
X-344A	UF6 SAMPLING FAC		E4	L
X-344B	MAINTENANCE STORAGE BLDG		E4	L
X-345	SNM STORAGE BLDG		F4	R
X-501	SUBSTATION		G4	L
X-501A	SUBSTATION		G4	L
X-502	SUBSTATION		G4	L
X-530A	SWITCH YARD		F3	L
X-530B	SWITCH HOUSE		F4	L
X-530C	TEST & REPAIR BLDG		F3	L
X-530D	OIL HOUSE		F3	L
X-530E	VALVE HOUSE		F3	L
X-530F	VALVE HOUSE		F3	L
X-530G	GCEP OIL PUMPING STA		F3	L
X-533	TRANSFORMER STORAGE PAD		E4	R
X-533A	SWITCH YARD		E4	R
X-533B	SWITCH HOUSE		E5	R
X-533C	TEST & REPAIR BLDG		E5	R
X-533D	OIL HOUSE		E4	R
X-533E	VALVE HOUSE		E5	R
X-533F	VALVE HOUSE		E4	R
X-533H	MONITORING STATION #4		E5	L
X-533J	GAS RECLAIMING CART GARAGE		E5	R
X-540	TELEPHONE BLDG		G4	L
X-600	STEAM PLANT FAC		H4	L
X-600A	COAL PILE YARD		H4	L
X-600B	STEAM PLANT SHOP		G4	L
X-600C	ASH WASH TREATMENT BLDG		H4	L
X-605H	BOOSTER PUMP HOUSE & FAC		C3	L
X-605I	CHLORINATOR BLDG		C3	L
X-605J	DIESEL GENERATOR BLDG		C3	L
X-611	WATER TREATMENT PLANT		D5	L
X-611A	PRAIRIE		E6	R
X-611B	SLUDGE LAGOON		D6	L
X-611C	FILTER BLDG		D5	L
X-611D	RECARBONIZATION INSTRUMENT BLDG		D5	L
X-611E	CLEARWELL & CHLORINE BLDG		D5	L
X-612	ELEVATED WATER TANK		E3	L
X-614A	SEWAGE PUMPING STA		F4	L
X-614B	SEWAGE LIFT STA		E4	L
X-614D	S SEWAGE LIFT STA		I4	L
X-614P	NE SEWAGE LIFT STA		E5	L
X-617	S HOLDING POND & PH CONTROL FAC		I4	L
X-618	N HOLDING POND STORAGE BLDG		D4	L
X-621	COAL PILE RUNOFF TREATMENT FAC		H4	L
X-622	S GROUNDWATER TREATMENT BLDG		H4	R
X-623	N GROUNDWATER TREATMENT BLDG		F5	R
X-624	LITTLE BEAVER GROUNDWATER TREATMENT FAC		E6	R
X-624-1	LITTLE BEAVER GROUNDWATER TREATMENT DECONTAMINATION PAD		E6	R
X-625	PILOT SCALE TREATMENT FAC		I3	R
X-626-1	RECIRCULATING WATER PUMP HOUSE		H4	L
X-626-2	COOLING TOWER		H4	L
X-627	GROUNDWATER TREATMENT FACILITY		F4	R
X-630-1	RECIRCULATING WATER PUMP HOUSE		E3	L
X-630-2A	COOLING TOWER		E4	L
X-630-2B	COOLING TOWER		E3	L
X-633-1	RECIRCULATING WATER PUMP HOUSE		E5	R
X-633-2A	COOLING TOWER		E5	R
X-633-2B	COOLING TOWER		E5	R
X-633-2C	COOLING TOWER		E5	R
X-633-2D	COOLING TOWER		E5	R
X-640-1	FIRE WATER PUMP HOUSE		E5	L
X-640-2	ELEVATED WATER TANK		F4	L
X-700	CONVERTER SHOP & CLEANING BLDG		F5	L
X-700A	AIR CONDITIONING EQUIP BLDG		F5	L
X-701B	HOLDING POND (DRAINED)		F5	R
X-701E	NEUTRALIZATION BLDG		F5	R
X-705	DECONTAMINATION BLDG		F4	L
X-705D	HEATING BOOSTER PUMP BLDG		F4	L
X-705E	OXIDE CONVERSION AREA		E4	R
X-710	TECHNICAL SERVICES BLDG		G4	L
X-710A	TECHNICAL SERVICES GAS MANIFOLD SHED		G4	L
X-710B	EXPLOSION TEST FAC		G4	L
X-720	MAINTENANCE & STORES BLDG		F4	L
X-720B	RADIO BASE STA BLDG		F4	L
X-720C	PAINT & OIL STORAGE BLDG		F4	L
X-721	RADIATION INSTRUMENT CALIBRATION FAC		F4	L
X-734	OLD SANITARY LANDFILL		B4	R
X-734A	CONSTRUCTION SPOILS DISPOSAL AREA		C3	R
X-734B	CONSTRUCTION SPOILS DISPOSAL AREA		D3	R
X-735	SANITARY LANDFILL		C5	R
X-735A	LANDFILL UTILITY BLDG		C5	R
X-735B	BORROW AREA		A7	R
X-736	W CONSTRUCTION SPOILS LANDFILL		C4	R
X-741	OIL DRUM STORAGE FAC		F5	L
X-742	GAS CYLINDER STORAGE FAC		G5	L
X-743	LUMBER STORAGE SHED		G4	L
X-744B	SALT STORAGE SHED		D3	L
X-744G	BULK STORAGE BLDG		F5	R
X-744H	BULK STORAGE BLDG		F5	L
X-744J	BULK STORAGE BLDG		F5	L
X-744K	WAREHOUSE K		H4	R
X-744L	STORES & MAINTENANCE BLDG		F5	L
X-744N	WAREHOUSE N NON UEA		G2	R
X-744P	WAREHOUSE P NON UEA		G2	R
X-744Q	WAREHOUSE Q NON UEA		G2	R
X-744S	WAREHOUSE S NON UEA		G3	R
X-744W	SURPLUS & SALVAGE BLDG		D3	L
X-744Y	WASTE STORAGE YARD		E3	R
X-745B	TOLL ENRICHMENT PROCESS GAS YARD		E4	L
X-745C	W DUF_4 STORAGE YARD		E3	R
X-745D	CYLINDER STORAGE YARD		E5	L
X-745E	NW DUF_4 STORAGE YARD		E3	R
X-745F	N PROCESS GAS STOCKPILE YARD		E4	L
X-745G	CYLINDER STORAGE YARD		D4	L
X-745H	CYLINDER STORAGE YARD		D4	L
X-747	CLEAN SCRAP YARD		D3	L
X-747A	MATERIAL STORAGE YARD		G4	L
X-747B	MATERIAL STORAGE YARD		G4	L
X-747C	MATERIAL STORAGE YARD		E5	L
X-747D	MATERIAL STORAGE YARD		E5	L
X-747E	MATERIAL STORAGE YARD		E5	L
X-747F	MISCELLANEOUS MATERIAL STORAGE YARD		F5	L
X-747H	NW CONTAMINATED SCRAP YARD		D3	R
X-748	TRUCK SCALE FAC		G3	L
X-749	S CONTAMINATED MATERIAL STORAGE YARD (CAPPED)		I4	R
X-749A	S CLASSIFIED BURIAL YARD (CAPPED)		H5	R
X-749B	PETER KIEWIT LANDFILL (CAPPED)		I4	R
X-750	MOBILE EQUIP MAINTENANCE GARAGE		G4	L
X-750A	GARAGE STORAGE BLDG		G4	L
X-751	GCEP MOBILE EQUIP GARAGE		F3	R
X-752	WAREHOUSE		D3	R
X-760	CHEMICAL ENGINEERING BLDG		G4	R
X-1000	ADMINISTRATION BLDG		H4	L
X-1007	FIRE STA		H4	L
X-1020	EMERGENCY OPERATIONS CENTER (EOC)		H4	L
X-6613	SANITARY WATER STORAGE TANK		H3	L
X-6614E	SEWAGE LIFT STA		G2	L
X-6614G	SEWAGE LIFT STA	3		L
X-6614H	SEWAGE LIFT STA	3		L
X-6614J	SEWAGE LIFT STA	3		L
X-6619	SEWAGE TREATMENT PLANT		G2	L
X-6643-1	FIRE WATER STORAGE TANK #1		H3	L
X-6643-2	FIRE WATER STORAGE TANK #2		H2	L
X-6644	FIRE WATER PUMP HOUSE		H3	L
X-7721	MAINTENANCE, STORES & TRAINING BLDG		G3	L
XT-801	S OFFICE BLDG		I4	L
XT-847	WAREHOUSE		I4	L

Z-SWMU-QUAD-1V	SOUTHERN END OF RAILROAD SPUR WHICH IS USED AS DRUM STORAGE AREA
Z-SWMU-QUAD-1V	CHEMICAL & PETROLEUM CONTAINMENT TANKS E OF X-533C
Z-SWMU-X-701	NE OIL BIODEGRADATION PLOT AREA WHICH WAS FORMERLY USED FOR THE DISPOSAL OF X-615 SLUDGE
Z-SWMU-X-710	INACTIVE "HOT PIT" IN THE AREA OF X-710 THAT WAS ONCE USED FOR THE STORAGE OF RADIOACTIVE WASTEWATER
Z-SWMU-X-744	RETRIEVABLE WASTE STORAGE AREA
Z-SWMU-XXXX	SOLID WASTE MANAGEMENT UNITS AS IDENTIFIED ON PORTSMOUTH ENVIR INFORMATION MANAGEMENT SYSTEM DRAWING, PRINTED 2/9/93

GENERAL NOTES

1. THE COMMON AREA LEASED BOUNDARY ASSOCIATED WITH DITCHES, CREEKS, AND WATERWAYS (EXCEPT PONDS) IS DEFINED AS 100 FOOT PARALLEL TO THE CENTERLINE OF THE WATER EACH DIRECTION, EXCEPT WHERE THE BOUNDARY HAS BEEN DEFINED BY A ROADWAY OR OTHER PHYSICAL BOUNDARY.
2. THE COMMON AREA LEASED BOUNDARY ASSOCIATED WITH PONDS IS DEFINED 100 FOOT PARALLEL FROM TOP OF POND BANK, EXCEPT WHERE THE BOUNDARY HAS BEEN DEFINED BY A ROADWAY OR OTHER PHYSICAL BOUNDARY.
3. THIS FACILITY SHOWN IN EXHIBIT A, NOT SHOWN ON THIS REVISION OF OF LEASE MAP.
4. THE MAP FACILITY INDEX FIELDS ARE DEFINED AS FOLLOWS BELOW:



ABBREVIATION LEGEND

ADC = AREA OF CONTAMINATION
AUX = AUXILIARY
AVE = AVENUE
BLDG = BUILDING
E = EAST
ENVIR = ENVIRONMENTAL
EQUIP = EQUIPMENT
FAC = FACILITY
GL = GRID LOCATION
LS = LEASE STATUS
N = NORTH
NT = NOTE
S = SOUTH
STA = STATION
SWMU = SOLID WASTE MANAGEMENT UNIT
W = WEST

◇ MONITORING STATIONS

NO.	LOCATION	PHONE
1.	X-109C TRAILER SOUTHEAST OF X-100	2238
2.	X-106 TRT STATION	5956
3.	X-109B FRAME BUILDING EAST OF X-106	2535
4.	X-533H TRAILER – WEST SIDE OF X-640-1	4183
5.	X-630 PUMPHOUSE – INSIDE NORTH END	4185
6.	X-109A SOUTH OF X-530 SWITCHYARD	4122
7.	X-1007 FIRE STATION	5611

Ⓐ PA/SIREN LOCATIONS

NO.	LOCATION
1.	SOUTH OF X-100
2.	NORTH SIDE OF X-745F
3.	NORTH EAST OF X-6619

PORTS PLANT LAYOUT INDEX
FIGURE 1-2A

Figure G-1. PORTS Emergency Reponse Facilities (cont.)

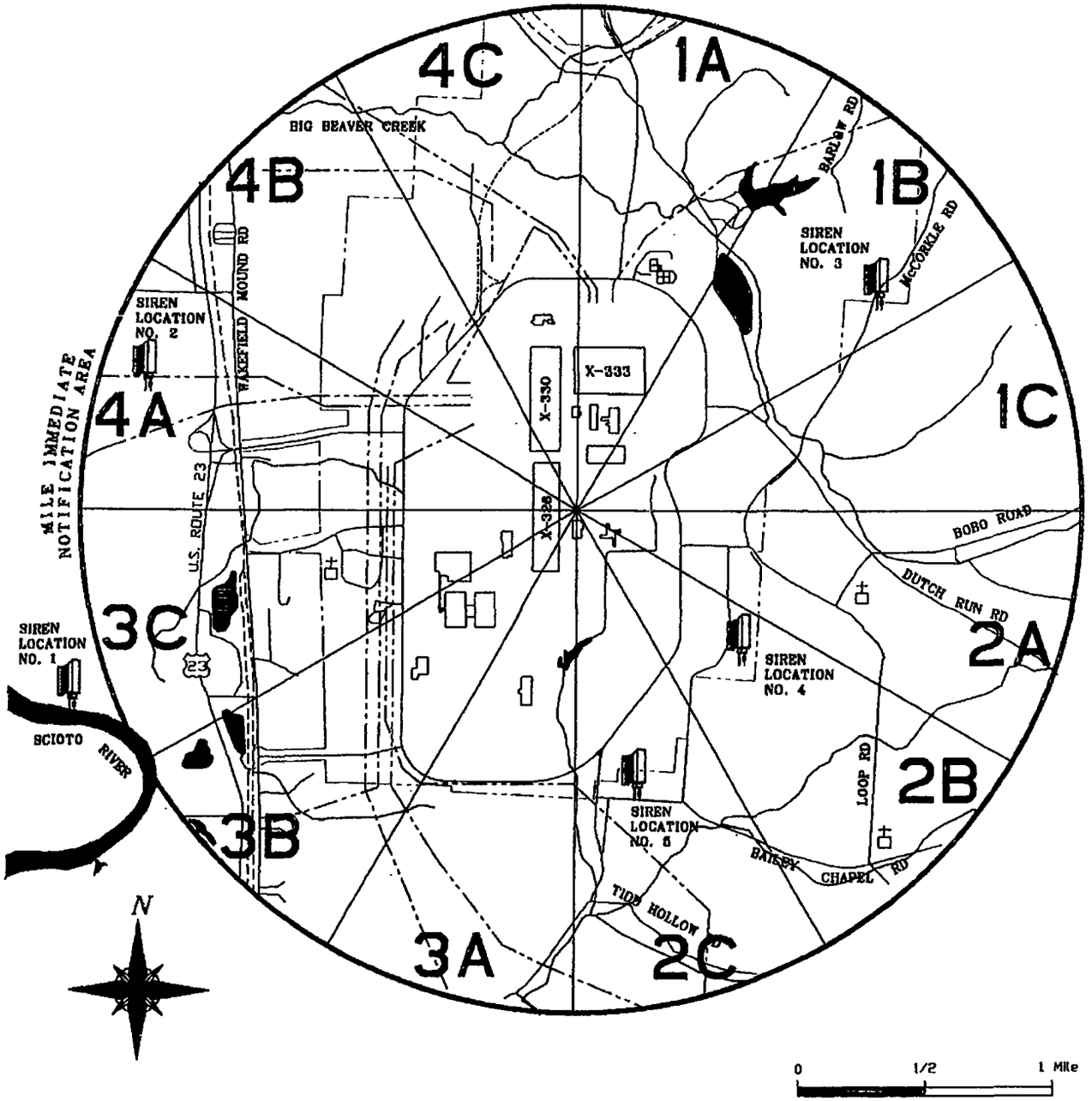


Figure G-2. PORTS Emergency Planning Map

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EMERGENCY NOTIFICATION FORM

*1. This is the Portsmouth Gaseous Diffusion Plant, located in Piketon, Ohio, with: (*check one*) *(check applicable item)*
- ◻ An INITIAL EMERGENCY notification
- ◻ An UPDATE notification
- ◻ A DRILL/EXERCISE notification

*2. This is Emergency Notification Number: _____

*3. This is (name)_____ calling from phone number_____
(*PRINT*)

*4 An Emergency Classification level of: (*check one*)
- ◻ ALERT was declared at _____ hours. ◻ SITE AREA EMERGENCY was declared at _____ hours.
- ◻ The EMERGENCY was Terminated at _____ hours.

In accordance with EAL Matrix Section (*if identified*): _____

*5. The emergency involves: (provide a brief **event description**):

_____

_____

_____

*6. **Release Information:**
- ◻ **No release** has occurred, and there is **NO potential** for a release
- ◻ No release has occurred, but the **potential** for one exists
- ◻ A release is occurring and is On-Site; however, it **is not expected to go Off-Site**
- ◻ A release is occurring On-site and **is going OFF-SITE**
- ◻ A release has occurred, but has stopped

*7. **Material Released**: (*check one*)
- ◻ NO Material is being released
- ◻ Material being released is: (*check as applicable*)
  - ◻ hydrogen fluoride (HF) ◻ fluorine ◻ chlorine ◻ chlorine trifluoride ◻ nitric acid ◻ uranium hexafluoride (UF_6)
  - ◻ other: _____

8. The **Quantity of Material Released** is estimated to be: _____ (lbs., tons, gallons, etc.) for approximately _____ minutes.

*9. The following OFF-SITE **Protective Actions** are being recommended:
- ◻ Residents living within the 2-mile Immediate Notification Area should Shelter-In-Place.
- ◻ No OFF-SITE protective actions are being recommended
- ◻ Other: _____

10. The following **Protective Actions** are for the **DOE Reservation Tenants** (◻ OVEC ◻ ONG):
- ◻ There are no protective actions for your facilities/areas
- ◻ Shelter-In-Place
- ◻ Evacuate your facility/area to the _____
- ◻ Other: _____

*11. The activation of the **Public Warning Sirens** is: (*check one*)
- ◻ Not required or recommended at this time
- ◻ Recommended due to the Site Area Emergency
- ◻ Being recommended due to _____

*12. **Emergency Alert System (EAS):**
- ◻ No EAS Message is being recommended at this time.
- ◻ Message # ___ for _____ is being recommended:

Message #1, No Protective Actions Required
Message #2, Shelter-In-Place
Message #3, Evacuation
Message #4, All Clear

13. The material has been released to the: ◻ Surface (soil, concrete, etc.) ◻ Water (ditch, pond, creek) ◻ Air ◻ Other: _____

14. The meteorological conditions at the site are: Wind is from the _____ (N,SW,ESE,etc.) at _____ mph. Stability Class is _____

*15. The impacts on the operations (plant status): (*check one*) ◻ No impacts ◻ Operating ◻ Shutdown ◻ Being Shutdown

Approved by: _____ Date: _____ Time: _____

tems must be completed for initial notification

Figure G-3. Emergency Notification and Release Form

EMERGENCY NOTIFICATION FORM

15-Minute Notifications				
Agency	Telephone	Contacted by FAX	Person Contacted	Date/Time
Pike County Sheriff's Office	(740) 947-2111, Press "1" Fax (740) 947-1049	Yes: _____ No: _____		
Ohio Emergency Management Agency	(614) 889-7150 Fax (614) 889-7183	Yes: _____ No: _____		
DOE Oak Ridge Operations Center	(865) 576-1005 Fax (865) 576-9772	Yes: _____ No: _____		

Tenant Organizations

(Note: Only the tenant organizations that need to be provided with protective actions are required to be notified as soon as possible. The time of notification will be affected by the location of the emergency and the priority of protective actions for these organizations.)

Agency	Telephone	Contacted by FAX	Person Contacted	Date/Time
Ohio National Guard (ONG)	**Mon.-Fri. 7 - 4:30** Primary: (740) 289-4561 Alternate: (614) 336-6926 **After Hours:** Daniel Thomas (740) 372-7101 Non-responsive or, Nick Vissoc (614) 406-1532 Fax (614) 336-6929	Yes: _____ No: _____		
Ohio Valley Electric Corporation (OVEC)	(740) 289-7210 Fax (740) 289-7285	Yes: _____ No: _____		

60-Minute Notifications

(Note: As soon as possible following notification of state and local agencies, but not to exceed 60-minutes.)

Agency	Telephone	Contacted by FAX	Person Contacted	Date/Time
NRC Operation Center, after calls to state and locals and within 1 hour of classification	(301) 816-5100 (301) 951-0550 (301) 415-0550 Fax (301) 816-5151	Yes: _____ No: _____		

USEC Headquarters (Note: Begin with the first listed name on USEC Headquarters listing until a contact is made.)	Person Contacted: (*check one*)		Date/Time
	☐ Bob VanNamen Office: (301) 564-3312 Home: (Non-responsive Cellular: Non-responsive	☐ John Welch Office: (301) 564-3300 Home: Non-responsive Cellular: Non-responsive	

Figure G-3. Emergency Notification and Release Form (cont.)

EMERGENCY NOTIFICATION FORM

Additional Notifications (Note: The following agencies are notified as identified)				
Agency	**Telephone**	**Contacted by Fax**	**Person Contacted**	**Date/Time**
If a hazardous or toxic release at PORTS has, or may affect **Scioto County**, notify within 15 minutes from time of discovery:				
Scioto County Sheriff's Office	(740) 354-7566 Fax (740) 355-8237	Yes: _____ No: _____		
If the facility has a fire, explosion, or any unplanned sudden or non-sudden release or hazardous waste or hazardous waste constituents to air, soil, or surface water, posing an imminent or actual harm or hazard to human health or the environment, immediately notify:				
Ohio Environmental Protection Agency (EPA)	(800) 282-9378 Fax (614) 644-3250	Yes: _____ No: _____		
If a release of a chemical or toxic substance in excess of the reportable quantities established under CERCLA section 102, notify within 30 minutes from time of discovery.				
Ohio EPA	(800) 282-9378 Fax (614) 644-3250	Yes: _____ No: _____		
National Response Center	(800) 424-8802	Not Applicable		
If the event results in a single fatality or offsite hospitalization to three (3) or more individuals, notify within 8 hours from time of discovery:				
Occupational Safety and Health Administration (OSHA)	(800) 321-6742 Fax (513) 841-4114	Yes: _____ No: _____		

Figure G-3. Emergency Notification and Release Form (cont.)

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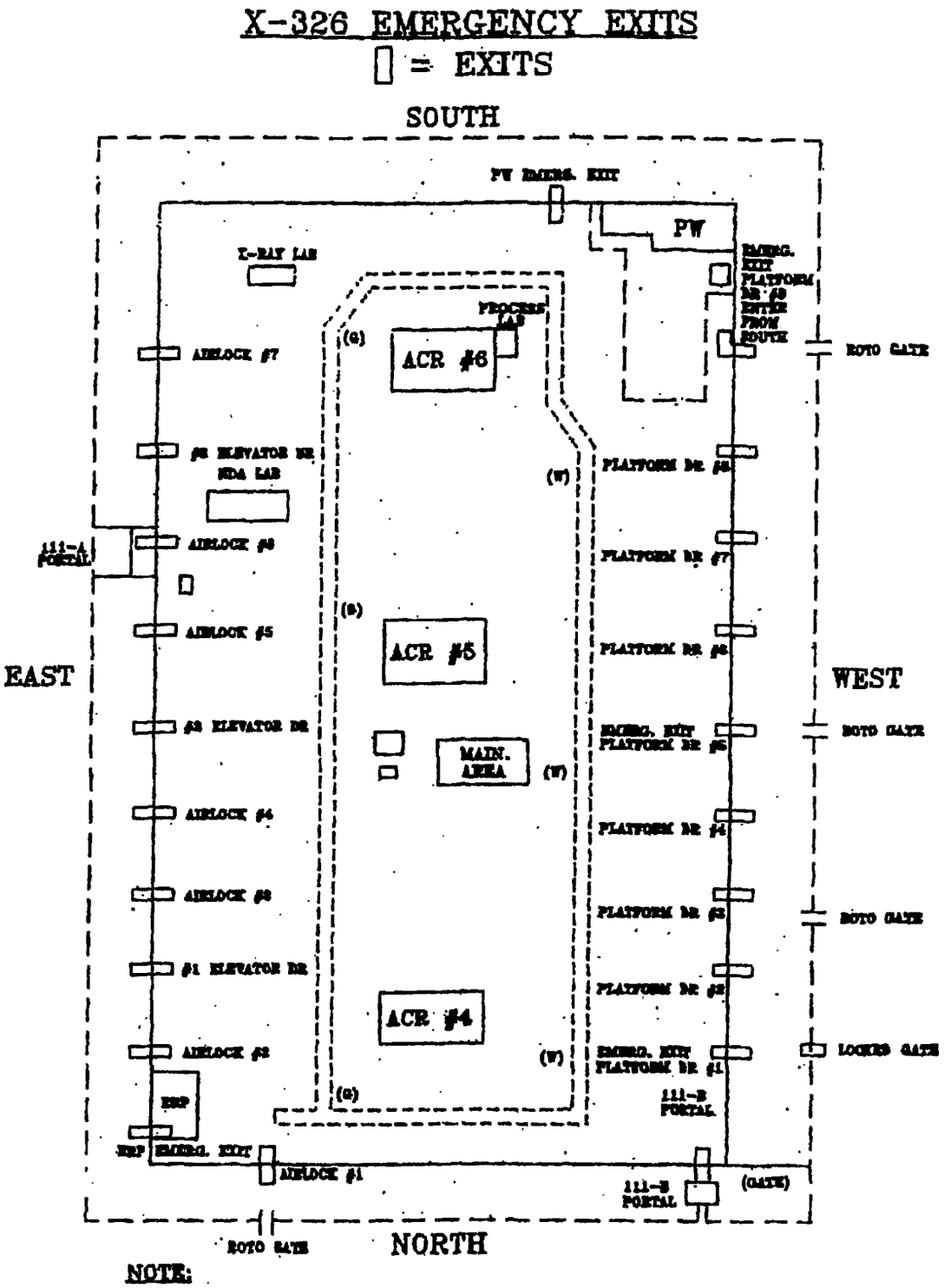

Figure G-4. X-326 Building Exists

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Attachment 1

Emergency Agreements/Arrangements

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Security Related Information
Withhold Under 10CFR2.390
NOT APPROVED FOR PUBLIC RELEASE

COPY

MEMORANDUM OF UNDERSTANDING BETWEEN THE UNITED STATES ENRICHMENT CORPORATION (USEC) AND THE PIKE COUNTY SHERIFF'S DEPARTMENT

The United States Enrichment Corporation (USEC) and the Pike County Sheriff's Department each recognize the benefit of providing mutual assistance and cooperation. Through this memorandum, the cooperative relationship between the Pike County Sheriff's Department and the USEC Security Group is outlined and agreed upon.

In support of this cooperative effort, USEC commits to the following:

- Provision on a cost-free loan basis, based upon availability, defensive support equipment, to include demonstration control equipment, metal detectors, night vision devices, and similar items requested by the Sheriff.
- Provision on a cost-free loan basis safety and law enforcement related training aids, to include films, slides, audio/visual equipment, and other miscellaneous training equipment.
- Provision on a cost-free basis, access to and use of the X-114 outdoor firing range for the Sheriff's training needs.
- Provision on a cost-free basis, other available resources, information, and any assistance to the Pike County Sheriff on an as-needed basis, including information related to potential security concerns or threat data when release of such information is not restricted or otherwise controlled.

The Sheriff recognizes that periodically the USEC Security Group and protected facilities/property under their cognizance may require official law enforcement assistance from the Pike County Sheriff's Department.

In support of the USEC Security Group, the Sheriff will:

- Provide supplemental support through manpower deployment as may be required to address site protection and enforcement of applicable laws during demonstrations or other crisis situations occurring at or near facilities operated and protected by USEC Security.
- Commit to the immediate deployment of officers during routine Monday through Friday day-shift hours, supplemented by the recall and dispatch of additional deputies following of verification of need.
- Commit to the immediate deployment of officers during other hours (including late afternoons, evenings, nights, weekends, ad holidays), supplemented with the recall and dispatch of additional officers following verification of need.
- Ensure that officers dispatched for support will arrive with the necessary equipment (weapons, radios, etc.) and will be in uniform.
- Ensure that personnel from the Sheriff's Department would serve as arresting officers when needed.

If a security situation were determined to be critical at the PORTS Plant, the Sheriff will arrange for additional assistance (manpower and/or equipment) through the Buckeye State Sheriff's Association (BSSA). Additional assistance will include the dispatch officers from surrounding counties to a central assembly point near plantsite. Exact numbers of responding support personnel and response times will vary by the time of day and the nature of the security situation.

Should the PORTS site require helicopter or other aircraft support, the Sheriff will coordinate and attempt to expedite the support response by:

- Coordinating the response of an Ohio Department of National Resources helicopter based in Ross County, through the Ross County Sheriff.
- Coordinating aircraft support through the BSSA to obtain the dispatch of a helicopter from the nearest available agency. Response times would vary.
- Request assistance through the Ohio State Highway Patrol General Headquarters.

Russell B. Starkey, Jr. 12/16/09
Russell B. Starkey, Jr. Date
USEC General Manager

12/17/09
Richard Henderson Date
Sheriff, Pike County

Security Related Information
Withhold Under 10CFR2.390
NOT APPROVED FOR PUBLIC RELEASE

COPY

LETTER OF UNDERSTANDING

Pike County Emergency Medical Service is willing to continue to provide mutual aid coverage to the United States Enrichment Corporation, the Department of Energy, and their contractors and tenants.

Micheal Beekman, Director
Pike County Emergency Medical Service

September 17th, 2007
Date

LETTER OF UNDERSTANDING

Pike Community Hospital is willing to accept employees from the United States Enrichment Corporation, the Department of Energy, and their contractors and tenants for evaluation and treatment of injuries, radiation exposure, and effects of toxic agents.

Craig Solle
President and Chief Executive Officer

9/20/2007
Date

COPY

September 21, 2007

Ms. Cheryl Bauer
United States Enrichment Corporation
Emergency Management/MS-5000
P.O. Box 628
Piketon, OH 45661

Dear Ms. Bauer:

The renewal Letter of our Understanding with the United States Enrichment Corporation is enclosed. Pike Community Hospital is pleased to be a part of the USEC Emergency Management program.

Should you need further information, please notify me at 740/947-6311.

Sincerely,

Craig E. Solle
President & CEO

CES:sls
Enclosure

PIKE COMMUNITY HOSPITAL • 100 DAWN LANE • WAVERLY, OHIO 45690
TELEPHONE (740) 947-2186 FAX (740) 947-6538

LETTER OF UNDERSTANDING

Southern Ohio Medical Center is willing to accept employees from the United States Enrichment Corporation, the Department of Energy, and their contractors and tenants for evaluation and treatment of injuries, radiation exposure, and effects of toxic agents.

Randal M. Arnett
President and Chief Executive Officer

September 17, 2007

Date

LETTER OF UNDERSTANDING

Adena Regional Medical Center is willing to accept employees, in the normal course of hospital operations, from the United States Enrichment Corporation, the Department of Energy, and their contractors and tenants for evaluation and treatment of injuries, radiation exposure, and effects of toxic agents.

Kellie Adams

Kellie Adams
Director of Emergency Services

10-23-07

Date

Mark Shuter, CEO

PIKE COUNTY SCHOOLS
UNITED STATES ENRICHMENT CORPORATION
LETTER OF AGREEMENT FOR RECEPTION CENTERS

This Letter of Agreement, by and between the Superintendent, Pike County School District, and the United States Enrichment Corporation (USEC), Portsmouth Gaseous Diffusion Plant (PORTS) General Manager, is to provide for the use of Eastern High School and Western High School as reception centers for USEC personnel.

More specifically, this Letter of Agreement authorizes occupancy of an area of each school by USEC, the Department of Energy, their contractors and tenants in the event of an evacuation of the PORTS reservation. The area of the school to be utilized by USEC will be determined by school personnel at the time of occurrence. The Crisis Manager, or designated representative, will determine the necessity for utilizing the school as a reception center and is responsible for ensuring that school personnel are notified of the impending arrival of evacuated personnel from the PORTS reservation.

Phil Satterfield, Superintendent
Pike County School District

9-18-07
Date

Wray Jordan, General Manager
USEC-PORTS

10-1-07
Date

VALLEY LOCAL SCHOOL DISTRICT
UNITED STATES ENRICHMENT CORPORATION
LETTER OF AGREEMENT FOR RECEPTION CENTERS

This Letter of Agreement, by and between the Superintendent, Valley Local School District, and the United States Enrichment Corporation (USEC), Portsmouth Gaseous Diffusion Plant (PORTS) General Manager, is to provide for the use of Valley High School as a reception center for USEC personnel.

More specifically, this Letter of Agreement authorizes occupancy of an area of the school by USEC, the Department of Energy, their contractors and tenants in the event of an evacuation of the PORTS reservation. The area of the school to be utilized by USEC will be determined by school personnel at the time of occurrence. The Crisis Manager, or designated representative, will determine the necessity for utilizing the school as a reception center and is responsible for ensuring that school personnel are notified of the impending arrival of evacuated personnel from the PORTS reservation.

Paul Miller — 9-18-07

Paul Miller, Superintendent
Valley Local School District

Date

Wray Jordan — 9/24/07

Wray Jordan, General Manager
USEC-PORTS

Date

WAVERY CITY SCHOOL DISTRICT
UNITED STATES ENRICHMENT CORPORATION
LETTER OF AGREEMENT FOR RECEPTION CENTERS

This Letter of Agreement, by and between the Superintendent, Waverly City School District, and the United States Enrichment Corporation (USEC), Portsmouth Gaseous Diffusion Plant (PORTS) General Manager, is to provide for the use of the Waverly Downtown Athletic Facility as a reception center for USEC personnel.

More specifically, this Letter of Agreement authorizes occupancy of an area of the school by USEC, the Department of Energy, their contractors and tenants in the event of an evacuation of the PORTS reservation. The area of the facility to be utilized by USEC will be determined by school personnel at the time of occurrence. The Crisis Manager, or designated representative, will determine the necessity for utilizing the Waverly Downtown Athletic Facility as a reception center and is responsible for ensuring that school personnel are notified of the impending arrival of evacuated personnel from the PORTS reservation.

Cheryl Francis
Cheryl Francis, Superintendent
Waverly City School District

9-19-07
Date

Wray Jordan
Wray Jordan, General Manager
USEC-PORTS

9/24/07
Date

COPY

Date: March 5, 2010

To Whom It May Concern:

The Pike County Firefighter's Association has given the United States Enrichment Corporation (USEC) Emergency Response Organization permission to use the Pike County Fire Repeater for the purpose of communicating with the fire departments of Pike County.

Transmitter 159.2625 Channel Guard 103.5

Receiver 154.8525 Channel Guard 103.5

Charles M. Brunner

President

William F. Jenkins

Witness

AGREEMENT FOR MUTUAL AID FOR ADDITIONAL FIRE PROTECTION

COPY

Pursuant to the provisions of paragraphs 1, 4 and 5 of Section 505.44 and 717.02 of the Revised Code of Ohio, this agreement is entered into this 27 day of JUNE, 2000 by and between the:

Waverly Fire Department
Beaver Volunteer Fire Department
Piketon- Seal Township Volunteer Fire Department
Elm Grove Volunteer Fire Department
Camp Creek Township Volunteer Fire Department
Pebble Township Volunteer Fire Department
Benton Township Volunteer Fire Department
Jackson Township Volunteer Fire Department
Scioto Township Volunteer Fire Department
Stockdale Volunteer Fire Department
United States Enrichment Corporation Fire Department
Ohio Division of Forestry- Pike State Forest
Franklin Township Fire Department
Peebles Fire Department
Brush Creek Township Fire Department
AND
Pike County Sheriff's Office

All political subdivisions under the laws of Ohio, Witnesseth:

THAT WHEREAS, the respective political subdivisions hereinabove named have certain fire fighting equipment and fire fighters to operate same, but which, in emergencies, may be inadequate to afford full and complete protection to said respective properties, and,

WHEREAS, it is desirable that in case of such emergency said respective parties hereto may have additional fire protection which may be afforded by the fire fighting equipment and personnel of others of the respective parties hereto as may then, in the opinion of the Chief or Officer in charge, of such other party or parties hereto as are called upon, IT IS MUTUALLY AGREED BY AND BETWEEN SAID PARTIES AS FOLLOWS, to wit:

1. That for purpose of affording additional protection to themselves, their contractual obligees, and their inhabitants, the parties hereto do hereby mutually agree to interchange the service of fire departments, and the use of fire apparatus and other emergency equipment, and to that end, it is hereby agreed that they, or any one or more of them shall assist the party hereto primarily responsible and responding to any fire alarm or fire call or other emergency from any Chief or Officer in charge, or other duly constituted public official which is a party of this agreement, with its or their fire fighting equipment, or other emergency vehicles and fire fighters, and shall render like services in combating fires or other emergencies as it renders to itself and its own in habitants, provided, however, that at no time shall the party or parties upon which the request is made, be required to respond with more than one piece of fire apparatus upon the first alarm, and provided further, that in no case shall the party hereto called upon or rendering such services be liable in damage to any other party hereto or any of its inhabitants, or contractual obligees, for failure to answer any fire call or other emergency, or for lack of speed in answering any such call, or for any

inadequacy of equipment, negligent operation of equipment, failure to extinguish any fire, or for any cause whatsoever growing out of such use of said fire or other equipment and fire fighters; nor shall the party hereto, which such use of said fire or other equipment and fire fighters; nor shall the party hereto, which issued such call be liable in any manner or event for damages or loss of equipment or personnel suffered by the party or parties answering such call.

2. ***It shall also be understood and agreed that all structure fires shall have, in addition to, the primary fire department, the next closest and/or available fire department alerted simultaneously and without delay, to provide tanker assistance to the primary responding fire department, and that all responding fire fighters should respond to their respective fire stations to man the fire apparatus and should not respond to the fire scene in their personal vehicles, and that the first out apparatus shall be a tanker truck capable of tending water and all other personnel and equipment should standby on their respected fire stations until requested by the responding fire departments Chief or Officer in charge as per paragraph 1. However, the mutual aid department may elect to respond with additional equipment as per local policy and procedures. The mutual aid fire department shall not be required to wait until a dispatch is received and may upon hearing their neighboring departments dispatch, elect to respond automatically to their station and/ or respond automatically with a fire apparatus. Further, all fire fighters responding should have all personal protective clothing with them as per state, federal, OSHA or NFPA guidelines and/or local standard operating procedures.***
3. ***Additionally, all daytime brush fires shall have, in addition to, the primary fire department, the next closest and/or available fire department alerted simultaneously and without delay, to provide additional fire fighters, vehicles and equipment capable of combating fires of this type. All responding firefighters should respond in accordance to paragraph 2.***
4. ***It shall also be understood that a certified fire fighter, Chief or Officer in charge shall acknowledge all fire or emergencies dispatched, within five minutes of the alert via radio or telephone. If the fire department does not respond with a fire apparatus within ten minutes of the alert, then the mutual aid department shall become the primary responding fire department and the next closest and/or available fire department shall then be alerted as the mutual aid department. This shall also apply to the mutual aid fire department and in the event the mutual aid department is not manned then another department shall be alerted using the same procedures as above. Further, you should not answer or acknowledge a fire or emergency call if you are out of your fire district and not within a reasonable response time. The primary responding fire departments Chief or Officer in charge shall immediately assess the fire or emergency scene and cancel the mutual aid department or request additional response without delay. The Chief or Officer in charge should advise the dispatch center of any errors in dispatch immediately upon hearing or learning of any such error and should offer the correct information without delay.***
5. ***It is also to be understood that the primary dispatch center for Pike County is located in the Pike County Sheriff's Office and that the on duty dispatcher will be***

City of Waverly Fire Department, Waverly, Ohio 45690

Mayor _____

Chief _____

Village of Beaver Volunteer Fire Department, Beaver, Ohio 45613

Mayor _____

Chief _____

Township of Seal Township Volunteer Fire Department, Piketon, Ohio 45661

Trustee _____

Chief _____

Elm Grove Volunteer Fire Department, Elm Grove, Ohio 45626

Asst. Chief [redacted] _____

Chief _____

Township of Camp Creek Township Volunteer Fire Department, Ohio

~~Treasurer~~ Trustee _____

Chief _____

Township of Pebble Township Volunteer Fire Department, Ohio

Trustee _____

Chief _____

Township of Benton Township Volunteer Fire Department, Ohio

Trustee _____

Chief _____

Township of Jackson Township Volunteer Fire Department, Ohio

Trustee _____

Chief _____

Township of Scioto Township Volunteer Fire Department, Wakefield, Ohio 45687

Trustee _____

Chief _____

Stockdale Volunteer Fire Department, Stockdale, Ohio 45683

Trustee _____

Chief _____

United States Enrichment Corporation Inc. Fire Department, Piketon, Ohio 45661

Manager _____

Legal _____

Legal _____

Ohio Division of Forestry, Pike State Forest, Latham, Ohio 45646

Manager NOT APPLICABLE

Manager NOT APPLICABLE

Township of Franklin Township Volunteer Fire Department

Trustee _____

Chief _____

Peebles Fire Department, Peebles, Ohio

Trustee _____

Chief _____

Township of Brush Creek Volunteer Fire Department, Sinking Springs, Ohio 45172

Trustee _____

Chief _____

Office of Pike County Sheriff, Waverly, Ohio 45690

Sheriff _____

Commissioner _____

Commissioner _____

Commissioner _____

responsible for the alerting of the correct primary and mutual aid fire department in accordance with the E911 system and available maps. This dispatcher will also be responsible for any necessary radio or phone calls as needed or requested by the Chief or Officer in charge. All requests should be kept to a minimum and all Chiefs or Officers in charge should remember that the dispatcher might be delayed in times of great demand.

6. That for the purpose of this agreement, mutual aid is hereby defined as "The aid rendered by or between subdivisions of government owned and operated fire fighting or other emergency equipment and shall not include primary response to any alarm of fire or other emergency made by a subdivision legally responsible for such primary response."
7. This contract shall be made and remain in full force and effect for perpetuity, provided, however, that any party may terminate this contract upon thirty days notice, in writing, to all other parties.

IN WITNESS WHEREOF, said respective political subdivisions parties hereto, have hereunto caused this agreement to be executed as provided by ordinance or resolution duly adopted for that purpose, a copy of which is hereto appended, this 27 day of JUNE, 2000.

The following Committee Members prepared this document for the Pike County Firefighters Association:

Jerry Wessel Jr. _____ Date 5-30-00

Jerry Wessel Sr. _____ Date 5-30-00

Jason Fields _____ Date 5-30-00

Charlie Brunner _____ Date 6-27-06

Dave Henson _____ Date _____

And approved by:

Pike County Prosecuting Attorney

C. Robert Junk _____ Date 05/30/00

COPY

WORD ALIVE FELLOWSHIP/MIRACLE CITY ACADEMY
JOINT PUBLIC INFORMATION CENTER
LETTER OF AGREEMENT

This Letter of Agreement, between Word Alive Fellowship/Miracle City Academy and the United States Enrichment Corporation (USEC) Portsmouth Gaseous Diffusion Plant (PORTS), is to provide for the use of Word Alive Fellowship/Miracle City Academy as a Joint Public Information Center (JPIC), in cases of emergency at PORTS, or at such times when USEC is called on by the Pike County Emergency Management Agency in situations of major non-plant emergencies to provide JPIC and other assistance as needed.

More specifically, this Letter of Agreement authorizes occupancy of Word Alive Fellowship/Miracle City Academy by personnel representing USEC, United States Department of Energy (DOE), DOE contractors, Ohio Emergency Management Agency, and Pike County Emergency Management Agency, for use as a JPIC in such cases of emergency. The PORTS General Manager or representative shall determine whether such requirements exist and shall initiate notification of other participants as to activation of JPIC operations at Word Alive Fellowship/Miracle City Academy during the emergency.

Activation of the JPIC shall include use of the Word Alive Fellowship/Miracle City Academy facility as described in the most recent purchase order.

Word Alive Fellowship/Miracle City Academy provides designated storage areas for USEC supplies and equipment.

A representative of Word Alive Fellowship/Miracle City Academy will furnish USEC with the security code and other applicable information needed to enable access to the facility.

On a case-by-case basis, the undersigned will consult and determine whether or not the circumstance requires that Fellowship or the Academy be dismissed during the emergency.

Rick Strucker, Pastor
Word Alive Fellowship/Miracle City Academy

9-12-07
Date

Robert W. Jordan, General Manager
PORTS USEC

9/13/07
Date

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SUBMISSION DATE: SEPTEMBER 13, 2010

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SECTION H

PERSONNEL TRAINING

H-1 OUTLINE OF TRAINING [3745-54-16]

Hazardous waste personnel are trained to respond effectively to emergencies, as deemed appropriate to the job descriptions; to perform their duties in a way that ensures the facility's compliance with the requirements of the hazardous waste facility standards chapters; and to implement the contingency plan. Hazardous waste personnel are familiarized with emergency procedures, emergency equipment, and emergency systems. At a minimum, all personnel at the site are trained to recognize emergencies and respond effectively using the methods listed in Section G-3. Training is completed within six months of employment or assignment to a position that may involve contact with hazardous materials and/or wastes. After completion of initial training, personnel are required to complete refresher training at varying intervals, such as annual or biennial, depending on the type of training. Training consists of classroom instruction, on-the-job training, and required reading materials.

H-1A JOB TITLE/JOB DESCRIPTION [3745-54-16]

Table H-1 provides selected job descriptions for personnel who are involved in hazardous waste management and require RCRA training.

H-1B TRAINING CONTENT, FREQUENCY AND TECHNIQUE [3745-54-16]

The training program consists of classroom training, on-the-job training, and required reading materials. The content of the training program for hazardous waste personnel is comprised of hazardous waste management procedures, contingency plan implementation, emergency procedures, emergency equipment, and emergency systems, including, where applicable, procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment; communications and alarm systems; response to fire or explosions; response to groundwater contamination incidents; and shutdown of operations. Training to meet actual job tasks is accomplished through on-the-job training. The on-the-job training program is conducted by direct supervision or by qualified instructors. This training includes operational and job safety requirements specific to the actual job task. Refresher training is completed on an annual or biennial basis, depending on the type of training. On-the-job training is conducted as needed.

H-1C TRAINING DIRECTOR [3745-54-16]

The program is administered by the direct supervisors of hazardous waste personnel, or their designees, who are trained in hazardous waste management procedures. An annual review of the initial training is conducted by the direct supervisors of hazardous waste personnel to ensure that all hazardous waste personnel have completed the necessary training.

SUBMISSION DATE: SEPTEMBER 13, 2010

H-1D RELEVANCE OF TRAINING TO JOB POSITION [3745-54-16]

The training requirements are tailored to individual job positions and are demonstrated by the completion of the on-the-job training program. Training requirements are reviewed annually, and the initial, refresher, and on-the-job training curricula are revised as necessary.

H-1E TRAINING FOR EMERGENCY RESPONSE [3745-54-16]

The training program is designed to ensure that hazardous waste personnel handle hazardous wastes safely, respond properly to emergency situations, and implement the contingency plan. The program trains hazardous waste personnel to maintain compliance under both normal operating conditions and emergency conditions.

H-2 IMPLEMENTATION OF TRAINING PROGRAMS [3745-54-16]

All hazardous waste personnel receive training relevant to the position for which they are employed by qualified personnel consistent with the regulatory requirements. Additionally, hazardous waste personnel receive OSHA mandated 24-hour training as described in 29 CFR 1910.120. All hazardous waste personnel must complete initial training within six months from their date of assignment to a hazardous waste job. No employee assigned to perform a hazardous waste job will work unsupervised prior to completion of the training program.

H-3 RECORDKEEPING [3745-54-16]

Individual training records, the job titles for each position, job descriptions, names of employees, and a written description of the type and amount of both introductory and continuing training that will be given to each person filling a position related to hazardous waste management are maintained at the site. The training records for current hazardous waste personnel are maintained until closure of the facility and the training records for former hazardous waste employees are kept for at least three years from the date the employee last worked at the facility.

TABLE H-1

JOB DESCRIPTIONS

POSITION TITLE:

D&D Operator 2

BASIC FUNCTION OF POSITION:

Handle and store hazardous and toxic materials and waste.

MAJOR ENVIRONMENTAL DUTIES AND RESPONSIBILITIES:

Coordinate the receipt of waste and other materials into the proper storage area.
Verify that the waste is properly identified and labeled.
Operate automatic equipment.
Operate other tools and equipment necessary to the handler's primary duties.
Perform arithmetic calculations relative to the above processes.
Assist in training of lesser qualified persons.

Responsible for proper spacing of nuclear materials to prevent critical mass hazards, tagging all containers to show complete description of contents, and preparing forms on all nuclear material transfers.

FORMAL EDUCATION REQUIRED:

High school diploma or equivalent. Minimum of three (3) years experience as a chemical operator or UMH or 18-24 months directly related experience or complete of operator training classes. Must have valid State drivers' license and be able to operate standard and automatic transmission vehicle.

REQUIRED RCRA TRAINING:

RCRA for Hazardous Waste Generators (Annual)
24-Hour HAZWOPER (Initial)
8-Hour HAZWOPER Refresher (Annual)
Hazard Communication (Biennial)
Emergency Preparedness (Annual)
Fire Protection (Annual)

TABLE H-1 (CONTINUED)

POSITION TITLE:

Waste Engineer

BASIC FUNCTION OF POSITION:

Ensure that the PORTS Waste Characterization/Certification Program is conducted in a safe, compliant, and cost effective manner in accordance with applicable approved procedures. Review/approve waste profiles and ensure waste stream data packages are approved before applicable waste shipments commence. Perform calculations applying standard formulas.

MAJOR ENVIRONMENTAL DUTIES AND RESPONSIBILITIES:

Performs duties that are designed to provide development and familiarization with engineering staff, procedures, practices, standards, and program. Applies standard practices and techniques in specific problems within own field of engineering; tabulates and correlates data; performs calculations; and performs engineering analysis work. May prepare bills of material, cost estimates, and specifications for procurement of materials and equipment or construction work.

Participates in safety and Quality Assurance activities by serving on teams, special projects, training sessions, special assignments, etc.

Prepares a variety of written summaries, informal reports and progress reports on work. May coordinate the work of technical support employees who assist in accomplishment of the primary task.

FORMAL EDUCATION REQUIRED:

Possess a basic understanding of engineering principles, theory and concepts and analytical techniques normally acquired at the B.S. level of an accredited engineering school. Exceptions may be given to other incumbents who have an appropriate combination of relevant education and experience with demonstrated capability over several years to perform professional engineering assignments.

TABLE H-1 (CONTINUED)

WASTE ENGINEER (Cont.)

REQUIRED RCRA TRAINING:

RCRA for Hazardous Waste Generators (Annual)
24-Hour HAZWOPER (Initial)
8-Hour HAZWOPER Refresher (Annual)
Hazard Communication (Biennial)
Emergency Preparedness (Annual)
Fire Protection (Annual)

TABLE H-1 (CONTINUED)

POSITION TITLE:

Waste Supervisor

BASIC FUNCTION OF POSITION:

Schedule and assign daily work and instruct operators in performing hazardous waste handling/storage and disposal project activities. Responsible for planning, organizing, and implementing operational activities.

MAJOR ENVIRONMENTAL DUTIES AND RESPONSIBILITIES:

Utilize approved operating equipment and systems while maintaining compliance with applicable regulatory requirements.
Maintain operating logs, review data sheets, coordinate maintenance and service groups, process repair orders, and issue special permits.
Conduct safety meetings and special training sessions, provide service as a local emergency director in handling operational emergencies, and apply company policy, rules and regulations.
Manage all regulated wastes for the Portsmouth Site in accordance with all applicable State and Federal regulations and orders, policies, procedures, plans, and contracts.
Responsible for receipt of all wastes into storage, operating all waste storage units in a safe and efficient manner.

FORMAL EDUCATION REQUIRED:

High school diploma or equivalency and four to six years experience in a production area or waste management activity.

REQUIRED RCRA TRAINING:

RCRA for Hazardous Waste Generators (Annual)
24-Hour HAZWOPER (Initial)
8-Hour HAZWOPER Refresher (Annual)
Hazard Communication (Biennial)
Emergency Preparedness (Annual)
Fire Protection (Annual)

TABLE H-1 (CONTINUED)

POSITION TITLE:

Manager, Waste Management

BASIC FUNCTION OF POSITION:

Management of DOE PORTS Waste Management activities.

MAJOR ENVIRONMENTAL DUTIES AND RESPONSIBILITIES:

Provide compliance and quality support; waste disposal; waste operations; and waste identification services for DOE PORTS in compliance with all applicable regulations, orders, laws, etc., in a manner that protects the environment and safety and health of the public and site personnel.

FORMAL EDUCATION REQUIRED:

Requires a B.S. degree with extensive experience in plant operations and processes including several years in related activities such as waste management and/or environmental activities. Requires effective supervisory and managerial skills, as well as thorough knowledge of related policies, procedures, and regulations.

REQUIRED RCRA TRAINING:

RCRA for Hazardous Waste Generators (Annual)
24-Hour HAZWOPER (Initial)
8-Hour HAZWOPER Refresher (Annual)
Hazard Communication (Biennial)
Emergency Preparedness (Annual)
Fire Protection (Annual)

TABLE H-1 (CONTINUED)

POSITION TITLE:

Radiological Control Technician

BASIC FUNCTION OF POSITION:

Perform duties including personnel monitoring, sample collection for radiation evaluation, data recording and tabulation, and related arithmetic calculations.

MAJOR ENVIRONMENTAL DUTIES AND RESPONSIBILITIES:

Perform monitoring and sampling as directed. Distributes, collects, tests and reads direct reading personnel monitoring instruments such as dosimeters. Collects samples for radiological evaluation. Monitors radiation and radioactive contamination and compares readings with exposure control standards, and material clearance requirements.

Records measurements made with radiation detection instruments. Tabulates, performs arithmetic calculations and reports results of routine measurements.

Analysis of data limited to comparison of routine readings with pre-determined standards, and reporting those which exceed operational levels.

FORMAL EDUCATION REQUIRED:

9 to 12 quarter hours of related technical subjects in post-high school curriculum; or through a combination of equivalent education and experience. Must learn to use radiation monitoring instruments and to distinguish and understand characteristics of radiation.

REQUIRED RCRA TRAINING:

RCRA for Hazardous Waste Generators (Annual)
24-Hour HAZWOPER (Initial)
8-Hour HAZWOPER Refresher (Annual)
Hazard Communication (Biennial)
Emergency Preparedness (Annual)
Fire Protection (Annual)

TABLE H-1 (CONTINUED)

POSITION TITLE:

Waste Sampler

BASIC FUNCTION OF POSITION:

Conduct routine sampling, monitoring and data collection activities in support of waste management activities.

MAJOR ENVIRONMENTAL DUTIES AND RESPONSIBILITIES:

Sets up sampling instrumentation and follows clearly defined, detailed plans to collect waste samples and data. Handles and/or assures proper calibration, maintenance and working order of sensitive equipment. Documents findings, compiles data and keeps appropriate records.

FORMAL EDUCATION REQUIRED:

Requires either training and/or experience equivalent to an associate degree in biological or environmental science field; or related technical subjects; and one to two years of related progressive experience; or through a combination of equivalent education and experience.

REQUIRED RCRA TRAINING:

RCRA for Hazardous Waste Generators (Annual)
24-Hour HAZWOPER (Initial)
8-Hour HAZWOPER Refresher (Annual)
Hazard Communication (Biennial)
Emergency Preparedness (Annual)
Fire Protection (Annual)
On-The-Job Training (Initial) for Sampling Methods

TABLE H-1 (CONTINUED)

POSITION TITLE:

Facility Compliance Inspector

BASIC FUNCTION OF POSITION:

Performs routine compliance field inspections that include requirements under RCRA. Provides all functions necessary to schedule and complete the necessary documentation for the facility compliance inspection program.

MAJOR ENVIRONMENTAL DUTIES AND RESPONSIBILITIES:

Perform weekly inspections of RCRA waste storage facilities.

FORMAL EDUCATION REQUIRED:

Familiarity with DOE systems, rules, regulations, and Code of Federal regulations. See required RCRA training requirements below.

REQUIRED RCRA TRAINING:

RCRA for Hazardous Waste Generators (Annual)
24-Hour HAZWOPER (Initial)
8-Hour HAZWOPER Refresher (Annual)
Hazard Communication (Biennial)
Emergency Preparedness (Annual)
Fire Protection (Annual)

SUBMISSION DATE: SEPTEMBER 13, 2010

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SUBMISSION DATE: SEPTEMBER 13, 2010

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SECTION I

CLOSURE PLAN, POST-CLOSURE PLAN, AND FINANCIAL REQUIREMENTS

I-1 CLOSURE PLAN [3745-50-44(A)(13)]

The closure plan for the X-326 container storage units currently operating under the Resource Conservation and Recovery Act Part B Permit #04-57-0680, EPA ID No. OH7890008983, is included as Appendix I-1. The director will be notified in writing at least forty-five days prior to the date on which partial or final closure is expected to begin. Amendments to the closure plan may be submitted in a written permit change request anytime prior to the notification of closure of the container storage units. Section I-1a to I-1e of the RCRA Part B Permit Application Checklist are addressed in the respective closure plan in Appendix I.

I-2 POST-CLOSURE PLAN [3745-50-44, 3745-55-18]

Not applicable

I-3 TO I-8

The information required by these sections of the RCRA Part B Checklist is addressed in the closure plan in Appendix I.

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SECTION J

CORRECTIVE ACTIONS

J-1 SOLID WASTE MANAGEMENT UNITS [3745-50-44]

RCRA Corrective Action at PORTS is being completed under the 1989 Consent Decree between the state of Ohio and DOE and also in accordance with the Director's Final Findings and Orders dated March 18, 1999. Information required for solid waste management units at PORTS is provided in the RCRA Facility Investigation Reports and the corrective action studies/corrective measures studies required by the Consent Decree and Director's Final Findings and Orders. The 1999 Director's Final Findings and Orders and 1989 Consent Decree are included as attachments J.1 and J.2, respectively.

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ATTACHMENT J.1

1999 DIRECTOR'S FINAL FINDINGS AND ORDERS

LATA/Parallax Portsmouth, LLC is not a party to the 1999 Director's Final Findings and Orders. With respect to LATA/Parallax Portsmouth, LLC's obligation to perform work under the 1999 Director's Final Findings and Orders, this obligation arises from LATA/Parallax Portsmouth, LLC's contract with DOE. Consequently, any obligations under the 1999 Director's Final Findings and Orders that LATA/Parallax Portsmouth, LLC may have through contract with DOE terminate when LATA/Parallax Portsmouth, LLC is no longer responsible under contract.

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6490990089
CC: FC

OhioEPA
State of Ohio Environmental Protection Agency

STREET ADDRESS:
1800 WaterMark Drive
Columbus, OH 43215-1099

TELE: (614) 644-3020 FAX: (614) 644-2329

MAILING ADDRESS:
P.O. Box 1049
Columbus, OH 43216-1049

March 18, 1999

Re: Director's Final Findings & Orders
United States Department of Energy
Portsmouth Gaseous Diffusion Plant
Bechtel Jacobs Company LLC
US EPA ID No.: OH7 890 008 983
Piketon, Ohio

CERTIFIED MAIL

C. Ray Miskelley, Esq.
Office of the Chief Counsel
U.S. Department of Energy
200 Administration Road
Oak Ridge, Tennessee 37831

Patrick W. Willison, Esq.
Bechtel-Jacobs Company LLC
East Tennessee Technology Park
Building K-1225 Room 123
Oak Ridge, Tennessee 37831-7294

Dear Sirs:

Transmitted herewith are Final Findings & Orders of the Director concerning the matter indicated.

Sincerely yours,

Thomas E. Crepeau

Thomas E. Crepeau, Manager
Data Management Section
Division of Hazardous Waste Management

TEC/dhs

cc: Frances Kovac, Legal
Dave Sholtis, Asst. Chief, DHWM
Melody Stewart, DHWM, SEDO
Maria Galanti, DERR, SEDO
Steve Rine, DSIWM, SEDO
Kevin Johnson, PIC
Eugene Gillespie, US DOE
John Shoemaker, Bechtel-Jacobs

Rosemary Richmond
Alex Harrington
Rick Denhelt
Jim King
Don Welker
Brenda Abke

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Printed on Recycled Paper

George V. Voinovich, Governor
Nancy P. Hollister, Lt. Governor
Donald R. Schregardus, Director

BEFORE THE
OHIO ENVIRONMENTAL PROTECTION AGENCY

In the Matter of:

United States Department of Energy	:	Director's Final
Portsmouth Gaseous Diffusion Plant	:	Findings and Orders
P.O. Box 700	:	
Piketon, Ohio 45661-0700	:	

Bechtel Jacobs Company LLC
Portsmouth Gaseous Diffusion Plant
P.O. Box 900
Piketon, Ohio 45661-0628

Respondents

PREAMBLE

It is hereby agreed by and among the Parties hereto as follows:

I. JURISDICTION

These Director's Final Findings and Orders ("Orders") are issued to the U.S. Department of Energy (" DOE") and Bechtel Jacobs Company LLC ("Bechtel Jacobs Company") pursuant to the authority vested in the Director of Environmental Protection ("Director") under chapters 3745 and 6111 of the Ohio Revised Code ("ORC") and the solid and hazardous waste laws in ORC chapter 3734, including ORC sections 3734.13, 3734.20, 3734.02(A) and 3734.02(G).

II. PURPOSE OF THESE ORDERS

The purpose of these Orders is:

1. To integrate the on-site work required for specific units under Section V of the Consent Decree and under the Ohio Administrative Code with the requirements of Section VII of the Consent Decree, and requirements of the Administrative Order by Consent in order to avoid duplication of effort, and efficiently perform sitewide ground water monitoring and surveillance and maintenance activities at PORTS;

2. To recognize that a substantial portion of the tasks required under existing approved

ENTERED DIRECTOR'S JOURNAL
MAR 18 1999
OHIO E.P.A.

I certify this to be a true and accurate copy of the official document as filed in the records of the Ohio Environmental Protection Agency
By: _____ Date 3/18/99

closure plans for certain units have been completed in accordance with those closure plans and to provide for the incorporation of the remaining tasks into the Integrated Groundwater Monitoring Plan and the Surveillance & Maintenance Plans and to terminate any further obligation under the existing closure plans;

3. To provide exemptions from specific solid and hazardous waste requirements of the Ohio Administrative Code as necessary to accomplish Purpose 1, above.

III. PARTIES BOUND

These Orders shall apply to and be binding upon the Respondents, their assigns and successors in interest. With respect to DOE, no change in ownership or operation of the Site will in any way alter DOE's responsibilities under these Orders, except as provided by law. The obligations of Bechtel Jacobs Company under these Orders shall terminate when Bechtel Jacobs Company is no longer responsible pursuant to contract with DOE to perform work under these Orders; provided, however, that this Section of the Orders does not absolve Bechtel Jacobs Company from any liability for any violation which occurs prior to the termination of such contract. Except as otherwise expressly provided herein, Respondents' obligations under these Orders may be altered only by written approval of the Director.

IV. DEFINITIONS

Words used in these Orders shall have their ordinary meaning, except as defined in this Section or the relevant statute or regulation.

A. "Site" shall mean all areas within the property boundary of the Portsmouth Gaseous Diffusion Plant ("PORTS") and any other areas that received or potentially received or released "hazardous substances, pollutants, or contaminants" originating from PORTS as defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, ("CERCLA"), 42 U.S.C. section 9601, et seq.

B. "Hazardous Waste Management Unit" ("HWMU") shall mean a contiguous area of land on or in which hazardous waste is placed or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area [40 CFR section 260.10; Ohio Administrative Code ("OAC") rule 3745-50-10].

C. "IGWMP" shall mean the Integrated Ground Water Monitoring Plan, as approved by Ohio EPA, and which is attached to these Orders as Attachment C.

D. "Party" shall mean DOE, Bechtel Jacobs Company or the Ohio Environmental Protection Agency ("Ohio EPA" or "OEPA"). "Parties" shall mean DOE, Bechtel Jacobs Company and Ohio EPA.

E. "Solid Waste Disposal Facility" ("SWDF") shall mean any site, location, tract of land, installation or building used for incineration, composing, sanitary landfilling, or other methods of disposal of solid wastes (OAC rule 3745-27-01(C)(11)).

F. "Consent Decree" shall mean the consent decree filed by DOE and the State of Ohio on September 1, 1989, in Civil Action Number C2-89-732, in United States District Court for the Southern District of Ohio, Eastern Division.

G. "Administrative Order by Consent" shall mean the administrative order by consent entered into by the DOE, Ohio EPA and U.S. EPA on August 12, 1997, for the purpose of defining oversight roles for Ohio EPA and U.S. EPA and certain performance obligations for DOE, and which replaced the earlier version of the ACO, as amended.

H. "Surveillance and Maintenance Plan" ("S&M Plan") shall mean the plan to be submitted and approved pursuant to Order number 16, below, which provides for post closure care and/or operation and maintenance of each of several units; following approval, the S&M Plan shall be incorporated by reference and attached to these Orders as Attachment D.

V. FINDINGS OF FACT

The Director of Environmental Protection hereby makes the following findings:

1. DOE owns PORTS, a uranium enrichment facility, located in Pike County, Ohio, approximately twenty (20) miles north of the City of Portsmouth. The current primary function of PORTS is the enrichment of uranium for use in fueling nuclear reactors. Pursuant to section 1403 (a) of the Energy Policy Act of 1992 (Public Law 102-486), DOE leases uranium enrichment facilities at PORTS to the United States Enrichment Corporation (USEC). Pursuant to the Energy Policy Act, including section 1403 (d), DOE has retained responsibility for certain cleanup activities with respect to conditions existing before July 1, 1993, the date that uranium enrichment operations at PORTS were assumed by USEC.

2. PORTS commenced operations in 1954. PORTS operations are located on a 15.1 square kilometer (3,714 acres) parcel of federally owned land. Several rural communities lie within a few kilometers of PORTS.

3. Bechtel Jacobs Company is a limited liability company, licensed to do business in the State of Ohio on December 24, 1997. Bechtel Jacobs Company has contracted with DOE to carry out certain day-to-day activities at PORTS, including certain cleanup activities.

4. The Respondents are each a "person" as defined in ORC section 3734.01(G) and Ohio Administrative Code ("OAC") rule 3745-50-10.

5. The Respondents generate or have generated "hazardous waste" as that term is defined in section 1003(5) of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act ("RCRA") as amended, 42 U.S.C. section 6903 (5) and in ORC section 3734.01 (J) and OAC rules 3745-50-10 and 3745-51-03.

6. The Respondents generate or have generated "solid waste" as that term is defined in ORC section 3734.01 (E) and OAC rule 3745-27-01.

7. The principal radioactive elements present in waste materials handled at the facility are uranium and technetium. The principal non-radioactive hazardous wastes known to be generated at PORTS are those exhibiting characteristics of ignitability, toxicity (TCLP) for chromium, lead, and cadmium, and various listed wastes including: spent halogenated solvents such as TCE; spent non-halogenated solvents; as well as small quantities of laboratory chemicals such as vanadium pentoxide, aniline, formaldehyde, formic acid, and lead acetate.

8. On August 18, 1980, DOE submitted a notification of hazardous waste activity at the facility as required by section 3010 (a) of RCRA, 42 U.S.C. section 6930 (a), and on July 12, 1984, DOE filed a RCRA Part A permit application as required by section 3005(a) of RCRA, 42 U.S.C. section 6925(a), to treat, store, and dispose of hazardous waste at the Facility. Subsequently, DOE filed a RCRA Part A permit application revision on September 9, 1988. OEPA transmitted PORTS' RCRA Part B Permit Application to the Ohio Hazardous Waste Facility Board on March 18, 1993, and the Board issued a permit to DOE, effective on August 21, 1995; the permit authorizes DOE to store certain hazardous and mixed wastes in two storage facilities {X-326 and X-7725} at PORTS. The permit does not address ground water monitoring requirements.

9. On June 30, 1989, Ohio EPA received final authorization from U.S. EPA to administer the hazardous waste program in Ohio; such authorization includes the authority to regulate the hazardous waste component of mixed waste. See 54 Fed. Reg. 27173. Ohio EPA's hazardous waste program authorization has since been expanded to include authorization to implement corrective action requirements under RCRA.

10. On September 1, 1989, DOE and the State of Ohio filed a Consent Decree, Civil Action

Number C2-89-732, in United States District Court for the Southern District of Ohio, Eastern Division ("Consent Decree"), for the purpose of addressing certain hazardous waste compliance issues at PORTS. The Consent Decree requires the performance of corrective actions at PORTS, in addition to other requirements.

11. On September 27, 1989, U.S. EPA and DOE entered into an Administrative Consent Order, U.S. EPA Docket Number V-W-90R-03, for the performance of response action/corrective actions at PORTS.

12. In August of 1994, the 1989 Administrative Consent Order ("ACO, as amended") was amended to, among other things, include Ohio as a party for the purpose of recovering its oversight costs from U.S. DOE.

13. On August 2, 1995, Ohio EPA issued a letter which referenced a meeting in which DOE and Ohio EPA agreed to the integration of closure and corrective action/response action for certain HWMUs.

14. On October 4, 1995, DOE and Ohio EPA entered into Director's Final Findings and Orders which approved DOE's site treatment plan for all land disposal restricted hazardous wastes in storage at PORTS.

15. On August 12, 1997, the DOE, Ohio EPA, and U.S. EPA entered into the Administrative Order by Consent for the purpose of defining oversight roles for Ohio EPA and U.S. EPA and certain performance obligations for DOE, which replaced the earlier version of the ACO, as amended. Pursuant to this Administrative Order by Consent, Ohio EPA assumed the lead oversight role from U.S. EPA for all remedial and corrective action activities at PORTS.

16. The corrective action/response action process being conducted at PORTS employs a Quadrant approach, in which PORTS is divided into four Quadrants for the purposes of organizing and facilitating the corrective action/response action process. The Quadrants are based approximately on the direction of groundwater flow at PORTS.

17. Consistent with Section VII of the Consent Decree and the Administrative Order by Consent, Respondents have agreed to implement the corrective actions/response actions selected in the Decision Documents for each Quadrant.

18. Pursuant to the requirements of Sections VII and VIII of the Consent Decree and provisions of the Administrative Order by Consent, DOE is responsible for conducting certain ground water monitoring requirements at PORTS. Pursuant to requirements of Section V of the Consent Decree

and provisions of the Administrative Order by Consent, DOE conducts closure and post closure care of certain HWMUs and solid waste disposal facilities ("SWDF") at PORTS.

19. Attachment A, incorporated by reference herein, identifies those SWDFs and those HWMUs which will be subject to one or more exemptions pursuant to this Order. The exemptions facilitate the integration process which consists of deferring the timing and procedural requirements applicable to certain units, and includes the unification of all site-wide groundwater monitoring requirements.

20. The SWDFs and HWMUs identified in Attachment A are subject to requirements for closure, investigation and/or remediation pursuant to Section V and/or Section VII of the Consent Decree. The SWDFs and HWMUs identified in Attachment A are all "Waste Units" pursuant to Section 2.16 of the Consent Decree and as used in Section VII. of the Consent Decree.

21. The SWDFs and HWMUs identified in Attachment A are subject to schedules for closure, investigation and/or remediation pursuant to the Consent Decree. These schedules are based upon discussions between the Respondent DOE and Ohio EPA, and are subject to change pursuant to the procedures required by the Consent Decree. Incorporated by reference herein as Attachment B is the agreed upon schedule for all remaining remedial activities as it exists as of the effective date of these Orders, which was submitted by Respondents to Ohio EPA on December 5, 1998 and approved by Ohio EPA on December 11, 1998. Pursuant to Section VII of the Consent Decree, this schedule is fully enforceable under the Consent Decree. Remedial actions proposed in accordance with the Consent Decree are subject to a public comment period.

22. On January 27, 1999, Ohio EPA approved the Integrated Ground Water Monitoring Plan, ("IGWMP"), which is designed to integrate site-wide ground water monitoring activities at PORTS by encompassing all ground water monitoring requirements and the goals of multiple regulatory programs in order to maximize resources to support corrective action and to minimize the potential for conflicts in requirements between regulatory programs.

23. SWDFs X-749A, X-735 Industrial Solid Waste Landfill, and X-749S (also known as the Low Level Disposal Unit) completed certification of closure on June 7, 1994, November 6, 1998, and February 9, 1993, respectively, at which times the 30 year post closure care period began, in accordance with OAC rules 3745-27-14 or 3745-29-14 for each unit. Ohio EPA accepted the certification of closure for the referenced units on November 12, 1996, December 28, 1998, and March 8, 1993, respectively. SWDFs X-749A, X-735 Industrial Solid Waste Landfill, and X-749S are subject to the requirements of post closure plans submitted in accordance with OAC rules 3745-27-11 or 3745-29-11 and approved on April 9, 1992, January 23, 1998, and July 17, 1991, respectively.

24. OAC rule 3745-29-01(B) defines an "industrial solid waste landfill facility" as a sanitary landfill facility which exclusively disposes one or any combination of industrial solid wastes as defined in OAC rule 3745-29-01(A). OAC rule 3745-29-01(A) defines "industrial solid waste" as a type of solid waste generated by manufacturing or industrial operations. SWDFs X-749A and X-749S are sanitary landfill facilities where industrial solid wastes were disposed and, currently, are subject to OAC Chapter 3745-27.

25. Pursuant to ORC section 3734.02 (G) and OAC rule 3745-50-31, the Director may by order exempt any person generating, storing, treating, disposing of or transporting hazardous waste in such quantities or under such circumstances that, in the determination of the Director, are unlikely to adversely affect the public health or safety or the environment from any requirement to obtain a permit or license, comply with the manifest system or comply with other requirements of ORC chapter 3734.

26. The SWDFs listed in Attachment A are subject to the ground water monitoring requirements contained within OAC rules 3745-27-10 or 3745-29-10. Compliance with the ground water monitoring requirements outlined within the IGWMP, Attachment C, instead of with the requirements of OAC rules 3745-27-10(C)(10) or 3745-29-10(C)(10), for the SWDFs listed in Attachment A, is unlikely to adversely affect the public health or safety or the environment.

27. By letter dated January 26, 1999, Respondents submitted an application for the exemptions contained in these Orders.

28. If the Respondents conduct an RCRA/CERCLA integrated remediation process in accordance with the requirements and schedules contained in or referenced in these Orders, it is unlikely that public health or safety or the environment will be adversely affected within the meaning of ORC section 3734.02(G).

29. Where a variance to the rules promulgated under ORC Chapter 3734. is granted, the Director has determined that such an action is appropriate and reasonable to prevent the creation of a nuisance or a hazard to the public health or safety or the environment, and that the construction and operation of the solid waste facility in the manner allowed by the variance and any terms or conditions imposed as part of the variance will not create a nuisance or a hazard to the public health or safety or the environment.

VI. ORDERS

1. The Respondents shall implement the IGWMP, Attachment C, except that, to the extent

that the IGWMP requires tasks specific to radiological contamination, and/or tasks specific to off-site residential monitoring, such tasks shall not be specifically enforceable under this Order. Where a task involves both radiological contamination and non-radiological contamination, only the portions of the task involving non-radiological contamination shall be specifically enforceable through this Order. Implementation shall occur pursuant to Order 17, below.

2. The Respondents are hereby exempted from complying with the rules contained in OAC chapters 3745-65 and 3745-66 for the HWMUs listed in Attachment A, *provided*, that the Respondents shall comply with the substantive requirements of the rules contained in OAC chapters 3745-54 and 3745-55 for the HWMUs listed in Attachment A, through the remedial processes of Section VII of the Consent Decree, except as provided below.

3. The Respondents are hereby exempted from complying with the rules contained in OAC chapter 3745-27, for the X-749S SWDF, and for the X-749A Classified Materials Disposal Facility, *provided* that the Respondents comply with the substantive requirements of OAC Chapter 3745-29 for those units, except as provided below.

4. The Respondents are hereby exempted from complying with OAC rule 3745-29-10(C)(10) for the X-735S Industrial Solid Waste Landfill, and for the X-749A Classified Materials Disposal Facility.

5. The Respondents are hereby granted a variance for the X-749S Industrial Solid Waste Landfill, the X-749A Classified Materials Disposal Facility, and X-735 SWDF, from complying with the requirement contained in OAC rule 3745-29-14(A)(3) to submit a written summary to the appropriate Ohio EPA district office not later than fifteen days after the date of the inspection required by this rule, *provided* that Respondents submit the written summary otherwise required by this rule within fifteen days following the end of the calendar year quarter in which the inspection occurred.

6. The Respondents are hereby exempted from complying with OAC rule 3745-29-10 for the X-749S Industrial Solid Waste Landfill. The X-749S Industrial Solid Waste Landfill will be monitored together with the X-749N HWMU as a single groundwater monitoring unit in accordance with OAC rule 3745-54-99, except as provided below.

7. The Respondents are hereby exempted from complying with OAC rule 3745-54-98 for the X-735N Hazardous Waste Landfill. The X-735N Hazardous Waste Landfill will be monitored together with the X-735S Industrial Solid Waste Landfill as a single groundwater monitoring unit pursuant to the exemption in paragraph 4, above.

8. The Respondents are hereby exempted from complying with OAC rule 3745-54-99(G) for the following HWMUs: X-231B, X-701C, X-740, X-701B, X-230J7, X-616, X-735N, and X-749.

9. The Respondents are hereby exempted from complying with OAC rule 3745-55-02(C) for the following HWMUs: X-231B, X-701B, X-701C, X-230J7, X-616, X-740, X-735N and X-749.

10. The Respondents are hereby exempted from complying with OAC rule 3745-55-12(A)(1) for the following HWMUs: X-230J7, X-701C, X-744Y, X-231B, and X-701B, *provided* that the CMS/CMIs necessary for the completion of remediation which are required by the Consent Decree, are submitted by Respondents in accordance with the schedule approved pursuant to the Consent Decree.

11. The Respondents are hereby exempted from complying with OAC rule 3745-55-13 for the following HWMUs: X-230J7, X-701C, X-744Y, X-231B, and X-701B, *provided* that the Respondents implement the Corrective Measures Implementation Work Plan in accordance with the schedule approved pursuant to the Consent Decree.

12. The Respondents are hereby exempted from complying with OAC rule 3745-55-15 for the following HWMUs: X-230J7, X-701C, X-744Y, X-231B, and X-701B, *provided* that the Respondents submit the Corrective Measures Implementation Final Report in accordance with the schedule approved pursuant to the Consent Decree, and the Certification Report, contained therein, meets the requirements of closure certification.

13. The Respondents are hereby exempted from complying with OAC rule 3745-55-20 for the following HWMUs: X-749, X-231B, X-701C, X-701B, X-230J7, X-616 and X-744Y, *provided* that the Respondents submit an Operation & Maintenance Monitoring Final Report which meets the requirements of a post-closure certification.

14. The Respondents are hereby exempted from complying with OAC rule 3745-55-18(A) for the following HWMUs: X-231B, X-701C, X-701B, X-230J7, and X-744Y, *provided* that the Respondents submit the Corrective Measures Implementation Workplan, which includes the Operation & Maintenance Plan, in accordance with the schedule approved pursuant to the Consent Decree and for the HWMUs X-231B, X-701C, X-701B, X-230J7 and X-744Y the Operation & Maintenance Plan must include the substantive requirements contained in OAC rule 3745-55-18 (B) through (D).

15. The Respondents are hereby exempted from complying with OAC rule 3745-55-18(A)

for the following HWMUs: X-616, X-749N and X-735N.

16. a. No later than twenty (20) days after the effective date of this Order, Respondents shall submit a Surveillance and Maintenance Plan ("the S&M Plan") providing for post closure care and/or operation and maintenance (excluding groundwater monitoring requirements, which are provided in the IGWMP) of each of the following units: SWDFs X-749A, X-735S Industrial Solid Waste Landfill and X-749S (also known as the Low Level Disposal Unit), and HWMUs X-616, X749N, and X-735N. The S&M Plan shall meet the following standards:

i. For the SWDFs X-749A, X-735S Industrial Solid Waste Landfill and X-749S (also known as the Low Level Disposal Unit), the S&M Plan must include all the requirements for post closure stated in the closure/post closure plans which were approved for those units on April 9, 1992, January 23, 1998, and July 17, 1991, respectively.

ii. For HWMUs X-616, X749N, and X-735N the S&M Plan must include all the requirements for post closure stated in the closure/post closure plans which were approved for those units on August 13, 1992, July 14, 1989, and September 13, 1993, respectively.

iii. For any other unit Respondents choose to incorporate into the S&M Plan, the S&M Plan shall incorporate all post closure and/or operation and maintenance requirements which exist at the time of submittal of the S&M Plan.

b. Respondents' S&M Plan shall be subject to review and approval by Ohio EPA. If Ohio EPA provides Respondents with a written statement of deficiencies in the S&M Plan, Respondents shall submit to Ohio EPA, within thirty (30) days of receipt of the statement of deficiencies, a revised S&M Plan that satisfactorily addresses the stated deficiencies.

c. Ohio EPA may either approve the S&M Plan as submitted or as revised, or approve it with modifications. If Ohio EPA modifies the S&M Plan as submitted or revised, the modified plan shall become the approved S&M Plan. Upon approval, the S&M Plan shall be incorporated by reference into this Order as Attachment D.

d. Upon implementation of the IGWMP and S&M Plan as described in Order 17, below, Respondents' obligations under the previously approved closure plans or post closure care plans for the units specified in Attachment A are satisfied, and the closure plan or post closure care plan terminates.

17. Respondents shall commence implementation of the IGWMP and the S&M Plan together on April 1, 1999. If, for any reason, approval of the S&M plan by Ohio EPA has not been obtained by April 1, 1999, these Orders and all exemptions contained herein will terminate, and Respondents shall have no further obligation under these Orders.

VII. AMENDMENT OF ATTACHMENTS

1. Amendment of the IGWMP (Attachment C) or the S&M Plan (Attachment D):

a. The IGWMP or the S&M Plan may be amended by mutual, written agreement of the parties, according to the procedures described below.

b. In the event that Respondents identify a need to amend the approved IGWMP or approved S&M Plan, Respondents shall submit an amended plan to Ohio EPA. Upon receipt of an amended plan, Ohio EPA may either approve the amended plan, as submitted, or disapprove and provide comments describing changes required before approval. Upon approval by Ohio EPA of the amended plan, Respondents shall implement the approved plan in accordance with the schedule approved pursuant to the Consent Decree.

c. In the event that Ohio EPA identifies a need to amend the approved plan, Respondents shall, within twenty (20) days of receipt of written notice from Ohio EPA of the need to amend the approved plan, submit an amended plan proposal. Upon receipt of an amended groundwater monitoring plan, Ohio EPA may either approve the amended plan, as submitted, or disapprove and provide comments describing changes required before approval. Upon approval of the amended plan by Ohio EPA, Respondents shall implement the approved plan in accordance with the schedule approved pursuant to the Consent Decree.

VIII. PROJECT MANAGERS

Ohio EPA's Project Manager is Maria Galanti of Ohio EPA's Southeast District Office. Respondent DOE's Project Manager is Melda Rafferty. Respondent Bechtel Jacobs Company's Project Manager is Don J. Wilkes. A Party may change its designated Project Manager by notifying the other Parties, in writing, ten (10) business days before the change, if possible.

Each Project Manager shall be the primary contact regarding the implementation of these Orders. The Project Managers shall meet periodically, as appropriate, to discuss progress and problems

regarding the implementation of these Orders.

IX. NOTICE

All documents to be submitted pursuant to these Orders shall be submitted to the following persons at the following addresses:

Ohio EPA:

Ohio Environmental Protection Agency
Southeast District Office
Division of Emergency & Remedial Response
Attn: Project Manager
2195 Front Street
Logan, Ohio 43138

and

Ohio Environmental Protection Agency
Division of Hazardous Waste Management
Attn: Manager, Compliance Assurance Section
Lazarus Government Center
P.O. Box 1049
Columbus, Ohio 43216-1049

Bechtel Jacobs Company:

Bechtel Jacobs Company LLC
Portsmouth Gaseous Diffusion Plant
P.O. Box 900
Piketon, Ohio 45661-0628
Attn: Don J. Wilkes, Bechtell Jacobs Company Project Manager for Environment Restoration

DOE:

U.S. DOE, Portsmouth Gaseous Diffusion Plant
Attn: Melda Rafferty
P.O. Box 700

Piketon, Ohio 45661-0700

or to such persons and addresses as may hereafter be otherwise specified in writing.

X. OTHER APPLICABLE LAWS

Nothing in these Orders shall be construed as waiving or compromising in any way the applicability and enforcement of any other statutes or regulations' applicability to the Respondents' activities at the Site. Ohio EPA reserves all rights and privileges except as specified herein. Respondents reserve all defenses they may have.

XI. RESERVATION OF RIGHTS

Nothing contained in these Orders shall be construed as restricting any rights or obligations contained in the Administrative Order by Consent and/or the Consent Decree. Nothing contained herein shall be construed to prevent the Ohio EPA from seeking legal or equitable relief to enforce the terms of these Orders or from taking other administrative, legal or equitable action, as deemed appropriate and necessary, including the revocation of exemptions, as necessary, and including seeking penalties against Respondents for noncompliance with these Orders. Nothing contained herein shall be construed to prevent Ohio EPA from exercising its lawful authority to require the Respondents to perform additional activities at the Site, pursuant to ORC chapter 3734 or any other applicable law in the future. If any section or subsection of the IGWMP, performance of which is a condition of an exemption, is amended by mutual agreement pursuant to Section VII., the Director reserves the right to revoke the exemption, unless he determines that such amendment is unlikely to adversely affect the public health or safety or the environment.

Nothing herein shall restrict the right of Respondents to raise any administrative, legal or equitable claim or defense with respect to such further actions that Ohio EPA may seek to require of the Respondents. Nothing in these Orders shall be construed as a waiver of DOE's jurisdiction over source, by-product, or special nuclear materials under the Atomic Energy Act, 42 U.S.C. section 2201, et seq. Nothing in the preceding sentence alters Respondents' duty to comply with these Orders.

The Director reserves the right to revoke these Orders, or any portion hereof, upon a determination by Ohio EPA that such revocation is necessary to protect human health or safety or the environment. The Respondents reserve the right to seek administrative or judicial review of any such revocation.

It is Ohio EPA's position that the Anti-Deficiency Act, 31 U.S.C. section 1341, as amended, does not apply to any obligations set forth in these Orders, and that obligations herein are not affected by Respondent DOE's failure to obtain adequate funds or appropriations from Congress. It is Respondents' position that the obligations set forth in these Orders are subject to the provisions of the Anti-Deficiency Act and are subject to the availability of funding. The Parties agree that it is premature to raise and resolve the validity of such positions at this time.

XII. OTHER CLAIMS

Nothing in these Orders shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any persons, firm, partnership or Corporation, not a signatory to these Orders, for any liability arising out of or relating to the operation of the Respondent DOE's Site.

XIII. SIGNATORIES

Each undersigned representative of a Party signatory to these Orders certifies that he or she is fully authorized to enter into the terms and conditions of these Orders and to legally bind such party to this document.

IT IS SO ORDERED:

Ohio Environmental Protection Agency

By: Christopher Jones, Director

3/17/99
Date

XV. WAIVER

The Respondents agree that these Orders are lawful and reasonable. The Respondents, by acceptance of these Orders, agree to comply with all conditions of these Orders and acknowledge the Respondents' failure to do so may result in further legal action by Ohio EPA.

The Respondents hereby waive the right to appeal or otherwise challenge the issuance of these Orders. Nothing in these Orders shall affect the Respondents' rights to seek administrative or judicial review of other final actions by the Director pursuant to ORC section 3745.04 or other applicable law.

Ohio EPA and the Respondents agree that in the event that these Orders are appealed by any other party to the Environmental Review Appeals Commission; or any court, the Respondents retain the right to intervene and participate in such appeal in support of these Orders. In such event, the Respondents shall continue to comply with these Orders notwithstanding such appeal and intervention unless these Orders are stayed, vacated, or modified.

IT IS SO AGREED:

U.S. Department of Energy:

By: Lester K. Price Date: 2/23/99

Executive Director, Office of Environmental Management, ORO
Title

Bechtel Jacobs Company LLC:

By: Joseph F. Nemec Date: 2/5/99

Joseph F. Nemec
President
Title

Ohio Environmental Protection Agency:

Date: 3/17/99

Christopher Jones, Director

ATTACHMENT A

Unit Name	Description	Quadrant	Unit Type for Groundwater Monitoring	Unit Type for S&M Activities
X-231B*	Oil Biodegradation Plot	Quadrant I	HWMU	Corrective Action
X-744Y*	Storage Yard	Quadrant II	HWMU	Corrective Action
X-230J7*	Holding Pond	Quadrant II	HWMU	Corrective Action
X-701B*	Holding Pond	Quadrant II	HWMU	Corrective Action
X-701C*	Neutralization Pit	Quadrant II	HWMU	Corrective Action
X-740**	Waste Oil Handling Facility	Quadrant III	HWMU\Corrective Action	HWMU (soils only)
X-616**	Chromium Sludge Lagoon	Quadrant III	HWMU	HWMU
X-749 N**	Landfill	Quadrant I	HWMU	HWMU
-749 S***	Landfill	Quadrant I	HWMU	SWDF
X-735 N**	Landfill	Quadrant IV	SWDF	HWMU
X-735 S***	Landfill	Quadrant IV	SWDF	SWDF
X-749A***	Landfill	Quadrant I	SWDF	SWDF

* HWMUs to be addressed under the RCRA Corrective Action\CERCLA Process. These units are addressed under the schedule for completion of remedial activity at the site.

** HWMU closed in accordance with approved closure plan for soils only. Groundwater to be addressed under RCRA Corrective Action\CERCLA Process.

** HWMUs closed in accordance with approved closure plans and are considered to be in post closure groundwater monitoring. Continued groundwater monitoring to be conducted as part of the IGWMP.

*** SWDF closed in accordance with approved closure plans. Continued groundwater monitoring to be conducted as part of the IGWMP.

ATTACHMENT J.2

1989 CONSENT DECREE

LATA/Parallax Portsmouth, LLC is not a party to the 1989 Consent Decree. With respect to LATA/Parallax Portsmouth, LLC's obligation to perform work under the 1989 Consent Decree, this obligation arises from LATA/Parallax Portsmouth, LLC's contract with DOE. Consequently any obligations under the 1989 Consent Decree that LATA/Parallax Portsmouth, LLC is no longer responsible under contract.

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U.S. DIST. COURT
SOUTHERN DIST. OHIO
EAST. DIV. COLUMBUS

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF OHIO
EASTERN DIVISION

STATE OF OHIO, Plaintiff, v. UNITED STATES DEPARTMENT OF ENERGY, DIVESTED ATOMIC CORPORATION, et.al, Defendants.	Civil Action No. ~~C2-89-732~~ Judge JUDGE SMITH MAGISTRATE KEMP

JOINT REQUEST FOR ENTRY OF CONSENT DECREE

On this date the State of Ohio filed its complaint in the above-captioned case against the United States Department of Energy (hereinafter "USDOE") and Divested Atomic Corporation (hereinafter "Divested Atomic"). The parties, having already agreed upon the appropriate resolution of this action, hereby jointly request the Court to forthwith enter the attached Consent Decree without the need for hearing or further pleading, as evidenced by the signature of counsel for all parties to this Request, and to the Consent Decree.

Respectfully submitted,

ANTHONY J. CELEBREZZE
Attorney General of Ohio

Jack Van Kley

JACK A. VAN KLEY, Trial Attorney
Assistant Attorneys General
Environmental Enforcement Section

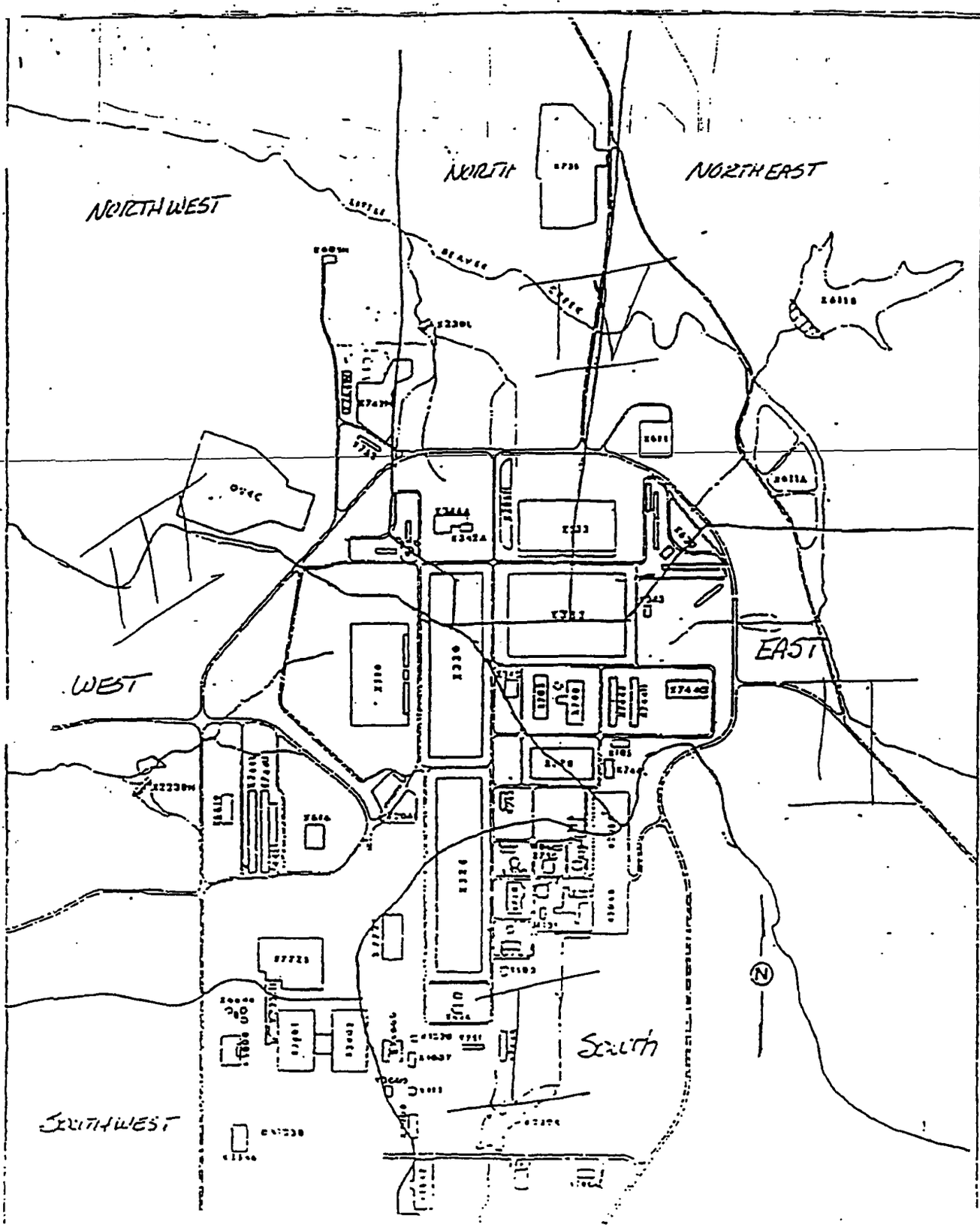
RICHARD B. STEWART
Assistant Attorney General
Land & Natural Resources Division
U.S. Department of Justice

D. MICHAEL CRITES
United States Attorney

J. Steven Rogers

J. STEVEN ROGERS, Trial Attorney
Environmental Defense Section
Land & Natural Resources Division

JOHN M. ROSS, Attorney for
DIVESTED ATOMIC CORPORATION



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U.S. Department of Energy &
James D. Watkins

Judge S
Mag TPK
Doc Ckpda
Pg 893

FILED
KENNETH J. MURPHY
CLERK

89 SEP -1 PM 3:

U.S. DISTRICT COURT
SOUTHERN DIST. OHIO
EAST. DIV. COLUMBUS

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF OHIO
EASTERN DIVISION

STATE OF OHIO, Plaintiff, v. UNITED STATES DEPARTMENT OF ENERGY, DIVESTED ATOMIC CORPORATION, et al., Defendants.	Civil Action No C2 89 732 Judge Smith

CONSENT DECREE

WHEREAS, on the 29th day of August, 1989, the State of Ohio filed a complaint in the above-captioned case against the United States Department of Energy (hereinafter "USDOE") and Divested Atomic Corporation (hereinafter "Divested Atomic");

WHEREAS, Ohio alleges that defendants have violated various provisions of Federal and Ohio law and regulations, and defendants deny any violation of and any liability under any federal or state statute, regulation or common law;

WHEREAS, the parties wish to ensure the safe and environmentally sound handling of hazardous waste, mixed waste, PCB's, solid waste, and water pollutants at PORTS;

3

WHEREAS, USDOE and the United States Environmental Protection Agency are negotiating an Administrative Consent Order, pursuant to RCRA section 3008(h) (the "3008(h) Order"), which also addresses the subject matter of this action;

WHEREAS, the parties wish to resolve this action without litigation and have, therefore, agreed to entry of this Consent Decree without the admission or adjudication of any issue of fact or law.

NOW, THEREFORE, it is hereby ordered, adjudged and decreed as follows:

I. JURISDICTION

1.1 The Court has jurisdiction over the matters resolved in this Consent Decree and the parties to the decree.

II. DEFINITIONS

For purposes of this Consent Decree, the following words and abbreviations have the meanings provided below:

2.1 "C.F.R." means Code of Federal Regulations.

2.2 "USDOE" means the United States Department of Energy and its officers, agents and employees.

2.3 "Facility" means the PORTS facility described below.

2.4 "Hazardous waste" means a hazardous waste as defined in 40 C.F.R. § 261 or OAC § 3745-51-03, but does not

include source, special nuclear, or by-product material. It does include the hazardous component of mixed waste.

2.5 Hazardous waste treatment, storage, and disposal areas at PORTS include, but are not limited to:

A. A land treatment facility consisting of an oil biodegradation plot identified as X-231B.

B. Two surface impoundments identified as the X-616 chromate reduction sludge lagoons.

C. Three surface impoundments identified as the X-701B holding pond and sludge containment areas.

D. The hazardous waste storage facility identified as the X-752 building used to store hazardous wastes in containers.

E. The contaminated materials disposal facility identified as X-749, which is a 7.43 acre facility used for the disposal of low-level radioactive wastes.

F. The incinerator identified as X-705A.

G. The X-744G mixed waste container storage area.

H. The X-326 mixed waste container storage area.

Hereinafter in this Consent Decree, these areas will be referred to by their identification numbers (e.g., "X-231B").

2.6 "Industrial waste" and "other wastes" have the meanings set forth in Ohio Revised Code Section 6111.01(C) and (D) respectively, but do not include source, special nuclear, or byproduct material.

2.7 "Mixed waste" means all waste containing both hazardous waste and source, special nuclear or byproduct material, or, for purposes of this Consent Decree only, other radionuclides.

2.8 "OAC" means Ohio Administrative Code.

2.9 "Ohio EPA" means Ohio Environmental Protection Agency and its representatives, including any contractor(s) retained by Ohio EPA to perform any monitoring, observation, testing, or other activities related to this Consent Decree.

2.10 "O.R.C." means Ohio Revised Code.

2.11 "PCB" or "PCBs" means polychlorinated biphenyls.

2.12 "PORTS" means the Portsmouth Gaseous Diffusion Plant, a facility owned by the Government of the United States under the jurisdiction of USDOE. The facility is located approximately twenty miles north of downtown Portsmouth, Ohio. PORTS operations are located on a 16.2 square kilometer federally owned site.

2.13 "Solid Waste" means a solid waste as defined in RCRA section 1004 (27), 42 U.S.C. 6903 (27), or O.R.C. § 3734.01(E).

2.14 Each of the terms "State", "State of Ohio", and "Ohio", includes all agencies and officers of the State of Ohio.

2.15 "Treatment", "storage", and "disposal" have the same meanings as the definitions provided therefor in 40 C.F.R. § 260.10 and OAC § 3745-50-10.

2.16 "Waste units" mean all areas which have been used for the treatment, storage or disposal of the solid waste component of radioactive waste and other solid wastes, all areas used for treatment or disposal of waste oils, all areas which are contaminated by spills or leaks of materials which are, or when spilled or leaked become, hazardous wastes, industrial wastes or other wastes, a sanitary landfill identified as X-735, a construction spoil area used for disposal of construction debris, brush and solid wastes, a classified materials burial ground identified as X-749A, and the units and areas more specifically identified as the Peter Kiewit Landfill, X-231A oil biodegradation plot, X-734 landfill, X-530 switch yard, X-533 switch yard, X-230-K South Holding Pond, South Holding Pond waste pile, X-611A and B lime lagoons, X-342-C HF pit, X-344D HF pit, X-615 inactive sewage plant, X-701-C Neutralization pit, process lines from buildings X-700 and X-705, X-710 Neutralization pit, East drainage ditch, RCW system, West drainage ditch impoundment basin, X-701-B North oil plot, X-2230 M Southwest Holding Pond, X-230 J-7 pond, X-230-L North holding pond, oil construction spoil area, X-740 waste oil handling facility, X-230-J-5 West holding pond, X-2230 northwest holding pond, the X-6619 sewage treatment plant, X-720 neutralization pit, X-750 waste oil tank, X-230J6 northeast holding pond, X-330 PCB storage, X-333 PCB storage, X-344A neutralization pit, X-614 sewage lift stations, X-621 coal runoff impoundment, X-760 waste water neutralization pit, X-700 contaminated tile drain system, X-2230N west holding

pond, south construction spoil area, two-acre barren area identified in the Portsmouth Environmental Survey dated August 21, 1987, X-230J3 runoff pond, X-617 pH adjustment facility, X-633 cooling tower basin, X-630 cooling tower basin, X-626 cooling tower basin and areas where PCB's have been disposed as defined in 40 C.F.R. Part 761.

2.17 Except as otherwise defined in the preceding definitions or as defined below, the terms used in this Consent Decree and any document required by this Consent Decree shall have the same meaning as used in Chapters 3734 and 6111 of the Ohio Revised Code, the counterpart provisions of RCRA and regulations promulgated under any of the foregoing statutes.

III. PERSONS BOUND

3.1 This Consent Decree shall apply to and be binding upon USDOE, its successors and assigns. USDOE shall direct its management contractor and any replacement management contractor to comply with this Consent Decree. In addition, USDOE shall provide copies of this Consent Decree to all contractors performing any of the work called for or referenced herein.

IV. CALCULATION OF TIME

4.1 Unless otherwise stated in this Consent Decree, where this Consent Decree requires actions to be taken within a specified period of time (e.g. "within thirty days"), this time period shall begin the day after the entry of this Consent Decree.

V. HAZARDOUS WASTE REQUIREMENTS

5.1 USDOE shall conduct its current and future treatment, storage, and disposal of all hazardous and mixed waste at PORTS in accordance with Federal and Ohio hazardous waste laws and hazardous waste regulations, including but not limited to the permit requirements of these laws and regulations. [However, USDOE is not required to comply with the above requirements, with regard to mixed waste, where compliance will increase the risk to human safety and health or the environment] or, with respect to hazardous or mixed waste, where the requirements would be inapplicable due to the restrictions of 42 U.S.C. § 6905(a). Should USDOE not be required to comply with a hazardous waste requirement due to any of the circumstances described in the preceding sentence, USDOE in consultation with Ohio EPA shall instead handle the hazardous or mixed waste in a manner as protective of human safety and health and the environment as if the hazardous waste requirement had been applied.

5.2 USDOE has submitted to Ohio EPA closure plans for final closure of units X-231B, X-616, X-701B and X-749. The closure plans include the removal of sludge and highly contaminated soil at X-701B, capping at X-749 and tasks and implementation schedules for the performance of the activities described in paragraphs 5.3, 5.4, 5.6 and 5.7 below. USDOE shall implement the closure plans in accordance with the implementation schedules contained in these plans.

5.3 USDOE has completed and submitted to Ohio EPA, and Ohio EPA has reviewed, the results of a groundwater quality assessment for units X-616, X-231B, X-701B and X-749. USDOE shall make available for inspection by Ohio EPA raw data from soil gas monitoring conducted by IEP, Inc., and shall provide copies of such data as requested by Ohio EPA.

5.4 Within one hundred and twenty (120) days of approval by Ohio EPA of the closure plan for unit X-231B, USDOE shall submit to Ohio EPA for review and approval a study of the options for final closure of unit X-231B. Within three hundred (300) days after receipt of the Ohio EPA selection of the preferred closure option, USDOE shall close unit X-231B in accordance with the option approved by Ohio EPA.

5.5 USDOE has submitted to Ohio EPA a permit to install application for the modification of unit X-735 in order to allow disposal in unit X-735 of treated chrome sludge from unit X-616. Within forty-five (45) days after receipt of Ohio EPA notice of any deficiencies in this application, USDOE shall submit revisions to the application that are responsive to the Ohio EPA notice. Within one hundred and eighty (180) days after receipt of Ohio EPA final action on the application, USDOE shall complete final closure of unit X-616 in accordance with the option as approved by Ohio EPA.

5.6 Within ninety (90) days after receipt of Ohio EPA approval of the closure plan for unit X-749, USDOE shall submit to Ohio EPA for review and approval a study of the options for

final closure of unit X-749. Within three hundred and sixty (360) days after receipt of Ohio EPA's selection of the preferred option, USDOE shall complete capping and final closure of unit X-749 in accordance with the option as approved by Ohio EPA.

5.7 Within ninety (90) days after Ohio EPA approval of the closure plan for unit X-701B, USDOE shall award a contract for removal of all sludge, and a one foot layer of soil from the sides and bottom, from the X-701B holding pond and sludge containment ponds. Within two hundred and ten (210) days after Ohio EPA approval of the closure plan, USDOE shall complete removal of this sludge and soil and shall complete construction of a drainage system to keep the X-701B holding pond and sludge containment ponds de-watered. Within two hundred and forty (240) days after Ohio EPA approval of the closure plan, USDOE shall submit to Ohio EPA for review and approval a study of the options for final closure of unit X-701B. Within three hundred and sixty (360) days of Ohio EPA selection of the preferred closure option, USDOE shall complete closure of unit X-701B in accordance with the option as approved by Ohio EPA.

5.8 Closure shall be deemed to have occurred upon completion of the construction called for in the closure option selected by the Ohio EPA. Operation of the selected option shall continue for the time period designated in the final closure option study and post closure plan approved by the Ohio EPA.

5.9 The parties recognize that the closure activities contemplated under paragraphs 5.4 through 5.7 will require

compaction of clay materials as part of construction of a clay liner in the X-735 landfill, and any clay caps approved as part of a RCRA unit closure, and further that such construction cannot be completed in a certifiable manner during inclement winter weather periods that may occur from October 31 to February 28. In the event that any of the following circumstances occurs, the time for completion of final closure of the applicable RCRA unit shall be extended for the additional time taken by Ohio EPA for approval of final action, plus such additional time as is necessary to avoid construction of the clay liner or clay caps during inclement winter weather periods that may occur from October 31 to February 28:

[A] Delay in Ohio EPA approval of the closure plans beyond June 1, 1989; or

[B] Delay in final action by the director of the Ohio EPA on the X-735 landfill permit application beyond August 1, 1989; or

[C] Delay in Ohio EPA approval of the final closure options studies beyond ninety (90) days after submittal by USDOE.

The parties also recognize that unusually inclement weather conditions may from time to time prevent construction work and delay completion of a closure activity undertaken pursuant to this Section V. In such an event, USDOE shall have the right to seek additional time to complete a closure activity

based upon the documented inability of its contractor to work as a result of unusually inclement weather conditions.

5.10 Within thirty (30) days, USDOE shall submit the facility contingency plan to appropriate emergency response authorities, including the Emergency Response office of Ohio EPA and that of communities in the vicinity of the plant.

5.11 USDOE shall maintain a written operating log pursuant to O.A.C. § 3745-65-73 and shall describe in the log the following information: each hazardous and mixed waste received at PORTS (including all such wastes generated at PORTS); the quantity of each such waste; methods and dates of treatment, storage and disposal for each such waste; and the location and quantity of each such waste treated, stored or disposed at PORTS.

VI. PCB RELEASES

6.1 USDOE shall investigate any past or present disposal and/or placement and/or discharge of PCBs into soil or water at PORTS. For those locations not included within closure plans or cleanup action plans submitted to Ohio EPA by USDOE under the terms of Section V of this Consent Decree or Section VII of this Consent Decree, USDOE shall within 270 days develop a PCB Spill Cleanup Plan consistent with 40 C.F.R. § 761 Subpart G or any modification thereto. USDOE shall submit the plan to Ohio EPA and implement the plan in accordance with the procedures set forth in Section XI of this Consent Decree.

VII. HAZARDOUS WASTE, WATER POLLUTION, AND SOLID WASTE CLEANUP REQUIREMENTS

7.1 Trichloroethylene ("TCE") Report and Removal: USDOE has submitted a revised proposal for further steps to remove, minimize and monitor the TCE in the groundwater in the vicinity of X-701B. Ohio EPA is reviewing the revised proposal. Within thirty (30) days of receiving any Ohio EPA comments on the revised proposal USDOE shall revise the proposal to respond to those comments and resubmit it to Ohio EPA. Within thirty (30) days from Ohio EPA's approval of the proposal, USDOE shall begin its implementation.

7.2 Solid Waste Landfills:

[A]. Classified Wastes Landfill: USDOE has submitted to Ohio EPA a closure plan with a proposed schedule for the X-749A classified wastes burial site. Closure shall be completed within one (1) year following receipt of notice of Ohio EPA approval of the closure plan.

[B]. Low Level Wastes Landfill. USDOE has submitted to Ohio EPA a closure plan for the existing low level radioactive wastes burial site. Closure shall be completed within one (1) year of USDOE's receipt of notice of Ohio EPA's approval of the closure plan.

7.3 Facility Investigation and Cleanup Alternatives Study: For units X-231B, X-701B, and X-749 and each Waste Unit, USDOE shall conduct facility investigations (except where USDOE, with the approval of Ohio EPA has determined, based on previous assessment(s) that a facility investigation is not warranted) and

cleanup alternatives studies in accordance with this Decree and Exhibits A and B attached hereto. The facility investigations shall determine the nature and extent (on-site and off-site) of water pollution, soil contamination, and other environmental pollution caused by solid wastes, industrial wastes, other wastes, and hazardous wastes.

7.4 Facility Investigations and Milestones: To accomplish the facility investigations required herein, USDOE shall award a contract for those tasks as soon as possible. Within fifteen (15) days after the effective date of this Consent Decree, USDOE shall submit a general facility investigation workplan to accomplish these tasks to Ohio EPA for approval consistent with the terms of Section XI below. The general facility investigation workplan shall include a Quality Assurance Project Plan, a Project Management Plan, a Health and Safety Plan, a Community Relations Plan, a detailed facility map, and a Data Management Plan for each site or source.

The general facility investigation workplan shall call for accomplishment of Tasks 1 through 4, 6, and 7 of Exhibit A for units X-231B, X-701B, X-749 and all Waste Units in accordance with the schedule set forth in Exhibit B. To the extent that the general facility workplan addresses the requirements of Tasks 1 through 4(a), USDOE may use all or portions of the Quality Assurance Project Plan, the Health and Safety Plan, the Community Relations Plan, the Project Management Plan, and the Data

Management Plan in preparation of subsequent workplans for facility investigations of individual quadrants.

7.5 USDOE shall award a contract in accordance with the schedule set forth in Exhibit B, to accomplish the cleanup alternatives study (CAS) listed as Tasks 5 and 8 through 15 of Exhibit A for units X-231B, X-701B, X-749 and any Waste Units identified as having released or having the potential for releasing industrial wastes, other wastes, solid wastes mixed with radionuclides, hazardous waste or hazardous constituents into the environment. At the completion of each facility investigation, a report detailing the findings of the investigation shall be submitted to Ohio EPA in accordance with the schedule set forth in Exhibit B.

7.6 Workplans and Cleanup: Within ninety (90) days of Ohio EPA's approval of the CAS study report for each phase, including approval of the preferred alternatives for cleanup action of units X-231B, X-701B, X-749 and Waste Units in such phase, USDOE shall submit to Ohio EPA a workplan describing the manner in which USDOE will implement the cleanup action for each such phase. Each such workplan shall include general plans, design criteria, and a schedule for preparation of detailed engineering plans, specifications and construction drawings as necessary to implement the approved cleanup actions, and schedules for selection of contractors, commencement of work, and completion of work. Following Ohio EPA approval of each such

workplan, USDOE shall implement the cleanup action in accordance with the approved schedule.

7.7 When workplans and reports described in this section are approved by Ohio EPA, they shall be incorporated by reference into this Consent Decree.

7.8 The data obtained pursuant to Sections V and VI above may be used, where appropriate, in the work conducted in accordance with this section.

VIII. OFF-SITE WELL SAMPLING PROGRAM

8.1 USDOE has submitted to Ohio EPA all results of groundwater monitoring obtained by sampling off-site residential wells. USDOE shall evaluate past data from off-site residential well sampling and submit a plan for future off-site residential well monitoring. USDOE shall implement the plan upon approval by Ohio EPA in accordance with Section X of this Consent Decree. DOE shall submit a copy of a report of the results of future sampling to Ohio EPA within thirty (30) days of receipt of the report. Upon request by Ohio EPA, the underlying data shall be submitted.

8.2 Should USDOE discover evidence of off-site groundwater contaminant migration from PORTS, USDOE shall submit to Ohio EPA within sixty (60) days for approval a plan for the installation of a network of groundwater plume interceptor wells, and shall manage contaminated groundwater in a manner consistent with all Federal, State, or local laws, regulations, rules, or ordinances. These activities shall be designed to mitigate any

potential threat to human health and/or the environment, consistent with and integrated into any long term solution at the facility, and implemented according to the schedule in the approved plan.

IX. STORAGE AREAS

9.1 USDOE has submitted a plan and schedule for identifying, removing, and disposing of soils contaminated with hazardous wastes, mixed wastes, solid wastes, PCB's, industrial wastes, or other wastes, if any, from surface spillage around fuel, chemical, and hazardous material storage areas and for installation of spill containment measures in and around such storage areas. USDOE shall implement the plan upon approval by Ohio EPA in accordance with Section XI of this Consent Decree.

X. ADDITIONAL WORK

10.1 Should Ohio EPA determine that additional work is necessary to achieve the purposes of this Consent Decree, Ohio EPA may notify USDOE of the need for such additional work. Within forty-five (45) days of receipt of such notification from Ohio EPA, USDOE shall prepare and submit to Ohio EPA for review and approval a new or revised document incorporating the additional work.

10.2 Should USDOE determine that additional work is necessary to achieve the purposes of this Consent Decree, USDOE shall submit to Ohio EPA for approval USDOE's plan for performing such work.

10.3 In the event that additional work is necessary for any task described in this Consent Decree, the deadline for completing such task(s) shall be extended by the amount of time required to perform the additional work required, including the period for time required to plan and/or obtain approval from Ohio EPA for the performance of such work.

XI. REVIEW OF SUBMITTALS

11.1 With regard to each closure plan, workplan, report, study or other document that USDOE is required under this Consent Decree to submit to Ohio EPA for review and approval, Ohio EPA will notify USDOE in writing thirty (30) days after receipt of such document of its approval, disapproval, or requirement for modifications of the document, or any parts thereof. The notice shall specify the deficiencies in the event of any disapproval or proposed modification and list the reasons for the disapproval or proposed modification. In the event that any document requires a longer review period, Ohio EPA will notify USDOE in writing of that fact within thirty (30) days after receipt of the document. If Ohio EPA gives notice of such delay to USDOE, any delay by USDOE in performance of the work under this Consent Decree which is due to Ohio EPA document review time beyond thirty (30) days shall not be considered a violation of this Consent Decree, and the time allowed for performance by USDOE shall be extended by the period of time resulting from the Ohio EPA delay. If USDOE shall dispute any

such disapproval or proposed modification the parties shall resolve the dispute in accordance with Section XII.

11.2 Within thirty (30) days (unless Ohio EPA agrees to a longer period of time) of the resolution of any dispute under Paragraph 12.3 or, if no dispute arises, within thirty (30) days of receipt of a disapproval or requirement to modify from the Ohio EPA, USDOE shall submit to Ohio EPA those revisions necessary to correct outstanding deficiencies or incorporate requested modifications.

11.3 Except for minor field changes agreed to by the Project Coordinators for the parties, no modification or additional changes shall be made by USDOE to any closure plan, workplan, report or study approved by Ohio EPA without prior written notification to and written approval by Ohio EPA. The notification required by this paragraph shall set forth the nature of and reasons for the desired modification.

XII. RESOLUTION OF DISPUTES

12.1 Should Ohio or USDOE have a good faith dispute under this Consent Decree, the procedures of this section shall apply except as specifically set forth elsewhere in this Consent Decree.

12.2 During the pendency of any dispute, Ohio and USDOE agree that they shall continue to implement those portions of this Consent Decree which are not in dispute and which Ohio determines can be reasonably implemented pending final resolution of the issue(s) in dispute. If Ohio determines that all or part

of those portions of work which are affected by the dispute should stop during the pendency of the dispute, USDOE shall discontinue implementing those portions of the work. Ohio and USDOE agree that they shall make reasonable efforts to informally resolve all disputes.

12.3 Disputes concerning any closure plan, workplan, report, study or other document that USDOE is required under this Consent Decree to submit to Ohio EPA for review and approval shall be resolved pursuant to this paragraph 12.3 in lieu of paragraph 12.4.

[A]. USDOE may request a meeting with Ohio EPA within five (5) working days of its receipt of the written notice required by paragraph 11.1 to discuss or dispute any deficiencies specified in the notice of disapproval or a requirement to modify the document under review. If USDOE fails to request such a meeting within five (5) working days, USDOE shall be deemed to have agreed to the position taken by Ohio EPA. Such meeting shall be held within five (5) working days, if possible, of such request, and may be conducted by telephone unless one of the parties requests a face-to-face meeting. To facilitate such meetings, USDOE and Ohio EPA each shall appoint a project coordinator, who shall make reasonable efforts to resolve all disputes or disagreements informally.

[B]. Disputes not resolved by the project coordinators shall be referred to the Submittals Dispute Resolution

Committee within five (5) working days, if possible. The Submittals Dispute Resolution Committee shall have four members consisting of one individual designated by Ohio EPA, one designated by USDOE and the two project coordinators. The Ohio EPA designee shall be the Chief, Division of Solid and Hazardous Waste Management, or the Chief, Division of Emergency and Remedial Response, who shall co-chair the Committee with the USDOE designee, the USDOE Director of Enriching Operations.

[C]. Within three (3) working days of receipt of a disputed matter, the Submittals Dispute Resolution Committee shall meet and attempt resolution. Meetings may be conducted by telephone, unless one of the members requests a face-to-face meeting. Disputed matters not resolved by the Committee within five (5) working days of receipt shall be referred to the Deputy Director of Remedial and Technical Programs, Ohio EPA, for a final decision.

12.4 Any good faith dispute over the interpretation of this Consent Decree or over whether a term of this Consent Decree has been violated, shall be resolved pursuant to this paragraph 12.4 in lieu of paragraph 12.3.

[A]. USDOE shall, within fifteen (15) days of any action by Ohio which it is disputing, provide Ohio with a written notice of dispute. USDOE shall, within thirty (30) days of any such action by Ohio which it is disputing, provide Ohio with a written statement of dispute setting

forth the nature of the dispute, USDOE's position with respect to the dispute and the information USDOE is relying upon to support its position. If USDOE does not provide such written notice within the fifteen (15) day period, or after such notice fails to provide a written statement to Ohio within the thirty (30) day period, USDOE shall be deemed to have agreed to the position taken by Ohio.

[B]. Upon receipt of the written statement of dispute, Ohio and USDOE shall engage in dispute resolution among the project coordinators. The project coordinators shall have fourteen (14) days from the receipt by Ohio of the written statement of dispute to resolve the dispute. During this period the project coordinators shall meet or confer by telephone as many times as necessary to discuss and attempt resolution of the dispute. If a resolution cannot be reached on any issue within this fourteen (14) day period, either Ohio or USDOE may, by written notice, elevate the dispute to the Dispute Resolution Committee (DRC) for resolution.

[C]. DOE and Ohio shall each designate one individual to serve on the DRC. The individuals designated to serve on the DRC shall be those designated in subparagraph [D], or their delegate authorized to serve on the DRC on behalf of such designated individual, for the purposes of dispute resolution under this Consent Decree. The DRC will serve as

a forum for resolution of disputes for which agreement has not been reached pursuant to subparagraph [B].

[D]. The Ohio designated member of the DRC is the Chief, Division of Solid and Hazardous Waste Management, Ohio EPA. The USDOE designated member is the USDOE Asst. Manager for Enriching Operations. Notice of any delegation of authority from a Party's designated member on the DRC shall be provided to all other Parties.

[E]. If both designated members of the DRC do not agree on a resolution of the dispute within thirty (30) days, either party may institute an action in this Court to resolve the dispute under this Consent Decree.

[F] If either Ohio or USDOE believes that a dispute is not a good faith dispute, or that a delay would pose or increase a threat of harm to the public or the environment, either party may petition the Court for relief without following the dispute resolution procedures of this paragraph 12.4.

12.5 The pendency of any dispute under this section shall not affect USDOE's responsibility for timely performance of the work required by this Consent Decree, except that the time period for completion of work affected by such dispute shall be extended for a period of time not to exceed the actual time taken to resolve any good faith dispute in accordance with the procedures specified herein if the delay will not pose or increase a threat of harm to the public and the environment and if the parties agree that the performance of such work could not

reasonably continue during the pendency of such dispute. All elements of the work required by this Consent Decree which are not affected by the dispute shall continue and be completed in accordance with the work plan schedule.

12.6 Within thirty (30) days of resolution of any dispute, USDOE shall incorporate the resolution and final determination into the appropriate plan, schedule or procedures and proceed to implement this Consent Decree according to the amended plan, schedule or procedures.

12.7 In the case of a dispute under this Section which involves any potential conflict with USDOE's actions under the 3008(h) Order (including but not limited to cleanup standards, investigation methods, timetables and remedial actions), a representative from U.S. EPA shall be invited to participate in the dispute resolution committees and all preceding phases of dispute resolution.

12.8 Resolution of a dispute pursuant to this section of the Consent Decree constitutes a final resolution of any dispute arising under this Consent Decree.

12.9 In any dispute subject to dispute resolution, the parties may by written agreement modify the procedures of Paragraphs 12.1 through 12.8 above, including but not limited to an extension or shortening of the times therein or the waiver of any provision set forth herein.

XIII. ACCESS

13.1 USDOE shall provide access to PORTS to Ohio EPA for the purpose of monitoring, sampling and observing activities carried out under this Consent Decree. Ohio EPA agrees that it will comply with all statutes, rules and regulations for personnel safety and site security. This paragraph shall not be construed to eliminate or restrict any State right to seek access to PORTS which it may otherwise have under Federal or State law.

13.2 To the extent that activities required by this Consent Decree must be carried out on property other than USDOE's property, USDOE shall use its best efforts to obtain access rights from those property owners which shall provide for reasonable access for USDOE, Ohio EPA and their authorized representatives. In the event that USDOE is unable to obtain such access rights, USDOE shall promptly notify Ohio EPA of its inability to reach such agreement and USDOE's efforts to obtain such agreements.

XIV. PERMITS AND APPROVALS

14.1 The State of Ohio will use its best efforts to review in a timely manner, following USDOE application, any permits necessary for USDOE to carry out the work required pursuant to this Consent Decree.

XV. PAYMENTS AND PROJECTS

15.1 Divested Atomic shall pay to the State of Ohio in full and final settlement of disputed claims brought by the State of Ohio against Divested Atomic in this action, the sum of One

Hundred Twenty-Five Thousand Dollars ($125,000.00) by certified check or by wire transfer payable to the order of "Treasurer, State of Ohio" for deposit into the "Hazardous Waste Cleanup Fund." This sum shall be paid pursuant to the following schedule:

[A]. Twenty-Five Thousand Dollars ($25,000.00) within thirty (30) days from the entry of this Consent Decree;

[B]. Twenty-Five Thousand Dollars ($25,000.00) on or before January 1, 1990; and

[C]. Seventy-Five Thousand Dollars ($75,000.00) on or before January 1, 1991.

These payments, if made by check, shall be delivered to Jennifer Tiell or her successor on the Legal Staff of Ohio EPA, or to another Ohio EPA employee if directed in writing by the State.

15.2 USDOE shall perform the following projects in conjunction with its activities at PORTS, provided, that USDOE shall not be required to expend more than a total of two hundred thousand dollars ($200,000) in completing these projects, although it may expend more funds at its discretion. USDOE and Ohio EPA have agreed to list the projects in descending order of priority, so that USDOE will concentrate its efforts on completion of the higher priority project before performing the project with the next highest priority.

[A]. Develop a wetland wildlife habitat of approximately twenty (20) acres on the site presently

occupied by the water treatment sludge unit at PORTS identified as X-611A. USDOE shall plan and construct the wetland wildlife habitat in consultation with Ohio EPA.

The parties agree, and USDOE admits for the purposes of 42 U.S.C. § 1344, that after the wetland area is created it will be a "water of the United States" or a "navigable water" as defined at 42 U.S.C. § 1362 (7), and thus subject to the restrictions and permit requirements of 42 U.S.C. § 1344. USDOE shall provide thirty (30) days written notice to Ohio EPA prior to applying for any permit under § 1344.

[B]. Perform a feasibility study for developing a wetland wildlife habitat on the site presently occupied by the water treatment sludge unit at PORTS identified as X-611B, and, if feasible, USDOE shall develop such habitat in consultation with Ohio EPA.

The parties agree, and USDOE admits for the purposes of 42 U.S.C. § 1344, that after the wetland area is created it will be a "water of the United States" or a "navigable water" as defined at 42 U.S.C. § 1362 (7), and thus subject to the restrictions and permit requirements of 42 U.S.C. § 1344. USDOE shall provide thirty (30) days written notice to Ohio EPA prior to applying for any permit under § 1344.

[C]. Provide nuclear emergency response training, for up to thirty (30) Ohio EPA inspectors, conducted by an authority recognized in this field. The purpose of this training is to prepare the inspectors to respond

to nuclear emergencies and to protect themselves from injury during these response activities.

[D]. Perform DRASTIC mapping of the groundwater resources in Pike County and other counties designated by Ohio EPA, using the procedures specified by Ohio EPA.

[E]. Present hazardous waste management seminars for small quantity generators of hazardous waste, in a manner approved by Ohio EPA.

[F]. Provide to Ohio EPA portable equipment for use in the surveillance of penetrating radiation and surface radioactive contamination. USDOE shall provide training for up to thirty (30) persons for the use of this equipment. For a period of two (2) years, USDOE shall provide maintenance and repair of the equipment and quarterly calibrations at PORTS for the equipment.

[G]. Perform other projects mutually acceptable to USDOE and Ohio EPA.

XVI. RESOLUTION OF INCONSISTENCIES

16.1 Should USDOE identify any inconsistency between any of the laws, rules, regulations, guidance or orders which will affect any of the work required by this Consent Decree, USDOE shall provide written identification to Ohio EPA of each such inconsistency, a description of its effect on the work to be performed, and USDOE's recommendation, along with the rationale for each recommendation, as to which requirement should be followed. USDOE shall implement the affected work based upon

Ohio EPA's direction in resolving any such inconsistencies, except in the case of inconsistencies between federal and state requirements, in which case USDOE and Ohio will attempt to resolve the dispute pursuant to the dispute resolution procedures in Section XII. If they are unable to reach agreement, then both reserve their rights to seek judicial review of the dispute.

XVII. NOTICE

17.1 All submissions and notifications made under this Consent Decree shall be sent to the following:

For USDOE:

Director, Enriching Operations Division United States Department of Energy
200 Administrative Road (Courier or Express Mail)
P.O. Box 2001 (Mailing Address)
Oak Ridge, Tennessee 37831-8651

DOE Site Manager
Portsmouth Gaseous Diffusion Plant
3930 U.S. Rt. 23 (Courier or Express Mail)
P.O. Box 628 (Mailing Address)
Piketon, Ohio 45661

For Ohio EPA:

Chief
Division of Solid and Hazardous Waste Management
Ohio Environmental Protection Agency
1800 Watermark Drive
Columbus, Ohio 43266-0149

and

Project Coordinator, Piketon Facility
Ohio Environmental Protection Agency
Southeast District Office
2195 Front Street
Logan, Ohio 43138

USDOE or Ohio EPA may change the person to whom notice shall be sent by sending written notification of the change to the other party.

XVIII. RELEASES

18.1 The State hereby releases, covenants not to sue and not to bring any action, whether civil, criminal or for administrative findings and orders, against Divested Atomic Corporation ("Divested Atomic"), Goodyear Atomic Corporation ("Goodyear"), Martin Marietta Energy Systems, Inc. ("Marietta"), the United States or any department or agency thereof, or any past or present officer, director, official, employee, agent, or contractor (and any past or present official, officer, director, employee, agent or sub-contractor of such contractor), of Divested, Goodyear, Marietta, or the United States, with respect to the claims contained in the Complaint and all claims under O.R.C. Chapter 3734 at Ports known to OEPA at the time this action is filed. The parties agree that this Consent Decree supersedes the Ohio EPA Director's Findings and Orders issued November 22, 1988.

18.2 By executing this Consent Decree, the State of Ohio expressly reserves for further action or enforcement and does not discharge, release, or in any way affect any right, demand, claim, or cause of action which it has, or may have against any person or entity not released in paragraph 18.1 above.

18.3 The parties agree to cooperate with each other in identifying other potential sources of contamination which may affect PORTS or the surrounding area.

XIX. COMPLIANCE

19.1 Except as specifically set forth in this Consent Decree, USDOE shall not be excused from compliance with any

applicable federal and state laws in carrying out the provisions of this Consent Decree. USDOE agrees to advise the State of Ohio of its efforts to obtain the appropriated funding necessary to implement this Consent Decree. If appropriated funds necessary to fulfill an obligation under this Consent Decree are not available, the parties agree to utilize the dispute resolution procedures of Paragraphs 12.2 and 12.4 [A]-[D] to discuss whether the state will, in its sole discretion, agree to make appropriate adjustments to the action dates for obligations which require the payment or obligation of such funds. If no agreement is reached, the State of Ohio and USDOE agree that in any judicial proceeding seeking to enforce the terms of this Consent Decree and/or to find USDOE in contempt for failure to comply or for delay in compliance with such terms, USDOE may raise as a defense that its failure or delay was caused by circumstances beyond its control or that such failure or delay was caused by the unavailability of appropriated funds. While the State of Ohio disagrees that such defenses exist, the parties do agree and stipulate that it is premature at this time to raise and adjudicate the existence of such defenses. This paragraph 19.1 does not constitute a waiver by USDOE of its position that its obligations under this Consent Decree are subject to the provisions of the Anti-Deficiency Act, 31 U.S.C. § 1341, nor does it constitute a waiver by the state of its position that USDOE's obligations under this Consent Decree are not subject to the Anti-Deficiency Act.

XX. USE OF DECREE

20.1 This Consent Decree was negotiated and executed by the parties in good faith to avoid expensive and protracted litigation and is a settlement of claims which were vigorously contested, denied and disputed as to validity and amount. The execution of this Consent Decree is not an admission of liability with regard to any issue dealt with in this Consent Decree. Accordingly, it is the intention of the parties, the parties hereby agree, and the Court orders, that with the exception of this proceeding, any proceeding to adjudicate a permit application (but only to the extent necessary to prove the requirements of the Consent Decree), any proceeding to determine whether the wetlands referred to in paragraph 15.2 are subject to 42 U.S.C. § 1344, and any other proceeding brought by the parties to enforce this Consent Decree, to the extent the parties can bind themselves and others, this Consent Decree shall not be admissible in any judicial or administrative proceeding whether civil or criminal, or in state or federal court, and regardless of whether the gravamen of such action or proceeding is based in tort, contracts or statute:

XXI. EFFECTIVE AND TERMINATION DATES

21.1 This Consent Decree shall be effective upon the date of its entry by the Court.

21.2 This Consent Decree shall terminate upon completion of the mandatory relief ordered herein, or upon the passage of five (5) years from its effective date, whichever is later.

XXII. MISCELLANEOUS

22.1 USDOE shall require that all of its contractors managing PORTS comply with applicable hazardous waste, water pollution, solid waste and PCB laws and the provisions of this Consent Decree.

22.2 Without predetermining whether or not the President can exempt the facility from any provisions of this Consent Decree, nothing in this Consent Decree shall preclude, restrict or expand any right or authority of the President of the United States contained in 33 U.S.C. § 1323 or 42 U.S.C. § 6961.

22.3 The Court shall maintain jurisdiction over this Consent Decree for the purpose of enabling the parties to apply to the Court for any further orders that may be necessary to construe, carry out, or enforce compliance with the terms and conditions set forth in this Consent Decree.

ENTERED THIS 31st DAY OF AUGUST, 1989

George C. Smith
UNITED STATES DISTRICT JUDGE

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ON BEHALF OF THE PARTIES (CONT.)

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EXHIBIT A

STATEMENT OF WORK
FACILITY INVESTIGATION/CLEANUP ALTERNATIVES STUDY

FACILITY INVESTIGATION

PURPOSE:

The purpose of this facility investigation is to determine the nature and extent of the problem at the site and off-site and to gather all necessary data to support the cleanup alternatives study. US DOE shall furnish all personnel, materials, and services necessary for, or incidental to, performing the facility investigation at the site.

SCOPE:

The facility investigation consists of seven tasks:

Task 1 --- Description of Current Situation

Task 2 --- Investigation Support

Task 3 --- Site Investigations

Task 4 --- Site Investigation Analysis

Task 5 --- Laboratory and Bench-Scale Studies

Task 6 --- Final Report

Task 7 --- Additional Requirements

[Task 1 -- DESCRIPTION OF CURRENT SITUATION]

US DOE shall describe the background of the site and its problems and outline the purpose and need for facility investigation of the site. Data gathered during previous investigations, site inspections, and other relevant activities shall be used. Previous investigations shall be summarized and referenced.

a. Site Background. Prepare a summary of the regional location, pertinent area boundary features, and general site physiography, hydrology, geology, and current and historic land and water use. The total area of the site and the general history relative to the use of the site for hazardous wastes, pollutants, industrial wastes or other wastes activity should be defined.

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By: Mary Carr Date 11-22-88

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b. Nature and Extent of Problem. Prepare a summary of actual and potential on-site and off-site health and environmental effects. This summary shall include: [the evaluation performed under Section 3b of the Findings and Orders] the types, physical states, and amounts of hazardous wastes, pollutants, industrial wastes or other wastes; the existence and condition of drums, tanks, landfills, surface ponding, and other containers; affected media and pathways of exposure; contaminated releases such as leachate and runoff; and any human or environmental exposure. Emphasis shall be placed on describing the threat or potential threat to public health and the environment.

c. History of Response Actions. Prepare a summary of any response actions conducted by Federal, State, local, or private parties. This summary shall include field inspections, sampling surveys, cleanup activities, and other technical investigations.

TASK 2 -- INVESTIGATION SUPPORT

US DOE shall conduct preliminary work necessary to scope and conduct the site investigations and cleanup alternatives study.

a. Safety Plan. A safety plan shall be developed to protect the health and safety of personnel involved in the site investigations and the surrounding community. The plan will be consistent with:

EPA Order 1440.3 -- Respiratory Protection

EPA Order 1440.2 -- Health and Safety Requirements for Employees Engaged in Field Activities

EPA Occupational Health and Safety Manual

EPA Interim Standard Operating Safety Procedures and other EPA guidance as developed by EPA

Site Conditions

The Safety Plan should identify problems or hazards that may be encountered and their solution. Safety procedures to be followed to protect third parties, such as visitors or the surrounding community, should also be provided.

b. Define Boundary Conditions. Establish site boundary conditions to limit the area of facility investigations. The boundary conditions shall be set so that subsequent investigations will cover the contaminated media in sufficient detail to support

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following activities, e.g. cleanup alternatives study. Boundary conditions will also be used to identify boundaries for site access control and site security.

c. Site Map. Prepare a site map showing all wetlands, surface water features, tanks, buildings, utilities, paved areas, easements, right-of-ways, and other features. The map shall be of sufficient detail and accuracy to locate all current or future work performed at the site.

d. Community Relations Plan. Prepare a plan, based on discussions with responsible local and State officials and interested community leaders, for the dissemination of information to the public regarding investigation and cleanup alternatives study activities and results. Opportunities for comment and input by citizen, community and other groups must also be identified and incorporated into the plan.

e. Pre-Investigation Evaluation. Prior to starting any facility investigations, US DOE shall assess the site conditions to identify potential cleanup technologies applicable to the site and associated data needed to evaluate alternatives based on these technologies for the cleanup alternative studies. A report shall be prepared for State review identifying broad categories of cleanup technologies that may be applicable to the site and data needs.

TASK 3 -- SITE INVESTIGATIONS -

US DOE shall conduct investigations necessary to characterize the site and its actual or potential hazards to public health and the environment, both on-site and off-site. The investigations shall produce sufficient data to assess cleanup alternatives and support the detailed evaluation of alternatives during the cleanup alternatives study.

a. US DOE shall prepare and submit for State review and concurrence a detailed work plan outlining data needs for characterizing the site and for support of the cleanup alternative studies. The work plan shall include an outline of proposed investigation activities, a time schedule, personnel and equipment requirements. The work plan shall also include a sampling plan indicating rationales for sampling activities, location, quantity; and frequency of sampling, sampling and analysis methods, constituents for analysis, and quality assurance procedures. In addition to these general sampling plan elements, other requirements will be identified in the following subtasks as they apply.

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All sample analyses will be conducted at laboratories following EPA protocols while following strict chain-of-custody procedures.

1. Chain-of-Custody. Any field sampling collection and analysis conducted shall be documented in accordance with chain-of-custody procedures as employed by EPA. US DOE shall prepare and submit as part of the work plan a description of the chain-of-custody procedures to be used.

2. Quality Assurance/Quality Control (QA/QC). US DOE shall prepare and submit as part of the work plan a Quality Assurance Project Plan for the sampling, analysis, and data handling aspects of the facility investigation. The plan shall address the following points:

   a) QA Objectives for Measurement Data, in terms of precision, accuracy, completeness, representativeness, and comparability.

   b) Sampling Procedures

   c) Sample Custody

   d) Calibration Procedures, References, and Frequency

   e) Internal QC Checks and Frequency

   f) QA Performance Audits, System Audits, and Frequency

   g) QA Reports to Management

   h) Preventive Maintenance Procedures and Schedule

   i) Specific procedures to be used to routinely assess data precision, representativeness, comparability, accuracy, and completeness of specific measurement parameters involved.

   j) Corrective Action

b. Waste Characterization. Develop and conduct a complete sampling and analysis program to supplement existing data and to physically and chemically characterize all potentially hazardous wastes, pollutants, industrial wastes or other wastes at the site. This activity should include identification of the location and probable quantities of subsurface wastes using appropriate methods.

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By: Mary Corrin Date 11-22-88

The sampling plan developed for this subtask shall address incompatibility testing of wastes (tank and drum opening procedures if necessary). Wastes shall be analyzed and grouped in compatibility classes to support any subsequent conclusions about segregating wastes on-site and developing cleanup alternatives.

As part of this subtask, all containers of hazardous wastes, pollutants, industrial wastes or other wastes such as drums, tanks, piles, abandoned vehicles, etc. must be located on the site map. The physical condition size, type and contents of the containers shall be described.

c. Hydrogeologic Investigation. Develop and conduct a program to determine the present and potential extent of groundwater contamination. A sampling program shall be developed to determine the location of water bearing strata and other subsurface geologic features, groundwater flow direction, vertical and horizontal distribution of contaminants, background levels of contamination, and the ability of the facility and local geology to control or contain the contaminants. Long-term disposition of contaminants will be evaluated based on mobility of the contaminants, attenuation capacity of local soils and other geologic features, regional flow direction and quantity, effects of local pumping, and the presence of discharge/recharge areas. Computer models of flow and contaminant transport may be used to demonstrate conclusions reached as a result of this investigation and predict effects of future cleanup actions.

The sampling plan developed for this subtask shall define the type of well construction and any geophysical or modeling techniques proposed.

d. Soils Investigation. Develop and conduct a program to determine the nature and vertical and horizontal extent of contamination of surface and subsurface soils. Cores from groundwater monitoring wells may serve as soils samples.

e. Surface Water and Sediments Investigation. Develop and conduct a program to determine the nature and extent of contamination of surface water and sediments. This program shall also evaluate the impacts of the contaminants on the floral and faunal communities in the surface water, sediments, and any adjacent wetlands.

f. Air Investigation. Develop and conduct a program to determine the nature and extent of on-site and off-site contamination. This program shall also address the tendency of the substance identified through Waste

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Characterization to enter and disperse in the atmosphere, considering seasonal weather conditions and wind patterns.

The above tasks should be summarized in a single sampling plan which is to be included in the detailed work plan. (Other categories of investigations may be needed for specialized problems. These could include additional biological or radiological investigations.)

TASK 4 -- SITE INVESTIGATION ANALYSIS

US DOE shall prepare a thorough analysis and summary of all site investigations and their results. The objective of this task will be to ensure that the investigation data are sufficient in quality and quantity to adequately describe the nature and extent of contamination and to support the cleanup alternatives study.

The results and data from all site investigations shall be organized and presented logically so that the relationships between facility investigations for each media are apparent.

a. Data Analysis. Analyze all site investigation data and develop a summary of the type and extent of contamination at the site. This analysis shall include all significant pathways of contamination and an exposure assessment. The exposure assessment shall describe any actual or potential threats to public health, welfare, and the environment.

b. Application of Potential Cleanup Technologies. Analyze the results of the site investigations in relation to the potential cleanup technologies applicable to the site. This analysis will determine the adequacy of data quality and quantity to support the cleanup alternatives study and will identify any additional data needs.

TASK 5 -- LABORATORY STUDIES AND BENCH-SCALE STUDIES (As Required)

US DOE shall conduct any necessary laboratory and bench scale treatability studies required to evaluate the applicability of cleanup technologies, e.g., leachate treatment, groundwater treatment, compatibility of waste-leachate with liners, cover, or other materials proposed for use in the remedy. The scope of this Task will depend on the results of Task 4. US DOE will submit a separate work plan for any proposed laboratory studies for State concurrence.

TASK 6 -- FINAL REPORT

US DOE shall prepare a final report covering the facility investigations and submit copies to the Ohio EPA. The report shall include the results of Tasks 1 through 4.

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TASK 7 -- ADDITIONAL REQUIREMENTS

a. Reporting Requirements. Monthly Technical Progress Reports are required of US DOE./

Content. For each on-going work assignment, US DOE shall submit progress reports with the following elements:

1. Identification of site and activity.
2. Status of work at the site and progress to date.
3. Percentage of completion.
4. Difficulties encountered during the reporting period.
5. Actions being taken to rectify problems.
6. Activities planned for the next month.
7. Changes in personnel.

The monthly progress report will list target and actual completion dates for each element of activity including project completion and provide an explanation of any deviation from the milestones in the work plan schedule./

CLEANUP ALTERNATIVES STUDY

PURPOSE

The purpose of the cleanup alternatives study is to develop and evaluate cleanup alternatives for the facility.

US DOE shall furnish the necessary personnel, materials, and services required to prepare the cleanup alternatives study.

SCOPE

The cleanup alternatives study consists of ten tasks.

Task 8 -- Description of Current Situation

Task 9 -- Work Plan

Task 10 -- Development of Alternatives

Task 11 -- Initial Screening of Alternatives

Task 12 -- Detailed Analysis of Alternatives

Task 13 -- Evaluation and Selection of Preferred Alternative

Task 14 -- Final Report

Task 15 -- Additional Requirements

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TASK 8 -- DESCRIPTION OF CURRENT SITUATION

Any changes to the description of the current situation from Task 1 shall be presented. Justification for changes must be based on results of the facility investigation.

A site-specific statement of purpose for the response, based on the results of the facility investigation, should be presented. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by cleanup alternatives. This statement of purpose shall be submitted to Ohio EPA for concurrence before continuing the remaining tasks of the Cleanup Alternatives Study.

TASK 9 -- WORK PLAN

A work plan that includes a detailed technical approach, personnel requirements, and schedules shall be submitted to Ohio EPA for review and concurrence for the proposed cleanup alternatives study.

TASK 10 -- DEVELOPMENT OF ALTERNATIVES

Based on the results of the facility investigation, US DOE shall develop a limited number of alternatives for source control or off-site cleanup actions, or both, on the basis of objectives established for the response.

a. Establishment of Cleanup Objectives

Establish site-specific objectives for the response based on public health and environmental concerns, information gathered during the facility investigation, and the requirements of any applicable Federal or State statutes. Preliminary cleanup objectives shall be developed in consultation with and for concurrence by Ohio EPA.

b. Identification of Cleanup Technologies

Based on the cleanup objectives established above and the statement of purpose identified in Task 8, identify appropriate cleanup technologies as a basis for the development of cleanup alternatives. These technologies shall be identified on a media-specific basis, although consideration should be given to the interrelationship of the media. The technologies should be able to meet the response objectives. The list of potential cleanup technologies developed in Task 2e and Task 4b shall be considered a master list of applicable technologies that may prove extremely difficult to implement, will require unreasonable time periods to implement, or will rely on insufficiently developed technology.

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c. Identification of Cleanup Alternatives

Develop alternatives to incorporate cleanup technologies, cleanup objectives, and other appropriate considerations into a comprehensive, site-specific approach.

There may be a no-action alternative, or there may be overlap among the alternatives developed. All alternatives must meet the requirements of all applicable State and Federal environmental laws including permitting requirements. Alternatives shall be developed in close consultation with Ohio EPA.

TASK 11 -- INITIAL SCREENING OF ALTERNATIVES

The alternatives developed in Task 10 shall be screened by US DOE to eliminate alternatives, prior to detailed analysis, that are clearly not feasible or appropriate. All decisions made as a part of this screening of alternatives should be documented.

The following consideration shall be used as a basis for the initial screening:

1) Effects of the Alternative. Only those alternatives that effectively contribute to protection of public health, welfare, and the environment will be considered further. Any alternatives that inherently present significant adverse effects will be excluded from further consideration.

2) Acceptable Engineering Practices. Alternatives that may prove extremely difficult to implement, will not achieve the cleanup objectives in a reasonable time period, or that rely on unproven technologies will be excluded from further consideration.

TASK 12 -- DETAILED ANALYSIS OF ALTERNATIVES

US DOE shall prepare a detailed analysis of the alternatives that pass through the initial screening in Task 11.

This detailed analysis shall consist of the following elements:

a. Detailed Description

The detailed description of each remaining alternative shall include as a minimum:

1) Description of appropriate treatment and disposal technologies.

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2) Special engineering considerations required to implement the alternative, e.g., pilot treatment facility or additional studies needed to proceed with final cleanup design.

3) Operation, maintenance, and monitoring requirements of the completed cleanup.

4) Off-site disposal needs and transportation plans.

5) Temporary storage requirements.

6) Safety requirements for cleanup implementation, including both on-site and off-site health and safety considerations.

7) An analysis of how the alternative could be phased into individual operations and a discussion of how these operations could best be implemented, individually or in groups, to produce significant environmental improvement.

8) A review of any off-site treatment or disposal facilities to ensure compliance with applicable RCRA, TSCA and State requirements, both current and proposed.

9) An analysis of the projected performance and expected results of the alternative with emphasis on potential for further future release of hazardous wastes, pollutants, industrial wastes or other wastes.

b. Environmental Analysis

An Environmental Analysis (EA) shall be performed for each alternative including, as a minimum, an evaluation of each alternative's environmental effects, an analysis of measures to mitigate adverse effects, physical or legal constraints, and compliance with Federal and State regulatory requirements.

Each alternative will be analyzed in terms of the extent to which it will mitigate damage to, or protect, public health, welfare, and the environment, in comparison to the other cleanup alternatives.

c. Cost Analysis

The present worth cost of implementing each cleanup alternative (and each phase of the alternative) as well as the annual operating and maintenance cost shall be presented. The cost shall be provided as a total cost and on an annual cost basis.

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TASK 13 -- EVALUATION AND SELECTION OF PREFERRED ALTERNATIVE

Ohio EPA shall review the results of the detailed analysis of alternatives prepared under Task 12 and select the preferred alternative.

The following considerations shall be used as the basis for selecting the cost-effective alternative:

1. Reliability. The alternatives that minimize or eliminate the potential for release of waste into the environment will be considered more reliable than other alternatives.

2. Implementability. The alternatives most easily implemented shall be favored.

3. Effects of the Alternative. The alternatives posing the greatest improvement to (and least negative impact on) public health, welfare, and the environment will be favored.

4. Safety Requirements. The alternatives with the lowest adverse safety impacts shall be favored.

TASK 14 -- FINAL REPORT

A final report shall be prepared for submission to Ohio EPA, including the results of Task 8 through 13. Copies of the report shall be submitted to Ohio EPA.

TASK 15 -- ADDITIONAL REQUIREMENTS

Monthly Technical Progress Reports are required of US DOE. These documents are described in Task 7 of the facility investigation scope of work.

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By: [illegible] Date 11-22-88
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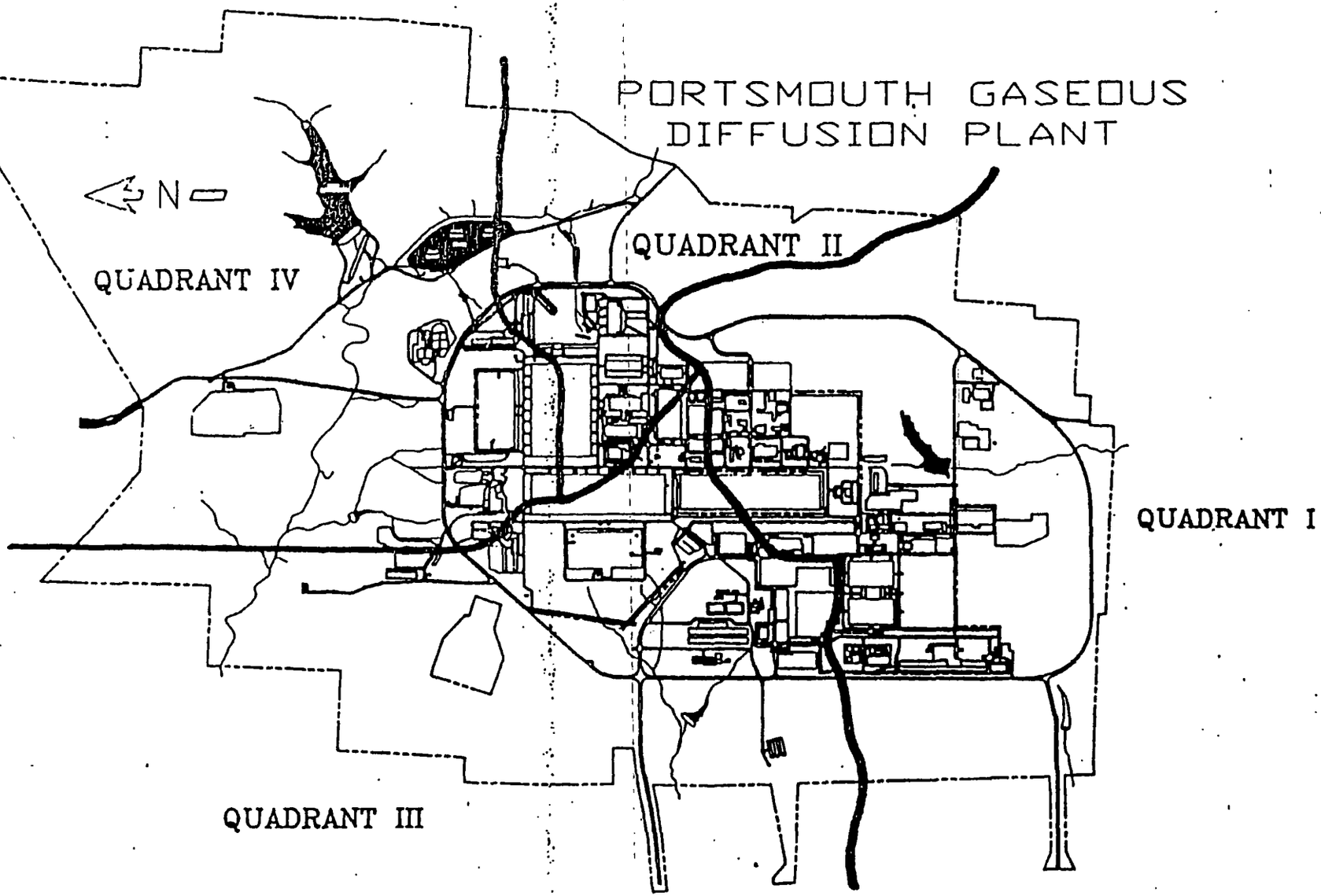
Schedule for Facility Investigation (FI)
and Cleanup Alternatives Study (CAS)

TASK	DEADLINE
Submission of General Workplan for Facility Investigation	15 Days From Effective Date of Orders
Quadrant 1: South and Southwest Regions*	**Quadrant 1**
(a) Submission of Quadrant I FI Workplan	(a) 1 month after approval of General Workplan, or 2/1/89 Whichever is later
(b) Submission of Quadrant I FI Report	(b) 12 months from approval of Quadrant I RI Workplan
(c) Submission of Quadrant I CAS Workplan	(c) 3 months from submission of Quadrant I RI Report
(d) Submission of Quadrant CAS Report	(d) 9 months from approval of Quadrant I CAS Workplan
Quadrant 2: East Region*	**Quadrant 2**
(a) Submission of Quadrant II FI Workplan	(a) 12 months from effective date of Orders
(b) Submission of Quadrant II FI Report	(b) 12 months from approval of Quadrant II RI Workplan
(c) Submission of Quadrant II CAS Workplan	(c) 3 months from submission of Quadrant II RI Report
(d) Submission of Quadrant CAS Report	(d) 6 months from approval of Quadrant II CAS Workplan
Quadrant 3: Northwest and West Regions*	**Quadrant 3**
(a) Submission of Quadrant III FI Workplan	(a) 18 months from effective date of Order
(b) Submission of Quadrant III FI Report	(b) 10 months from approval of Quadrant III RI Workplan
(c) Submission of Quadrant III CAS Workplan	(c) 3 months from submission of Quadrant III RI Report
(d) Submission of Quadrant CAS Report	(d) 5 months from approval of Quadrant III CAS Workplan
Quadrant 4: North and Northeast Regions*	**Quadrant 4**
(a) Submission of Quadrant IV FI Workplan	(a) 23 months from effective date of Order
(b) Submission of Quadrant IV FI Report	(b) 9 months from approval of Quadrant IV RI Workplan
(c) Submission of Quadrant IV CAS Workplan	(c) 3 months from submission of Quadrant IV RI Report
(d) Submission of Quadrant CAS Report	(d) 3 months from approval of Quadrant IV CAS Workplan

*As marked on attached map.



Quadrant Boundaries for PORTS RCRA Facility Investigations (RFI)

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SECTION K – OTHER FEDERAL LAWS

K-1 OTHER FEDERAL LAWS [3745-50-44] K-1

SUBMISSION DATE: SEPTEMBER 13, 2010

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SECTION K

OTHER FEDERAL LAWS

K-1 OTHER FEDERAL LAWS [3745-50-44]

The PORTS site is subject to all applicable federal laws.

CLEAN WATER ACT

An NPDES permit (0IO00000*JD) has been obtained for the site from the Ohio EPA. No discharges are associated with the container storage units.

CLEAN AIR ACT

All activities conducted in the container storage units are evaluated for compliance with the Clean Air Act on a case-by-case basis, and necessary permits are obtained from the Ohio EPA. No emissions are associated with the routine operations of the container storage units.

FISH AND WILDLIFE COORDINATION ACT

No body of water will be diverted or modified as a result of the operation of the container storage units, and therefore, the Fish and Wildlife Coordination Act is not applicable to this permit application.

WILD AND SCENIC RIVERS ACT

There will be no adverse effects on any wild or scenic rivers as a result of the operation of the container storage units, and therefore the Wild and Scenic Rivers Act is not applicable to this permit application.

ENDANGERED SPECIES ACT

No endangered species will be jeopardized or have its critical habitat adversely affected as a result of the operation of the container storage units, and therefore, the Endangered Species Act is not applicable to this permit application.

THE NATIONAL HISTORIC PRESERVATION ACT OF 1966

There will be no effect on any properties eligible to be listed on the National Register of Historic Places as a result of the operation of the container storage units, and therefore the National Historic Preservation Act of 1966 is not applicable to this permit application.

SUBMISSION DATE: SEPTEMBER 13, 2010

THE COASTAL ZONE MANAGEMENT ACT

The PORTS facility is not in a coastal zone, and therefore the Coastal Zone Management Act is not applicable to this permit application.

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

PORTS is subject to NESHAP regulations (40 CFR 61). The U.S. EPA Region V has oversight responsibility and permitting authority for NESHAP regulations. All NESHAP related reports are sent to U.S. EPA Region V.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT

Compliance with the Superfund Amendments and Reauthorization Act (SARA) regulations is coordinated with other environmental regulations, including RCRA, CAA, and CWA. Material inventories, material usage, waste inventories, waste treatment, waste shipments, and chemical releases are tracked for emergency release notifications and inclusion in the annual SARA reports submitted to the U.S. EPA and Ohio EPA. Environmental specialists review the aforementioned data for technical accuracy.

NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act (NEPA) requires evaluation of environmental impacts for proposed activities at federal facilities and for activities funded with federal dollars. All activities conducted in the container storage units are evaluated in accordance with NEPA.

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SECTION L – ORGANIC AIR EMISSIONS

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L-2 SPECIFIC PART B INFORMATION REQUIREMENTS FOR EQUIPMENT L-1

L-3 SPECIFIC PART B INFORMATION REQUIREMNETS FOR FACILITIES THAT STORE HAZARDOUS WASTE IN CONTAINERS L-1

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SECTION L

ORGANIC AIR EMISSIONS

L-1 SPECIFIC PART B INFORMATION REQUIREMENTS FOR PROCESS VENTS

The Portsmouth Gaseous Diffusion Plant (PORTS) does not have any equipment of the listed types that are used to recycle, recover, or reprocess hazardous wastes; therefore, PORTS does not have any equipment which is subject to Subpart AA.

L-2 SPECIFIC PART B INFORMATION REQUIREMENTS FOR EQUIPMENT

PORTS does not have any equipment of the listed types which contains or contacts hazardous wastes containing at least 10 percent organics; therefore, PORTS does not have any equipment which is subject to Subpart BB.

L-3 SPECIFIC PART B INFORMATION REQUIREMENTS FOR FACILITIES THAT STORE HAZARDOUS WASTE IN CONTAINERS

The container storage units are facilities used solely for the management of radioactive mixed waste in accordance with the applicable regulations under the authority of the Atomic Energy Act and the Nuclear Waste Policy Act; therefore, the units are not subject to Subpart CC requirements.

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SECTION M – RECORDKEEPING

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SECTION M

RECORDKEEPING

M-1 GENERAL REQUIREMENTS OF A MANIFEST [3745-52-20, 3745-52-21, 3745-52-22, AND 3745-52-23]

PORTS completes offsite hazardous waste shipments and prepares a uniform hazardous waste manifest for each shipment. The following manifest activities are completed by PORTS:

- Sign the manifest certification by hand
- Obtain the handwritten signature of the initial transporter and date of acceptance on the manifest
- Retain one copy of the manifest and give the other copies to the transporter
- For rail shipments send at least three copies of the manifest dated and signed to the following as appropriate:

  (1) The next non-rail transporter, if any
  (2) The designated facility if transported solely by rail, or
  (3) The last rail transporter to handle the waste in the state of Ohio if transported by rail.

- For shipments of hazardous waste to a designated facility in another state that is authorized pursuant to 40 CFR Part 271 but has not yet obtained authorization to regulate that particular waste as hazardous, PORTS will assure that the designated facility agrees to sign and return the manifest to PORTS and that any out-of-state transporter signs and forwards the manifest to the designated facility.

M-2 USE OF A MANIFEST SYSTEM [3745-54-71, 3745-54-72 AND 3745-54-76]

Currently PORTS does not accept any hazardous waste for treatment, storage or disposal from offsite locations. PORTS may accept treatment residues returned as a result of treatment of its wastes. PORTS will maintain a manifest tracking system for each incoming shipment. The following information will be verified before PORTS signs the manifest accepting the residue for storage:

- Information on the Hazardous Waste Manifest
- The quantity or type of hazardous waste designated on the manifest or shipping paper (i.e. for bulk waste, variations greater than 10% and for batch waste, any variation in the count)
- Evidence of tampering
- LDR Notification
- Treatment Standards
- Laboratory analysis confirming the LDR determination

- Back-up laboratory analysis that confirms any other hazardous designations attached to the waste (i.e. because of incineration, heavy metals may have concentrated in the waste, thus causing the residue to become a TCLP characteristic waste).

If a significant discrepancy is found (i.e. number of drums does not match the manifest, weight of bulk waste is not within 10% of weight on manifest, evidence of tampering is present, etc.), PORTS will contact appropriate personnel to resolve the discrepancy (i.e. by telephone). If the discrepancy is not resolved in 15 days, PORTS will immediately submit to the director a letter describing the discrepancy and all attempts to resolve it, as well as a copy of the manifest and/or shipping paper at issue.

M-3 OPERATING RECORD [3745-54-73 AND 3745-54-74]

PORTS maintains a written operating record for all hazardous waste management activities at the permitted storage units, as required by 3745-54-73 and Appendix I, Record Keeping Instructions. The operating record contains the information, as it becomes available, regarding the description, quantity, location and characteristics of the hazardous waste generated at the facility; records and results of waste analyses; the methods and dates of storage; the information required in the notice (except the manifest number) required by 3745-59-07; inspection logs; ground water monitoring data; summary reports and details of all incidents that require implementing the contingency plan; certification of a program to reduce the volume and toxicity of hazardous waste generated; and reports to regulatory agencies.

The information in the operating record will be maintained until closure of the hazardous wastes units at which time the information will be archived. The records and results of inspections required by 3745-54-15 (D) will be kept for at least three years from the date of inspection. The information in the operating record is available for inspection at all reasonable times.

SECTION N
CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U.S. Department of Energy

Owner and Operator

_____ 9/13/10

Site Manager Date Signed

LATA/Parallax Portsmouth LLC

Co-Operator

BY: _____ 08/11/2010

Project Manager Date Signed

The Department of Energy has signed this application for the permitted facility as owner and operator and LATA/Parallax Portsmouth LLC has signed as co-operator. The Department has determined that dual signatures best reflect the actual apportionment of responsibility under which the Department's RCRA responsibilities are for policy, programmatic, funding and scheduling decisions, as well as general oversight; and, the contractor's RCRA responsibilities for day-to-day operations, (in accordance with general directions given by DOE as part of its general oversight responsibility), including but not limited to, the following responsibilities: waste analysis and handling, monitoring, record keeping, reporting, and contingency planning. For purposes of the certification required by OAC 3745-50-42(D), the DOE and LATA/Parallax Portsmouth LLC representatives certify, to the best of their knowledge and belief, the truth, accuracy and completeness of the application for their respective areas of responsibility.

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DOE/PPPO/03-0140&D0

RCRA Part B Permit Renewal Application

At the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Volume 2.
Appendices C-1 & C-2
Documentation Supporting Characterization

This document is approved for public release per review by:

Henry H. Thomas 07/14/2010

PORTS Classification/Information Office Date

SUBMISSION DATE: SEPTEMBER 13, 2010

APPENDICES C-1 & C-2

DOCUMENTATION SUPPORTING CHARACTERIZATION

SUBMISSION DATE: SEPTEMBER 13, 2010

SUBMISSION DATE: SEPTEMBER 13, 2010

APPENDIX C-1

WASTE STREAM ANALYTICAL REPORTS

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Waste Stream Number: PW – 201

Waste Stream Title: Debris

PW-201

Paper, Plastic, and Personal Protective Equipment

S.M. STOLLER CORP.

1

INORGANIC ANALYSES DATA SHEET

STOL SAMPLE NO.

PW201-MET-1

Lab Name: SOUTHWEST_RESEARCH_INSTIT Contract:12474.05.00X

Lab Code: SWRI__ Task Ord:100710-2 SRR No.: 41538_ SDG No.: 436192

Matrix (soil/water): SZ___ Lab Sample ID: 436192

Level (low/med): LOW__ Date Received: 07/10/10

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.3			P
7440-39-3	Barium	5.8			P
7440-43-9	Cadmium	0.48	U		P
7440-47-3	Chromium	4.5			P
7439-92-1	Lead	4.1		*	P
7439-97-6	Mercury	0.019	U		CV
7782-49-2	Selenium	0.96	U		P
7440-22-4	Silver	0.48	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

_____

_____

_____

_____

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Technetium-99 Result (pCi/g)	Q	TPU (pCi/g)	Rh103 Internal Std Rec	Date Analyzed
Prep Blank	pbwg12cm3	0.0195	U	1.25	69.6%	07/14/10
Lab Control	lcswg12cm4	92.6		15.6	91.6%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Prep Blank 2	pbwg13cm1	-0.0844	U	1.25	46.4%	07/14/10
Lab Control 2	lcswg13cm1	90.3		15.4	86.1%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	90.3%		-----	-----	-----
PW201-RAD-1	436196	3.04		1.28	62.9%	07/14/10
Duplicate result	436196D	3.49		1.27	71.1%	07/14/10
RPD	-----	13.8%		-----	-----	-----
Spike result	436196S	95.0		15.6	99.5%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Spike Duplicate result	436196SD	96.4		15.7	101%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	94.0%		----	----	-----
PW201-RAD-2	436197	7.62		1.43	81.9%	07/14/10
PW201-RAD-3	436198	6.94		1.43	80.7%	07/14/10
PW201-RAD-4	436199	0.393	U	1.16	73.7%	07/14/10
PW202-RAD-1	436214	6.13		1.35	85.1%	07/14/10
PW205-RAD-1	436217	1580		158	114%	07/14/10
PW207-RAD-1	436222	234		23.4	82.6%	07/14/10
PW201-RAD-5	436601	7.66		1.43	55.5%	07/14/10
PW204-RAD-1	436607	27.6		5.93	48.6%	07/14/10

Reporting Limit: 2.50 pCi/g
Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Total Uranium Result (ug/g)	Q	TPU (ug/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.00153	U	0.00101	72.1%
Lab Control	lcswg12cm5	7.90		0.790	84.3%
True Value	-----	7.48		-----	-----
Recovery	-----	105.6%		-----	-----
Prep Blank 2	pbwg12cm5	0.00642		0.00210	72.0%
Lab Control 2	lcswg12cm7	15.3		1.53	86.6%
True Value	-----	15.0		-----	-----
Recovery	-----	102.0%		-----	-----
Prep Blank 3	pbwg12cm2	0.000316	U	0.00200	113%
Lab Control 3	lcswg12cm2	15.4		1.54	80.2%
True Value	-----	15.0		-----	-----
Recovery	-----	102.7%		-----	-----
Prep Blank 4	pbwg13cm2	0.000348	U	0.00100	66.7%
Lab Control 4	lcswg13cm2	7.95		0.795	83.1%
True Value	-----	7.48		-----	-----
Recovery	-----	106.3%		-----	-----
PW201-RAD-1	436196	4.11		0.412	86.1%
Duplicate result	436196D	4.41		0.441	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	12.9		1.29	85.2%
Spike added	-----	7.05		-----	-----
Recovery	-----	124.7%		-----	-----
Spike Duplicate result	436196SD	10.9		1.09	84.2%
Spike added	-----	7.26		-----	-----
Recovery	-----	93.5%		----	----
PW201-RAD-2	436197	0.0957		0.00963	62.0%
PW201-RAD-3	436198	0.0283		0.00298	61.7%
PW201-RAD-4	436199	0.199		0.0199	61.8%
PW202-RAD-1	436214	3.47		0.347	71.0%
PW205-RAD-1	436217	186		18.6	86.0%
PW207-RAD-1	436222	2.52		0.253	67.7%
PW201-RAD-5	436601	0.0158		0.00183	47.2%
PW204-RAD-1	436607	4950		495	85.6%

Reporting Limit: 0.002 ug/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{238}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.000516	U	0.000340	72.1%
Lab Control	lcswg12cm5	2.63		0.263	84.3%
True Value	-----	2.50		-----	-----
Recovery	-----	105.2%		-----	-----
Prep Blank 2	pbwg12cm5	0.00215		0.000706	72.0%
Lab Control 2	lcswg12cm7	5.09		0.509	86.6%
True Value	-----	5.01		-----	-----
Recovery	-----	101.6%		-----	-----
Prep Blank 3	pbwg12cm2	0.0000918	U	0.000672	113%
Lab Control 3	lcswg12cm2	5.14		0.514	80.2%
True Value	-----	5.01		-----	-----
Recovery	-----	102.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.000103	U	0.000336	66.7%
Lab Control 4	lcswg13cm2	2.65		0.265	83.1%
True Value	-----	2.50		-----	-----
Recovery	-----	106.0%		-----	-----
PW201-RAD-1	436196	1.37		0.137	86.1%
Duplicate result	436196D	1.47		0.147	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	4.29		0.429	85.2%
Spike added	-----	2.35		-----	-----
Recovery	-----	124.3%		-----	-----
Spike Duplicate result	436196SD	3.62		0.362	84.2%
Spike added	-----	2.42		-----	-----
Recovery	-----	93.0%		-----	----
PW201-RAD-2	436197	0.0320		0.00322	62.0%
PW201-RAD-3	436198	0.00938		0.000992	61.7%
PW201-RAD-4	436199	0.0663		0.00664	61.8%
PW202-RAD-1	436214	1.16		0.116	71.0%
PW205-RAD-1	436217	61.2		6.12	86.0%
PW207-RAD-1	436222	0.836		0.0836	67.7%
PW201-RAD-5	436601	0.00527		0.000611	47.2%
PW204-RAD-1	436607	1651		165	85.6%

Reporting Limit: 0.000672 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{236}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.0572	U	0.0812	79.0%
Lab Control	lcswg12cm6	1170		117	86.5%
True Value	-----	1050		-----	-----
Recovery	-----	111.4%		-----	-----
Prep Blank 2	pbwg12cm5	0.00259	U	0.162	76.3%
Lab Control 2	lcswg12cm8	2150		215	85.0%
True Value	-----	2090		-----	-----
Recovery	-----	102.9%		-----	-----
Prep Blank 3	pbwg12cm2	0.00951	U	0.162	79.5%
Lab Control 3	lcswg12cm3	2130		213	91.2%
True Value	-----	2090		-----	-----
Recovery	-----	101.9%		-----	-----
Prep Blank 4	pbwg13cm2	0.00948	U	0.0810	78.0%
Lab Control 4	lcswg13cm3	1110		111	89.5%
True Value	-----	1050		-----	-----
Recovery	-----	105.7%		-----	-----
PW201-RAD-1	436196	0.0339	U	0.0801	97.6%
Duplicate result	436196D	0.0150	U	0.0805	93.0%
RPD	-----	0.00%		-----	-----
Spike result	436196S	1120		112	84.5%
Spike added	-----	1040		-----	-----
Recovery	-----	107.7%		-----	-----
Spike Duplicate result	436196SD	1110		111	83.1%
Spike added	-----	1020		-----	-----
Recovery	-----	108.8%		-----	-----
PW201-RAD-2	436197	0.0289	U	0.0811	61.5%
PW201-RAD-3	436198	0.00521	U	0.0770	64.2%
PW201-RAD-4	436199	0.0187	U	0.0785	61.7%
PW202-RAD-1	436214	0.0752	U	0.159	85.7%
PW205-RAD-1	436217	0.741		0.170	47.5%
PW207-RAD-1	436222	0.0522	U	0.159	113%
PW201-RAD-5	436601	0.0415	U	0.0746	43.8%
PW204-RAD-1	436607	0.420		0.164	34.8%

Reporting Limit: 0.162 pCi/g
Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{235}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec	Percent 235U
Prep Blank	pbwg12cm4	0.0000106	U	0.000270	72.1%	NC
Lab Control	lcswg12cm5	0.118		0.0130	84.3%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	102.6%		-----	-----	-----
Prep Blank 2	pbwg12cm5	0.0000932	U	0.000540	72.0%	NC
Lab Control 2	lcswg12cm7	0.224		0.0249	86.6%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	97.8%		-----	-----	-----
Prep Blank 3	pbwg12cm2	0.0000867	U	0.000540	113%	NC
Lab Control 3	lcswg12cm2	0.241		0.0264	80.2%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	105.2%		-----	-----	-----
Prep Blank 4	pbwg13cm2	0.0000702	U	0.000270	66.7%	NC
Lab Control 4	lcswg13cm2	0.120		0.0132	83.1%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	104.3%		-----	-----	-----
PW201-RAD-1	436196	0.0787	N	0.00831	86.1%	0.886%
Duplicate result	436196D	0.0865		0.00906	86.3%	0.907%
RPD	-----	9.44%		-----	-----	2.34%
Spike result	436196S	0.228	N	0.0234	85.2%	NA
Spike added	-----	0.108		-----	-----	-----
Recovery	-----	138.2%		-----	-----	-----
Spike Duplicate result	436196SD	0.178		0.0186	84.2%	NA
Spike added	-----	0.112		-----	-----	-----
Recovery	-----	88.7%		-----	----	-----
PW201-RAD-2	436197	0.00116	N	0.000294	62.0%	0.562%
PW201-RAD-3	436198	0.000738	N	0.000268	61.7%	1.20%
PW201-RAD-4	436199	0.00310	N	0.000406	61.8%	0.719%
PW202-RAD-1	436214	0.0524	N	0.00535	71.0%	0.700%
PW205-RAD-1	436217	7.44	N	0.751	86.0%	1.85%
PW207-RAD-1	436222	0.0775	N	0.00782	67.7%	1.42%
PW201-RAD-5	436601	0.000322	UN	0.000251	47.2%	<12.5%
PW204-RAD-1	436607	82.7	N	8.68	85.6%	0.772%

Reporting Limit: 0.000540 pCi/g

Q - data qualifier code.

NA - Not Applicable

NC - NC indicates that the total uranium concentration is too low to calculate %U235.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{234}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	-0.109	U	0.311	95.5%
Lab Control	lcswg12cm5	2.37		0.391	74.8%
True Value	-----	2.41		-----	-----
Recovery	-----	98.3%		-----	-----
Prep Blank 2	pbwg12cm5	-0.145	U	0.620	75.3%
Lab Control 2	lcswg12cm7	4.42		0.762	76.0%
True Value	-----	4.81		-----	-----
Recovery	-----	91.9%		-----	-----
Prep Blank 3	pbwg12cm2	-0.408	U	0.621	78.1%
Lab Control 3	lcswg12cm2	4.49		0.765	74.2%
True Value	-----	4.81		-----	-----
Recovery	-----	93.3%		-----	-----
Prep Blank 4	pbwg13cm2	-0.424	U	0.314	75.0%
Lab Control 4	lcswg13cm2	2.16		0.379	88.2%
True Value	-----	2.41		-----	-----
Recovery	-----	89.6%		-----	-----
PW201-RAD-1	436196	1.67	N	0.351	70.7%
Duplicate result	436196D	1.66		0.352	74.2%
RPD	-----	0.60%		-----	-----
Spike result	436196S	4.86	N	0.568	77.1%
Spike added	-----	2.27		-----	-----
Recovery	-----	140.5%		-----	-----
Spike Duplicate result	436196SD	3.89		0.492	73.5%
Spike added	-----	2.33		-----	-----
Recovery	-----	95.3%		-----	-----
PW201-RAD-2	436197	0.00825	UN	0.311	61.4%
PW201-RAD-3	436198	-0.0487	UN	0.297	63.0%
PW201-RAD-4	436199	0.152	UN	0.303	63.3%
PW202-RAD-1	436214	0.464	UN	0.612	65.2%
PW205-RAD-1	436217	181	N	18.1	66.5%
PW207-RAD-1	436222	0.460	UN	0.612	66.1%
PW201-RAD-5	436601	-0.273	UN	0.288	51.6%
PW204-RAD-1	436607	1360	N	136	82.6%

Reporting Limit: 0.622 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{233}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.038	U	0.482	99.1%
Lab Control	lcswg12cm5	105		10.5	80.7%
True Value	-----	95.9		-----	-----
Recovery	-----	109.5%		-----	-----
Prep Blank 2	pbwg12cm5	0.0891	U	0.965	84.5%
Lab Control 2	lcswg12cm7	198		19.8	82.4%
True Value	-----	192		-----	-----
Recovery	-----	103.1%		-----	-----
Prep Blank 3	pbwg12cm2	0.12	U	0.965	91.8%
Lab Control 3	lcswg12cm2	199		20.0	88.8%
True Value	-----	192		-----	-----
Recovery	-----	103.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.0877	U	0.482	84.3%
Lab Control 4	lcswg13cm2	106		10.6	81.4%
True Value	-----	95.9		-----	-----
Recovery	-----	110.5%		-----	-----
PW201-RAD-1	436196	0.457	U	0.480	112%
Duplicate result	436196D	0.590	U	0.484	116%
RPD	-----	0.00%		-----	-----
Spike result	436196S	97.4		10.0	101%
Spike added	-----	90.3		-----	-----
Recovery	-----	107.9%		-----	-----
Spike Duplicate result	436196SD	99.4		10.2	99.4%
Spike added	-----	93.0		-----	-----
Recovery	-----	106.9%		-----	-----
PW201-RAD-2	436197	0.13	U	0.482	65.5%
PW201-RAD-3	436198	0.0812	U	0.460	67.3%
PW201-RAD-4	436199	0.111	U	0.469	66.1%
PW202-RAD-1	436214	1.58	U	0.958	112%
PW205-RAD-1	436217	0.881	U	0.914	62.9%
PW207-RAD-1	436222	0.265	U	1.89	108%
PW201-RAD-5	436601	0.0745	U	0.444	50.5%
PW204-RAD-1	436607	0.125	U	0.472	33.2%

Reporting Limit: 0.964 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Spike/Spike Duplicate Recovery

Project: 12474.05.00X
Sample ID: PW201-VOC-1
Instrument: REVEILLE

Case: QXP02220X4O
MS File: R07121008

SDG: 436192
MSD File: R07121009

Compound	Spike Added (µg/kg)	Sample Concentration (µg/kg)	MS Concentration (µg/kg)	MS %Rec	QC Limit Rec
VINYL CHLORIDE	17000	0	23000	***135 ****	70-130
1,1-DICHLOROETHENE	17000	0	20000	118	70-130
1,1-DICHLOROETHANE	17000	0	21000	124	70-130
CHLOROFORM	17000	0	19000	112	70-130
1,1,1-TRICHLOROETHANE	17000	0	20000	118	70-130
BENZENE	17000	0	21000	124	70-130
1,2-DICHLOROETHANE	17000	0	19000	112	70-130
TRICHLOROETHENE	17000	93000	120000	***159 ****	70-130
1,2-DICHLOROPROPANE	17000	0	20000	118	70-130
TOLUENE	17000	1100	22000	123	70-130
TETRACHLOROETHENE	17000	160	18000	105	70-130
1,1,2-TRICHLOROETHANE	17000	94	18000	105	70-130
CHLOROBENZENE	17000	0	19000	112	70-130
ETHYLBENZENE	17000	0	20000	118	70-130
BROMOFORM	17000	0	16000	94	70-130
1,1,2,2-TETRACHLOROETHANE	17000	0	18000	106	70-130

Compound	Spike Added (µg/kg)	MSD Concentration (µg/kg)	MSD %Rec	%RPD	QC Limits RPD	QC Limits REC
VINYL CHLORIDE	17000	21000	124	9	20	70-130
1,1-DICHLOROETHENE	17000	21000	124	5	20	70-130
1,1-DICHLOROETHANE	17000	22000	129	5	20	70-130
CHLOROFORM	17000	20000	118	5	20	70-130
1,1,1-TRICHLOROETHANE	17000	20000	118	0	20	70-130
BENZENE	17000	21000	124	0	20	70-130
1,2-DICHLOROETHANE	17000	19000	112	0	20	70-130
TRICHLOROETHENE	17000	120000	***159 ****	0	20	70-130
1,2-DICHLOROPROPANE	17000	20000	118	0	20	70-130
TOLUENE	17000	21000	117	5	20	70-130
TETRACHLOROETHENE	17000	17000	99	6	20	70-130
1,1,2-TRICHLOROETHANE	17000	18000	105	0	20	70-130
CHLOROBENZENE	17000	19000	112	0	20	70-130
ETHYLBENZENE	17000	20000	118	0	20	70-130
BROMOFORM	17000	16000	94	0	20	70-130
1,1,2,2-TETRACHLOROETHANE	17000	17000	100	6	20	70-130

* Values outside of QC Limits

RPD: 0 of 16 outside limits
Spike Recovery: 3 of 32 outside limits

SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Sample Weight (g): 5.30
Extraction Dilution: 1.9
Dry Weight Input: 100

Client Sample ID: PW201-VOC-1
System ID: 436209
Filename: R07121005
Extract Volume (mL): 10
Sample dilution: 50

Project Number: 12474.05.00X
Instrument: REVEILLE
Date Received: Jul 10 2010 11:30AM
Date Analyzed: Jul 12 2010 6:18PM
Total Dilution Factor: 94.3

CAS No.	Compound	µg/kg	
74-87-3	CHLOROMETHANE	94	U
75-01-4	VINYL CHLORIDE	94	U
74-83-9	BROMOMETHANE	94	U
75-00-3	CHLOROETHANE	94	U
75-69-4	TRICHLOROFLUOROMETHANE	94	U
75-35-4	1,1-DICHLOROETHENE	94	U
75-15-0	***CARBON DISULFIDE***	***12000***	***E***
74-88-4	IODOMETHANE	94	U
75-09-2	METHYLENE CHLORIDE	94	U
67-64-1	ACETONE	94	U
156-60-5	***TRANS-1,2-DICHLOROETHENE***	***130***	
75-34-3	1,1-DICHLOROETHANE	94	U
108-05-4	VINYL ACETATE	94	U
156-59-2	***CIS-1,2-DICHLOROETHENE***	***5400***	
74-97-5	BROMOCHLOROMETHANE	94	U
67-66-3	CHLOROFORM	94	U
56-23-5	CARBON TETRACHLORIDE	94	U
-55-6	1,1,1-TRICHLOROETHANE	94	U
-93-3	***2-BUTANONE***	***250***	***B***
71-43-2	BENZENE	94	U
107-06-2	1,2-DICHLOROETHANE	94	U
79-01-6	***TRICHLOROETHENE***	***93000***	***E***
74-95-3	DIBROMOMETHANE	94	U
78-87-5	1,2-DICHLOROPROPANE	94	U
75-27-4	BROMODICHLOROMETHANE	94	U
10061-01-5	CIS-1,3-DICHLOROPROPENE	94	U
108-88-3	***TOLUENE***	***1100***	
127-18-4	***TETRACHLOROETHENE***	***160***	
108-10-1	4-METHYL-2-PENTANONE	94	U
10061-02-6	TRANS-1,3-DICHLOROPROPENE	94	U
79-00-5	***1,1,2-TRICHLOROETHANE***	***94***	
124-48-1	DIBROMOCHLOROMETHANE	94	U
106-93-4	1,2-DIBROMOETHANE	94	U
591-78-6	2-HEXANONE	94	U
108-90-7	CHLOROBENZENE	94	U
100-41-4	ETHYLBENZENE	94	U
630-20-6	1,1,1,2-TETRACHLOROETHANE	94	U
179601-23-1	***M/P-XYLENE***	***110***	
95-47-6	***O-XYLENE***	***120***	
100-42-5	STYRENE	94	U
75-25-2	BROMOFORM	94	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	94	U
96-18-4	1,2,3-TRICHLOROPROPANE	94	U
110-57-6	TRANS-1,4-DICHLORO-2-BUTENE	190	U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Sample Weight (g): 5.30
Extraction Dilution: 1.9
Dry Weight Input: 100

Client Sample ID: PW201-VOC-1
System ID: 436209
Filename: R07121005
Extract Volume (mL): 10
Sample dilution: 50

Project Number: 12474.05.00X
Instrument: REVEILLE
Date Received: Jul 10 2010 11:30AM
Date Analyzed: Jul 12 2010 6:18PM
Total Dilution Factor: 94.3

CAS No.	Compound	µg/kg
106-46-7	1,4-DICHLOROBENZENE	94 U
95-50-1	1,2-DICHLOROBENZENE	94 U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	94 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC1 (DCE)	SMC2 (TOL)	SMC3 (BFB)	Out
1	BLANK071210 MBLK	96	94	84	0
2	LCS071210 LCS	98	105	101	0
3	PW201-VOC-1	93	97	90	0
4	PW201-VOC-1 DL	104	101	86	0
5	PW201-VOC-1 MS DL	96	107	96	0
6	PW201-VOC-1 MSD DL	95	106	93	0
7	PW201-VOC-2	96	95	88	0
8	PW201-VOC-3	109	100	84	0
9	PW201-VOC-4	99	96	82	0
10	PW205-VOC-1	104	95	86	0
11	PW207-VOC-1	106	93	86	0
12	BLANK071410 MBLK	113	98	89	0
13	LCS071410 LCS	118	111	110	0
14	PW201-VOC-5	133*	101	80	1
15	PW204-VOC-1	124	102	86	0

QC Limits	
SMC1 (DCE) = 1,2-DICHLOROETHANE-D4 (SURR1)	(70-130)
SMC2 (TOL) = TOLUENE-D8 (SURR2)	(70-130)
SMC3 (BFB) = BROMOFLUOROBENZENE (SURR3)	(70-130)

* Values outside contract required QC Limits

Comments

SOUTHWEST RESEARCH INSTITUTE

Method 8270C Semi-volatile Organics Spike/Spike Duplicate Recovery

Project: 12474.05.00X
Sample ID: PW201-SVOC-1
Instrument: BEVO

Case: QXP02220X4O
MS File: B07141008

SDG: 436192
MSD File: B07151002

Compound	Spike Added (ug/Kg)	Sample Concentration (ug/Kg)	MS Concentration (ug/Kg)	MS %Rec	QC Limit Rec
Phenol	1660	0	1080	65	26- 90
2-Chlorophenol	1660	0	1030	62	25-102
1,4-Dichlorobenzene	1660	0	891	54	28-104
N-Nitroso-di-n-propylamine	1660	0	1020	61	41-126
2,4-Dichlorophenol	1660	0	1090	66	50-150
1,2,4-Trichlorobenzene	1660	0	953	57	38-107
Naphthalene	1660	0	1060	64	50-150
4-Chloro-3-methylphenol	1660	0	1200	72	26-103
2,4,6-Trichlorophenol	1660	0	1060	64	50-150
Acenaphthene	1660	0	1080	65	31-137
2,4-Dinitrotoluene	1660	0	1040	63	28- 89
Pentachlorophenol	1660	0	1630	98	17-109
Fluoranthene	1660	0	1170	70	50-150
Pyrene	1660	0	1090	66	35-142
Benzo[a]pyrene	1660	0	915	55	50-150

Compound	Spike Added (ug/Kg)	MSD Concentration (ug/Kg)	MSD %Rec	%RPD	QC Limits RPD	QC Limits REC
Phenol	1640	1010	62	5	35	26-90
2-Chlorophenol	1640	1060	65	4	50	25-102
1,4-Dichlorobenzene	1640	903	55	3	27	28-104
N-Nitroso-di-n-propylamine	1640	994	61	1	38	41-126
2,4-Dichlorophenol	1640	1120	68	4	50	50-150
1,2,4-Trichlorobenzene	1640	977	60	4	23	38-107
Naphthalene	1640	1070	65	2	50	50-150
4-Chloro-3-methylphenol	1640	1250	76	5	33	26-103
2,4,6-Trichlorophenol	1640	1150	70	9	50	50-150
Acenaphthene	1640	1100	67	3	19	31-137
2,4-Dinitrotoluene	1640	986	60	4	47	28-89
Pentachlorophenol	1640	2010	***123*** *	22	47	17-109
Fluoranthene	1640	1120	68	3	50	50-150
Pyrene	1640	1120	68	4	36	35-142
Benzo[a]pyrene	1640	950	58	5	50	50-150

* Values outside of QC Limits

RPD: 0 of 15 outside limits
Spike Recovery: 1 of 30 outside limits

SOUTHWEST RESEARCH INSTITUTE

Method 8270C Semi-volatile Organics Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Matrix: SZ
Sample wt. (g): 15.71
Level: LOW
GPC Cleanup: N

Client Sample ID: PW201-SVOC-1
System ID: 436200
Filename: B07141003
pH: NA
Conc. Ext. Vol. (uL): 2000
% Moisture: 0
Decanted: N

Project Number: 12474.05.00X
Instrument: BEVO
Date Received: Jul 10, 2010
Date Extracted: Jul 12, 2010
Date Analyzed: Jul 14 2010 7:50PM
Dilution Factor: 1
Injection Volume (uL): 1.0

CAS No.	Compound	ug/Kg
111-44-4	bis(2-Chloroethyl)ether	637 U
108-95-2	Phenol	637 U
95-57-8	2-Chlorophenol	637 U
541-73-1	1,3-Dichlorobenzene	637 U
106-46-7	1,4-Dichlorobenzene	637 U
95-50-1	1,2-Dichlorobenzene	637 U
100-51-6	Benzyl alcohol	637 U
108-60-1	bis(2-chloroisopropyl)ether	637 U
95-48-7	2-Methylphenol	637 U
67-72-1	Hexachloroethane	637 U
621-64-7	N-Nitroso-di-n-propylamine	637 U
106-44-5	3&4-Methylphenol	637 U
98-95-3	Nitrobenzene	637 U
78-59-1	Isophorone	637 U
88-75-5	2-Nitrophenol	637 U
05-67-9	2,4-Dimethylphenol	637 U
11-91-1	bis(2-Chloroethoxy)methane	637 U
120-83-2	2,4-Dichlorophenol	637 U
120-82-1	1,2,4-Trichlorobenzene	637 U
91-20-3	Naphthalene	637 U
65-85-0	Benzoic Acid	637 U
106-47-8	4-Chloroaniline	637 U
87-68-3	Hexachlorobutadiene	637 U
59-50-7	4-Chloro-3-methylphenol	637 U
91-57-6	2-Methylnaphthalene	637 U
77-47-4	Hexachlorocyclopentadiene	637 U
88-06-2	2,4,6-Trichlorophenol	637 U
95-95-4	2,4,5-Trichlorophenol	637 U
91-58-7	2-Chloronaphthalene	637 U
88-74-4	2-Nitroaniline	637 U
208-96-8	Acenaphthylene	637 U
131-11-3	Dimethylphthalate	637 U
606-20-2	2,6-Dinitrotoluene	637 U
83-32-9	Acenaphthene	637 U
99-09-2	3-Nitroaniline	637 U
51-28-5	2,4-Dinitrophenol	637 U
132-64-9	Dibenzofuran	637 U
121-14-2	2,4-Dinitrotoluene	637 U
100-02-7	4-Nitrophenol	637 U
86-73-7	Fluorene	637 U
7005-72-3	4-Chlorophenyl-phenylether	637 U
84-66-2	Diethylphthalate	637 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- D Concentration value is from dilution analysis.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

SOUTHWEST RESEARCH INSTITUTE

Method 8270C Semi-volatile Organics Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Matrix: SZ
Sample wt. (g): 15.71
Level: LOW
GPC Cleanup: N

Client Sample ID: PW201-SVOC-1
System ID: 436200
Filename: B07141003
pH: NA
Conc. Ext. Vol. (uL): 2000
% Moisture: 0
Decanted: N

Project Number: 12474.05.00X
Instrument: BEVO
Date Received: Jul 10, 2010
Date Extracted: Jul 12, 2010
Date Analyzed: Jul 14 2010 7:50PM
Dilution Factor: 1
Injection Volume (uL): 1.0

CAS No.	Compound	ug/Kg
100-01-6	4-Nitroaniline	637 U
534-52-1	4,6-Dinitro-2-methylphenol	637 U
86-30-6	n-Nitrosodiphenylamine	637 U
101-55-3	4-Bromophenyl-phenylether	637 U
118-74-1	Hexachlorobenzene	637 U
87-86-5	Pentachlorophenol	637 U
85-01-8	Phenanthrene	637 U
120-12-7	Anthracene	637 U
86-74-8	Carbazole	637 U
84-74-2	Di-n-butylphthalate	637 U
206-44-0	Fluoranthene	637 U
129-00-0	Pyrene	637 U
85-68-7	Butylbenzylphthalate	637 U
91-94-1	3,3'-Dichlorobenzidine	637 U
56-55-3	Benzo[a]anthracene	637 U
218-01-9	Chrysene	637 U
-81-7	***bis(2-Ethylhexyl)phthalate***	***854***
7-84-0	Di-n-octylphthalate	637 U
205-99-2	Benzo[b]fluoranthene	637 U
207-08-9	Benzo[k]fluoranthene	637 U
50-32-8	Benzo[a]pyrene	637 U
193-39-5	Indeno[1,2,3-cd]pyrene	637 U
53-70-3	Dibenz[a,h]anthracene	637 U
191-24-2	Benzo[g,h,i]perylene	637 U
110-86-1	Pyridine	637 U
62-75-9	n-Nitrosodimethylamine	637 U
62-53-3	Aniline	637 U
58-90-2	2,3,4,6-Tetrachlorophenol	637 U
103-33-3	Diphenyldiazene	637 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- D *Concentration value is from dilution analysis.*
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC1 (NBZ)	SMC2 (FBP)	SMC3 (TPH)	SMC4 (PHL)	Out
1	SMB_12JUL10 BLK	70	72	89	71	0
2	PW201-SVOC-1	59	62	75	63	0
3	PW201-SVOC-2	55	56	66	62	0
4	PW201-SVOC-3	47	46	51	54	0
5	PW201-SVOC-4	57	65	82	62	0
6	PW205-SVOC-1	45	56	76	2*	1
7	PW201-SVOC-1 MS	58	62	76	64	0
8	PW201-SVOC-1 MSD	60	62	68	65	0
9	LCS_12JUL10 LCS	59	58	60	59	0
10	SMB_13JUL10 BLK	71	72	75	75	0
11	PW201-SVOC-5	61	54	56	58	0
12	PW204-SVOC-1	54	55	77	60	0
13	LCS_13JUL10 LCS	68	68	70	71	0

QC Limits

SMC1 (NBZ) = Nitrobenzene-d5	(23-120)
SMC2 (FBP) = 2-Fluorobiphenyl	(30-115)
SMC3 (TPH) = Terphenyl-d14	(18-137)
SMC4 (PHL) = Phenol-d5	(24-113)

* Values outside contract required QC Limits

Comments _____

FORM II-A

Printed: 16 Jul 2010 17:14:03

ver (3/19/2010)

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC1 (NBZ)	SMC2 (FBP)	SMC3 (TPH)	SMC4 (PHL)	Out
1	SMB_12JUL10 BLK	70	72	89	71	0
2	PW201-SVOC-1	59	62	75	63	0
3	PW201-SVOC-2	55	56	66	62	0
4	PW201-SVOC-3	47	46	51	54	0
5	PW201-SVOC-4	57	65	82	62	0
6	PW205-SVOC-1	45	56	76	2*	1
7	PW201-SVOC-1 MS	58	62	76	64	0
8	PW201-SVOC-1 MSD	60	62	68	65	0
9	LCS_12JUL10 LCS	59	58	60	59	0
10	SMB_13JUL10 BLK	71	72	75	75	0
11	PW201-SVOC-5	61	54	56	58	0
12	PW204-SVOC-1	54	55	77	60	0
13	LCS_13JUL10 LCS	68	68	70	71	0

QC Limits

SMC1 (NBZ) = Nitrobenzene-d5	(23-120)
SMC2 (FBP) = 2-Fluorobiphenyl	(30-115)
SMC3 (TPH) = Terphenyl-d14	(18-137)
SMC4 (PHL) = Phenol-d5	(24-113)

* Values outside contract required QC Limits

Comments _____

Waste Stream Number: PW – 202

Waste Stream Title: Soil

PW-202

Drill Cuttings (Soil)

S.M. STOLLER CORP.

1

INORGANIC ANALYSES DATA SHEET

STOL SAMPLE NO.

PW202-MET-1

Lab Name: SOUTHWEST_RESEARCH_INSTIT Contract:12474.05.00X

Lab Code: SWRI__ Task Ord:100710-2 SRR No.: 41538_ SDG No.: 436192

Matrix (soil/water): SZ___ Lab Sample ID: 436213

Level (low/med): LOW__ Date Received: 07/10/10

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	14.5			P
7440-39-3	Barium	36.8			P
7440-43-9	Cadmium	0.43	U		P
7440-47-3	Chromium	11.2			P
7439-92-1	Lead	9.2		*	P
7439-97-6	Mercury	0.020	U		CV
7782-49-2	Selenium	0.85	U		P
7440-22-4	Silver	0.43	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Technetium-99 Result (pCi/g)	Q	TPU (pCi/g)	Rh103 Internal Std Rec	Date Analyzed
Prep Blank	pbwg12cm3	0.0195	U	1.25	69.6%	07/14/10
Lab Control	lcswg12cm4	92.6		15.6	91.6%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Prep Blank 2	pbwg13cm1	-0.0844	U	1.25	46.4%	07/14/10
Lab Control 2	lcswg13cm1	90.3		15.4	86.1%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	90.3%		-----	-----	-----
PW201-RAD-1	436196	3.04		1.28	62.9%	07/14/10
Duplicate result	436196D	3.49		1.27	71.1%	07/14/10
RPD	-----	13.8%		-----	-----	-----
Spike result	436196S	95.0		15.6	99.5%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Spike Duplicate result	436196SD	96.4		15.7	101%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	94.0%		----	----	-----
PW201-RAD-2	436197	7.62		1.43	81.9%	07/14/10
PW201-RAD-3	436198	6.94		1.43	80.7%	07/14/10
PW201-RAD-4	436199	0.393	U	1.16	73.7%	07/14/10
PW202-RAD-1	436214	6.13		1.35	85.1%	07/14/10
PW205-RAD-1	436217	1580		158	114%	07/14/10
PW207-RAD-1	436222	234		23.4	82.6%	07/14/10
PW201-RAD-5	436601	7.66		1.43	55.5%	07/14/10
PW204-RAD-1	436607	27.6		5.93	48.6%	07/14/10

Reporting Limit: 2.50 pCi/g
Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Total Uranium Result (ug/g)	Q	TPU (ug/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.00153	U	0.00101	72.1%
Lab Control	lcswg12cm5	7.90		0.790	84.3%
True Value	-----	7.48		-----	-----
Recovery	-----	105.6%		-----	-----
Prep Blank 2	pbwg12cm5	0.00642		0.00210	72.0%
Lab Control 2	lcswg12cm7	15.3		1.53	86.6%
True Value	-----	15.0		-----	-----
Recovery	-----	102.0%		-----	-----
Prep Blank 3	pbwg12cm2	0.000316	U	0.00200	113%
Lab Control 3	lcswg12cm2	15.4		1.54	80.2%
True Value	-----	15.0		-----	-----
Recovery	-----	102.7%		-----	-----
Prep Blank 4	pbwg13cm2	0.000348	U	0.00100	66.7%
Lab Control 4	lcswg13cm2	7.95		0.795	83.1%
True Value	-----	7.48		-----	-----
Recovery	-----	106.3%		-----	-----
PW201-RAD-1	436196	4.11		0.412	86.1%
Duplicate result	436196D	4.41		0.441	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	12.9		1.29	85.2%
Spike added	-----	7.05		-----	-----
Recovery	-----	124.7%		-----	-----
Spike Duplicate result	436196SD	10.9		1.09	84.2%
Spike added	-----	7.26		-----	-----
Recovery	-----	93.5%		----	----
PW201-RAD-2	436197	0.0957		0.00963	62.0%
PW201-RAD-3	436198	0.0283		0.00298	61.7%
PW201-RAD-4	436199	0.199		0.0199	61.8%
PW202-RAD-1	436214	3.47		0.347	71.0%
PW205-RAD-1	436217	186		18.6	86.0%
PW207-RAD-1	436222	2.52		0.253	67.7%
PW201-RAD-5	436601	0.0158		0.00183	47.2%
PW204-RAD-1	436607	4950		495	85.6%

Reporting Limit: 0.002 ug/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{238}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.000516	U	0.000340	72.1%
Lab Control	lcswg12cm5	2.63		0.263	84.3%
True Value	-----	2.50		-----	-----
Recovery	-----	105.2%		-----	-----
Prep Blank 2	pbwg12cm5	0.00215		0.000706	72.0%
Lab Control 2	lcswg12cm7	5.09		0.509	86.6%
True Value	-----	5.01		-----	-----
Recovery	-----	101.6%		-----	-----
Prep Blank 3	pbwg12cm2	0.0000918	U	0.000672	113%
Lab Control 3	lcswg12cm2	5.14		0.514	80.2%
True Value	-----	5.01		-----	-----
Recovery	-----	102.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.000103	U	0.000336	66.7%
Lab Control 4	lcswg13cm2	2.65		0.265	83.1%
True Value	-----	2.50		-----	-----
Recovery	-----	106.0%		-----	-----
PW201-RAD-1	436196	1.37		0.137	86.1%
Duplicate result	436196D	1.47		0.147	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	4.29		0.429	85.2%
Spike added	-----	2.35		-----	-----
Recovery	-----	124.3%		-----	-----
Spike Duplicate result	436196SD	3.62		0.362	84.2%
Spike added	-----	2.42		-----	-----
Recovery	-----	93.0%		-----	----
PW201-RAD-2	436197	0.0320		0.00322	62.0%
PW201-RAD-3	436198	0.00938		0.000992	61.7%
PW201-RAD-4	436199	0.0663		0.00664	61.8%
PW202-RAD-1	436214	1.16		0.116	71.0%
PW205-RAD-1	436217	61.2		6.12	86.0%
PW207-RAD-1	436222	0.836		0.0836	67.7%
PW201-RAD-5	436601	0.00527		0.000611	47.2%
PW204-RAD-1	436607	1651		165	85.6%

Reporting Limit: 0.000672 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{236}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.0572	U	0.0812	79.0%
Lab Control	lcswg12cm6	1170		117	86.5%
True Value	-----	1050		-----	-----
Recovery	-----	111.4%		-----	-----
Prep Blank 2	pbwg12cm5	0.00259	U	0.162	76.3%
Lab Control 2	lcswg12cm8	2150		215	85.0%
True Value	-----	2090		-----	-----
Recovery	-----	102.9%		-----	-----
Prep Blank 3	pbwg12cm2	0.00951	U	0.162	79.5%
Lab Control 3	lcswg12cm3	2130		213	91.2%
True Value	-----	2090		-----	-----
Recovery	-----	101.9%		-----	-----
Prep Blank 4	pbwg13cm2	0.00948	U	0.0810	78.0%
Lab Control 4	lcswg13cm3	1110		111	89.5%
True Value	-----	1050		-----	-----
Recovery	-----	105.7%		-----	-----
PW201-RAD-1	436196	0.0339	U	0.0801	97.6%
Duplicate result	436196D	0.0150	U	0.0805	93.0%
RPD	-----	0.00%		-----	-----
Spike result	436196S	1120		112	84.5%
Spike added	-----	1040		-----	-----
Recovery	-----	107.7%		-----	-----
Spike Duplicate result	436196SD	1110		111	83.1%
Spike added	-----	1020		-----	-----
Recovery	-----	108.8%		-----	-----
PW201-RAD-2	436197	0.0289	U	0.0811	61.5%
PW201-RAD-3	436198	0.00521	U	0.0770	64.2%
PW201-RAD-4	436199	0.0187	U	0.0785	61.7%
PW202-RAD-1	436214	0.0752	U	0.159	85.7%
PW205-RAD-1	436217	0.741		0.170	47.5%
PW207-RAD-1	436222	0.0522	U	0.159	113%
PW201-RAD-5	436601	0.0415	U	0.0746	43.8%
PW204-RAD-1	436607	0.420		0.164	34.8%

Reporting Limit: 0.162 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{235}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec	Percent 235U
Prep Blank	pbwg12cm4	0.0000106	U	0.000270	72.1%	NC
Lab Control	lcswg12cm5	0.118		0.0130	84.3%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	102.6%		-----	-----	-----
Prep Blank 2	pbwg12cm5	0.0000932	U	0.000540	72.0%	NC
Lab Control 2	lcswg12cm7	0.224		0.0249	86.6%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	97.8%		-----	-----	-----
Prep Blank 3	pbwg12cm2	0.0000867	U	0.000540	113%	NC
Lab Control 3	lcswg12cm2	0.241		0.0264	80.2%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	105.2%		-----	-----	-----
Prep Blank 4	pbwg13cm2	0.0000702	U	0.000270	66.7%	NC
Lab Control 4	lcswg13cm2	0.120		0.0132	83.1%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	104.3%		-----	-----	-----
PW201-RAD-1	436196	0.0787	N	0.00831	86.1%	0.886%
Duplicate result	436196D	0.0865		0.00906	86.3%	0.907%
RPD	-----	9.44%		-----	-----	2.34%
Spike result	436196S	0.228	N	0.0234	85.2%	NA
Spike added	-----	0.108		-----	-----	-----
Recovery	-----	138.2%		-----	-----	-----
Spike Duplicate result	436196SD	0.178		0.0186	84.2%	NA
Spike added	-----	0.112		-----	-----	-----
Recovery	-----	88.7%		-----	----	-----
PW201-RAD-2	436197	0.00116	N	0.000294	62.0%	0.562%
PW201-RAD-3	436198	0.000738	N	0.000268	61.7%	1.20%
PW201-RAD-4	436199	0.00310	N	0.000406	61.8%	0.719%
PW202-RAD-1	436214	0.0524	N	0.00535	71.0%	0.700%
PW205-RAD-1	436217	7.44	N	0.751	86.0%	1.85%
PW207-RAD-1	436222	0.0775	N	0.00782	67.7%	1.42%
PW201-RAD-5	436601	0.000322	UN	0.000251	47.2%	<12.5%
PW204-RAD-1	436607	82.7	N	8.68	85.6%	0.772%

Reporting Limit: 0.000540 pCi/g

Q - data qualifier code.

NA - Not Applicable

NC - NC indicates that the total uranium concentration is too low to calculate %U235.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{234}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	-0.109	U	0.311	95.5%
Lab Control	lcswg12cm5	2.37		0.391	74.8%
True Value	-----	2.41		-----	-----
Recovery	-----	98.3%		-----	-----
Prep Blank 2	pbwg12cm5	-0.145	U	0.620	75.3%
Lab Control 2	lcswg12cm7	4.42		0.762	76.0%
True Value	-----	4.81		-----	-----
Recovery	-----	91.9%		-----	-----
Prep Blank 3	pbwg12cm2	-0.408	U	0.621	78.1%
Lab Control 3	lcswg12cm2	4.49		0.765	74.2%
True Value	-----	4.81		-----	-----
Recovery	-----	93.3%		-----	-----
Prep Blank 4	pbwg13cm2	-0.424	U	0.314	75.0%
Lab Control 4	lcswg13cm2	2.16		0.379	88.2%
True Value	-----	2.41		-----	-----
Recovery	-----	89.6%		-----	-----
PW201-RAD-1	436196	1.67	N	0.351	70.7%
Duplicate result	436196D	1.66		0.352	74.2%
RPD	-----	0.60%		-----	-----
Spike result	436196S	4.86	N	0.568	77.1%
Spike added	-----	2.27		-----	-----
Recovery	-----	140.5%		-----	-----
Spike Duplicate result	436196SD	3.89		0.492	73.5%
Spike added	-----	2.33		-----	-----
Recovery	-----	95.3%		-----	-----
PW201-RAD-2	436197	0.00825	UN	0.311	61.4%
PW201-RAD-3	436198	-0.0487	UN	0.297	63.0%
PW201-RAD-4	436199	0.152	UN	0.303	63.3%
PW202-RAD-1	436214	0.464	UN	0.612	65.2%
PW205-RAD-1	436217	181	N	18.1	66.5%
PW207-RAD-1	436222	0.460	UN	0.612	66.1%
PW201-RAD-5	436601	-0.273	UN	0.288	51.6%
PW204-RAD-1	436607	1360	N	136	82.6%

Reporting Limit: 0.622 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{233}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.038	U	0.482	99.1%
Lab Control	lcswg12cm5	105		10.5	80.7%
True Value	-----	95.9		-----	-----
Recovery	-----	109.5%		-----	-----
Prep Blank 2	pbwg12cm5	0.0891	U	0.965	84.5%
Lab Control 2	lcswg12cm7	198		19.8	82.4%
True Value	-----	192		-----	-----
Recovery	-----	103.1%		-----	-----
Prep Blank 3	pbwg12cm2	0.12	U	0.965	91.8%
Lab Control 3	lcswg12cm2	199		20.0	88.8%
True Value	-----	192		-----	-----
Recovery	-----	103.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.0877	U	0.482	84.3%
Lab Control 4	lcswg13cm2	106		10.6	81.4%
True Value	-----	95.9		-----	-----
Recovery	-----	110.5%		-----	-----
PW201-RAD-1	436196	0.457	U	0.480	112%
Duplicate result	436196D	0.590	U	0.484	116%
RPD	-----	0.00%		-----	-----
Spike result	436196S	97.4		10.0	101%
Spike added	-----	90.3		-----	-----
Recovery	-----	107.9%		-----	-----
Spike Duplicate result	436196SD	99.4		10.2	99.4%
Spike added	-----	93.0		-----	-----
Recovery	-----	106.9%		-----	-----
PW201-RAD-2	436197	0.13	U	0.482	65.5%
PW201-RAD-3	436198	0.0812	U	0.460	67.3%
PW201-RAD-4	436199	0.111	U	0.469	66.1%
PW202-RAD-1	436214	1.58	U	0.958	112%
PW205-RAD-1	436217	0.881	U	0.914	62.9%
PW207-RAD-1	436222	0.265	U	1.89	108%
PW201-RAD-5	436601	0.0745	U	0.444	50.5%
PW204-RAD-1	436607	0.125	U	0.472	33.2%

Reporting Limit: 0.964 pCi/g

Q - data qualifier code.

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PW-202 Soils X-701B Soils

Customer Smpl Id: IM21-01-WS
Project:X-17-X-701B QXP2218F2B
Subproj Analyses:SOIL
Customer:J A APPLEGATE

Matrix: SOIL
Protocol: NONE
Status: APPROVED
Location:

Sampled: 07/21/09 15:10:00
Received: 07/23/09 10:20:55
Needed: 08/17/09 23:59:00
Approved: 08/05/09 14:44:07

COC#:
Sample Desc:
Customer Comments:
Lab Smpl Comments:

Analy Meth:SW846-8260B QC Batch:QC09217035 Test:VOA-2 Rpt Basis:Not Corrected Date Approved
Prep Meth: Analyzed:07/29/09 16:25:00 J N STRICKLAND Approver: F R MACHESKY 08/05/09 14:41

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	HT	CLF
Trichloroethene	13000		ug/kg		C	2500	1		

Comments: Surrogate Data:	% Recovery	Limits
Dibromofluoromethane	91.0	78-110
Toluene-d8	100	70-126
Bromofluorobenzene	111	79-114

QC Batch Comments: PORTS was provided 500 ml amber glass wide-mouth jars containing approximately 200 g of sample preserved with approximately 250 ml of methanol for SW846-8260B (High Level Methanolic Extraction) analysis for TCE.

Upon arrival at PORTS (per customer instructions) the sample jars were weighed to verify sample weight (which was provided by the customer). The samples were then agitated, with a linear agitator, for 30 minutes and reweighed comparing the results to the original weight to check if any sample loss occured. The customer described the above extraction technique as a modification of SW846-5035 which is used for preparing solid samples containing high concentrations of TCE. The TCE reporting limit of 200 ug/kg (based on 200 g of sample) for this project is below PORTS typical reporting limit but above the detection limit. The RL's have been adjusted based on the weight of the sample.

The samples were then introduced to the GC/MS system by standard SW846-5030 techniques and analyzed by SW846-8260B for TCE only.

Footnotes:
C - Method SW846-5030A "Purge-and-Trap"

Waste Stream Number: PW – 203

Waste Stream Title: Aqueous Liquids

PW-203
X-700 Tank #1

TANK #1
LIQUID

Portsmouth Analytical Laboratory
Official Report

Customer Smpl Id: EVSR2008-135
Project:X-01-EC X700TANKS
Subproj Analyses:LIQUID
Customer:C J MAYNARD

Matrix: LIQUID
Protocol: NONE
Status: APPROVED
Location:

Sampled: 11/18/08 09:00:00
Received: 11/18/08 13:45:25
Needed: 12/16/08 23:59:00
Approved: 01/19/09 12:57:24

COC#:
Sample Desc:
Customer Comments:
Lab Smpl Comments:

Analy Meth:SW846-7470A | QC Batch:QC08331018 Test:HG7470A | Rpt Basis:Not Corrected | Date Approved
Prep Meth: | Analyzed:11/21/08 00:00:00 T E SHOOK | Approver: K A DAYS | 11/26/08 11:55

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	HT	CLF
Mercury	10.0		ug/L	U		10.0	1		

Analy Meth:SW846-3010A | QC Batch:QC08331012 Test:METALS-PREP | Rpt Basis:Not Corrected | Date Approved
Prep Meth: | Analyzed:11/19/08 00:00:00 K A DAYS | Approver: K A DAYS | 12/01/08 12:33

Analy Meth:SW846-6010B | QC Batch:QC08336043 Test:SW846-6010B | Rpt Basis:Not Corrected | Date Approved
p Meth: SW846-3010A | Analyzed:11/20/08 00:00:00 T E SHOOK | Approver: K A DAYS | 12/01/08 12:40

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	HT	CLF
Arsenic	1220	0	ug/L	U		1220	50		
Barium	58	0	ug/L	U		58	50		
Cadmium	140	0	ug/L	U		140	50		
Chromium	312	0	ug/L	B		119	50		
Lead	1300	0	ug/L	*U		1300	50		
Selenium	3160	0	ug/L	NU		3160	50		
Silver	120	0	ug/L	U		120	50		

EPA Qualifiers:

* - Duplicate analysis not within control limits.
B - Analyte result less than the Practical Quantitation Limit (PQL) and greater than or equal to the Instrument Detection Limit (IDL).
N - Sample spike recovery not within control limits.
U - Analyte analyzed for but undetected. Analyte result was below the Lowest Concentration Reported (LCR).

Portsmouth Analytical Laboratory
Official Report

Analy Meth: PORTS-Non-standard	QC Batch: QC08337042 Test: SHIPPING	Rpt Basis: Not Corrected	Date Approved
Prep Meth:	Analyzed: 11/20/08 00:00:00 C J MAYNARD	Approver: C J MAYNARD	01/19/09 12:49

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	HT	CLP
Other	SHIPPED						1		

Comments: Sent to Southwest Research Institute for SVOC analysis. Shipping order X-13306.

Analy Meth: SW846-3510C	QC Batch: QC08365022 Test: ORGEXT-PCB-1	Rpt Basis: Not Corrected	Date Approved
Prep Meth:	Analyzed: 11/20/08 12:16:42 F R MACHESKY	Approver: F R MACHESKY	12/30/08 12:37

Comments: THIS SAMPLE FORMED A THICK EMULSION DURING EXTRACTION.

Analy Meth: SW846-3510C	QC Batch: QC09014029 Test: ORGEXT-PEST1	Rpt Basis: Not Corrected	Date Approved
Prep Meth:	Analyzed: 11/24/08 09:51:35 F R MACHESKY	Approver: F R MACHESKY	01/14/09 07:55

Comments: THIS SAMPLE FORMED A THICK EMULSION DURING EXTRACTION.

y Meth: SW846-8082	QC Batch: QC09006011 Test: PCB8082	Rpt Basis: Not Corrected	Date Approved
Prep Meth: SW846-3510C	Analyzed: 11/20/08 21:11:00 F R MACHESKY	Approver: J N STRICKLAND	01/08/09 11:34

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	HT	CLP
Aroclor-1016	1.2		ug/L	U		1.2	1		
Aroclor-1221	1.2		ug/L	U		1.2	1		
Aroclor-1232	1.2		ug/L	U		1.2	1		
Aroclor-1242	1.2		ug/L	U		1.2	1		
Aroclor-1248	1.2		ug/L	U		1.2	1		
Aroclor-1254	3.8		ug/L			1.2	1		
Aroclor-1260	47		ug/L	J		6	5		
Aroclor-1268	19		ug/L			6	5		

Comments: The dilutions for this sample were analyzed with QA08161229M6D in which the 2nd Aroclor 1260 ccc recovery (120%) is above the PORTS acceptance limit of 115% therefore the Aroclor 1260 result for this sample will be estimated "J".

The Aroclor 1260 matrix spike which was also diluted and analyzed with QA08161229M6D had a recovery of 207% which is above the PORTS acceptance limit of 129%.

The TCMX surrogate recovery and the Aroclor 1016 matrix spike recoveries were acceptable.

Analy Meth:SW846-8081A | QC Batch:QC09014033 Test:PEST8081A | Rpt Basis:Not Corrected | Date Approved
Prep Meth: SW846-3510C | Analyzed:01/03/09 02:33:00 F R MACHESKY | Approver: J N STRICKLAND | 01/15/09 08:32

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	HT	CLF
Chlordane	2.91		ug/L	JU		2.91	1		
Endrin	0.29		ug/L	JU		0.29	1		
Heptachlor	0.29		ug/L	JU		0.29	1		
Heptachlor epoxide	0.29		ug/L	JU		0.29	1		
Lindane	0.29		ug/L	JU		0.29	1		
Methoxychlor	0.29		ug/L	JU		0.29	1		
Toxaphene	5.81		ug/L	JU		5.81	1		

Comments: The following are the Matrix Spike Recoveries associated with this sample:

Compound	Recovery	Acceptance Range
Lindane	67.9%	75-108%
Heptachlor	47.8%	68-105%
Heptachlor Epox	56.4%	82-108%
Endrin	29.0%	83-112%
Methoxychlor	29.5%	77-112%
Chlordane	58.1%	59-125%
Toxaphene	42.2%	44-124%

Matrix interferences and detectable aroclors resulted in poor chromatography.
The bracketing chlordane CCC recoveries (117%, 125%) are above the PORTS acceptance range of 115%. Chlordane was not detected in this sample.

Analy Meth:SW846-8260B | QC Batch:QC08326005 Test:VOA-2 | Rpt Basis:Not Corrected | Date Approved
Prep Meth: | Analyzed:11/19/08 00:00:00 M R KELLEY | Approver: J N STRICKLAND | 11/25/08 06:28

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	HT	CLF
1,1,1-Trichloroethane	20		ug/L	U	C	20	10		
1,1,2,2-Tetrachloroethane	20		ug/L	U	C	20	10		
1,1,2-Trichloroethane	20		ug/L	U	C	20	10		
1,1-Dichloroethane	20		ug/L	U	C	20	10		
1,1-Dichloroethene	20		ug/L	U	C	20	10		
1,2-Dichlorobenzene	20		ug/L	U	C	20	10		
1,2-Dichloroethane	20		ug/L	U	C	20	10		
1,2-Dimethylbenzene	20		ug/L	U	C	20	10		
1,3 (1,4)-Dimethylbenzene	20		ug/L	U	C	20	10		
1,4-Dichlorobenzene	20		ug/L	U	C	20	10		
2-Butanone	500		ug/L	U	C	500	10		
4-Methyl-2-pentanone	500		ug/L	U	C	500	10		
Acetone	500		ug/L	U	C	500	10		
Benzene	20		ug/L	JU	C	20	10		
Bromodichloromethane	20		ug/L	U	C	20	10		
Bromoform	20		ug/L	U	C	20	10		

TANK I
LIQUID

Portsmouth Analytical Laboratory
Official Report

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	RT	CLP
Bromomethane	40		ug/L	JU	C	40	10		
Carbon disulfide	20		ug/L	U	C	20	10		
Carbon tetrachloride	20		ug/L	U	C	20	10		
Chlorobenzene	20		ug/L	U	C	20	10		
Chloroethane	40		ug/L	U	C	40	10		
Chloroform	20		ug/L	U	C	20	10		
Chloromethane	40		ug/L	U	C	40	10		
Dibromochloromethane	20		ug/L	U	C	20	10		
Ethylbenzene	20		ug/L	U	C	20	10		
Methylene chloride	20		ug/L	U	C	20	10		
Tetrachloroethene	20		ug/L	U	C	20	10		
Toluene	20		ug/L	U	C	20	10		
Trichloroethene	20		ug/L	U	C	20	10		
Trichlorofluoromethane	40		ug/L	U	C	40	10		
Vinyl chloride	10		ug/L	U	C	10	10		
cis-1,2-Dichloroethene	20		ug/L	JU	C	20	10		
trans-1,2-Dichloroethene	20		ug/L	U	C	20	10		

Comments: Bromomethane (35.4%) failed the method criteria of <15% RSD in the initial calibration and will be estimated "J".

Cis-1,2-dichloroethene (31.2%) failed the PORTS "good laboratory practice" of <25% D in the continuing calibration verification and will be estimated "J".

Benzene exceeded the PORTS established upper limit of 116% on the MS and MSD and will be estimated "J".

EPA Qualifiers:
J - Estimated value.
U - Analyte analyzed for but undetected. Analyte result was below the Lowest Concentration Reported (LCR).

Analy Meth:PORTS-XP4-TS-RL7230 QC Batch:QC08325011 Test:AB-ACT-GPC Rpt Basis:Not Corrected Date Approved
Prep Meth: Analyzed:11/19/08 00:00:00 R M BALL Approver: W R WAUGH 11/20/08 08:30

Analyte Name	Result	+/-	Unit	Qual	Fn	TPE	MDA	Dec Lvl
Alpha activity	2.52E-01	2.01E-01	pCi/ml			2.02E-01	2.22E-01	7.03E-0
Beta activity	7.10E+00	5.29E-01	pCi/ml			5.50E-01	2.40E-01	1.08E-0

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC08330027 Test:ALPHA-AM-AS Rpt Basis:Not Corrected Date Approved
Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:11/24/08 17:14:34 S J JAMES Approver: C D GOOD 11/25/08 13:37

Analyte Name	Result	+/-	Unit	Qual	Fn	TPE	MDA	Dec Lvl
Americium-241	1.396E-02	1.974E-02	pCi/ml	U		1.979E-02	1.891E-02	

TANK 1
LIQUID

Portsmouth Analytical Laboratory
Official Report

Analy Meth:PORTS-XP4-TS-RL7510	QC Batch:QC08330025 Test:ALPHA-NP-AS				Rpt Basis:Not Corrected			Date Approved
Prep Meth: PORTS-XP4-TS-RL7505	Analyzed:11/24/08 17:16:37 S J JAMES				Approver: C D GOOD			11/25/08 13:39
Analyte Name	Result	+/-	Unit	Qual Fn	TPE	MDA		Dec Lvl
Neptunium-237	0.000E+00	0.000E+00	pCi/ml	U	1.286E-04	1.732E-02		
Plutonium-238	1.275E-02	1.803E-02	pCi/ml	U	1.811E-02	1.727E-02		
Plutonium-239/240	1.912E-02	2.208E-02	pCi/ml	U	2.222E-02	1.727E-02		

Analy Meth:PORTS-XP4-TS-RL7510	QC Batch:QC08330032 Test:ALPHA-U-AS				Rpt Basis:Not Corrected			Date Approved
Prep Meth: PORTS-XP4-TS-RL7505	Analyzed:11/24/08 17:18:26 S J JAMES				Approver: J J SISLER			11/26/08 11:45
Analyte Name	Result	+/-	Unit	Qual Fn	TPE	MDA		Dec Lvl
Uranium-233/234	1.886E-01	7.242E-02	pCi/ml		7.622E-02	4.785E-02		
Uranium-235	0.000E+00	0.000E+00	pCi/ml	U	1.530E-04	2.174E-02		
Uranium-236	0.000E+00	0.000E+00	pCi/ml	U	1.374E-04	1.952E-02		
Uranium-238	4.544E-02	3.435E-02	pCi/ml		3.482E-02	1.759E-02		

Analy Meth:PORTS-XP4-TS-RL7505	QC Batch:QC08326021 Test:RAD-PREP				Rpt Basis:Not Corrected			Date Approved
Prep Meth:	Analyzed:11/19/08 13:01:17 R M BALL				Approver: R M BALL			11/21/08 12:22

y Meth:PORTS-XP4-TS-RL7510	QC Batch:QC08329024 Test:TC99-ACT-LS				Rpt Basis:Not Corrected			Date Approved
Prep Meth: PORTS-XP4-TS-RL7505	Analyzed:11/21/08 00:00:00 R M BALL				Approver: C D GOOD			11/25/08 14:12
Analyte Name	Result	+/-	Unit	Qual Fn	TPE	MDA		Dec Lvl
Technetium-99	1.27E+01	4.71E-01	pCi/ml		4.87E-01	3.66E-01		1.78E-0

Analy Meth:PORTS-XP4-TS-RL7510	QC Batch:QC08330034 Test:TOTAL-U-AS				Rpt Basis:Not Corrected			Date Approved
Prep Meth: PORTS-XP4-TS-RL7505	Analyzed:11/24/08 00:00:00 S J JAMES				Approver: J J SISLER			11/26/08 11:43
Analyte Name	Result	+/-	Unit	Qual Fn	TPE	MDA		Dec Lvl
Uranium	1.352E-01		ug/ml		1.036E-01	6.272E-02		

135 PPB

Analy Meth:PORTS-XP4-TS-RL7510	QC Batch:QC08330029 Test:U235-WT-AS				Rpt Basis:Not Corrected			Date Approved
Prep Meth: PORTS-XP4-TS-RL7505	Analyzed:11/24/08 00:00:00 S J JAMES				Approver: J J SISLER			11/26/08 11:44
Analyte Name	Result	+/-	Unit	Qual Fn	TPE	MDA		Dec Lvl
Uranium-235	0.000E+00		wt %	U	0.000E+00			

EPA Qualifiers:
U - Indicates analyte/nuclide was analyzed for, but not detected.

Footnotes:

C - Method SW846-5030A "Purge-and-Trap"

***** END OF REPORT *****

A-3159 (8-1-04)

☐ Rush Sampling
Need Sampling by 11, 18, 08
☐ Rush Analysis
Need Analysis by ASAP

FIELD SAMPLE LOG SHEET

RFD Number _____ Number of Containers TANK #1
WML No. _____ WMS No. _____ EVSR 2008-135 EZ _____ Waste Stream ID _____
Sample Location X-700 TANK #1
Sample Description Liquid Solution (RINSE/SOAP/WATER)
USEPA ID Code(s) _____
Contact Person(s) P. McGORON / J. KEMP Ext. 2326/2260
Suspected Hazardous PCB / TCE / ACIDIC OGRU _____ (Note TID application on COC)

ANALYSES REQUESTED

Uranium Total, Isotopic Tc ✓ %U-235 ✓ Gross Alpha +Beta ✓ TRU's Gross-Beta ✓
Solvents: F001 _____ F002 _____ F003 _____ F004 _____ F005 _____
Solvents: Volatiles _____ SV/BN _____ SV/A _____ VOC _____ VOX _____
RCRA Metals: Direct (Ba, Cd, Cr, Pb, Ag, As, Hg, Se) _____ NPDES Metals (Cu, Fe, Ni, Zn) _____
(TCLP) Pest Pesticides Metals +Hg ✓ Volatiles ✓ SV/BN SVOC SV/A _____
PCB ✓ Flash Point _____ Field pH ✓ Corrosivity _____

FIELD SAMPLING NOTES

Sample Numbers EVSR2008-135
Sample Date 11 / 18 / 08 Sample Time 0900
Sample Media: Liquid X Solid _____ Sludge _____
Odor: Strong _____ Mild _____ None X Field pH 10 Inst # or (pH paper) _____
Description of contents: Liquid solution
Sampling Point: X 700
Sample Destination: X-710 X Other _____

Sample Type: Grab _____ Composite X Other _____
Equipment and Methodology baler
Size and Number of Containers/Preservatives see attached
Signature of Samplers [signature] (RCRA)
Field Observations/Observer _____
COC No. _____ Waste Mgmt QA/QC ☐Yes/☐ No X-710 QA/QC _____
Notes _____

CERTIFIED TO BE AN ACCURATE RECORD
SIGNATURE [signature]
DATE 12/31/08

Waste Stream Number: PW – 204

Waste Stream Title: Combustible Liquids

PW-204
Sludge Waste from
T-700 Tank #3

S.M. STOLLER CORP.

1

STOL SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

PW204-MET-1

Lab Name: SOUTHWEST_RESEARCH_INSTIT Contract:12474.05.00X

Lab Code: SWRI__ Task Ord:100710-2 SRR No.: 41538_ SDG No.: 436192

Matrix (soil/water): SZ___ Lab Sample ID: 436606

Level (low/med): LOW__ Date Received: 07/13/10

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.2			P
7440-39-3	Barium	8.2			P
7440-43-9	Cadmium	3.6			P
7440-47-3	Chromium	15.7			P
7439-92-1	Lead	7.5		*	P
7439-97-6	Mercury	0.020	U		CV
7782-49-2	Selenium	0.90	U		P
7440-22-4	Silver	0.45	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

_____

_____

_____

_____

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Technetium-99 Result (pCi/g)	Q	TPU (pCi/g)	Rh103 Internal Std Rec	Date Analyzed
Prep Blank	pbwg12cm3	0.0195	U	1.25	69.6%	07/14/10
Lab Control	lcswg12cm4	92.6		15.6	91.6%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Prep Blank 2	pbwg13cm1	-0.0844	U	1.25	46.4%	07/14/10
Lab Control 2	lcswg13cm1	90.3		15.4	86.1%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	90.3%		-----	-----	-----
PW201-RAD-1	436196	3.04		1.28	62.9%	07/14/10
Duplicate result	436196D	3.49		1.27	71.1%	07/14/10
RPD	-----	13.8%		-----	-----	-----
Spike result	436196S	95.0		15.6	99.5%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Spike Duplicate result	436196SD	96.4		15.7	101%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	94.0%		----	----	-----
PW201-RAD-2	436197	7.62		1.43	81.9%	07/14/10
PW201-RAD-3	436198	6.94		1.43	80.7%	07/14/10
PW201-RAD-4	436199	0.393	U	1.16	73.7%	07/14/10
PW202-RAD-1	436214	6.13		1.35	85.1%	07/14/10
PW205-RAD-1	436217	1580		158	114%	07/14/10
PW207-RAD-1	436222	234		23.4	82.6%	07/14/10
PW201-RAD-5	436601	7.66		1.43	55.5%	07/14/10
PW204-RAD-1	436607	27.6		5.93	48.6%	07/14/10

Reporting Limit: 2.50 pCi/g
Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Total Uranium Result (ug/g)	Q	TPU (ug/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.00153	U	0.00101	72.1%
Lab Control	lcswg12cm5	7.90		0.790	84.3%
True Value	-----	7.48		-----	-----
Recovery	-----	105.6%		-----	-----
Prep Blank 2	pbwg12cm5	0.00642		0.00210	72.0%
Lab Control 2	lcswg12cm7	15.3		1.53	86.6%
True Value	-----	15.0		-----	-----
Recovery	-----	102.0%		-----	-----
Prep Blank 3	pbwg12cm2	0.000316	U	0.00200	113%
Lab Control 3	lcswg12cm2	15.4		1.54	80.2%
True Value	-----	15.0		-----	-----
Recovery	-----	102.7%		-----	-----
Prep Blank 4	pbwg13cm2	0.000348	U	0.00100	66.7%
Lab Control 4	lcswg13cm2	7.95		0.795	83.1%
True Value	-----	7.48		-----	-----
Recovery	-----	106.3%		-----	-----
PW201-RAD-1	436196	4.11		0.412	86.1%
Duplicate result	436196D	4.41		0.441	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	12.9		1.29	85.2%
Spike added	-----	7.05		-----	-----
Recovery	-----	124.7%		-----	-----
Spike Duplicate result	436196SD	10.9		1.09	84.2%
Spike added	-----	7.26		-----	-----
Recovery	-----	93.5%		----	----
PW201-RAD-2	436197	0.0957		0.00963	62.0%
PW201-RAD-3	436198	0.0283		0.00298	61.7%
PW201-RAD-4	436199	0.199		0.0199	61.8%
PW202-RAD-1	436214	3.47		0.347	71.0%
PW205-RAD-1	436217	186		18.6	86.0%
PW207-RAD-1	436222	2.52		0.253	67.7%
PW201-RAD-5	436601	0.0158		0.00183	47.2%
PW204-RAD-1	436607	4950		495	85.6%

Reporting Limit: 0.002 ug/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{238}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.000516	U	0.000340	72.1%
Lab Control	lcswg12cm5	2.63		0.263	84.3%
True Value	-----	2.50		-----	-----
Recovery	-----	105.2%		-----	-----
Prep Blank 2	pbwg12cm5	0.00215		0.000706	72.0%
Lab Control 2	lcswg12cm7	5.09		0.509	86.6%
True Value	-----	5.01		-----	-----
Recovery	-----	101.6%		-----	-----
Prep Blank 3	pbwg12cm2	0.0000918	U	0.000672	113%
Lab Control 3	lcswg12cm2	5.14		0.514	80.2%
True Value	-----	5.01		-----	-----
Recovery	-----	102.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.000103	U	0.000336	66.7%
Lab Control 4	lcswg13cm2	2.65		0.265	83.1%
True Value	-----	2.50		-----	-----
Recovery	-----	106.0%		-----	-----
PW201-RAD-1	436196	1.37		0.137	86.1%
Duplicate result	436196D	1.47		0.147	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	4.29		0.429	85.2%
Spike added	-----	2.35		-----	-----
Recovery	-----	124.3%		-----	-----
Spike Duplicate result	436196SD	3.62		0.362	84.2%
Spike added	-----	2.42		-----	-----
Recovery	-----	93.0%		-----	----
PW201-RAD-2	436197	0.0320		0.00322	62.0%
PW201-RAD-3	436198	0.00938		0.000992	61.7%
PW201-RAD-4	436199	0.0663		0.00664	61.8%
PW202-RAD-1	436214	1.16		0.116	71.0%
PW205-RAD-1	436217	61.2		6.12	86.0%
PW207-RAD-1	436222	0.836		0.0836	67.7%
PW201-RAD-5	436601	0.00527		0.000611	47.2%
PW204-RAD-1	436607	1651		165	85.6%

Reporting Limit: 0.000672 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{236}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.0572	U	0.0812	79.0%
Lab Control	lcswg12cm6	1170		117	86.5%
True Value	-----	1050		-----	-----
Recovery	-----	111.4%		-----	-----
Prep Blank 2	pbwg12cm5	0.00259	U	0.162	76.3%
Lab Control 2	lcswg12cm8	2150		215	85.0%
True Value	-----	2090		-----	-----
Recovery	-----	102.9%		-----	-----
Prep Blank 3	pbwg12cm2	0.00951	U	0.162	79.5%
Lab Control 3	lcswg12cm3	2130		213	91.2%
True Value	-----	2090		-----	-----
Recovery	-----	101.9%		-----	-----
Prep Blank 4	pbwg13cm2	0.00948	U	0.0810	78.0%
Lab Control 4	lcswg13cm3	1110		111	89.5%
True Value	-----	1050		-----	-----
Recovery	-----	105.7%		-----	-----
PW201-RAD-1	436196	0.0339	U	0.0801	97.6%
Duplicate result	436196D	0.0150	U	0.0805	93.0%
RPD	-----	0.00%		-----	-----
Spike result	436196S	1120		112	84.5%
Spike added	-----	1040		-----	-----
Recovery	-----	107.7%		-----	-----
Spike Duplicate result	436196SD	1110		111	83.1%
Spike added	-----	1020		-----	-----
Recovery	-----	108.8%		-----	-----
PW201-RAD-2	436197	0.0289	U	0.0811	61.5%
PW201-RAD-3	436198	0.00521	U	0.0770	64.2%
PW201-RAD-4	436199	0.0187	U	0.0785	61.7%
PW202-RAD-1	436214	0.0752	U	0.159	85.7%
PW205-RAD-1	436217	0.741		0.170	47.5%
PW207-RAD-1	436222	0.0522	U	0.159	113%
PW201-RAD-5	436601	0.0415	U	0.0746	43.8%
PW204-RAD-1	436607	0.420		0.164	34.8%

Reporting Limit: 0.162 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{235}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec	Percent 235U
Prep Blank	pbwg12cm4	0.0000106	U	0.000270	72.1%	NC
Lab Control	lcswg12cm5	0.118		0.0130	84.3%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	102.6%		-----	-----	-----
Prep Blank 2	pbwg12cm5	0.0000932	U	0.000540	72.0%	NC
Lab Control 2	lcswg12cm7	0.224		0.0249	86.6%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	97.8%		-----	-----	-----
Prep Blank 3	pbwg12cm2	0.0000867	U	0.000540	113%	NC
Lab Control 3	lcswg12cm2	0.241		0.0264	80.2%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	105.2%		-----	-----	-----
Prep Blank 4	pbwg13cm2	0.0000702	U	0.000270	66.7%	NC
Lab Control 4	lcswg13cm2	0.120		0.0132	83.1%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	104.3%		-----	-----	-----
PW201-RAD-1	436196	0.0787	N	0.00831	86.1%	0.886%
Duplicate result	436196D	0.0865		0.00906	86.3%	0.907%
RPD	-----	9.44%		-----	-----	2.34%
Spike result	436196S	0.228	N	0.0234	85.2%	NA
Spike added	-----	0.108		-----	-----	-----
Recovery	-----	138.2%		-----	-----	-----
Spike Duplicate result	436196SD	0.178		0.0186	84.2%	NA
Spike added	-----	0.112		-----	-----	-----
Recovery	-----	88.7%		-----	----	-----
PW201-RAD-2	436197	0.00116	N	0.000294	62.0%	0.562%
PW201-RAD-3	436198	0.000738	N	0.000268	61.7%	1.20%
PW201-RAD-4	436199	0.00310	N	0.000406	61.8%	0.719%
PW202-RAD-1	436214	0.0524	N	0.00535	71.0%	0.700%
PW205-RAD-1	436217	7.44	N	0.751	86.0%	1.85%
PW207-RAD-1	436222	0.0775	N	0.00782	67.7%	1.42%
PW201-RAD-5	436601	0.000322	UN	0.000251	47.2%	<12.5%
PW204-RAD-1	436607	82.7	N	8.68	85.6%	0.772%

Reporting Limit: 0.000540 pCi/g

Q - data qualifier code.

NA - Not Applicable

NC - NC indicates that the total uranium concentration is too low to calculate %U235.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{234}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	-0.109	U	0.311	95.5%
Lab Control	lcswg12cm5	2.37		0.391	74.8%
True Value	-----	2.41		-----	-----
Recovery	-----	98.3%		-----	-----
Prep Blank 2	pbwg12cm5	-0.145	U	0.620	75.3%
Lab Control 2	lcswg12cm7	4.42		0.762	76.0%
True Value	-----	4.81		-----	-----
Recovery	-----	91.9%		-----	-----
Prep Blank 3	pbwg12cm2	-0.408	U	0.621	78.1%
Lab Control 3	lcswg12cm2	4.49		0.765	74.2%
True Value	-----	4.81		-----	-----
Recovery	-----	93.3%		-----	-----
Prep Blank 4	pbwg13cm2	-0.424	U	0.314	75.0%
Lab Control 4	lcswg13cm2	2.16		0.379	88.2%
True Value	-----	2.41		-----	-----
Recovery	-----	89.6%		-----	-----
PW201-RAD-1	436196	1.67	N	0.351	70.7%
Duplicate result	436196D	1.66		0.352	74.2%
RPD	-----	0.60%		-----	-----
Spike result	436196S	4.86	N	0.568	77.1%
Spike added	-----	2.27		-----	-----
Recovery	-----	140.5%		-----	-----
Spike Duplicate result	436196SD	3.89		0.492	73.5%
Spike added	-----	2.33		-----	-----
Recovery	-----	95.3%		-----	-----
PW201-RAD-2	436197	0.00825	UN	0.311	61.4%
PW201-RAD-3	436198	-0.0487	UN	0.297	63.0%
PW201-RAD-4	436199	0.152	UN	0.303	63.3%
PW202-RAD-1	436214	0.464	UN	0.612	65.2%
PW205-RAD-1	436217	181	N	18.1	66.5%
PW207-RAD-1	436222	0.460	UN	0.612	66.1%
PW201-RAD-5	436601	-0.273	UN	0.288	51.6%
PW204-RAD-1	436607	1360	N	136	82.6%

Reporting Limit: 0.622 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{233}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.038	U	0.482	99.1%
Lab Control	lcswg12cm5	105		10.5	80.7%
True Value	-----	95.9		-----	-----
Recovery	-----	109.5%		-----	-----
Prep Blank 2	pbwg12cm5	0.0891	U	0.965	84.5%
Lab Control 2	lcswg12cm7	198		19.8	82.4%
True Value	-----	192		-----	-----
Recovery	-----	103.1%		-----	-----
Prep Blank 3	pbwg12cm2	0.12	U	0.965	91.8%
Lab Control 3	lcswg12cm2	199		20.0	88.8%
True Value	-----	192		-----	-----
Recovery	-----	103.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.0877	U	0.482	84.3%
Lab Control 4	lcswg13cm2	106		10.6	81.4%
True Value	-----	95.9		-----	-----
Recovery	-----	110.5%		-----	-----
PW201-RAD-1	436196	0.457	U	0.480	112%
Duplicate result	436196D	0.590	U	0.484	116%
RPD	-----	0.00%		-----	-----
Spike result	436196S	97.4		10.0	101%
Spike added	-----	90.3		-----	-----
Recovery	-----	107.9%		-----	-----
Spike Duplicate result	436196SD	99.4		10.2	99.4%
Spike added	-----	93.0		-----	-----
Recovery	-----	106.9%		-----	-----
PW201-RAD-2	436197	0.13	U	0.482	65.5%
PW201-RAD-3	436198	0.0812	U	0.460	67.3%
PW201-RAD-4	436199	0.111	U	0.469	66.1%
PW202-RAD-1	436214	1.58	U	0.958	112%
PW205-RAD-1	436217	0.881	U	0.914	62.9%
PW207-RAD-1	436222	0.265	U	1.89	108%
PW201-RAD-5	436601	0.0745	U	0.444	50.5%
PW204-RAD-1	436607	0.125	U	0.472	33.2%

Reporting Limit: 0.964 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Sample Weight (g): 5.86
Extraction Dilution: 1.7
Dry Weight Input: 100

Client Sample ID: PW204-VOC-1
System ID: 436611
Filename: R07141012
Extract Volume (mL): 10
Sample dilution: 50

Project Number: 12474.05.00X
Instrument: REVEILLE
Date Received: Jul 13 2010 8:35AM
Date Analyzed: Jul 14 2010 7:32PM
Total Dilution Factor: 85.3

CAS No.	Compound	µg/kg	
74-87-3	CHLOROMETHANE	85	U
75-01-4	VINYL CHLORIDE	85	U
74-83-9	BROMOMETHANE	85	U
75-00-3	CHLOROETHANE	85	U
75-69-4	TRICHLOROFLUOROMETHANE	85	U
75-35-4	1,1-DICHLOROETHENE	85	U
75-15-0	CARBON DISULFIDE	85	U
74-88-4	IODOMETHANE	85	U
75-09-2	METHYLENE CHLORIDE	85	U
67-64-1	***ACETONE***	***300***	
156-60-5	TRANS-1,2-DICHLOROETHENE	85	U
75-34-3	1,1-DICHLOROETHANE	85	U
108-05-4	VINYL ACETATE	85	U
156-59-2	CIS-1,2-DICHLOROETHENE	85	U
74-97-5	BROMOCHLOROMETHANE	85	U
67-66-3	CHLOROFORM	85	U
6-23-5	CARBON TETRACHLORIDE	85	U
1-55-6	1,1,1-TRICHLOROETHANE	85	U
78-93-3	***2-BUTANONE***	***290***	***B***
71-43-2	BENZENE	85	U
107-06-2	1,2-DICHLOROETHANE	85	U
79-01-6	TRICHLOROETHENE	85	U
74-95-3	DIBROMOMETHANE	85	U
78-87-5	1,2-DICHLOROPROPANE	85	U
75-27-4	BROMODICHLOROMETHANE	85	U
10061-01-5	CIS-1,3-DICHLOROPROPENE	85	U
108-88-3	TOLUENE	85	U
127-18-4	TETRACHLOROETHENE	85	U
108-10-1	4-METHYL-2-PENTANONE	85	U
10061-02-6	TRANS-1,3-DICHLOROPROPENE	85	U
79-00-5	1,1,2-TRICHLOROETHANE	85	U
124-48-1	DIBROMOCHLOROMETHANE	85	U
106-93-4	1,2-DIBROMOETHANE	85	U
591-78-6	2-HEXANONE	85	U
108-90-7	CHLOROBENZENE	85	U
100-41-4	ETHYLBENZENE	85	U
630-20-6	1,1,1,2-TETRACHLOROETHANE	85	U
179601-23-1	M/P-XYLENE	85	U
95-47-6	O-XYLENE	85	U
100-42-5	STYRENE	85	U
75-25-2	BROMOFORM	85	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	85	U
96-18-4	1,2,3-TRICHLOROPROPANE	85	U
110-57-6	***TRANS-1,4-DICHLORO-2-BUTENE***	***0***	

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Sample Weight (g): 5.86
Extraction Dilution: 1.7
Dry Weight Input: 100

Client Sample ID: PW204-VOC-1
System ID: 436611
Filename: R07141012
Extract Volume (mL): 10
Sample dilution: 50

Project Number: 12474.05.00X
Instrument: REVEILLE
Date Received: Jul 13 2010 8:35AM
Date Analyzed: Jul 14 2010 7:32PM
Total Dilution Factor: 85.3

CAS No.	Compound	µg/kg
106-46-7	1,4-DICHLOROBENZENE	85 U
95-50-1	1,2-DICHLOROBENZENE	85 U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	85 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC1 (DCE)	SMC2 (TOL)	SMC3 (BFB)	Out
1	BLANK071210 MBLK	96	94	84	0
2	LCS071210 LCS	98	105	101	0
3	PW201-VOC-1	93	97	90	0
4	PW201-VOC-1 DL	104	101	86	0
5	PW201-VOC-1 MS DL	96	107	96	0
6	PW201-VOC-1 MSD DL	95	106	93	0
7	PW201-VOC-2	96	95	88	0
8	PW201-VOC-3	109	100	84	0
9	PW201-VOC-4	99	96	82	0
10	PW205-VOC-1	104	95	86	0
11	PW207-VOC-1	106	93	86	0
12	BLANK071410 MBLK	113	98	89	0
13	LCS071410 LCS	118	111	110	0
14	PW201-VOC-5	133*	101	80	1
15	PW204-VOC-1	124	102	86	0

QC Limits	
SMC1 (DCE) = 1,2-DICHLOROETHANE-D4 (SURR1)	(70-130)
SMC2 (TOL) = TOLUENE-D8 (SURR2)	(70-130)
SMC3 (BFB) = BROMOFLUOROBENZENE (SURR3)	(70-130)

* Values outside contract required QC Limits

Comments _____

SOUTHWEST RESEARCH INSTITUTE

Method 8270C Semi-volatile Organics Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Matrix: SZ
Sample wt. (g): 7.74
Level: LOW
GPC Cleanup: N

Client Sample ID: PW204-SVOC-1
System ID: 436608
Filename: B07141011
pH: NA
Conc. Ext. Vol. (uL): 1000
% Moisture: 0
Decanted: N

Project Number: 12474.05.00X
Instrument: BEVO
Date Received: Jul 13, 2010
Date Extracted: Jul 13, 2010
Date Analyzed: Jul 15 2010 12:31AM
Dilution Factor: 1
Injection Volume (uL): 1.0

CAS No.	Compound	ug/Kg
111-44-4	bis(2-Chloroethyl)ether	646 U
108-95-2	Phenol	646 U
95-57-8	2-Chlorophenol	646 U
541-73-1	1,3-Dichlorobenzene	646 U
106-46-7	1,4-Dichlorobenzene	646 U
95-50-1	1,2-Dichlorobenzene	646 U
100-51-6	Benzyl alcohol	646 U
108-60-1	bis(2-chloroisopropyl)ether	646 U
95-48-7	2-Methylphenol	646 U
67-72-1	Hexachloroethane	646 U
621-64-7	N-Nitroso-di-n-propylamine	646 U
106-44-5	3&4-Methylphenol	646 U
98-95-3	Nitrobenzene	646 U
78-59-1	Isophorone	646 U
88-75-5	2-Nitrophenol	646 U
05-67-9	2,4-Dimethylphenol	646 U
1-91-1	bis(2-Chloroethoxy)methane	646 U
20-83-2	2,4-Dichlorophenol	646 U
120-82-1	1,2,4-Trichlorobenzene	646 U
91-20-3	Naphthalene	646 U
65-85-0	Benzoic Acid	646 U
106-47-8	4-Chloroaniline	646 U
87-68-3	Hexachlorobutadiene	646 U
59-50-7	4-Chloro-3-methylphenol	646 U
91-57-6	2-Methylnaphthalene	646 U
77-47-4	Hexachlorocyclopentadiene	646 U
88-06-2	2,4,6-Trichlorophenol	646 U
95-95-4	2,4,5-Trichlorophenol	646 U
91-58-7	2-Chloronaphthalene	646 U
88-74-4	2-Nitroaniline	646 U
208-96-8	Acenaphthylene	646 U
131-11-3	Dimethylphthalate	646 U
606-20-2	2,6-Dinitrotoluene	646 U
83-32-9	Acenaphthene	646 U
99-09-2	3-Nitroaniline	646 U
51-28-5	2,4-Dinitrophenol	646 U
132-64-9	Dibenzofuran	646 U
121-14-2	2,4-Dinitrotoluene	646 U
100-02-7	4-Nitrophenol	646 U
86-73-7	Fluorene	646 U
7005-72-3	4-Chlorophenyl-phenylether	646 U
84-66-2	Diethylphthalate	646 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- D Concentration value is from dilution analysis.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

SOUTHWEST RESEARCH INSTITUTE

Method 8270C Semi-volatile Organics Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Matrix: SZ
Sample wt. (g): 7.74
Level: LOW
GPC Cleanup: N

Client Sample ID: PW204-SVOC-1
System ID: 436608
Filename: B07141011
pH: NA
Conc. Ext. Vol. (uL): 1000
% Moisture: 0
Decanted: N

Project Number: 12474.05.00X
Instrument: BEVO
Date Received: Jul 13, 2010
Date Extracted: Jul 13, 2010
Date Analyzed: Jul 15 2010 12:31AM
Dilution Factor: 1
Injection Volume (uL): 1.0

CAS No.	Compound	ug/Kg
100-01-6	4-Nitroaniline	646 U
534-52-1	4,6-Dinitro-2-methylphenol	646 U
86-30-6	n-Nitrosodiphenylamine	646 U
101-55-3	4-Bromophenyl-phenylether	646 U
118-74-1	Hexachlorobenzene	646 U
87-86-5	Pentachlorophenol	646 U
85-01-8	Phenanthrene	646 U
120-12-7	Anthracene	646 U
86-74-8	Carbazole	646 U
84-74-2	Di-n-butylphthalate	646 U
206-44-0	Fluoranthene	646 U
129-00-0	Pyrene	646 U
85-68-7	Butylbenzylphthalate	646 U
91-94-1	3,3'-Dichlorobenzidine	646 U
56-55-3	Benzo[a]anthracene	646 U
18-01-9	Chrysene	646 U
7-81-7	bis(2-Ethylhexyl)phthalate	646 U
117-84-0	Di-n-octylphthalate	646 U
205-99-2	Benzo[b]fluoranthene	646 U
207-08-9	Benzo[k]fluoranthene	646 U
50-32-8	Benzo[a]pyrene	646 U
193-39-5	Indeno[1,2,3-cd]pyrene	646 U
53-70-3	Dibenz[a,h]anthracene	646 U
191-24-2	Benzo[g,h,i]perylene	646 U
110-86-1	Pyridine	646 U
62-75-9	n-Nitrosodimethylamine	646 U
62-53-3	Aniline	646 U
58-90-2	2,3,4,6-Tetrachlorophenol	646 U
103-33-3	Diphenyldiazene	646 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- D *Concentration value is from dilution analysis.*
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC1 (NBZ)	SMC2 (FBP)	SMC3 (TPH)	SMC4 (PHL)	Out
1	SMB_12JUL10 BLK	70	72	89	71	0
2	PW201-SVOC-1	59	62	75	63	0
3	PW201-SVOC-2	55	56	66	62	0
4	PW201-SVOC-3	47	46	51	54	0
5	PW201-SVOC-4	57	65	82	62	0
6	PW205-SVOC-1	45	56	76	2*	1
7	PW201-SVOC-1 MS	58	62	76	64	0
8	PW201-SVOC-1 MSD	60	62	68	65	0
9	LCS_12JUL10 LCS	59	58	60	59	0
10	SMB_13JUL10 BLK	71	72	75	75	0
11	PW201-SVOC-5	61	54	56	58	0
12	PW204-SVOC-1	54	55	77	60	0
13	LCS_13JUL10 LCS	68	68	70	71	0

QC Limits

SMC1 (NBZ) = Nitrobenzene-d5	(23-120)
SMC2 (FBP) = 2-Fluorobiphenyl	(30-115)
SMC3 (TPH) = Terphenyl-d14	(18-137)
SMC4 (PHL) = Phenol-d5	(24-113)

* *Values outside contract required QC Limits*

Comments _____

FORM II-A

Printed 16 Jul 2010 17:14:03

ver (3/19/2010)

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC5 (2FP)	SMC6 (TBP)			Out
1	SMB_12JUL10 BLK	75	59			0
2	PW201-SVOC-1	60	63			0
3	PW201-SVOC-2	59	59			0
4	PW201-SVOC-3	51	51			0
5	PW201-SVOC-4	61	61			0
6	PW205-SVOC-1	44	22			0
7	PW201-SVOC-1 MS	60	64			0
8	PW201-SVOC-1 MSD	64	68			0
9	LCS_12JUL10 LCS	62	58			0
10	SMB_13JUL10 BLK	75	64			0
11	PW201-SVOC-5	55	56			0
12	PW204-SVOC-1	59	63			0
13	LCS_13JUL10 LCS	71	63			0

QC Limits	
SMC5 (2FP) = 2-Fluorophenol	(25-121)
SMC6 (TBP) = 2,4,6-Tribromophenol	(19-122)

* Values outside contract required QC Limits

Comments _____

FORM II-B

Printed: 16 Jul 2010 17:14:03
ver (3/19/2010)

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.04.00X

Matrix: SZ

SOW: QXP02220X4O

SRR #: 41570

Date Received: 07/13/10

Method: ASTM D93

Task Order #: 100713-3

Sample ID	Lab System ID	**Flashpoint Results**	Units	Date Analyzed
Lab Control	lcs10098	84.99	°C	07/14/10
True Value	----	85.0	----	----
Recovery	----	100.0%	----	----
Lab Control 2	lcs210098	85.1	°C	07/14/10
True Value	----	85.0	----	----
Recovery	----	100.1%	----	----
PW204-IGN-1	436605	>120	°C	07/14/10
Duplicate result	436605D	>120	°C	07/14/10
RPD	----	0.00%	----	----

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Waste Stream Number: PW – 205

Waste Stream Title: Sludge

PW - 205

Heavy Metals Sludge

S.M. STOLLER CORP.

1

INORGANIC ANALYSES DATA SHEET

STOL SAMPLE NO.

PW205-MET-1

Lab Name: SOUTHWEST_RESEARCH_INSTIT Contract:12474.05.00X

Lab Code: SWRI__ Task Ord:100710-2 SRR No.: 41538_ SDG No.: 436192

Matrix (soil/water): SZ___ Lab Sample ID: 436216

Level (low/med): LOW__ Date Received: 07/10/10

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.60	B		P
7440-39-3	Barium	1.2			P
7440-43-9	Cadmium	1.7			P
7440-47-3	Chromium	178			P
7439-92-1	Lead	511		*	P
7439-97-6	Mercury	1.2			CV
7782-49-2	Selenium	0.97	U		P
7440-22-4	Silver	0.49	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

_____

_____

_____

_____

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Technetium-99 Result (pCi/g)	Q	TPU (pCi/g)	Rh103 Internal Std Rec	Date Analyzed
Prep Blank	pbwg12cm3	0.0195	U	1.25	69.6%	07/14/10
Lab Control	lcswg12cm4	92.6		15.6	91.6%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Prep Blank 2	pbwg13cm1	-0.0844	U	1.25	46.4%	07/14/10
Lab Control 2	lcswg13cm1	90.3		15.4	86.1%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	90.3%		-----	-----	-----
PW201-RAD-1	436196	3.04		1.28	62.9%	07/14/10
Duplicate result	436196D	3.49		1.27	71.1%	07/14/10
RPD	-----	13.8%		-----	-----	-----
Spike result	436196S	95.0		15.6	99.5%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Spike Duplicate result	436196SD	96.4		15.7	101%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	94.0%		----	----	-----
PW201-RAD-2	436197	7.62		1.43	81.9%	07/14/10
PW201-RAD-3	436198	6.94		1.43	80.7%	07/14/10
PW201-RAD-4	436199	0.393	U	1.16	73.7%	07/14/10
PW202-RAD-1	436214	6.13		1.35	85.1%	07/14/10
PW205-RAD-1	436217	1580		158	114%	07/14/10
PW207-RAD-1	436222	234		23.4	82.6%	07/14/10
PW201-RAD-5	436601	7.66		1.43	55.5%	07/14/10
PW204-RAD-1	436607	27.6		5.93	48.6%	07/14/10

Reporting Limit: 2.50 pCi/g
Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Total Uranium Result (ug/g)	Q	TPU (ug/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.00153	U	0.00101	72.1%
Lab Control	lcswg12cm5	7.90		0.790	84.3%
True Value	-----	7.48		-----	-----
Recovery	-----	105.6%		-----	-----
Prep Blank 2	pbwg12cm5	0.00642		0.00210	72.0%
Lab Control 2	lcswg12cm7	15.3		1.53	86.6%
True Value	-----	15.0		-----	-----
Recovery	-----	102.0%		-----	-----
Prep Blank 3	pbwg12cm2	0.000316	U	0.00200	113%
Lab Control 3	lcswg12cm2	15.4		1.54	80.2%
True Value	-----	15.0		-----	-----
Recovery	-----	102.7%		-----	-----
Prep Blank 4	pbwg13cm2	0.000348	U	0.00100	66.7%
Lab Control 4	lcswg13cm2	7.95		0.795	83.1%
True Value	-----	7.48		-----	-----
Recovery	-----	106.3%		-----	-----
PW201-RAD-1	436196	4.11		0.412	86.1%
Duplicate result	436196D	4.41		0.441	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	12.9		1.29	85.2%
Spike added	-----	7.05		-----	-----
Recovery	-----	124.7%		-----	-----
Spike Duplicate result	436196SD	10.9		1.09	84.2%
Spike added	-----	7.26		-----	-----
Recovery	-----	93.5%		----	----
PW201-RAD-2	436197	0.0957		0.00963	62.0%
PW201-RAD-3	436198	0.0283		0.00298	61.7%
PW201-RAD-4	436199	0.199		0.0199	61.8%
PW202-RAD-1	436214	3.47		0.347	71.0%
PW205-RAD-1	436217	186		18.6	86.0%
PW207-RAD-1	436222	2.52		0.253	67.7%
PW201-RAD-5	436601	0.0158		0.00183	47.2%
PW204-RAD-1	436607	4950		495	85.6%

Reporting Limit: 0.002 ug/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{238}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.000516	U	0.000340	72.1%
Lab Control	lcswg12cm5	2.63		0.263	84.3%
True Value	-----	2.50		-----	-----
Recovery	-----	105.2%		-----	-----
Prep Blank 2	pbwg12cm5	0.00215		0.000706	72.0%
Lab Control 2	lcswg12cm7	5.09		0.509	86.6%
True Value	-----	5.01		-----	-----
Recovery	-----	101.6%		-----	-----
Prep Blank 3	pbwg12cm2	0.0000918	U	0.000672	113%
Lab Control 3	lcswg12cm2	5.14		0.514	80.2%
True Value	-----	5.01		-----	-----
Recovery	-----	102.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.000103	U	0.000336	66.7%
Lab Control 4	lcswg13cm2	2.65		0.265	83.1%
True Value	-----	2.50		-----	-----
Recovery	-----	106.0%		-----	-----
PW201-RAD-1	436196	1.37		0.137	86.1%
Duplicate result	436196D	1.47		0.147	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	4.29		0.429	85.2%
Spike added	-----	2.35		-----	-----
Recovery	-----	124.3%		-----	-----
Spike Duplicate result	436196SD	3.62		0.362	84.2%
Spike added	-----	2.42		-----	-----
Recovery	-----	93.0%		-----	----
PW201-RAD-2	436197	0.0320		0.00322	62.0%
PW201-RAD-3	436198	0.00938		0.000992	61.7%
PW201-RAD-4	436199	0.0663		0.00664	61.8%
PW202-RAD-1	436214	1.16		0.116	71.0%
PW205-RAD-1	436217	61.2		6.12	86.0%
PW207-RAD-1	436222	0.836		0.0836	67.7%
PW201-RAD-5	436601	0.00527		0.000611	47.2%
PW204-RAD-1	436607	1651		165	85.6%

Reporting Limit: 0.000672 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{236}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.0572	U	0.0812	79.0%
Lab Control	lcswg12cm6	1170		117	86.5%
True Value	-----	1050		-----	-----
Recovery	-----	111.4%		-----	-----
Prep Blank 2	pbwg12cm5	0.00259	U	0.162	76.3%
Lab Control 2	lcswg12cm8	2150		215	85.0%
True Value	-----	2090		-----	-----
Recovery	-----	102.9%		-----	-----
Prep Blank 3	pbwg12cm2	0.00951	U	0.162	79.5%
Lab Control 3	lcswg12cm3	2130		213	91.2%
True Value	-----	2090		-----	-----
Recovery	-----	101.9%		-----	-----
Prep Blank 4	pbwg13cm2	0.00948	U	0.0810	78.0%
Lab Control 4	lcswg13cm3	1110		111	89.5%
True Value	-----	1050		-----	-----
Recovery	-----	105.7%		-----	-----
PW201-RAD-1	436196	0.0339	U	0.0801	97.6%
Duplicate result	436196D	0.0150	U	0.0805	93.0%
RPD	-----	0.00%		-----	-----
Spike result	436196S	1120		112	84.5%
Spike added	-----	1040		-----	-----
Recovery	-----	107.7%		-----	-----
Spike Duplicate result	436196SD	1110		111	83.1%
Spike added	-----	1020		-----	-----
Recovery	-----	108.8%		-----	-----
PW201-RAD-2	436197	0.0289	U	0.0811	61.5%
PW201-RAD-3	436198	0.00521	U	0.0770	64.2%
PW201-RAD-4	436199	0.0187	U	0.0785	61.7%
PW202-RAD-1	436214	0.0752	U	0.159	85.7%
PW205-RAD-1	436217	0.741		0.170	47.5%
PW207-RAD-1	436222	0.0522	U	0.159	113%
PW201-RAD-5	436601	0.0415	U	0.0746	43.8%
PW204-RAD-1	436607	0.420		0.164	34.8%

Reporting Limit: 0.162 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{235}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec	Percent 235U
Prep Blank	pbwg12cm4	0.0000106	U	0.000270	72.1%	NC
Lab Control	lcswg12cm5	0.118		0.0130	84.3%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	102.6%		-----	-----	-----
Prep Blank 2	pbwg12cm5	0.0000932	U	0.000540	72.0%	NC
Lab Control 2	lcswg12cm7	0.224		0.0249	86.6%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	97.8%		-----	-----	-----
Prep Blank 3	pbwg12cm2	0.0000867	U	0.000540	113%	NC
Lab Control 3	lcswg12cm2	0.241		0.0264	80.2%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	105.2%		-----	-----	-----
Prep Blank 4	pbwg13cm2	0.0000702	U	0.000270	66.7%	NC
Lab Control 4	lcswg13cm2	0.120		0.0132	83.1%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	104.3%		-----	-----	-----
PW201-RAD-1	436196	0.0787	N	0.00831	86.1%	0.886%
Duplicate result	436196D	0.0865		0.00906	86.3%	0.907%
RPD	-----	9.44%		-----	-----	2.34%
Spike result	436196S	0.228	N	0.0234	85.2%	NA
Spike added	-----	0.108		-----	-----	-----
Recovery	-----	138.2%		-----	-----	-----
Spike Duplicate result	436196SD	0.178		0.0186	84.2%	NA
Spike added	-----	0.112		-----	-----	-----
Recovery	-----	88.7%		-----	----	-----
PW201-RAD-2	436197	0.00116	N	0.000294	62.0%	0.562%
PW201-RAD-3	436198	0.000738	N	0.000268	61.7%	1.20%
PW201-RAD-4	436199	0.00310	N	0.000406	61.8%	0.719%
PW202-RAD-1	436214	0.0524	N	0.00535	71.0%	0.700%
PW205-RAD-1	436217	7.44	N	0.751	86.0%	1.85%
PW207-RAD-1	436222	0.0775	N	0.00782	67.7%	1.42%
PW201-RAD-5	436601	0.000322	UN	0.000251	47.2%	<12.5%
PW204-RAD-1	436607	82.7	N	8.68	85.6%	0.772%

Reporting Limit: 0.000540 pCi/g

Q - data qualifier code.

NA - Not Applicable

NC - NC indicates that the total uranium concentration is too low to calculate %U235.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{234}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	-0.109	U	0.311	95.5%
Lab Control	lcswg12cm5	2.37		0.391	74.8%
True Value	-----	2.41		-----	-----
Recovery	-----	98.3%		-----	-----
Prep Blank 2	pbwg12cm5	-0.145	U	0.620	75.3%
Lab Control 2	lcswg12cm7	4.42		0.762	76.0%
True Value	-----	4.81		-----	-----
Recovery	-----	91.9%		-----	-----
Prep Blank 3	pbwg12cm2	-0.408	U	0.621	78.1%
Lab Control 3	lcswg12cm2	4.49		0.765	74.2%
True Value	-----	4.81		-----	-----
Recovery	-----	93.3%		-----	-----
Prep Blank 4	pbwg13cm2	-0.424	U	0.314	75.0%
Lab Control 4	lcswg13cm2	2.16		0.379	88.2%
True Value	-----	2.41		-----	-----
Recovery	-----	89.6%		-----	-----
PW201-RAD-1	436196	1.67	N	0.351	70.7%
Duplicate result	436196D	1.66		0.352	74.2%
RPD	-----	0.60%		-----	-----
Spike result	436196S	4.86	N	0.568	77.1%
Spike added	-----	2.27		-----	-----
Recovery	-----	140.5%		-----	-----
Spike Duplicate result	436196SD	3.89		0.492	73.5%
Spike added	-----	2.33		-----	-----
Recovery	-----	95.3%		-----	-----
PW201-RAD-2	436197	0.00825	UN	0.311	61.4%
PW201-RAD-3	436198	-0.0487	UN	0.297	63.0%
PW201-RAD-4	436199	0.152	UN	0.303	63.3%
PW202-RAD-1	436214	0.464	UN	0.612	65.2%
PW205-RAD-1	436217	181	N	18.1	66.5%
PW207-RAD-1	436222	0.460	UN	0.612	66.1%
PW201-RAD-5	436601	-0.273	UN	0.288	51.6%
PW204-RAD-1	436607	1360	N	136	82.6%

Reporting Limit: 0.622 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{233}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.038	U	0.482	99.1%
Lab Control	lcswg12cm5	105		10.5	80.7%
True Value	-----	95.9		-----	-----
Recovery	-----	109.5%		-----	-----
Prep Blank 2	pbwg12cm5	0.0891	U	0.965	84.5%
Lab Control 2	lcswg12cm7	198		19.8	82.4%
True Value	-----	192		-----	-----
Recovery	-----	103.1%		-----	-----
Prep Blank 3	pbwg12cm2	0.12	U	0.965	91.8%
Lab Control 3	lcswg12cm2	199		20.0	88.8%
True Value	-----	192		-----	-----
Recovery	-----	103.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.0877	U	0.482	84.3%
Lab Control 4	lcswg13cm2	106		10.6	81.4%
True Value	-----	95.9		-----	-----
Recovery	-----	110.5%		-----	-----
PW201-RAD-1	436196	0.457	U	0.480	112%
Duplicate result	436196D	0.590	U	0.484	116%
RPD	-----	0.00%		-----	-----
Spike result	436196S	97.4		10.0	101%
Spike added	-----	90.3		-----	-----
Recovery	-----	107.9%		-----	-----
Spike Duplicate result	436196SD	99.4		10.2	99.4%
Spike added	-----	93.0		-----	-----
Recovery	-----	106.9%		-----	-----
PW201-RAD-2	436197	0.13	U	0.482	65.5%
PW201-RAD-3	436198	0.0812	U	0.460	67.3%
PW201-RAD-4	436199	0.111	U	0.469	66.1%
PW202-RAD-1	436214	1.58	U	0.958	112%
PW205-RAD-1	436217	0.881	U	0.914	62.9%
PW207-RAD-1	436222	0.265	U	1.89	108%
PW201-RAD-5	436601	0.0745	U	0.444	50.5%
PW204-RAD-1	436607	0.125	U	0.472	33.2%

Reporting Limit: 0.964 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Sample Weight (g): 5.04
Extraction Dilution: 2.0
Dry Weight Input: 100

Client Sample ID: PW205-VOC-1
System ID: 436220
Filename: R07121016
Extract Volume (mL): 10
Sample dilution: 50

Project Number: 12474.05.00X
Instrument: REVEILLE
Date Received: Jul 10 2010 11:30AM
Date Analyzed: Jul 12 2010 10:23PM
Total Dilution Factor: 99.2

CAS No.	Compound	µg/kg	
74-87-3	CHLOROMETHANE	99	U
75-01-4	VINYL CHLORIDE	99	U
74-83-9	BROMOMETHANE	99	U
75-00-3	CHLOROETHANE	99	U
75-69-4	TRICHLOROFLUOROMETHANE	99	U
75-35-4	1,1-DICHLOROETHENE	99	U
75-15-0	CARBON DISULFIDE	99	U
74-88-4	IODOMETHANE	99	U
75-09-2	METHYLENE CHLORIDE	99	U
67-64-1	ACETONE	99	U
156-60-5	TRANS-1,2-DICHLOROETHENE	99	U
75-34-3	1,1-DICHLOROETHANE	99	U
108-05-4	VINYL ACETATE	99	U
156-59-2	CIS-1,2-DICHLOROETHENE	99	U
74-97-5	BROMOCHLOROMETHANE	99	U
67-66-3	CHLOROFORM	99	U
6-23-5	CARBON TETRACHLORIDE	99	U
1-55-6	1,1,1-TRICHLOROETHANE	99	U
78-93-3	***2-BUTANONE***	***250***	***B***
71-43-2	BENZENE	99	U
107-06-2	1,2-DICHLOROETHANE	99	U
79-01-6	***TRICHLOROETHENE***	***140***	
74-95-3	DIBROMOMETHANE	99	U
78-87-5	1,2-DICHLOROPROPANE	99	U
75-27-4	BROMODICHLOROMETHANE	99	U
10061-01-5	CIS-1,3-DICHLOROPROPENE	99	U
108-88-3	TOLUENE	99	U
127-18-4	TETRACHLOROETHENE	99	U
108-10-1	4-METHYL-2-PENTANONE	99	U
10061-02-6	TRANS-1,3-DICHLOROPROPENE	99	U
79-00-5	1,1,2-TRICHLOROETHANE	99	U
124-48-1	DIBROMOCHLOROMETHANE	99	U
106-93-4	1,2-DIBROMOETHANE	99	U
591-78-6	2-HEXANONE	99	U
108-90-7	CHLOROBENZENE	99	U
100-41-4	ETHYLBENZENE	99	U
630-20-6	1,1,1,2-TETRACHLOROETHANE	99	U
179601-23-1	M/P-XYLENE	99	U
95-47-6	O-XYLENE	99	U
100-42-5	STYRENE	99	U
75-25-2	BROMOFORM	99	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	99	U
96-18-4	1,2,3-TRICHLOROPROPANE	99	U
110-57-6	TRANS-1,4-DICHLORO-2-BUTENE	200	U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Sample Weight (g): 5.04
Extraction Dilution: 2.0
Dry Weight Input: 100

Client Sample ID: PW205-VOC-1
System ID: 436220
Filename: R07121016
Extract Volume (mL): 10
Sample dilution: 50

Project Number: 12474.05.00X
Instrument: REVEILLE
Date Received: Jul 10 2010 11:30AM
Date Analyzed: Jul 12 2010 10:23PM
Total Dilution Factor: 99.2

CAS No.	Compound	µg/kg
106-46-7	1,4-DICHLOROBENZENE	99 U
95-50-1	1,2-DICHLOROBENZENE	99 U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	99 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC1 (DCE)	SMC2 (TOL)	SMC3 (BFB)	Out
1	BLANK071210 MBLK	96	94	84	0
2	LCS071210 LCS	98	105	101	0
3	PW201-VOC-1	93	97	90	0
4	PW201-VOC-1 DL	104	101	86	0
5	PW201-VOC-1 MS DL	96	107	96	0
6	PW201-VOC-1 MSD DL	95	106	93	0
7	PW201-VOC-2	96	95	88	0
8	PW201-VOC-3	109	100	84	0
9	PW201-VOC-4	99	96	82	0
10	PW205-VOC-1	104	95	86	0
11	PW207-VOC-1	106	93	86	0
12	BLANK071410 MBLK	113	98	89	0
13	LCS071410 LCS	118	111	110	0
14	PW201-VOC-5	133*	101	80	1
15	PW204-VOC-1	124	102	86	0

QC Limits	
SMC1 (DCE) = 1,2-DICHLOROETHANE-D4 (SURR1)	(70-130)
SMC2 (TOL) = TOLUENE-D8 (SURR2)	(70-130)
SMC3 (BFB) = BROMOFLUOROBENZENE (SURR3)	(70-130)

* Values outside contract required QC Limits

Comments _____

SOUTHWEST RESEARCH INSTITUTE

Method 8270C Semi-volatile Organics Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Matrix: SZ
Sample wt. (g): 15.49
Level: LOW
GPC Cleanup: N

Client Sample ID: PW205-SVOC-1
System ID: 436218
Filename: B07141007
pH: NA
Conc. Ext. Vol. (uL): 1000
% Moisture: 0
Decanted: N

Project Number: 12474.05.00X
Instrument: BEVO
Date Received: Jul 10, 2010
Date Extracted: Jul 12, 2010
Date Analyzed: Jul 14 2010 10:11PM
Dilution Factor: 1
Injection Volume (uL): 1.0

CAS No.	Compound	ug/Kg
111-44-4	bis(2-Chloroethyl)ether	323 U
108-95-2	***Phenol***	***5780 E***
95-57-8	2-Chlorophenol	323 U
541-73-1	1,3-Dichlorobenzene	323 U
106-46-7	1,4-Dichlorobenzene	323 U
95-50-1	1,2-Dichlorobenzene	323 U
100-51-6	Benzyl alcohol	323 U
108-60-1	bis(2-chloroisopropyl)ether	323 U
95-48-7	2-Methylphenol	323 U
67-72-1	Hexachloroethane	323 U
621-64-7	N-Nitroso-di-n-propylamine	323 U
106-44-5	3&4-Methylphenol	323 U
98-95-3	Nitrobenzene	323 U
78-59-1	Isophorone	323 U
88-75-5	2-Nitrophenol	323 U
105-67-9	2,4-Dimethylphenol	323 U
11-91-1	bis(2-Chloroethoxy)methane	323 U
20-83-2	2,4-Dichlorophenol	323 U
120-82-1	1,2,4-Trichlorobenzene	323 U
91-20-3	Naphthalene	323 U
65-85-0	***Benzoic Acid***	***1510***
106-47-8	4-Chloroaniline	323 U
87-68-3	Hexachlorobutadiene	323 U
59-50-7	4-Chloro-3-methylphenol	323 U
91-57-6	2-Methylnaphthalene	323 U
77-47-4	Hexachlorocyclopentadiene	323 U
88-06-2	2,4,6-Trichlorophenol	323 U
95-95-4	2,4,5-Trichlorophenol	323 U
91-58-7	2-Chloronaphthalene	323 U
88-74-4	2-Nitroaniline	323 U
208-96-8	Acenaphthylene	323 U
131-11-3	Dimethylphthalate	323 U
606-20-2	2,6-Dinitrotoluene	323 U
83-32-9	Acenaphthene	323 U
99-09-2	3-Nitroaniline	323 U
51-28-5	2,4-Dinitrophenol	323 U
132-64-9	Dibenzofuran	323 U
121-14-2	2,4-Dinitrotoluene	323 U
100-02-7	4-Nitrophenol	323 U
86-73-7	Fluorene	323 U
7005-72-3	4-Chlorophenyl-phenylether	323 U
84-66-2	***Diethylphthalate***	***392***

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- D Concentration value is from dilution analysis.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

SOUTHWEST RESEARCH INSTITUTE

Method 8270C Semi-volatile Organics Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Matrix: SZ
Sample wt. (g): 15.49
Level: LOW
GPC Cleanup: N

Client Sample ID: PW205-SVOC-1
System ID: 436218
Filename: B07141007
pH: NA
Conc. Ext. Vol. (uL): 1000
% Moisture: 0
Decanted: N

Project Number: 12474.05.00X
Instrument: BEVO
Date Received: Jul 10, 2010
Date Extracted: Jul 12, 2010
Date Analyzed: Jul 14 2010 10 11PM
Dilution Factor: 1
Injection Volume (uL): 1.0

CAS No.	Compound	ug/Kg
100-01-6	4-Nitroaniline	323 U
534-52-1	4,6-Dinitro-2-methylphenol	323 U
86-30-6	n-Nitrosodiphenylamine	323 U
101-55-3	4-Bromophenyl-phenylether	323 U
118-74-1	Hexachlorobenzene	323 U
87-86-5	Pentachlorophenol	323 U
85-01-8	Phenanthrene	323 U
120-12-7	Anthracene	323 U
86-74-8	Carbazole	323 U
84-74-2	Di-n-butylphthalate	323 U
206-44-0	Fluoranthene	323 U
129-00-0	Pyrene	323 U
85-68-7	Butylbenzylphthalate	323 U
91-94-1	3,3'-Dichlorobenzidine	323 U
56-55-3	Benzo[a]anthracene	323 U
18-01-9	Chrysene	323 U
7-81-7	bis(2-Ethylhexyl)phthalate	323 U
17-84-0	Di-n-octylphthalate	323 U
205-99-2	Benzo[b]fluoranthene	323 U
207-08-9	Benzo[k]fluoranthene	323 U
50-32-8	Benzo[a]pyrene	323 U
193-39-5	Indeno[1,2,3-cd]pyrene	323 U
53-70-3	Dibenz[a,h]anthracene	323 U
191-24-2	Benzo[g,h,i]perylene	323 U
110-86-1	Pyridine	323 U
62-75-9	n-Nitrosodimethylamine	323 U
62-53-3	Aniline	323 U
58-90-2	2,3,4,6-Tetrachlorophenol	323 U
103-33-3	Diphenyldiazene	323 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- D Concentration value is from dilution analysis.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC5 (2FP)	SMC6 (TBP)			Out
1	SMB_12JUL10 BLK	75	59			0
2	PW201-SVOC-1	60	63			0
3	PW201-SVOC-2	59	59			0
4	PW201-SVOC-3	51	51			0
5	PW201-SVOC-4	61	61			0
6	PW205-SVOC-1	44	22			0
7	PW201-SVOC-1 MS	60	64			0
8	PW201-SVOC-1 MSD	64	68			0
9	LCS_12JUL10 LCS	62	58			0
10	SMB_13JUL10 BLK	75	64			0
11	PW201-SVOC-5	55	56			0
12	PW204-SVOC-1	59	63			0
13	LCS_13JUL10 LCS	71	63			0

QC Limits	
SMC5 (2FP) = 2-Fluorophenol	(25-121)
SMC6 (TBP) = 2,4,6-Tribromophenol	(19-122)

* Values outside contract required QC Limits

Comments _____

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC5 (2FP)	SMC6 (TBP)			Out
1	SMB_12JUL10 BLK	75	59			0
2	PW201-SVOC-1	60	63			0
3	PW201-SVOC-2	59	59			0
4	PW201-SVOC-3	51	51			0
5	PW201-SVOC-4	61	61			0
6	PW205-SVOC-1	44	22			0
7	PW201-SVOC-1 MS	60	64			0
8	PW201-SVOC-1 MSD	64	68			0
9	LCS_12JUL10 LCS	62	58			0
10	SMB_13JUL10 BLK	75	64			0
11	PW201-SVOC-5	55	56			0
12	PW204-SVOC-1	59	63			0
13	LCS_13JUL10 LCS	71	63			0

QC Limits	
SMC5 (2FP) = 2-Fluorophenol	(25-121)
SMC6 (TBP) = 2,4,6-Tribromophenol	(19-122)

* Values outside contract required QC Limits

Comments _____

Waste Stream Number: PW – 206

Waste Stream Title: Solid Process Residuals

PW - 206
Magnessium Fluoride from X-705
Technetium trap # 27

Analy Meth:SW846-3050B QC Batch:QC08329011 Test:METALS-PREP
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:11/19/08 00:00:00 T E SHOOK
Approver: T E SHOOK 11/24/08 12:00

Analy Meth:SW846-6010B QC Batch:QC08329013 Test:SW846-6010B
Rpt Basis:Not Corrected Date Approved

Prep Meth: SW846-3050B Analyzed:11/20/08 00:00:00 K A DAYS
Approver: T E SHOOK 11/24/08 12:02

Analyte Name	Result	+/-	Unit	Qual	F-	LCR	Dilu	HT	CLF
Arsenic	2.23	0	mg/kg	U	2.23	90.91			
Barium	3.55	0	mg/kg		0.105	90.91			
Cadmium	1.45 ✓	0	mg/kg	B	0.254	90.91			
Chromium	1.14	0	mg/kg	B	0.215	90.91			
Lead	26.4 ✓	0	mg/kg	B	2.36	90.91			
Selenium	7.40 ✓	0	mg/kg	B	5.74	90.91			
Silver	0.219	0	mg/kg	U	0.219	90.91			

EPA Qualifiers:

B - Analyte result less than the Practical Quantitation Limit (PQL) and greater than or equal to the Instrument Detection

Limit (IDL).

U - Analyte analyzed for but undetected. Analyte result was below the Lowest Concentration Reported (LCR).

Analy Meth:PORTS-Non-standard QC Batch:QC08337042 Test:SHIPPING
Basis:Not Corrected Date Approved

Prep Meth: Analyzed:11/24/08 00:00:00 C J MAYNARD
Approver: C J MAYNARD 01/19/09 12:49

Analyte Name	Result	+/-	Unit	Qual	Fn	LCR	Dilu	HT	CLF
Other	SHIPPED				1				

Comments: Sent to Southwest Research Institute for SVOC analysis. Shipping order X-13306.

Analy Meth:SW846-3540B QC Batch:QC08357025 Test:ORGEXT-PCB-1
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:11/18/08 08:31:44 F R MACHESKY
Approver: F R MACHESKY 12/22/08 08:57

Analy Meth:SW846-3540B QC Batch:QC08353030 Test:ORGEXT-PEST1
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:11/24/08 13:19:47 F R MACHESKY

Approver: F R MACHESKY 12/18/08 10:46

Analy Meth:SW846-8082 QC Batch:QC08364029 Test:PCB8082
Rpt Basis:Not Corrected Date Approved

Prep Meth: SW846-3540B Analyzed:11/18/08 20:48:00 F R MACHESKY
Approver: J N STRICKLAND 12/30/08 09:14

Fn	Analyte Name / LCR	Dilu	HT	CLF	Result	+/-	Unit	Qual
1	Aroclor-1016	1			1		ug/g	U
1	Aroclor-1221	1			1		ug/g	U
1	Aroclor-1232	1			1		ug/g	U
	Aroclor-1242	1			1		ug/g	U
1	Aroclor-1248	1			1		ug/g	U
1	Aroclor-1254	1			1		ug/g	
5	Aroclor-1260	5			16		ug/g	
1	Aroclor-1268	1			5.5		ug/g	

Comments: See QA08161120M6D for dilutions associated with this sample.

Analy Meth:SW846-8081A QC Batch:QC09016019 Test:PEST8081A
Rpt Basis:Not Corrected Date Approved

Prep Meth: SW846-3540B Analyzed:01/04/09 20:54:00 F R MACHESKY
Approver: J N STRICKLAND 01/16/09 12:00

Fn	Analyte Name / LCR	Dilu	HT	CLF	Result	+/-	Unit	Qual
	Chlordane				1000		ug/kg	JU

1000	1	X			
	Endrin		10	ug/kg	JU
	1	X			
	Heptachlor		10	ug/kg	JU
10	1	X			
	Heptachlor epoxide		10	ug/kg	JU
10	1	X			
	Lindane		10	ug/kg	JU
10	1	X			
	Methoxychlor		10	ug/kg	JU
10	1	X			
	Toxaphene		2000	ug/kg	JU
2000	1	X			

Comments: The matrix spike and matrix spike duplicate recoveries associated with this sample are the following:

MS recoveries

Compound	Recovery	Acceptance Range
Lindane	138%	70-130%
Heptachlor	79.2%	70-130%
Heptachlor Epox	102	70-130%
Endrin	106%	70-130%
Methoxychlor	62.8%	70-130%
Chlordane	*	70-130%
Toxaphene	*	70-130%

* - Due to matrix interferences Chlordane and Toxaphene recoveries could not be calculated. The associated LCS recovery (See QA08161216P6D) was Chlordane (126%) and Toxaphene (82.6%). RL's adjusted accordingly.

MSD recoveries

Compound	Recovery	Acceptance Range

Lindane	151%	70-130%
Heptachlor	70.0%	70-130%
Heptachlor Epox	100%	70-130%
Endrin	94.0%	70-130%
Methoxychlor	58.7%	70-130%
Chlordane	*	70-130%
Toxaphene	*	70-130%

* - Due to matrix interferences Chlordane and Toxaphene recoveries could not be calculated. The associated LCS recovery (See QA08161216P6D) was Chlordane (126%) and Toxaphene (82.6%). RL's adjusted accordingly.

note - matrix interferences in this sample caused Retention Time shifting of the compounds. The spiked samples were overlayed with the non spiked sample to determine relevant Retention Times for the compounds to aid in identification and calculation of spike recoveries.

The second methoxychlor ccc recovery (72.2%) is below the PORTS acceptance limit of 85%.

Analy Meth:SW846-8260B QC Batch:QC08326018 Test:VOA-2
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:11/19/08 12:14:00 J N STRICKLAND
Approver: B D FUHR 11/26/08 09:52

Fn	Analyte Name / LCR	Dilu	HT	CLF	Result	+/-	Unit	Qual	
20	1,1,1-Trichloroethane	1			20		ug/kg	JU	C
	1,1,2,2-Tetrachloroethane	1			20		ug/kg	JU	C
20	1,1,2-Trichloroethane	1			20		ug/kg	JU	C
20	1,1-Dichloroethane	1			20		ug/kg	JU	C

20	1,1-Dichloroethene 1	20	ug/kg	JU	C
20	1,2-Dichlorobenzene 1	20	ug/kg	JU	C
20	1,2-Dichloroethane 1	20	ug/kg	JU	C
20	1,2-Dimethylbenzene 1	20	ug/kg	JU	C
20	1,3 (1,4)-Dimethylbenzene 1	20	ug/kg	JU	C
20	1,4-Dichlorobenzene 1	20	ug/kg	JU	C
500	2-Butanone 1	500	ug/kg	JU	C
500	4-Methyl-2-pentanone 1	500	ug/kg	JU	C
500	Acetone 1	500	ug/kg	JU	C
20	Benzene 1	20	ug/kg	JU	C
	Bromodichloromethane 1	20	ug/kg	JU	C
20	Bromoform 1	20	ug/kg	JU	C
40	Bromomethane 1	40	ug/kg	JU	C
20	Carbon disulfide 1	30.6	ug/kg	J	C
20	Carbon tetrachloride 1	20	ug/kg	JU	C
20	Chlorobenzene 1	20	ug/kg	JU	C
40	Chloroethane 1	40	ug/kg	JU	C
20	Chloroform 1	20	ug/kg	JU	C
40	Chloromethane 1	40	ug/kg	JU	C
20	Dibromochloromethane 1	20	ug/kg	JU	C
	Ethylbenzene 1	20	ug/kg	JU	C
20	Methylene chloride 1	20	ug/kg	JU	C

Fn	Analyte Name	LCR	Dilu	HT	CLF	Result	+/-	Unit	Qual	
20	Tetrachloroethene		1			20		ug/kg	JU	C
	Toluene		1			20		ug/kg	JU	C

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Fn	Analyte Name	LCR	Dilu	HT	CLF	Result	+/-	Unit	Qual	
20	Trichloroethene		1			57.6		ug/kg	J	C
40	Trichlorofluoromethane		1			40		ug/kg	JU	C
	Vinyl chloride		1			10		ug/kg	JU	C
20	cis-1,2-Dichloroethene		1			20		ug/kg	JU	C
20	trans-1,2-Dichloroethene		1			20		ug/kg	JU	C

Estimated

Concentr	TIC Name	Qual	Unit	Fn	Retention Time	Unit
500	1-(2-Methoxy-1-methylethoxy)-2-propanol	J	ug/kg		19.16	min
130	1-(2-Methoxypropyl)-2-propanol	J	ug/kg		19.52	min
240	2,4-Dimethylphenol	J	ug/kg		22.76	min
1300	2-(4-methoxyphenyl)-2-met-1,3-dioxolane	J	ug/kg		24.20	min
76	2-methyl-2-cyclopenten-1-one	J	ug/kg		11.06	min
*	Naphthalene	J	ug/kg		22.99	min
80	Unknown	J	ug/kg		19.64	min

Unknown 23.90 min
100 J ug/kg

n-octane 13.02 min
J ug/kg

p-tertpamyl phenoxy ethanol 24.05 min
100 J ug/kg

Comments: Reproducibility as expressed by the recovery of the surrogates in the MBLK compared to the recovery of the surrogates in the LCS failed the PORTS estabished RPD lower limit of -11.4% for the surrogate bromofluorobenzene (-13.4%).

Choromethane(17.6%) and bromomethane(22.7%) failed the method criteria of < 15% RSD on the initial calibration and the values are estimated "J".

Chloromethane(35.8%), bromomethane(95.4%), chloroethane(32.3%), 1,1,2,2 Tetrachloroethane(25.5%), and acetone(31.1%)

failed the PORTS good laboratory practice of < 25% D on the daily continuing calibration check and the values are estimated "J".

Due to matrix interferences, 3 out of 4 of the internal standards failed the method area lower limit of < -50% and all values are estimated "J". All three surrogates failed the PORTS established recovery limits.

A large mass of coeluting non-target compounds particularly in the 16-20 minute range and again from 22 minutes to the end of the chromatogram attributed to qualifying the data. Also, the poor separation in these particular regions made the identification of TICS(tentatively identified compounds) difficult.

EPA Qualifiers:

J - Estimated value.

U - Analyte analyzed for but undetected. Analyte result was below the Lowest Concentration Reported (LCR).

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Analy Meth:PORTS-XP4-TS-RL7240 QC Batch:QC08324022 Test:AB-ACT-GPC
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:11/17/08 15:00:00 R M BALL
__ over: W R WAUGH 11/19/08 14:54

Analyte Name	Result	+/-	Unit	Qual
Fn TPE MDA Dec Lvl				
Alpha activity	2.18E+00	2.97E+00	pCi/g	U
2.97E+00 4.86E+00 1.93E+0				
Beta activity	2.77E+01	5.76E+00	pCi/g	
5.88E+00 5.87E+00 2.66E+0				

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC08330028 Test:ALPHA-AM-AS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:11/24/08 17:09:15 S J JAMES
Approver: C D GOOD 11/25/08 12:58

Analyte Name	Result	+/-	Unit	Qual
TPE MDA Dec Lvl				
Americium-241	9.951E-03	1.149E-02	pCi/g	U
1.154E-02 8.989E-03				

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC08330026 Test:ALPHA-NP-AS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:11/24/08 17:11:10 S J JAMES
Approver: C D GOOD 11/25/08 13:00

Fn	Analyte Name TPE	MDA	Dec Lvl	Result	+/-	Unit	Qual
	Neptunium-237			1.693E-02	1.596E-02	pCi/g	U
1.610E-02	2.076E-02						
	Plutonium-238			8.440E-03	9.746E-03	pCi/g	U
9.805E-03	7.624E-03						
	Plutonium-239/240			2.816E-03	9.742E-03	pCi/g	U
9.749E-03	2.070E-02						

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC08330031 Test:ALPHA-U-AS
R Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:11/24/08 17:12:46 S J JAMES
Approver: C D GOOD 11/25/08 13:01

Fn	Analyte Name TPE	MDA	Dec Lvl	Result	+/-	Unit	Qual
	Uranium-233/234			3.435E-01	6.974E-02	pCi/g	
8.239E-02	2.553E-02						
	Uranium-235			2.568E-02	2.097E-02	pCi/g	
2.123E-02	1.160E-02						
	Uranium-236			0.000E+00	0.000E+00	pCi/g	U
7.013E-05	1.042E-02						
	Uranium-238			8.311E-02	3.393E-02	pCi/g	
3.584E-02	9.385E-03						

Comments: .

Analy Meth:PORTS-XP4-TS-RL7505 QC Batch:QC08329042 Test:RAD-PREP
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:11/20/08 14:15:50 R M BALL

Approver: R M BALL 11/24/08 13:25

*Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC08330019 Test:TC99-ACT-LS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:11/24/08 00:00:00 R M BALL
Approver: W R WAUGH 02/10/09 11:49

Fn	Analyte Name TPE	MDA	Dec Lvl	Result	+/-	Unit	Qual
	Technetium-99			8.95E+01	9.40E-01	pCi/g	
2.02E+00	2.49E-01		1.21E-0				

02/10/09 11:52
Page: 6

EVSR2008-136 Portsmouth Analytical Laboratory
X083220027

Revised Report REV 01

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC08330033 Test:TOTAL-U-AS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:11/24/08 00:00:00 S J JAMES
Approver: C D GOOD 11/25/08 13:03

Fn	Analyte Name TPE	MDA	Dec Lvl	Result	+/-	Unit	Qual
	Uranium			2.542E-01		ug/g	
1...1E-01	3.346E-02						

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC08330030 Test:U235-WT-AS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:11/24/08 00:00:00 S J JAMES
Approver: C D GOOD 11/25/08 13:05

Analyte Name	Result	+/-	Unit	Qual	Fn	TPE	MDA	Dec Lvl
Uranium-235	4.676E+00		wt %				4.337E+00	

EPA Qualifiers:

U - Indicates analyte/nuclide was analyzed for, but not detected.

Footnotes:

C - Method SW846-5030A "Purge-and-Trap"

An asterisk (*) beside a Cust Smpl Id, Test, Analyte Id, Aliquot or TIC CAS Id indicates a modification after re-open.

Waste Stream Number: PW – 207

Waste Stream Title: Spent Activated Carbon

PW-207

Spent Activated Carbon from X-622 Extraction Wells

S.M. STOLLER CORP.

1

INORGANIC ANALYSES DATA SHEET

STOL SAMPLE NO.

PW207-MET-1

Lab Name: SOUTHWEST_RESEARCH_INSTIT Contract:12474.05.00X

Lab Code: SWRI__ Task Ord:100710-2 SRR No.: 41538_ SDG No.: 436192

Matrix (soil/water): SZ___ Lab Sample ID: 436221

Level (low/med): LOW__ Date Received: 07/10/10

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.7			P
7440-39-3	Barium	131			P
7440-43-9	Cadmium	8.4			P
7440-47-3	Chromium	43.2			P
7439-92-1	Lead	1.4		*	P
7439-97-6	Mercury	1.4			CV
7782-49-2	Selenium	0.99	B		P
7440-22-4	Silver	0.44	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Technetium-99 Result (pCi/g)	Q	TPU (pCi/g)	Rh103 Internal Std Rec	Date Analyzed
Prep Blank	pbwg12cm3	0.0195	U	1.25	69.6%	07/14/10
Lab Control	lcswg12cm4	92.6		15.6	91.6%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Prep Blank 2	pbwg13cm1	-0.0844	U	1.25	46.4%	07/14/10
Lab Control 2	lcswg13cm1	90.3		15.4	86.1%	07/14/10
True Value	-----	100		-----	-----	-----
Recovery	-----	90.3%		-----	-----	-----
PW201-RAD-1	436196	3.04		1.28	62.9%	07/14/10
Duplicate result	436196D	3.49		1.27	71.1%	07/14/10
RPD	-----	13.8%		-----	-----	-----
Spike result	436196S	95.0		15.6	99.5%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	92.6%		-----	-----	-----
Spike Duplicate result	436196SD	96.4		15.7	101%	07/14/10
Spike added	-----	99.3		-----	-----	-----
Recovery	-----	94.0%		----	----	-----
PW201-RAD-2	436197	7.62		1.43	81.9%	07/14/10
PW201-RAD-3	436198	6.94		1.43	80.7%	07/14/10
PW201-RAD-4	436199	0.393	U	1.16	73.7%	07/14/10
PW202-RAD-1	436214	6.13		1.35	85.1%	07/14/10
PW205-RAD-1	436217	1580		158	114%	07/14/10
PW207-RAD-1	436222	234		23.4	82.6%	07/14/10
PW201-RAD-5	436601	7.66		1.43	55.5%	07/14/10
PW204-RAD-1	436607	27.6		5.93	48.6%	07/14/10

Reporting Limit: 2.50 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	Total Uranium Result (ug/g)	Q	TPU (ug/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.00153	U	0.00101	72.1%
Lab Control	lcswg12cm5	7.90		0.790	84.3%
True Value	-----	7.48		-----	-----
Recovery	-----	105.6%		-----	-----
Prep Blank 2	pbwg12cm5	0.00642		0.00210	72.0%
Lab Control 2	lcswg12cm7	15.3		1.53	86.6%
True Value	-----	15.0		-----	-----
Recovery	-----	102.0%		-----	-----
Prep Blank 3	pbwg12cm2	0.000316	U	0.00200	113%
Lab Control 3	lcswg12cm2	15.4		1.54	80.2%
True Value	-----	15.0		-----	-----
Recovery	-----	102.7%		-----	-----
Prep Blank 4	pbwg13cm2	0.000348	U	0.00100	66.7%
Lab Control 4	lcswg13cm2	7.95		0.795	83.1%
True Value	-----	7.48		-----	-----
Recovery	-----	106.3%		-----	-----
PW201-RAD-1	436196	4.11		0.412	86.1%
Duplicate result	436196D	4.41		0.441	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	12.9		1.29	85.2%
Spike added	-----	7.05		-----	-----
Recovery	-----	124.7%		-----	-----
Spike Duplicate result	436196SD	10.9		1.09	84.2%
Spike added	-----	7.26		-----	-----
Recovery	-----	93.5%		----	----
PW201-RAD-2	436197	0.0957		0.00963	62.0%
PW201-RAD-3	436198	0.0283		0.00298	61.7%
PW201-RAD-4	436199	0.199		0.0199	61.8%
PW202-RAD-1	436214	3.47		0.347	71.0%
PW205-RAD-1	436217	186		18.6	86.0%
PW207-RAD-1	436222	2.52		0.253	67.7%
PW201-RAD-5	436601	0.0158		0.00183	47.2%
PW204-RAD-1	436607	4950		495	85.6%

Reporting Limit: 0.002 ug/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{238}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	0.000516	U	0.000340	72.1%
Lab Control	lcswg12cm5	2.63		0.263	84.3%
True Value	-----	2.50		-----	-----
Recovery	-----	105.2%		-----	-----
Prep Blank 2	pbwg12cm5	0.00215		0.000706	72.0%
Lab Control 2	lcswg12cm7	5.09		0.509	86.6%
True Value	-----	5.01		-----	-----
Recovery	-----	101.6%		-----	-----
Prep Blank 3	pbwg12cm2	0.0000918	U	0.000672	113%
Lab Control 3	lcswg12cm2	5.14		0.514	80.2%
True Value	-----	5.01		-----	-----
Recovery	-----	102.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.000103	U	0.000336	66.7%
Lab Control 4	lcswg13cm2	2.65		0.265	83.1%
True Value	-----	2.50		-----	-----
Recovery	-----	106.0%		-----	-----
PW201-RAD-1	436196	1.37		0.137	86.1%
Duplicate result	436196D	1.47		0.147	86.3%
RPD	-----	7.04%		-----	-----
Spike result	436196S	4.29		0.429	85.2%
Spike added	-----	2.35		-----	-----
Recovery	-----	124.3%		-----	-----
Spike Duplicate result	436196SD	3.62		0.362	84.2%
Spike added	-----	2.42		-----	-----
Recovery	-----	93.0%		-----	----
PW201-RAD-2	436197	0.0320		0.00322	62.0%
PW201-RAD-3	436198	0.00938		0.000992	61.7%
PW201-RAD-4	436199	0.0663		0.00664	61.8%
PW202-RAD-1	436214	1.16		0.116	71.0%
PW205-RAD-1	436217	61.2		6.12	86.0%
PW207-RAD-1	436222	0.836		0.0836	67.7%
PW201-RAD-5	436601	0.00527		0.000611	47.2%
PW204-RAD-1	436607	1651		165	85.6%

Reporting Limit: 0.000672 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{236}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.0572	U	0.0812	79.0%
Lab Control	lcswg12cm6	1170		117	86.5%
True Value	-----	1050		-----	-----
Recovery	-----	111.4%		-----	-----
Prep Blank 2	pbwg12cm5	0.00259	U	0.162	76.3%
Lab Control 2	lcswg12cm8	2150		215	85.0%
True Value	-----	2090		-----	-----
Recovery	-----	102.9%		-----	-----
Prep Blank 3	pbwg12cm2	0.00951	U	0.162	79.5%
Lab Control 3	lcswg12cm3	2130		213	91.2%
True Value	-----	2090		-----	-----
Recovery	-----	101.9%		-----	-----
Prep Blank 4	pbwg13cm2	0.00948	U	0.0810	78.0%
Lab Control 4	lcswg13cm3	1110		111	89.5%
True Value	-----	1050		-----	-----
Recovery	-----	105.7%		-----	-----
PW201-RAD-1	436196	0.0339	U	0.0801	97.6%
Duplicate result	436196D	0.0150	U	0.0805	93.0%
RPD	-----	0.00%		-----	-----
Spike result	436196S	1120		112	84.5%
Spike added	-----	1040		-----	-----
Recovery	-----	107.7%		-----	-----
Spike Duplicate result	436196SD	1110		111	83.1%
Spike added	-----	1020		-----	-----
Recovery	-----	108.8%		-----	-----
PW201-RAD-2	436197	0.0289	U	0.0811	61.5%
PW201-RAD-3	436198	0.00521	U	0.0770	64.2%
PW201-RAD-4	436199	0.0187	U	0.0785	61.7%
PW202-RAD-1	436214	0.0752	U	0.159	85.7%
PW205-RAD-1	436217	0.741		0.170	47.5%
PW207-RAD-1	436222	0.0522	U	0.159	113%
PW201-RAD-5	436601	0.0415	U	0.0746	43.8%
PW204-RAD-1	436607	0.420		0.164	34.8%

Reporting Limit: 0.162 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{235}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec	Percent 235U
Prep Blank	pbwg12cm4	0.0000106	U	0.000270	72.1%	NC
Lab Control	lcswg12cm5	0.118		0.0130	84.3%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	102.6%		-----	-----	-----
Prep Blank 2	pbwg12cm5	0.0000932	U	0.000540	72.0%	NC
Lab Control 2	lcswg12cm7	0.224		0.0249	86.6%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	97.8%		-----	-----	-----
Prep Blank 3	pbwg12cm2	0.0000867	U	0.000540	113%	NC
Lab Control 3	lcswg12cm2	0.241		0.0264	80.2%	NA
True Value	-----	0.229		-----	-----	-----
Recovery	-----	105.2%		-----	-----	-----
Prep Blank 4	pbwg13cm2	0.0000702	U	0.000270	66.7%	NC
Lab Control 4	lcswg13cm2	0.120		0.0132	83.1%	NA
True Value	-----	0.115		-----	-----	-----
Recovery	-----	104.3%		-----	-----	-----
PW201-RAD-1	436196	0.0787	N	0.00831	86.1%	0.886%
Duplicate result	436196D	0.0865		0.00906	86.3%	0.907%
RPD	-----	9.44%		-----	-----	2.34%
Spike result	436196S	0.228	N	0.0234	85.2%	NA
Spike added	-----	0.108		-----	-----	-----
Recovery	-----	138.2%		-----	-----	-----
Spike Duplicate result	436196SD	0.178		0.0186	84.2%	NA
Spike added	-----	0.112		-----	-----	-----
Recovery	-----	88.7%		-----	----	-----
PW201-RAD-2	436197	0.00116	N	0.000294	62.0%	0.562%
PW201-RAD-3	436198	0.000738	N	0.000268	61.7%	1.20%
PW201-RAD-4	436199	0.00310	N	0.000406	61.8%	0.719%
PW202-RAD-1	436214	0.0524	N	0.00535	71.0%	0.700%
PW205-RAD-1	436217	7.44	N	0.751	86.0%	1.85%
PW207-RAD-1	436222	0.0775	N	0.00782	67.7%	1.42%
PW201-RAD-5	436601	0.000322	UN	0.000251	47.2%	<12.5%
PW204-RAD-1	436607	82.7	N	8.68	85.6%	0.772%

Reporting Limit: 0.000540 pCi/g

Q - data qualifier code.

NA - Not Applicable

NC - NC indicates that the total uranium concentration is too low to calculate %U235.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{234}U Result (pCi/g)	Q	TPU (pCi/g)	U236 Internal Std Rec
Prep Blank	pbwg12cm4	-0.109	U	0.311	95.5%
Lab Control	lcswg12cm5	2.37		0.391	74.8%
True Value	-----	2.41		-----	-----
Recovery	-----	98.3%		-----	-----
Prep Blank 2	pbwg12cm5	-0.145	U	0.620	75.3%
Lab Control 2	lcswg12cm7	4.42		0.762	76.0%
True Value	-----	4.81		-----	-----
Recovery	-----	91.9%		-----	-----
Prep Blank 3	pbwg12cm2	-0.408	U	0.621	78.1%
Lab Control 3	lcswg12cm2	4.49		0.765	74.2%
True Value	-----	4.81		-----	-----
Recovery	-----	93.3%		-----	-----
Prep Blank 4	pbwg13cm2	-0.424	U	0.314	75.0%
Lab Control 4	lcswg13cm2	2.16		0.379	88.2%
True Value	-----	2.41		-----	-----
Recovery	-----	89.6%		-----	-----
PW201-RAD-1	436196	1.67	N	0.351	70.7%
Duplicate result	436196D	1.66		0.352	74.2%
RPD	-----	0.60%		-----	-----
Spike result	436196S	4.86	N	0.568	77.1%
Spike added	-----	2.27		-----	-----
Recovery	-----	140.5%		-----	-----
Spike Duplicate result	436196SD	3.89		0.492	73.5%
Spike added	-----	2.33		-----	-----
Recovery	-----	95.3%		-----	-----
PW201-RAD-2	436197	0.00825	UN	0.311	61.4%
PW201-RAD-3	436198	-0.0487	UN	0.297	63.0%
PW201-RAD-4	436199	0.152	UN	0.303	63.3%
PW202-RAD-1	436214	0.464	UN	0.612	65.2%
PW205-RAD-1	436217	181	N	18.1	66.5%
PW207-RAD-1	436222	0.460	UN	0.612	66.1%
PW201-RAD-5	436601	-0.273	UN	0.288	51.6%
PW204-RAD-1	436607	1360	N	136	82.6%

Reporting Limit: 0.622 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE
SAMPLE ANALYSIS DATA SHEET

Lab Name: Southwest Research Institute

Client: S.M. Stoller Corp.

Lab Code: SwRI

Project No.: 12474.05.00X

Matrix: SZ

Case #: QXP02220X4O

SRR #: 41538, 41570

Date Received: 07/10/10, 07/13/10

Task Order #: 100710-2, 100713-3

SDG: 436192

Sample ID	Lab System ID	^{233}U Result (pCi/g)	Q	TPU (pCi/g)	Tl205 Internal Std Rec
Prep Blank	pbwg12cm4	0.038	U	0.482	99.1%
Lab Control	lcswg12cm5	105		10.5	80.7%
True Value	-----	95.9		-----	-----
Recovery	-----	109.5%		-----	-----
Prep Blank 2	pbwg12cm5	0.0891	U	0.965	84.5%
Lab Control 2	lcswg12cm7	198		19.8	82.4%
True Value	-----	192		-----	-----
Recovery	-----	103.1%		-----	-----
Prep Blank 3	pbwg12cm2	0.12	U	0.965	91.8%
Lab Control 3	lcswg12cm2	199		20.0	88.8%
True Value	-----	192		-----	-----
Recovery	-----	103.6%		-----	-----
Prep Blank 4	pbwg13cm2	0.0877	U	0.482	84.3%
Lab Control 4	lcswg13cm2	106		10.6	81.4%
True Value	-----	95.9		-----	-----
Recovery	-----	110.5%		-----	-----
PW201-RAD-1	436196	0.457	U	0.480	112%
Duplicate result	436196D	0.590	U	0.484	116%
RPD	-----	0.00%		-----	-----
Spike result	436196S	97.4		10.0	101%
Spike added	-----	90.3		-----	-----
Recovery	-----	107.9%		-----	-----
Spike Duplicate result	436196SD	99.4		10.2	99.4%
Spike added	-----	93.0		-----	-----
Recovery	-----	106.9%		-----	-----
PW201-RAD-2	436197	0.13	U	0.482	65.5%
PW201-RAD-3	436198	0.0812	U	0.460	67.3%
PW201-RAD-4	436199	0.111	U	0.469	66.1%
PW202-RAD-1	436214	1.58	U	0.958	112%
PW205-RAD-1	436217	0.881	U	0.914	62.9%
PW207-RAD-1	436222	0.265	U	1.89	108%
PW201-RAD-5	436601	0.0745	U	0.444	50.5%
PW204-RAD-1	436607	0.125	U	0.472	33.2%

Reporting Limit: 0.964 pCi/g

Q - data qualifier code.

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SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Sample Weight (g): 5.02
Extraction Dilution: 2.0
Dry Weight Input: 100

Client Sample ID: PW207-VOC-1
System ID: 436224
Filename: R07121017
Extract Volume (mL): 10
Sample dilution: 50

Project Number: 12474.05.00X
Instrument: REVEILLE
Date Received: Jul 10 2010 11:30AM
Date Analyzed: Jul 12 2010 10:45PM
Total Dilution Factor: 99.6

CAS No.	Compound	µg/kg	
74-87-3	CHLOROMETHANE	100	U
75-01-4	VINYL CHLORIDE	100	U
74-83-9	BROMOMETHANE	100	U
75-00-3	CHLOROETHANE	100	U
75-69-4	TRICHLOROFLUOROMETHANE	100	U
75-35-4	1,1-DICHLOROETHENE	100	U
75-15-0	CARBON DISULFIDE	100	U
74-88-4	IODOMETHANE	100	U
75-09-2	METHYLENE CHLORIDE	100	U
67-64-1	***ACETONE***	***3900***	
156-60-5	TRANS-1,2-DICHLOROETHENE	100	U
75-34-3	1,1-DICHLOROETHANE	100	U
108-05-4	VINYL ACETATE	100	U
156-59-2	CIS-1,2-DICHLOROETHENE	100	U
74-97-5	BROMOCHLOROMETHANE	100	U
67-66-3	CHLOROFORM	100	U
6-23-5	CARBON TETRACHLORIDE	100	U
-55-6	1,1,1-TRICHLOROETHANE	100	U
8-93-3	***2-BUTANONE***	***270***	***B***
71-43-2	BENZENE	100	U
107-06-2	1,2-DICHLOROETHANE	100	U
79-01-6	TRICHLOROETHENE	100	U
74-95-3	DIBROMOMETHANE	100	U
78-87-5	1,2-DICHLOROPROPANE	100	U
75-27-4	BROMODICHLOROMETHANE	100	U
10061-01-5	CIS-1,3-DICHLOROPROPENE	100	U
108-88-3	TOLUENE	100	U
127-18-4	TETRACHLOROETHENE	100	U
108-10-1	4-METHYL-2-PENTANONE	100	U
10061-02-6	TRANS-1,3-DICHLOROPROPENE	100	U
79-00-5	1,1,2-TRICHLOROETHANE	100	U
124-48-1	DIBROMOCHLOROMETHANE	100	U
106-93-4	1,2-DIBROMOETHANE	100	U
591-78-6	2-HEXANONE	100	U
108-90-7	CHLOROBENZENE	100	U
100-41-4	ETHYLBENZENE	100	U
630-20-6	1,1,1,2-TETRACHLOROETHANE	100	U
179601-23-1	M/P-XYLENE	100	U
95-47-6	O-XYLENE	100	U
100-42-5	STYRENE	100	U
75-25-2	BROMOFORM	100	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	100	U
96-18-4	1,2,3-TRICHLOROPROPANE	100	U
110-57-6	TRANS-1,4-DICHLORO-2-BUTENE	200	U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary concentration dilution action (This is not necessarily the instrument detection limit).

SOUTHWEST RESEARCH INSTITUTE

Method 8260B Medium Soil Data Reporting Form

Client: S.M. Stoller
Case: QXP02220X4O
SDG: 436192
Sample Weight (g): 5.02
Extraction Dilution: 2.0
Dry Weight Input: 100

Client Sample ID: PW207-VOC-1
System ID: 436224
Filename: R07121017
Extract Volume (mL): 10
Sample dilution: 50

Project Number: 12474.05.00X
Instrument: REVEILLE
Date Received: Jul 10 2010 11:30AM
Date Analyzed: Jul 12 2010 10:45PM
Total Dilution Factor: 99.6

CAS No.	Compound	µg/kg
106-46-7	1,4-DICHLOROBENZENE	100 U
95-50-1	1,2-DICHLOROBENZENE	100 U
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	100 U

DATA REPORTING QUALIFIERS

- B This flag is used when the analyte is found in the blank as well as the sample.
- E This flag indicates compounds whose concentrations exceed the calibration range.
- J Indicates an estimated value.
- U *Indicates compound was analyzed for, but not detected. Report the minimum detection limit for the sample with U (e.g. 10U) based on necessary* concentration dilution action (This is not necessarily the instrument detection limit).

Southwest Research Institute

System Monitoring Compound Recovery

Project: 12474.05.00X Case: QXP02220X4O SDG: 436192

	Sample ID	SMC1 (DCE)	SMC2 (TOL)	SMC3 (BFB)	Out
1	BLANK071210 MBLK	96	94	84	0
2	LCS071210 LCS	98	105	101	0
3	PW201-VOC-1	93	97	90	0
4	PW201-VOC-1 DL	104	101	86	0
5	PW201-VOC-1 MS DL	96	107	96	0
6	PW201-VOC-1 MSD DL	95	106	93	0
7	PW201-VOC-2	96	95	88	0
8	PW201-VOC-3	109	100	84	0
9	PW201-VOC-4	99	96	82	0
10	PW205-VOC-1	104	95	86	0
11	PW207-VOC-1	106	93	86	0
12	BLANK071410 MBLK	113	98	89	0
13	LCS071410 LCS	118	111	110	0
14	PW201-VOC-5	133*	101	80	1
15	PW204-VOC-1	124	102	86	0

QC Limits	
SMC1 (DCE) = 1,2-DICHLOROETHANE-D4 (SURR1)	(70-130)
SMC2 (TOL) = TOLUENE-D8 (SURR2)	(70-130)
SMC3 (BFB) = BROMOFLUOROBENZENE (SURR3)	(70-130)

* Values outside contract required QC Limits

Comments _____

FORM II-A

Printed: 16 Jul 2010 17:03:27

ver (3/19/2010)

Waste Stream Number: PW – 208

Waste Stream Title: Mercury Containing Waste

PW-208 Chem trap material (50% Alumina, 50% Soda Lime)

Kemp, Jeffrey C

n: Halcomb, Barbara E
ent: Wednesday, September 30, 2009 2:41 PM
To: Kemp, Jeffrey C; Corbin, Bryan J
Subject: FW: Customer Report for Sample X092460005

-----Original Message-----
From: eslbatporprd@pgdp.usec.com [mailto:eslbatporprd@pgdp.usec.com]
Sent: Wednesday, September 30, 2009 3:36 PM
To: Halcomb, Barbara E
Subject: Customer Report for Sample X092460005

09/30/09 13:33
Page: 1

WMS1867-1 Portsmouth Analytical Laboratory
X092460005

Official Report

Customer Smpl Id: WMS1867-1 Matrix: SOLID
Sampled: 09/03/09 09:40:00

Project:X-01-WM WMS Protocol: RCRA
Received: 09/03/09 10:20:09

Subproj Analyses:SOLID Status: APPROVED
Needed: 10/01/09 23:59:00

Customer:B E HALCOMB Location:
Approved: 09/30/09 13:33:42

COC#:

Sample Desc:

Customer Comments:

Lab Smpl Comments:

Analy Meth:SW846-6010B(TCLP) QC Batch:QC09271014 Test:6010B-TCLP
Rpt Basis:Not Corrected Date Approved

Prep Meth: SW846-3010A(TCLP) Analyzed:09/23/09 00:00:00 K A DAYS
Approver: T E SHOOK 09/29/09 06:37

Analyte Name	Result	+/-	Unit	Qual	LCR	Dilu	HT	CLF
Arsenic	0.0431	0	mg/L	B	0.0215	1	N	
Barium	0.00971	0	mg/L	B				

0.0012	1	N				
Cadmium			0.00295	0	mg/L	U
0295	1	N				
Chromium			0.0091	0	mg/L	B
0.00586	1	N				
Copper			0.006	0	mg/L	U
0.006	1					
Lead			0.0223	0	mg/L	U
0.0223	1	N				
Selenium			0.0525	0	mg/L	U
0.0525	1	N				
Silver			0.00738	0	mg/L	U
0.00738	1	N				
Zinc			0.0114	0	mg/L	B
0.00203	1					

Comments: LCR for Se outside control limits.

Analy Meth:SW846-7470A(TCLP) QC Batch:QC09265008 Test:HG7470A-TCLP
Rpt Basis:Not Corrected Date Approved

Prep Meth: SW846-1311(Mercury) Analyzed:09/21/09 00:00:00 K A DAYS
Approver: T E SHOOK 09/22/09 12:38

Analyte Name			Result	+/-	Unit	Qual
Fn	LCR	Dilu	HT	CLF		
Mercury			62.0		mg/L	
20	2000	Y				

Analy Meth:SW846-3010A(TCLP) QC Batch:QC09265030 Test:M-PREP-TCLP
Rpt Basis:Not Corrected Date Approved

Prep Meth: SW846-1311(Metals) Analyzed:09/15/09 10:18:21 K A DAYS
Approver: T E SHOOK 09/29/09 06:34

EPA Qualifiers:

B - Analyte result less than the Practical Quantitation Limit (PQL) and greater than or equal to the Instrument Detection

Limit (IDL).

U - Analyte analyzed for but undetected. Analyte result was below the Lowest Concentration Reported (LCR).

Analy Meth:SW846-1311(Mercury) QC Batch:QC09257003 Test:1311TCLP-MER
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:09/10/09 14:17:15 D A DAYTON
Approver: D A DAYTON 09/14/09 07:03

Analy Meth:SW846-1311(Metals) QC Batch:QC09257002 Test:1311TCLP-MET
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:09/10/09 14:17:15 D A DAYTON
Approver: D A DAYTON 09/14/09 07:02

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC09273005 Test:ALPHA-AM-AS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:09/29/09 15:24:29 S J JAMES
Approver: C D GOOD 09/30/09 13:31

Analyte Name			Result	+/-	Unit	Qual
TPE	MDA	Dec Lvl				
Americium-241			4.361E-02	6.497E-02	pCi/g	U
6.520E-02	1.069E-01					

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC09273006 Test:ALPHA-NP-AS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:09/29/09 15:27:20 S J JAMES
Approver: C D GOOD 09/30/09 13:32

Analyte Name			Result	+/-	Unit	Qual
Fn TPE	MDA	Dec Lvl				
Neptunium-237			2.638E-01	1.151E-01	pCi/g	
1.209E-01	3.404E-02					
Plutonium-238			5.011E-02	5.011E-02	pCi/g	U
5.060E-02	3.395E-02					
Plutonium-239/240			2.631E-01	1.148E-01	pCi/g	
06E-01	3.395E-02					

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC09273003 Test:ALPHA-U-AS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:09/28/09 15:31:32 S J JAMES
Approver: C D GOOD 09/30/09 13:32

Analyte Name			Result	+/-	Unit	Qual
Fn TPE	MDA	Dec Lvl				
Uranium-233/234			8.733E+04	3.359E+03	pCi/g	
1.153E+04	8.753E+01					
Uranium-235			3.626E+03	7.602E+02	pCi/g	
8.873E+02	1.080E+02					
Uranium-236			2.147E+02	2.024E+02	pCi/g	U
2.042E+02	2.632E+02					
Uranium-238			3.733E+04	2.194E+03	pCi/g	
33E+03	8.735E+01					

Analy Meth:PORTS-XP4-TS-RL7400 QC Batch:QC09264000 Test:GAMMA-ACT-GS
t Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:09/19/09 00:00:00 W C ZUEFLE
Approver: C D GOOD 09/30/09 12:28

Analyte Name	Result	+/-	Unit	Qual
Fn TPE MDA Dec Lvl				
Protactinium-234m	4.011E+04	2.118E+02	pCi/g	
9.928E+03 2.006E+03				
Thorium-230	1.057E+04	4.973E+01	pCi/g	
1.829E+03 1.207E+03				
Thorium-231	4.028E+03	1.073E+01	pCi/g	
4.728E+02 7.755E+01				
Thorium-234	2.627E+04	5.875E+01	pCi/g	
1.633E+03 9.731E+01				
Uranium-234	9.610E+04	3.326E+03	pCi/g	J
6.361E+03 4.423E+03				
Uranium-235	3.605E+03	1.170E+01	pCi/g	
4.389E+02 7.012E+00				
Uranium-238	1.162E+04	6.084E+03	pCi/g	
21E+03 8.322E+03				

Analy Meth:PORTS-XP4-TS-RL7505 QC Batch:QC09261007 Test:RAD-PREP
Rpt Basis:Not Corrected Date Approved

Prep Meth: Analyzed:09/18/09 10:00:26 C D GOOD
Approver: C D GOOD 09/18/09 10:34

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC09267006 Test:TC99-ACT-LS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:09/22/09 00:00:00 R M BALL
Approver: C D GOOD 09/29/09 10:40

Analyte Name	Result	+/-	Unit	Qual	Fn	TPE	MDA	Dec Lvl
Technetium-99	3.73E+03	3.02E+02	pCi/g				3.12E+02	3.40E+02 1.66E+0

Analy Meth:PORTS-XP4-TS-RL7510 QC Batch:QC09273004 Test:U235-WT-AS
Rpt Basis:Not Corrected Date Approved

Prep Meth: PORTS-XP4-TS-RL7505 Analyzed:09/28/09 00:00:00 S J JAMES
Approver: C D GOOD 09/30/09 13:32

Analyte Name	Result	+/-	Unit	Qual	Fn	TPE	MDA	Dec Lvl
Uranium-235	1.497E+00		wt %				4.215E-01	

EPA Qualifiers:

J - Indicates an estimated value.

U - Indicates analyte/nuclide was analyzed for, but not detected.

***** END OF REPORT *****

Distribution List:
To: maynardcj
To: 8894_BEH

Waste Stream Number: PW – 209

Waste Stream Title: Labpacks

Waste stream PW-209 (Labpacks) consists of off specification chemicals. The waste characteristics are based on known properties of the waste and are assigned as indicated about the chemical by the label, Material Safety Data Sheet, or manufacturer information.

Waste Stream Number: PW – 210

Waste Stream Title: Containerized Gases

Waste stream PW-210 (Containerized Gases) consists of off specification gases, aerosol cans, and their associated residues. The exact concentrations of the hazardous constituents of these containers can be determined by Material Safety Data Sheet.

APPENDIX C-2

MATERIAL SAFETY DATA SHEETS

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MSDS – Supporting the Process Knowledge Waste Identification Reports

This volume contains the Material Safety Data Sheets which apply to the hazardous waste streams covered by the RCRA Part B Permit and referenced in the individual waste stream reports.

Material	MSDS Number/CAS Number
1,1,1-Trichloroethane	71-55-6
1,2-Dichloroethane	107-06-02
1,2-Dichloroethylene	540-59-0
1-Methoxy-2-Propanol	107-98-2
2-Propanol	67-63-0
Acetic Acid	64-19-7
Acetone	67-64-1
Acetylene	74-86-2
Ammonia	12125-02-9
Ammonium Citrate	3012-65-5
Arsenic	1327-53-3
Barium	VW4203
Benzene	200-753-7
Blanket Cleaning Solvent	64742-48-9
Boric Acid	10043-35-3
Cadmium	3108
Carbon Disulfide	75-15-0
Carbon Tetrachloride	56-23-5
Chlorine Trifluoride	7790-91-2
Chlorobenzene	108-90-7
Chloroform	67-66-3
Chromium	7440-47-3
Copper Cyanide	544-92-3
Cresols	1319-77-3
Cresol Red	1733-12-6
Cresylic Acid	108-95-2
CS Ink	96.35.031
Cyanide	309
Cyclohexanone	108-94-1
Deglazing Solvent	71-55-6
Electrostatic Solution	96.35.095
Endrin	72-20-8
Ethanol	64-17-5
Ethyl Ether	60-29-7

SUBMISSION DATE: SEPTEMBER 13, 2010

Freon 113	76-13-1
Gasoline	86290-81-5
Heptachlor	76-44-8
Hexane	110-54-3
Hydrochloric Acid	7647-01-0
Hydrofluoric Acid	7664-39-3
Isopropyl Alcohol	67-63-0
Kerosene, 1-K	8008-20-6
Kerosene, BP	64741-77-1
Lead	7439-92-1
Mercury	7439-97-6
Methanol	67-56-1
Methyl Ethyl Ketone	78-93-3
Methyl Isobutyl Ketone	108-10-1
Methylene Chloride	75-09-2
Multigraphics Cleaning Solution	BJRJQ
Multigrpahics Electrostatic Solution	13943-58-3
Multilith Cylinder Cleaner	7697-37-2
Naptha	64742-89-8
Nitric Acid	7697-37-2
Phosphoric Acid	7664-38-2
Potassium Ferricyanide	13746-66-2
Propionaldehyde	123-238-6
Pyridine	110-86-1
Selenium	7782-49-2
Silver	7440-22-4
Sodium	7440-23-5
Sodium Hydroxide	1310-73-2
Sulfamic Acid	5329-14-6
Sulfuric Acid	7664-93-9
Tetrachloroethylene	127-18-4
Toluene	108-88-3
Toner, Pre-mixed	BMQXG
Trichloroethylene	79-01-6
Universal Blanket Wash	64742-88-7
Xylene	108-38-3

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006
Version 4.0 Revision Date 13.03.2010
Print Date 20.05.2010
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product name	:	1,2-Dichloroethane
Product Number	:	284505
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

According to Regulation (EC) No1272/2008
Flammable liquids (Category 2)
Carcinogenicity (Category 1B)
Eye irritation (Category 2)
Specific target organ toxicity - single exposure (Category 3)
Skin irritation (Category 2)
Acute toxicity, Oral (Category 4)

According to European Directive 67/548/EEC as amended.
Highly flammable. May cause cancer. Harmful if swallowed. Irritating to eyes, respiratory system and skin.

Label elements

Pictogram

Signal word: Danger

Hazard statement(s)	
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H315	Causes skin irritation.
H302	Harmful if swallowed.
H335	May cause respiratory irritation.
H350	May cause cancer.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/attention.
Hazard symbol(s)	
F	Highly flammable
T	Toxic

R-phrase(s)	
R45	May cause cancer.
R11	Highly flammable.
R22	Also harmful if swallowed.
R36/37/38	Irritating to eyes, respiratory system and skin.

S-phrase(s)	
S53	Avoid exposure - obtain special instructions before use.
S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Restricted to professional users.

Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Ethylene dichloride
Ethylene chloride

Formula : $C_2H_4Cl_2$

Molecular Weight : 98,96 g/mol

CAS-No.	EC-No.	Index-No.	Classification	Concentration
Ethylene dichloride				
107-06-2	203-458-1	602-012-00-7	Flam. Liq. 2; Carc. 1B; Eye Irrit. 2; STOT SE 3; Skin Irrit. 2; Acute Tox. 4; H225, H319, H315, H302, H335, H350 F, T, Carc.Cat.2, R45 - R11 - R22 - R36/37/38	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid inhalation of vapour or mist.Avoid exposure - obtain special instructions before use.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	clear, liquid
Colour	colourless

Safety data

pH	no data available
Melting point	-35 °C - lit.

Boiling point	83 °C - lit.
Flash point	13,0 °C - closed cup - Tested according to Annex V of Directive 67/548/EEC.
Ignition temperature	413 °C at 1.013 hPa
Lower explosion limit	6,2 %(V)
Upper explosion limit	16,2 %(V)
Vapour pressure	33,3 hPa at 0 °C 86 hPa at 20 °C - Tested according to Annex V of Directive 67/548/EEC. 312 hPa at 50 °C
Density	1,256 g/mL at 25 °C - lit.
Water solubility	8,69 g/l at 20 °C - Tested according to Annex V of Directive 67/548/EEC. - slightly soluble 10,3 g/l at 56 °C
Partition coefficient: n-octanol/water	log Pow: 1,48 at 20 °C - Tested according to Annex V of Directive 67/548/EEC.

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 670,0 mg/kg

LC50 Inhalation - rat - 7 h - 1000 ppm
Remarks: Behavioral:Coma. Cyanosis Nutritional and Gross Metabolic:Changes in:Body temperature decrease.

LD50 Dermal - rabbit - 2.800 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation.

Skin corrosion/irritation
Skin - rabbit - irritating - 72 h - Draize Test

Serious eye damage/eye irritation
Eyes - rabbit - Moderate eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Genotoxicity in vitro - Ames test - S. typhimurium - positive

Carcinogenicity

Carcinogenicity - rat - Oral
Tumorigenic:Carcinogenic by RTECS criteria. Gastrointestinal:Tumors. Skin and Appendages: Other: Tumors.

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Ethylene dichloride)

Reproductive toxicity

Reproductive toxicity - rat - Inhalation
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Specific target organ toxicity - single exposure
May cause damage to organs.

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
Acts as a simple asphyxiant by displacing air., anesthetic effects, Difficulty in breathing, Headache, Dizziness, Prolonged or repeated contact with skin may cause:, defatting, Dermatitis, Contact with eyes can cause:, Redness, Blurred vision, Provokes tears., Effects due to ingestion may include:, Gastrointestinal discomfort, Central nervous system depression, Paresthesia., Drowsiness, Convulsions, Conjunctivitis., Pulmonary edema. Effects may be delayed., Irregular breathing., Stomach/intestinal disorders, Nausea, Vomiting, Increased liver enzymes., Weakness, Heavy or prolonged skin exposure may result in the absorption of harmful amounts of material.

Additional Information
RTECS: KI0525000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 225,00 mg/l - 96 h
	NOEC - Cyprinodon variegatus (sheepshead minnow) - 130 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 540,00 mg/l - 24 h
	Immobilization EC50 - Daphnia magna (Water flea) - 160 mg/l - 48 h

Persistence and degradability

Biodegradability	Biotic/Aerobic Result: < 20 % - Not readily biodegradable. Remarks: not applicable

Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 14 d Bioconcentration factor (BCF): 2

Mobility in soil
no data available

PBT and vPvB assessment

no data available

Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

ADR/RID
UN-Number: 1184 Class: 3 (6.1) Packing group: II
Proper shipping name: ETHYLENE DICHLORIDE

IMDG
UN-Number: 1184 Class: 3 (6.1) Packing group: II EMS-No: F-E, S-D
Proper shipping name: ETHYLENE DICHLORIDE
Marine pollutant: No

IATA
UN-Number: 1184 Class: 3 (6.1) Packing group: II
Proper shipping name: Ethylene dichloride

15. REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

Acute Tox.	Acute toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H350	May cause cancer.
Skin Irrit.	Skin irritation
F	Highly flammable
T	Toxic
R11	Highly flammable.
R22	Harmful if swallowed.
R36/37/38	Irritating to eyes, respiratory system and skin.
R45	May cause cancer.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MSDS Number: **T4914** * * * * * *Effective Date: **05/26/09** * * * * * Supercedes: **07/06/06***

MSDS **Material Safety Data Sheet**

From: **Mallinckrodt Baker, Inc.**
222 Red School Lane
Phillipsburg, NJ 08865

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,1,1-TRICHLOROETHANE

1. Product Identification

Synonyms: Methyl chloroform; trichloroethane; chloroetene
CAS No.: 71-55-6
Molecular Weight: 133.40
Chemical Formula: CH3CCl3
Product Codes: 9435, 9437, W509, W510

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Chloroform	71-55-6	96 - 100%	Yes
Dioxane	123-91-1	< 3%	Yes
1,2-Epoxybutane	106-88-7	< 0.5%	Yes
Actual concentrations proprietary			

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Inhalation of vapors will irritate the respiratory tract. Affects the central nervous system. Symptoms include headache, dizziness, weakness, nausea. Higher levels of exposure (> 5000 ppm) can cause irregular heart beat, kidney and liver damage, fall in blood pressure, unconsciousness and even death.
Ingestion:
Harmful if swallowed. Symptoms similar to inhalation will occur along with nausea, vomiting. Aspiration of material into the lungs can cause chemical pneumonitis which can be fatal. If aspirated, may be rapidly absorbed through the lungs and result in injury to other body systems.
Skin Contact:
Causes mild irritation and redness, especially on prolonged contact. Repeated contact may cause drying or flaking of the skin.
Eye Contact:
Liquids and vapors cause irritation. Symptoms include tearing, redness, stinging, swelling.
Chronic Exposure:
Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may affect the kidneys and liver. Dioxane is a suspected human carcinogen based on animal data.
Aggravation of Pre-existing Conditions:
Personnel with CNS, kidney, liver or heart disease may be more susceptible to the effects of this substance. Use of alcoholic beverages may aggravate symptoms.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Autoignition temperature: 500C (932F)
Flammable limits in air % by volume:
lel: 7.0; uel: 16.0
Vapors in containers can explode if subjected to high energy source.
Dioxane has a flash point below 16C (60F).
Explosion:
Can react with strong caustic, such as potash to form a flammable or explosive material. Air/vapor mixtures may explode when heated. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! Do not use aluminum, magnesium or zinc metal for storage container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not use aluminum equipment or storage containers. Contact with aluminum parts in a pressurized fluid system may cause violent reactions.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
350 ppm (TWA) for trichloroethane
100 ppm (TWA) skin for dioxane
-ACGIH Threshold Limit Value (TLV):
350 ppm (TWA), 450 ppm (STEL) for trichloroethane
20 ppm (TWA) skin, A3 - Animal Carcinogen for dioxane

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has questionable warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Viton is a recommended material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Mild chloroform-like odor.
Solubility:
4,400 ppm in water @ 20C (68F)
Specific Gravity:
1.34 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
74C (165F)
Melting Point:
-32C (-26F)
Vapor Density (Air=1):
4.63
Vapor Pressure (mm Hg):
100 @ 20C (68F)
Evaporation Rate (BuAc=1):
12.8

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10. Stability and Reactivity

Stability:
Requires inhibitor content to prevent corrosion of metals. Slowly hydrolyzes in water to form hydrochloric and acetic acid.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition. Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Hazardous polymerization can occur in contact with aluminum trichloride.
Incompatibilities:
Open flames, welding arcs, nitrogen tetroxide, oxygen, liquid oxygen, sodium, sodium hydroxide, and sodium-potassium alloy, strong alkalis, oxidizers, aluminum and other reactive metals.
Conditions to Avoid:
Insufficient inhibitor, incompatibles, heat, flame and ignition sources

11. Toxicological Information

Oral rat LD50: 9600 mg/kg; inhalation rat LC50: 18000 ppm/4H; investigated as a mutagen, tumorigen, reproductive effector; irritation eye rabbit, Standard Draize, 2mg/24H severe.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Chloroform (71-55-6)	No	No	3
Dioxane (123-91-1)	No	Yes	2B
1,2-Epoxybutane (106-88-7)	No	No	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released to the atmosphere, this material has an average global half-life of 6.0 - 6.9 years. When released into the air, this material may adversely affect the ozone layer.
Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: 1,1,1-TRICHLOROETHANE
Hazard Class: 6.1

UN/NA: UN2831
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Methyl Chloroform (71-55-6)	Yes	Yes	Yes	Yes
Dioxane (123-91-1)	Yes	Yes	Yes	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Chloroform (71-55-6)	Yes	Yes	No	Yes
Dioxane (123-91-1)	Yes	Yes	No	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Chloroform (71-55-6)	No	No	Yes	No
Dioxane (123-91-1)	No	No	Yes	No
1,2-Epoxybutane (106-88-7)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Chloroform (71-55-6)	1000	U226	No
Dioxane (123-91-1)	100	U108	No
1,2-Epoxybutane (106-88-7)	100	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.
Label First Aid:
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. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3.
Disclaimer:
****
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****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

1,2-Dichloroethylene, 99%, mixture of isomers

ACC# 97772

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,2-Dichloroethylene, 99%, mixture of isomers
Catalog Numbers: AC113400000, AC113400250
Synonyms: trans-Acetylene dichloride.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
540-59-0	1,2-Dichloroethylene	99	208-750-2

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.
Warning! Flammable liquid and vapor. Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects
Eye: Causes moderate eye irritation.
Skin: Causes moderate skin irritation. May cause dermatitis.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.
Inhalation: Harmful if inhaled. May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at ??00 ppm.
ronic: Not available. Some German investigators reported fatty degeneration of the liver upon eated narcotic doses in rats and

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.
Extinguishing Media: Use water fog, dry chemical, carbon dioxide, or regular foam.
Flash Point: 6 deg C (42.80 deg F)
Autoignition Temperature: 440 deg C (824.00 deg F)
Explosion Limits, Lower:9.70 vol %
Upper: 12.80 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.
Storage: Keep away from sources of ignition. Store in a tightly closed container.

Flammables-area. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,2-Dichloroethylene	200 ppm TWA	200 ppm TWA; 790 mg/m3 TWA 1000 ppm IDLH	200 ppm TWA; 790 mg/m3 TWA

OSHA Vacated PELs: 1,2-Dichloroethylene: 200 ppm TWA; 790 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear
Odor: Pleasant odor
pH: Not available.
Vapor Pressure: 201 mm Hg @ 25 deg C
Vapor Density: 3.34 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 48-60 deg C @ 760 mm Hg
Freezing/Melting Point:-57 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:1.2800
Molecular Formula:C2H2Cl2
Molecular Weight:96.94

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.
Conditions to Avoid: Light, ignition sources, exposure to air, excess heat.

Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, copper.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 540-59-0: KV9360000
LD50/LC50:
CAS# 540-59-0:
Draize test, rabbit, skin: 100 mg/24H Moderate;
Inhalation, mouse: LC50 = 21700 ppm/6H;
Oral, mouse: LD50 = 2122 mg/kg;
Oral, rat: LD50 = 770 mg/kg;
.

Carcinogenicity:
CAS# 540-59-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	1,2-DICHLOROETHYLENE
Hazard Class:		3

UN Number:	UN1150
Packing Group:	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 540-59-0 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
Section 313
This material contains 1,2-Dichloroethylene (CAS# 540-59-0, 99%),which is subject to the orting requirements of Section 313 of SARA Title III and 40 CFR
an Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 540-59-0 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 540-59-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F
Risk Phrases:
R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 7 Keep container tightly closed.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 540-59-0: 2

Canada - DSL/NDSL

CAS# 540-59-0 is listed on Canada's NDSL List.

Canada - WHMIS

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 540-59-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 11/20/1997
Revision #5 Date: 3/16/2007

The information above 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, express 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. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost pro or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised the possibility of such damages.

SIGMA-ALDRICH

Material Safety Data Sheet

Version 3.2
Revision Date 05/07/2008
Print Date 09/08/2008

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 1-Methoxy-2-propanol

Product Number : 484407
Brand : Aldrich

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : DOWANOL™ PM
Propylene glycol methyl ether
Propyleneglycol monomethyl ether

Formula : C4H10O2
Molecular Weight : 90.12 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Monopropylene glycol methyl ether			
107-98-2	203-539-1	603-064-00-3	-

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable Liquid, Target Organ Effect, Irritant

Target Organs
Liver, Kidney

HMIS Classification
Health Hazard: 3
Chronic Health Hazard: *
Flammability: 3
Physical hazards: 0

NFPA Rating
Health Hazard: 3
Fire: 3
Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	May be harmful if swallowed.

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties

Flash point	34 °C (93 °F) - closed cup
Ignition temperature	278 °C (532 °F)

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Specific hazards
Flash back possible over considerable distance. Container explosion may occur under fire conditions. Vapours may form explosive mixture with air. May form peroxides of unknown stability.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid breathing vapors, mist or gas. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Do not let product enter drains.

Methods for cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Storage
Keep container tightly closed in a dry and well-ventilated place. Store in cool place.

Air sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Monopropylene glycol methyl ether	107-98-2	TWA	100 ppm 369 mg/m3	1994-09-01	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004:Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)
		STEL	150 ppm 553 mg/m3	1994-09-01	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004:Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)
		TWA	100 ppm 360 mg/m3	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A
		STEL	150 ppm 540 mg/m3	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid, clear
Colour	colourless

Safety data

pH	no data available
Melting point	no data available
Boiling point	118 - 119 °C (244 - 246 °F) at 1,013 hPa (760 mmHg)
Flash point	34 °C (93 °F) - closed cup
Ignition temperature	278 °C (532 °F)
Lower explosion limit	1.8 %(V)
Upper explosion limit	16 %(V)
Vapour pressure	14.5 hPa (10.9 mmHg) at 25 °C (77 °F)
Density	0.921 g/cm3
Water solubility	completely miscible
Relative vapour density	3.11 - (Air = 1.0)

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions. May form peroxides on prolonged storage. Date container and periodically test for peroxides.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Hazardous reactions
Vapours may form explosive mixture with air.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

LD50 Oral - mouse - 11,700 mg/kg
Remarks: Behavioral:Convulsions or effect on seizure threshold. Behavioral:Ataxia. Lungs, Thorax, or Respiration:Dyspnea.

LC50 Inhalation - rat - 5 h - 10000 ppm

Inhalation: Irritating to respiratory system.

LD50 Dermal - rabbit - 13,000 mg/kg

Irritation and corrosion

Skin - rabbit - Open irritation test

Eyes - rabbit - Mild eye irritation - 24 h

Sensitisation

no data available

Chronic exposure

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	May be harmful if swallowed.
Target Organs	Liver, Kidney,

Additional Information
RTECS: UB7700000

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

no data available

Ecotoxicity effects

no data available

Further information on ecology

no data available

13. DISPOSAL CONSIDERATIONS

Product
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3092 Class: 3 Packing group: III
Proper shipping name: 1-Methoxy-2-propanol
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 3092 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: 1-METHOXY-2-PROPANOL
Marine pollutant: No

IATA
UN-Number: 3092 Class: 3 Packing group: III
Proper shipping name: 1-Methoxy-2-propanol

15. REGULATORY INFORMATION

OSHA Hazards
Flammable Liquid, Target Organ Effect, Irritant

TSCA Status
On TSCA Inventory

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Monopropylene glycol methyl ether	107-98-2	1989-12-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Monopropylene glycol methyl ether	107-98-2	1989-12-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Monopropylene glycol methyl ether	107-98-2	1989-12-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION

Further information
Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

Creation Date 01-Sep-2009 **Revision Date** 26-Sep-2009 **Revision Number** 1

1. IDENTIFICATION

Product Name 2-Propanol

Cat No. **A415-4; A415-20; A416-1; A416-4; A416-4LC; A416-20; A416-200; A416-200LC; A416-500; A416P-4; A416S-4; A416SK-4; A416FB-19; A416FB-50; A416FB-115; A416FB-200; A416RB-50; A416RB-115; A416RB-200; A416RS-28; A416RS-50; A416RS-115; A416RS-200; A416SS-28; A416SS-50; A416SS-115; A416SS-200; A417-1; A417-4; A419-1; A419-4; A419RS-28; A419RS-115; A419RS-200; A419SS-28; A419SS-50; A419SS-115; A419SS-200; A426P-4; A426S-4; A426S-20; A426S-200; A451-1; A451-4; A451CU-50; A451N-219; A451POP-19; A451RS-19; A451RS-50; A451RS-115; A451RS-200; A451SK-1; A451SK-4; A451SS-200; A461-1; A461-4; A461-212; A461-500; A464-4, A464-4LC; A464RS-200; A464SK-4; A516-4; A516-20; A516-200; A516-500; A519-4; A520-4; A520RS-200; A520SS-28; A520SS-50; A520SS-115; A520SS-200; A522-4; A522-20; A522SAM-1; A522SAM-2; A522SAM-3; BP2621100; BP26324**

Synonyms Isopropanol; Isopropyl Alcohol (Certified ACS, HPLC, Laboratory, Histological, Spectranalyzed, OPTIMA LC/MS, USP, Pesticide, Low Water, USP/EP/BP/JP)

Recommended Use Laboratory chemicals

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 703-527-3887

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Flammable liquid and vapor. Irritating to eyes and skin. May cause irritation of respiratory tract. Vapors may cause drowsiness and dizziness. Aspiration hazard if swallowed - can enter lungs and cause damage.

Appearance Colorless **Physical State** Liquid **Odor** Alcohol-like

Target Organs Skin, Respiratory system, Eyes, Central nervous system (CNS), Liver, Kidney

Potential Health Effects

Acute Effects
Principle Routes of Exposure

Eyes	Irritating to eyes.
Skin	Irritating to skin. May be harmful in contact with skin.
Inhalation	May be harmful if inhaled. May cause drowsiness and dizziness. May cause irritation of respiratory tract.
Ingestion	Aspiration hazard if swallowed - can enter lungs and cause damage. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Chronic Effects Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse liver effects. May cause adverse kidney effects.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Preexisting eye disorders. Skin disorders.

[redacted]

Haz/Non-haz

Component	CAS-No	Weight %
Isopropyl alcohol	67-63-0	>95

[redacted]

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Notes to Physician Treat symptomatically.

[redacted]

Flash Point	12°C / 53.6°F
Method	No information available.
Autoignition Temperature	425°C / 797°F
Explosion Limits	
Upper	12.7% @ 93°C
Lower	2.0%
Suitable Extinguishing Media	CO_2, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media	Water may be ineffective.
Hazardous Combustion Products	No information available.

Sensitivity to mechanical impact	No information available.
Sensitivity to static discharge	No information available.

Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA **Health** 1 **Flammability** 3 **Instability** 0 **Physical hazards** N/A

Personal Precautions	Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.
Environmental Precautions	Should not be released into the environment.
Methods for Containment and Clean Up	Remove all sources of ignition. Soak up with inert absorbent material. Use spark-proof tools and explosion-proof equipment. Keep in suitable and closed containers for disposal. Take precautionary measures against static discharges.

Handling	Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharges.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place. Flammables area. Keep away from heat and sources of ignition.

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Isopropyl alcohol	TWA: 200 ppm STEL: 400 ppm	(Vacated) TWA: 980 mg/m³ (Vacated) TWA: 400 ppm (Vacated) STEL: 1225 mg/m³ (Vacated) STEL: 500 ppm TWA: 400 ppm TWA: 980 mg/m³	IDLH: 2000 ppm TWA: 980 mg/m³ TWA: 400 ppm STEL: 500 ppm STEL: 1225 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Isopropyl alcohol	TWA: 400 ppm TWA: 985 mg/m³ STEL: 500 ppm STEL: 1230 mg/m³	TWA: 400 ppm TWA: 980 mg/m³ STEL: 1225 mg/m³ STEL: 500 ppm	TWA: 200 ppm STEL: 400 ppm

NIOSH IDLH: *Immediately Dangerous to Life or Health*

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Physical State	Liquid
Appearance	Colorless
Odor	Alcohol-like
Odor Threshold	No information available.
pH	7 1% aq. sol.
Vapor Pressure	43 mmHg @ 20 °C
Vapor Density	2.1 (Air = 1.0)
Viscosity	2.27 mPa.s at 20 °C
Boiling Point/Range	81 - 83°C / 177.8 - 181.4°F@ 760 mmHg
Melting Point/Range	-89.5°C / -129.1°F
Decomposition temperature °C	No information available.
Flash Point	12°C / 53 6°F
Evaporation Rate	1.7 (Butyl Acetate = 1.0)
Specific Gravity	0.785
Solubility	Miscible with water
log Pow	No data available
Molecular Weight	60.1
Molecular Formula	C3 H8 O

Stability	Hygroscopic.
Conditions to Avoid	Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition. Exposure to moist air or water.
Incompatible Materials	Strong oxidizing agents, Acids, Halogens, Acid anhydrides
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions .	None under normal processing..

Acute Toxicity

Product Information See actual entry in RTECS for complete information.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Isopropyl alcohol	4396 mg/kg (Rat)	12800 mg/kg (Rat) 12870 mg/kg (Rabbit)	72.6 mg/L (Rat) 4 h

Irritation Irritating to eyes and skin

Toxicologically Synergistic Products No information available.

Chronic Toxicity

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	ACGIH	IARC	NTP	OSHA	Mexico
Isopropyl alcohol	Not listed	Group 1	Not listed	Not listed	Not listed

IARC: (International Agency for Research on Cancer)
IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

Sensitization No information available.

Mutagenic Effects Mutagenic effects have occurred in experimental animals.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity No information available.

Other Adverse Effects See actual entry in RTECS for complete information.

Endocrine Disruptor Information No information available

Ecotoxicity

. Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Isopropyl alcohol	EC50 96 h >1000 mg/L EC50 72 h >1000 mg/L EC50 96 h >1000 mg/L	LC50 96 h 9640 mg/L	= 35390 mg/L EC50 Photobacterium phosphoreum 5 min	EC50 48 h 13299 mg/L

Persistence and Degradability Expected to be biodegradable.

Bioaccumulation/ Accumulation No information available

Mobility

Component	log Pow
Isopropyl alcohol	0.05

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

DOT

UN-No	UN1219
Proper Shipping Name	Isopropanol
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1219
Proper Shipping Name	ISOPROPANOL
Hazard Class	3
Packing Group	II

IATA

UN-No	UN1219
Proper Shipping Name	Isopropanol

Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	UN1219
Proper Shipping Name	Isopropanol (Isopropyl alcohol)
Hazard Class	3
Packing Group	II

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Isopropyl alcohol	X	X	-	200-661-7	-		X	X	X	X	KE-29363 X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Isopropyl alcohol	67-63-0	>95	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
Not applicable

Clean Air Act
Not applicable

OSHA
Not applicable

CERCLA
Not Applicable

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Isopropyl alcohol	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
B2 Flammable liquid
D2B Toxic materials

Prepared By	Regulatory Affairs Thermo Fisher Scientific Tel: (412) 490-8929
Creation Date	01-Sep-2009
Print Date	26-Sep-2009
Revision Summary	"***", and red text indicates revision

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

Material Safety Data Sheet

Version 4.0
Revision Date 03/12/2010
Print Date 05/17/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Acetic acid
Product Number	:	A6283
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Combustible Liquid, Target Organ Effect, Harmful by skin absorption., Corrosive

Target Organs

Teeth., KidneyTeeth., Kidney

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H226	Flammable liquid and vapour.
H303	May be harmful if swallowed.
H312	Harmful in contact with skin.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H331	Toxic if inhaled.
H402	Harmful to aquatic life.

Precautionary statement(s)

P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/physician.

HMIS Classification

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	2
Physical hazards:	0

NFPA Rating

Health hazard:	3
Fire:	2
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Skin	Harmful if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.
Ingestion	May be harmful if swallowed. Causes burns.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Glacial acetic acid

Formula : $C_2H_4O_2$

Molecular Weight : 60.05 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Acetic acid			
64-19-7	200-580-7	607-002-00-6	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Continue rinsing eyes during transport to hospital.Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

Moisture sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Acetic acid	64-19-7	TWA	10 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye & Upper Respiratory Tract irritation Pulmonary function				
		STEL	15 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
	Eye & Upper Respiratory Tract irritation Pulmonary function				
		TWA	10 ppm 25 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	10 ppm 25 mg/m3	1997-08-04	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.				

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Tightly fitting safety goggles. Faceshield (8-inch minimum).

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	colourless

Safety data

pH	2.4 at 60.05 g/l
Melting point	16.2 °C (61.2 °F)
Boiling point	117 - 118 °C (243 - 244 °F)
Flash point	40.0 °C (104.0 °F) - closed cup
Ignition temperature	485 °C (905 °F)
Lower explosion limit	4 %(V)
Upper explosion limit	19.9 %(V)
Vapour pressure	73.3 hPa (55.0 mmHg) at 50.0 °C (122.0 °F) 15.2 hPa (11.4 mmHg) at 20.0 °C (68.0 °F)
Density	1.049 g/mL at 25 °C (77 °F)
Water solubility	completely miscible
Partition coefficient: n-octanol/water	log Pow: -0.17

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Oxidizing agents, Soluble carbonates and phosphates, Hydroxides, Metals, Peroxides, permanganates, e.g. potassium permanganate, Amines, Alcohols

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 3,310 mg/kg

LC50 Inhalation - mouse - 1 h - 5620 ppm
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Conjunctive irritation. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Blood:Other changes.

LD50 Dermal - rabbit - 1,112 mg/kg

Skin corrosion/irritation
Skin - rabbit - Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Corrosive to eyes

Respiratory or skin sensitization
May cause sensitization by skin contact.

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion	May be harmful if swallowed. Causes burns.
Skin	Harmful if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Ingestion or inhalation of concentrated acetic acid causes damage to tissues of the respiratory and digestive tracts. Symptoms include: hematemesis, bloody diarrhea, edema and/or perforation of the esophagus and pylorus, pancreatitis, hematuria, anuria, uremia, albuminuria, hemolysis, convulsions, bronchitis, pulmonary edema, pneumonia, cardiovascular collapse, shock, and death. Direct contact or exposure to high concentrations of vapor with skin or eyes can cause: erythema, blisters, tissue destruction with slow healing, skin blackening, hyperkeratosis, fissures, corneal erosion, opacification, iritis, conjunctivitis, and possible blindness., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: AF1225000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Leuciscus idus (Golden orfe) - 410.00 mg/l - 48 h
	LC50 - Cyprinus carpio (Carp) - 49.00 mg/l - 48 h
	LC50 - Pimephales promelas (fathead minnow) - 79.00 - 88.00 mg/l - 96 h
	LC50 - Lepomis macrochirus - 75 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 65.00 mg/l - 48 h

Persistence and degradability
Biodegradability Remarks: Expected to be biodegradable

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

Biochemical Oxygen Demand (BOD)	880 mg/g
Additional ecological information	*no data available*

13. DISPOSAL CONSIDERATIONS

Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2789 Class: 8 (3) Packing group: II
Proper shipping name: Acetic acid, glacial
Reportable Quantity (RQ): 5000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2789 Class: 8 (3) Packing group: II EMS-No: F-E, S-C
Proper shipping name: ACETIC ACID, GLACIAL
Marine pollutant: No

IATA
UN-Number: 2789 Class: 8 (3) Packing group: II
Proper shipping name: Acetic acid, glacial

15. REGULATORY INFORMATION

OSHA Hazards
Combustible Liquid, Target Organ Effect, Harmful by skin absorption., Corrosive

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Acetic acid	64-19-7	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Acetic acid	64-19-7	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Acetic acid	64-19-7	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

6. OTHER INFORMATION

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Fisher Scientific

Material Safety Data Sheet

Creation Date 28-Apr-2009 **Revision Date** 22-Sep-2009 **Revision Number** 1

Product Name Acetone

Cat No. **A9-4; A9-20; A9-200; A11-1; A11-4; A11-20; A11-200; A11S-4; A16F-1GAL; A16P-1GAL; A16P-4; A16S-4; A16S-20; A18-1; A18-4; A18-20; A18-200; A18-200LC; A18-500; A18CU1300; A18FB-19; A18FB-50; A18FB-115; A18FB-200; A18P-4; A18POP-19; A18POPB-50; A18RB-19; A18RB-50; A18RB-115; A18RB-200; A18RS-28; A18RS-50; A18RS-115; A18RS-200; A18S-4; A18SK-4; A18SS-19; A18SS-28; A18SS-50; A18SS-115; A18SS-200; A19-1; A19-4; A19RS-115; A19RS-200; A40-4; A928-4; A929-1; A929-4; A929RS-19; A929RS-50; A929RS-200; A929SK-4; A929SS-28; A929SS-50; A929SS-115; A929SS-200; A946-4; A946-4LC; A946FB-200; A946RB-19; A946RB-50; A946RB-115; A946RB-200; A949-1; A949-4; A949CU-50; A949N-119; A949N-219; A949POP-19; A949RS-28; A949RS-50; A949RS-115; A949SK-1; A949SK-4; A949SS-19; A949SS-28; A949SS-50; A949SS-115; A949SS-200; BP2403-1; BP2403-4; BP2403-20; BP2404-1; BP2404-4; BP2404SK-1; BP2404SK-4**

Synonyms 2-Propanone; Dimethyl ketone; (Certified ACS, HPLC, OPTIMA, Histological, Spectranalyzed, NF/FCC/EP, Pesticide, Electronic, GC Resolv, SAFE-COTE)

Recommended Use Laboratory chemicals

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 703-527-3887

DANGER!

Emergency Overview

Flammable liquid and vapor. Irritating to eyes and skin. May cause irritation of respiratory tract. Vapors may cause drowsiness and dizziness. Repeated exposure may cause skin dryness or cracking.

Appearance Colorless **Physical State** Liquid **Odor** sweet

Target Organs Central nervous system (CNS), Eyes, Respiratory system, Skin, Kidney, Liver, spleen

Potential Health Effects

Acute Effects

Principle Routes of Exposure

Eyes	Irritating to eyes.
Skin	Irritating to skin. May be harmful in contact with skin. Repeated exposure may cause skin dryness or cracking.
Inhalation	Inhalation may cause central nervous system effects. May cause drowsiness and dizziness. May cause irritation of respiratory tract. May be harmful if inhaled.
Ingestion	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. May be harmful if swallowed.

Chronic Effects Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse liver effects. May cause adverse kidney effects.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Central nervous system disorders. Preexisting eye disorders. Skin disorders. Kidney disorders. Liver disorders.

[redacted]

Haz/Non-haz

Component	CAS-No	Weight %
Acetone	67-64-1	>95

[redacted]

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Get medical attention immediately if symptoms occur.

Ingestion Do not induce vomiting. Obtain medical attention.

Notes to Physician Treat symptomatically.

[redacted]

Flash Point	-20°C / -4°F
Method	No information available.
Autoignition Temperature	465°C / 869°F
Explosion Limits	
Upper	12.8 vol %
Lower	2.5 vol %
Suitable Extinguishing Media	CO_2, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media	Water may be ineffective.
Hazardous Combustion Products	No information available.
Sensitivity to mechanical impact	No information available.
Sensitivity to static discharge	No information available.

Specific Hazards Arising from the Chemical
Flammable. Risk of ignition. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA **Health** 1 **Flammability** 3 **Instability** 0 **Physical hazards** N/A

Personal Precautions	Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Should not be released into the environment.
Methods for Containment and Clean Up	Remove all sources of ignition. Soak up with inert absorbent material. Take precautionary measures against static discharges. Keep in suitable and closed containers for disposal.

Handling	Wear personal protective equipment. Keep away from open flames, hot surfaces and sources of ignition. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharges.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

Engineering Measures

Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Acetone	TWA: 500 ppm STEL: 750 ppm	(Vacated) TWA: 750 ppm (Vacated) TWA: 1800 mg/m³ (Vacated) STEL: 1000 ppm (Vacated) STEL: 2400 mg/m³ TWA: 1000 ppm TWA: 2400 mg/m³	IDLH: 2500 ppm TWA: 250 ppm TWA: 590 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Acetone	TWA: 1190 mg/m³ TWA: 500 ppm STEL: 1000 ppm STEL: 2380 mg/m³	TWA: 1000 ppm TWA: 2400 mg/m³ STEL: 1260 ppm STEL: 3000 mg/m³	TWA: 500 ppm STEL: 750 ppm

NIOSH IDLH: *Immediately Dangerous to Life or Health*

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Physical State	Liquid
Appearance	Colorless
Odor	sweet
Odor Threshold	No information available.
pH	No information available.
Vapor Pressure	247 mbar @ 20 °C
Vapor Density	2.0 (Air = 1.0)
Viscosity	0.32 mPa.s @ 20 °C
Boiling Point/Range	56°C / 132.8°F
Melting Point/Range	-95°C / -139°F
Decomposition temperature °C	No information available.
Flash Point	-20°C / -4°F
Evaporation Rate	5.6 (Butyl Acetate = 1.0)
Specific Gravity	0.790
Solubility	Soluble in water
log Pow	No data available
Molecular Weight	58.08
Molecular Formula	C3 H6 O

Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products. Heat, flames and sparks.
Incompatible Materials	Strong oxidizing agents, Strong reducing agents, Strong bases, Peroxides
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2), Formaldehyde, Methanol
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions .	None under normal processing..

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Acetone	5800 mg/kg (Rat)	Not listed	Not listed

Irritation	Irritating to eyes and skin
Toxicologically Synergistic Products	Carbon tetrachloride; Chloroform; Trichloroethylene; Bromodichloromethane; Dibromochloromethane; N-nitrosodimethylamine; 1,1,2-Trichloroethane; Styrene; Acetonitrile, 2,5-Hexanedione; Ethanol; 1,2-Dichlorobenzene

Chronic Toxicity

Carcinogenicity	There are no known carcinogenic chemicals in this product
Sensitization	No information available.
Mutagenic Effects	Mutagenic effects have occurred in experimental animals.
Reproductive Effects	Experiments have shown reproductive toxicity effects on laboratory animals.
Developmental Effects	Developmental effects have occurred in experimental animals.
Teratogenicity	Teratogenic effects have occurred in experimental animals..
Other Adverse Effects	The toxicological properties have not been fully investigated.. See actual entry in RTECS for complete information.
Endocrine Disruptor Information	No information available

Ecotoxicity

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Acetone	Not listed	Leuciscus idus: LC50 = 11300 mg/L/48h Salmo gairdneri: LC50 = 6100 mg/L/24h	EC50 = 14500 mg/L/15 min	EC50 = 39 mg/L/48h EC50 = 12700 mg/L/48h EC50 = 12600 mg/L/48h

Persistence and Degradability Readily biodegradable.

Bioaccumulation/ Accumulation No information available

Mobility

Component	log Pow
Acetone	-0.24

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Acetone - 67-64-1	U002	-

DOT

UN-No	UN1090
Proper Shipping Name	ACETONE
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1090
Proper Shipping Name	ACETONE
Hazard Class	3
Packing Group	II

IATA

UN-No	UN1090
Proper Shipping Name	ACETONE
Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	UN1090
Proper Shipping Name	ACETONE
Hazard Class	3
Packing Group	II

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Acetone	X	X	-	200-662-2	-		X	X	X	X	KE-29367 X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313
Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
Not applicable

Clean Air Act
Not applicable

OSHA
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Acetone	5000 lb	-

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Acetone	X	X	X	-	X

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Acetone	2000 lb STQ

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
B2 Flammable liquid
D2B Toxic materials

Prepared By	Regulatory Affairs Thermo Fisher Scientific Tel: (412) 490-8929
Creation Date	28-Apr-2009
Print Date	22-Sep-2009
Revision Summary	"***", and red text indicates revision

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

Material Safety Data Sheet

Acetylene

Section 1. Chemical product and company identification

Product name	: Acetylene
Supplier	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Product use	: Synthetic/Analytical chemistry.
Synonym	: acetylen; acetylene ; ethine; ethyne; narcylen
MSDS #	: 001001
Date of Preparation/Revision	: **4/22/2010.**
In case of emergency	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Gas.
Emergency overview	: WARNING! FLAMMABLE GAS. MAY CAUSE FLASH FIRE. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CONTENTS UNDER PRESSURE. Keep away from heat, sparks and flame. Do not puncture or incinerate container. May cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container closed. Contact with rapidly expanding gases can cause frostbite.
Target organs	: May cause damage to the following organs: upper respiratory tract, central nervous system (CNS).
Routes of entry	: Inhalation
Potential acute health effects	
Eyes	: Contact with rapidly expanding gas may cause burns or frostbite.
Skin	: Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation	: Acts as a simple asphyxiant.
Ingestion	: Ingestion is not a normal route of exposure for gases
Potential chronic health effects	: **CARCINOGENIC EFFECTS**: Not available. **MUTAGENIC EFFECTS**: Not available. **TERATOGENIC EFFECTS**: Not available.
Medical conditions aggravated by over-exposure	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Acetylene	74-86-2	100	**NIOSH REL (United States, 6/2009).** CEIL: 2662 mg/m³ CEIL: 2500 ppm

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Flammable.

Auto-ignition temperature : 304.85°C (580.7°F)

Flash point : Closed cup: -18.15°C (-0.7°F).

Flammable limits : Lower: 2.5% Upper: 82%

Products of combustion : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Fire hazards in the presence of various substances : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge, heat and oxidizing materials.

Fire-fighting media and instructions : In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

ction 7. Handling and storage

Handling : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

spiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

acetylene

NIOSH REL (United States, 6/2009).
CEIL: 2662 mg/m³
CEIL: 2500 ppm

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : 26.04 g/mole

Molecular formula : C2-H2

Melting/freezing point : Sublimation temperature: -81.8°C (-115.2°F)

Critical temperature : 35.3°C (95.5°F)

Vapor pressure : 635 (psig)

Vapor density : 0.9 (Air = 1)

cific Volume (ft ³/lb) : 14.7058

Density (lb/ft ³) : 0.613

Section 10. Stability and reactivity

Stability and reactivity : The product may undergo hazardous decomposition, condensation or polymerization, react violently with water to emit toxic gases or become self-reactive under conditions of shock or increase in temperature or pressure.

Incompatibility with various substances : Extremely reactive or incompatible with oxidizing agents

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Chronic effects on humans : May cause damage to the following organs: upper respiratory tract, central nervous system (CNS).

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects : No known significant effects or critical hazards.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Not available.

Products of degradation : Products of degradation: carbon oxides (CO, CO_2) and water.

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1001	ACETYLENE, DISSOLVED	2.1	Not applicable (gas).		**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 15 kg

Acetylene						
TDG Classification	UN1001	ACETYLENE, DISSOLVED	2.1	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0 **Passenger Carrying Ship Index** 75 **Passenger Carrying Road or Rail Index** Forbidden **Special provisions** 38, 42
Mexico Classification	UN1001	ACETYLENE, DISSOLVED	2.1	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

ction 15. Regulatory information

United States

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: acetylene
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: acetylene: Fire hazard, reactive, Sudden release of pressure, Immediate (acute) health hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 accidental release prevention: acetylene

Clean Air Act (CAA) 112 regulated flammable substances: acetylene

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.

Rhode Island Hazardous Substances: This material is not listed.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
Class F: Dangerously reactive material.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

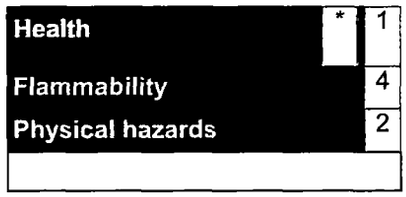
United States

Label requirements : FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

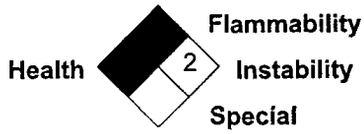
Canada

Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.
Class F: Dangerously reactive material.

Hazardous Material Information System (U.S.A.) :



National Fire Protection Association (U.S.A.) :



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

ISO9001:2000 Certified

Material Safety Data Sheet

Ammonia Standard Solutions, 50ppm - 1000ppm

Section 1 - Chemical Product and Company Identification

MSDS Name:

Ammonia Standard Solutions, 50ppm - 1000ppm

Catalog Numbers:

LC10900, LC17940

Synonyms:

Ammonia reference solutions, 1ml - .05mg to 1mg

Company Identification:

LabChem, Inc.
200 William Pitt Way
Pittsburgh, PA 15238

Company Phone Number:

(412) 826-5230

Emergency Phone Number:

(800) 424-9300

CHEMTREC Phone Number:

(800) 424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent
7732-18-5	Water	balance
12125-02-9	Ammonium chloride	.016-0.314

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Colorless
Caution! May cause skin irritation. May cause eye irritation. This is expected to be a low hazard for usual industrial handling.
Target Organs: None.

Potential Health Effects

Eye:

May cause eye irritation.

Skin:

May cause skin irritation.

Ingestion:

Ingestion can result in nausea, vomiting, gastric irritation. Large doses (over 6g ammonium chloride) may cause systemic ammonia toxicity including heavy breathing, blue skin, dullness, restlessness, convulsions, coma. Susceptibility increases with pre-existing live function impairment.

Inhalation:

Low hazard for usual industrial handling.

Chronic:

May cause dermatitis and conjunctivitis.

Section 4 - First Aid Measures

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids until no evidence of chemical remains. Get medical aid.

Skin:

Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Ingestion:

Give conscious victim 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid if irritation or symptoms occur.

Inhalation:

Move victim to fresh air immediately. Get medical aid if cough or other symptoms appear.

Notes to Physician:

Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Move container if possible, avoid breathing vapors or dust.

Extinguishing Media:

For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.

Autoignition Temperature:

Not applicable.

Flash Point:

Not applicable.

NFPA Rating:

CAS# 7732-18-5: Not published.
CAS# 12125-02-9: Not published.

Explosion Limits:

Lower: No information Upper: No information

Section 6 - Accidental Release Measures

General Information:

Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spills with absorbent (vermiculite, sand, fuller's earth) and place in plastic bags for later disposal. Area may be washed down with water.

Section 7 - Handling and Storage

Handling:

Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.

Storage:

Store capped at room temperature. Protect from heat and water reactive substance (sodium, oleum).

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:

Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product.

Exposure Limits

Chemical Name:	ACGIH	NIOSH	OSHA
Water	None of the components are on this list.	None of the components are on this list.	None of the components are on this list.
Ammonium chloride	10 mg/m3 TWA;20 mg/m3 STEL	10 mg/m3 TWA	None of the components are on this list.

OSHA Vacated PELs

Ammonium chloride: 10 mg/m3 TWA

Personal Protective Equipment

Eyes:

Do not wear contact lenses when working with chemicals. An eye wash fountain should be available in the immediate work area. Wear splash-proof safety goggles.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Not required for normal use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Color: Colorless
Odor: Odorless to slight ammonia
pH: No information found.
Vapor Pressure: 14 mm Hg @20C

Material Safety Data Sheet

Ammonia Standard Solutions, 50ppm - 1000ppm

Vapor Density:	0.7
Evaporation Rate:	No information found.
Viscosity:	No information found.
Boiling Point:	212°F (100.00°C)
Freezing/Melting Point:	32°F (0.00°C)
Decomposition Temperature:	No information found.
Solubility in water:	No information found.
Specific Gravity/Density:	1.0
Molecular Formula:	Solution
Molecular Weight	No information found.

Section 10 - Stability and Reactivity

Chemical Stability:

Stable under normal temperatures and pressures.

Conditions to Avoid:

Incompatible materials.

Incompatibilities with Other Materials

Ammonium nitrate, bromine trifluoride, potassium chlorates, iodine heptafluoride.

Hazardous Decomposition Products

Dry crystal sublimes at 644F.

Hazardous Polymerization

Has not been reported.

Section 11 - Toxicological Information

RTECS:

CAS# 7732-18-5: ZC0110000.
CAS# 12125-02-9: BP4550000.

LD50/LC50:

CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg.
CAS# 12125-02-9:
Oral, mouse: LD50 = 1300 mg/kg
Oral, rat: LD50 = 1650 mg/kg.

Carcinogenicity:

CAS# 7732-18-5: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65.
CAS# 12125-02-9: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65.

Epidemiology:

Ammonium chloride is a mild skin and respiratory irritant, and a severe eye irritant.

Teratogenicity:

Reproductive:

Mutagenicity:

Neurotoxicity:

Section 12 - Ecological Information

No information found.

Section 13 - Disposal Considerations

Dispose of in accordance with Federal, State, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: Not regulated

Hazard Class:

UN Number:

Packing Group:

Section 15 - Regulatory Information

US Federal

TSCA

CAS# 7732-18-5 is listed on the TSCA Inventory.
CAS# 12125-02-9 is listed on the TSCA Inventory.

SARA Reportable Quantities (RQ)

CAS# 12125-02-9: final RQ = 5000 pounds (2270 kg)

CERCLA/SARA Section 313

None of the components are on this list.

OSHA - Highly Hazardous

None of the components are on this list.

US State

State Right to Know

Ammonium chloride can be found on the following state Right-to-Know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California Regulations

European/International Regulations

Canadian DSL/NDSL

CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 12125-02-9 is listed on Canada's DSL List.

Canada Ingredient Disclosure List

CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.
CAS# 12125-02-9 is listed on Canada's Ingredient Disclosure List.

Section 16 - Other Information

MSDS Creation Date: November 15, 1997
Revision Date: August 15, 2007

Information in this MSDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc. assumes no liability resulting from the use of this MSDS. The user must determine suitability of this information for his application.

Fisher Scientific

Material Safety Data Sheet
Ammonium citrate dibasic

MSDS# 01200

Section 1 - Chemical Product and Company Identification

MSDS Name:	Ammonium citrate dibasic
Catalog Numbers:	61116-0025, 61116-5000, A663-212, A663-500, NC9525748
Synonyms:	Ammonium monohydrogen citrate; Citric acid diammonium salt; Diammonium citrate; Diammonium hydrogen citrate; Dibasic ammonium citrate.
Company Identification:	Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	201-796-7100
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300

Section 2 - Composition, Information on Ingredients

Risk Phrases:

CAS#:	3012-65-5
Chemical Name:	Ammonium citrate dibasic
%:	100
EINECS#:	221-146-3

Hazard Symbols:

Text for R-phrases: see Section 16

Hazard Symbols: XI

Risk Phrases: 36/37/38

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Warning! Causes eye, skin, and respiratory tract irritation. Target Organs: Respiratory system, eyes, skin.

Potential Health Effects

Eye:	Causes eye irritation.
Skin:	Causes skin irritation.
Ingestion:	May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation:	Causes respiratory tract irritation.
Chronic:	No information found.

Section 4 - First Aid Measures

Eyes:	Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
Skin:	Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion:	Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Absorption of this product into the body may cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). Moderate degrees of cyanosis need to be treated only by supportive measures: bed rest and oxygen inhalation. For methemoglobinemia, administer oxygen alone or with Methylene Blue depending on the methemoglobin concentration in the blood. Cleansing of the entire contaminated area of the body is of utmost importance.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Runoff from fire control or dilution water may cause pollution.

Extinguishing Media: Use agent most appropriate to extinguish fire. Use water spray, dry chemical, carbon dioxide, or alcohol-resistant foam.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: 2; flammability: 0; instability: 0;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with skin and eyes. Avoid ingestion and inhalation.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Ammonium citrate dibasic	none listed	none listed	none listed
Ammonia	25 ppm; 35 ppm STEL	25 ppm TWA; 18 mg/m3 TWA 300 ppm IDLH	50 ppm TWA; 35 mg/m3 TWA

OSHA Vacated PELs: Ammonium citrate dibasic: None listed Ammonia: None listed

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if

irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Color: white
Odor: ammonia-like - weak odor
pH: 4.8-5.3 (5% soln)
Vapor Pressure: Not available
Vapor Density: Not available
Evaporation Rate: Not available
Viscosity: Not available
Boiling Point: Not available
Freezing/Melting Point: Decomposes.
Decomposition Temperature: Not available
Solubility in water: Soluble in water.
Specific Gravity/Density: 1.5
Molecular Formula: (NH4)2C6H6O7
Molecular Weight: 226.11

Section 10 - Stability and Reactivity

Chemical Stability:	Stable under normal temperatures and pressures.
Conditions to Avoid:	Incompatible materials, dust generation, excess heat, strong oxidants.
Incompatibilities with Other Materials	Not available
Hazardous Decomposition Products	Carbon monoxide, carbon dioxide, nitrogen oxides (NOx) and ammonia (NH3).
Hazardous Polymerization	Has not been reported.

Section 11 - Toxicological Information

RTECS#: CAS# 3012-65-5: None listed
CAS# 7664-41-7: BO0875000

LD50/LC50: RTECS: Not available. RTECS:
CAS# 7664-41-7: Inhalation, mouse: LC50 = 4230 ppm/1H;
Inhalation, mouse: LC50 = 4600 mg/m3/2H;
Inhalation, rabbit: LC50 = 7 gm/m3/1H;
Inhalation, rat: LC50 = 2000 ppm/4H;
Inhalation, rat: LC50 = 18600 mg/m3/5M;
Inhalation, rat: LC50 = 7040 mg/m3/30M;
Skin, rat: LD50 = 112000 mg/m3/15M;
Skin, rat: LD50 = 71900 mg/m3/30M;
Skin, rat: LD50 = 4840 mg/m3/60M;
.

Carcinogenicity: Ammonium citrate dibasic - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
Ammonia - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Not available

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: Not regulated as a hazardous material
Hazard Class:
UN Number:
Packing Group:
Canada TDG
Shipping Name: Not available

Hazard Class:
UN Number:
Packing Group:

USA RQ: CAS# 3012-65-5: 5000 lb final RQ; 2270 kg final RQ

USA RQ: CAS# 7664-41-7: 100 lb final RQ; 45.4 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XI

Risk Phrases:

R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 3012-65-5: 1

CAS# 7664-41-7: 2

Canada

CAS# 3012-65-5 is listed on Canada's DSL List

CAS# 7664-41-7 is listed on Canada's DSL List

Canadian WHMIS Classifications: Not controlled.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 3012-65-5 is not listed on Canada's Ingredient Disclosure List.

CAS# 7664-41-7 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 3012-65-5 is listed on the TSCA Inventory.

CAS# 7664-41-7 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 12/12/1997

Revision #7 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility or any other warranty, express 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. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.

Material Safety Data Sheet

Version 3.0
Revision Date 04/30/2009
Print Date 02/11/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Arsenic Standard for AAS

Product Number : 39436
Brand : Fluka

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +18003255832
Fax : +18003255052
Emergency Phone # : (314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
Nitric acid			
7697-37-2	231-714-2	007-004-00-1	>= 2 - <= 4 %
Arsenic trioxide			
1327-53-3	215-481-4	033-003-00-0	0.1 %
Water			
7732-18-5	231-791-2	-	96.7 %

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Target Organ Effect, Corrosive

Target Organs

Lungs, Teeth., Cardiovascular system.

HMIS Classification
Health Hazard: 3
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating
Health Hazard: 3
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Skin	May be harmful if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.
Ingestion	May be harmful if swallowed. Causes burns.

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Continue rinsing eyes during transport to hospital.Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties

Flash point	not applicable
Ignition temperature	no data available

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
The product itself does not burn.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods for cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid inhalation of vapour or mist.

Storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Nitric acid	7697-37-2	TWA	2 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye & Upper Respiratory Tract irritation Dental erosion				
		STEL	4 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
	Eye & Upper Respiratory Tract irritation Dental erosion				
		TWA	2 ppm 5 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	4 ppm 10 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	2 ppm 5 mg/m3	1997-08-04	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.				

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid

Safety data

pH	3.0
Melting point	no data available
Boiling point	no data available
Flash point	not applicable
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Density	1.010 g/cm3
Water solubility	no data available

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Materials to avoid
Bases, Amines, Alkali metals, Copper, Aluminum

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - nitrogen oxides (NOx)

11. TOXICOLOGICAL INFORMATION

Acute toxicity

no data available

Irritation and corrosion

no data available

Sensitisation

no data available

Chronic exposure

IARC:	1 - Group 1: Carcinogenic to humans (Arsenic trioxide)
NTP:	Known to be human carcinogen (Arsenic trioxide)
OSHA:	1910.1018 (Arsenic trioxide)

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation	*May be harmful if inhaled. Material is extremely destructive to the tissue of the* mucous membranes and upper respiratory tract.
Skin	May be harmful if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.
Ingestion	May be harmful if swallowed. Causes burns.
Target Organs	Lungs, Teeth., Cardiovascular system.,

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

no data available

Ecotoxicity effects

no data available

Further information on ecology

no data available

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3264 Class: 8 Packing group: III
Proper shipping name: Corrosive liquid, acidic, inorganic, n.o.s.
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 3264 Class: 8 Packing group: III EMS-No: F-A, S-B
Proper shipping name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.
Marine pollutant: No

IATA
UN-Number: 3264 Class: 8 Packing group: III
Proper shipping name: Corrosive liquid, acidic, inorganic n.o.s.

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Corrosive

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components

	CAS-No.	Revision Date
Nitric acid	7697-37-2	2007-07-01
Arsenic trioxide	1327-53-3	1991-07-01

SARA 313 Components

	CAS-No.	Revision Date
Nitric acid	7697-37-2	2007-07-01
Arsenic trioxide	1327-53-3	1991-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Nitric acid	7697-37-2	2007-07-01
Arsenic trioxide	1327-53-3	1991-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Nitric acid	7697-37-2	2007-07-01
Arsenic trioxide	1327-53-3	1991-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Nitric acid	7697-37-2	2007-07-01
Arsenic trioxide	1327-53-3	1991-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known in the State of California to cause cancer. Arsenic trioxide	1327-53-3	1987-02-27

16. OTHER INFORMATION

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MATERIAL SAFETY DATA SHEET (MSDS)

EM Science

M A T E R I A L S A F E T Y D A T A S H E E T

Section I Product Identification and Use

Manufacturer:
EM SCIENCE
A Division of EM Industries
P.O. Box 70
480 Democrat Road
Gibbstown, N.J. 08027

For More Information Call
856-423-6300 Technical Service
Monday - Friday; 8:00 AM to 5:00 PM
In Case of Emergency Call
800-424-9300 CHEMTREC (USA)
416-201-6383 CANUTEC (Canada)
24 Hours/Day: 7 Days/Week

Product Name: Barium standard 1000 ppm
Product Code(s): VW4203, BX0041,
Chemical Name/Other Name: Barium standard 1000 ppm
Chemical Formula: $BaCO_3$, HNO_3, H_2O
Chemical Family: Inorganic solution
TDG Shipping Name/UN: Not regulated
TDG Classification/Packing group: Not regulated
Use: Laboratory reagent

Section II Hazardous Ingredients

Chemical name	CAS No.	LD_{50}	%
Nitric acid	7697-37-2	Not available	2

Section III Physical Data

Physical State: Liquid
Appearance and Odour: Clear colourless solution
Odour Threshold: Not available
Specific Gravity: Approx. 1
Vapour Pressure: Not available
Vapour Density: Not available
Evaporation Rate: Not available
Boiling Point: Approx. 100°C
Freezing Point: Approx. 0°C
pH: Not available
Coefficient of water/oil distribution: Not available

Section IV Fire or Explosion Hazard

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ditions of Flammability: Noncombustible
Extinguishing Media: Use an extinguisher appropriate to the surrounding material that is burning
Flash point / method: Not applicable

UEL: Not applicable
LEL: Not applicable
Autoignition Temperature: Not applicable
Hazardous Combustion Products: NO_x, CO_x
Explosion data - sensitivity to mechanical impact: No
- sensitivity to static discharge: No

Section V Reactivity Data

Conditions of instability: Normally stable
Incompatibilities: Fluorine
Conditions of reactivity: Normally stable
Hazardous decomposition products: NO_x, CO_x

Section VI Toxicological Properties / Health Hazard Data

Route of entry:
- **-skin contact:** May irritate
- **-skin absorption:** No information available
- **-eye contact:** May irritate
- **-inhalation:** May irritate
- **-ingestion:** Harmful

LC_{50}: Not available
LD_{50}: Not available
Exposure Limits: TLV: 2 ppm (Nitric acid)
Effects of Acute Exposure: No information available
Effects of Chronic Exposure: No information available
Irritancy: No experimental information available
Sensitization to Product: No information available
Carcinogenicity: No information available
Reproductive Toxicity: No information available
Teratogenicity: No information available
Mutagenicity: No information available
Toxicologically Synergistic Products: None found

Section VII First aid measures

Skin: Flush the contact area with lukewarm running water for at least 15 minutes. Remove contaminated clothing, taking care not to spread the chemical. If contamination is extensive, remove clothing under running water. Discard or decontaminate clothing under running water. Discard or decontaminate clothing before use. Unless contact has been slight, seek medical attention. Seek medical attention if irritation persists.
Eye: Flush the contaminated eye(s) for at least 15 minutes with lukewarm running water, holding the eyelids open. Take care not to rinse contaminated water into the non-affected eye. Always seek medical attention for accidents involving the eyes.
Inhalation: Take proper precautions to ensure your own safety before attempting rescue. Remove source of contamination or move victim to fresh air. If breathing has stopped, trained personnel should begin artificial respiration, or if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Seek medical attention.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Rinse mouth thoroughly with water. Do not induce vomiting. Have victim drink 200-400 ml of water to dilute. . breathing has stopped, trained personnel should begin artificial piration, or if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Seek medical attention.

Section VIII Preventive Measures

Engineering Controls: Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation (dilution and local exhaust), process or personal enclosure, control of process conditions, and process modification. Administrative controls and personal protective equipment may also be required.

Personal protective equipment:

- **-gloves:** Rubber or plastic
- **-respiratory protection:** Fume hood as appropriate
- **-eye protection:** Chemical safety goggles
- **-clothing:** Plastic apron, sleeves and boots as appropriate

Storage Requirements: Store in suitable labelled containers. Keep containers tightly closed when not in use and when empty. Protect from damage. Store in a cool, dry, well-ventilated area, out of direct sunlight.

Handling Procedures and Equipment: Follow routine safe handling procedures

Leak or Spill Clean-up: Before dealing with spillages take necessary protective measures, inform others to keep at a safe distance and, for flammable materials, shut off all possible sources of ignition. Spread soda ash liberally over the llage. Transfer to container and arrange removal by disposal company. Wash s..e of spillage thoroughly with water.

Disposal: Follow all federal, provincial and local regulations for disposal. Use only licensed disposal and waste hauling companies. Disposal of small amounts of spilled material may be handled as described under "Leak or Spill Cleanup". Large spills must be dealt with separately and must be handled by qualified disposal companies.

Special Shipping Information: Follow all TDG regulations and see classification in Section I

Section IX Preparation Information

Prepared by: Technical Affairs Department, BDH Inc.,
Toronto, Ontario
(416) 255-8521

For questions contact: Regulatory Affairs Department, EM Science
Gibbstown, NJ
(856) 423-6300

Date: August 29, 1995

ision date: AUG 21, 1997; SEPT 26, 1997; Sep 28, 2000

WHMIS Classification: E, C

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their own discretion and risk. Since conditions and manner of use are outside
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OR OTHERWISE.

Fisher Scientific

Material Safety Data Sheet

Benzene

MSDS# 02610

Section 1 - Chemical Product and Company Identification

MSDS Name:	Benzene
Catalog Numbers:	AC167660000, AC167660010, AC167660025, AC167660250, AC167665000, AC168650250 AC168650250, AC295330000, AC295330010, AC295330025, AC295330250, AC296880000 AC296880000, AC296880010, AC296880025, AC296880250, AC610230010, AC610231000 AC610231000, AC611001000, B243-4, B245-4, B245-500, B411-1, B411-4, B412-1, S79920ACS
Synonyms:	Benzol; Cyclohexatriene; Phenyl hydride.
Company Identification:	Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	201-796-7100
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#:	71-43-2
Chemical Name:	Benzene
%:	> 99
EINECS#:	200-753-7

Hazard Symbols: T F

Risk Phrases: 45 46 11 36/38 48/23/24/25 65

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause central nervous system effects. Harmful if swallowed, inhaled, or absorbed through the skin. May cause blood abnormalities. Contains benzene. Benzene can cause cancer. Extremely flammable liquid and vapor. Vapor may cause flash fire. Causes eye, skin, and respiratory tract irritation. Target Organs: Blood, central nervous system, respiratory system, eyes, bone marrow, immune system, skin.

Potential Health Effects

Eye:	Causes eye irritation.
Skin:	Causes skin irritation. Harmful if absorbed through the skin. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion:	May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation:	Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central nervous system depression. Exposure may lead to irreversible bone marrow injury. Exposure may lead to aplastic anemia. May cause bone marrow abnormalities with damage to blood forming tissues. May cause anemia and other blood cell abnormalities. Chronic exposure to benzene has been associated with an increased incidence of

Chronic: leukemia and multiple myeloma (tumor composed of cells of the type normally found in the bone marrow). Immunodepressive effects have been reported. This substance has caused adverse reproductive and fetal effects in laboratory animals.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.

Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire. May accumulate static electricity.

Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: 498 deg C (928.40 deg F)

Flash Point: -11 deg C (12.20 deg F)

Explosion Limits: Lower: 1.3 vol %

Explosion Limits: Upper: 7.1 vol %

NFPA Rating: health: 2; flammability: 3; instability: 0;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Provide ventilation. Approach spill from upwind. Use water spray to cool and disperse vapors, protect personnel, and dilute spills to form nonflammable mixtures.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor.

Storage: Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzene	0.5 ppm; 2.5 ppm STEL; Skin - potential significant	0.1 ppm TWA 500 ppm IDLH	1 ppm TWA; 10 ppm TWA (applies to industry

	contribution to overall exposure by the cutaneous route		segments exempt from the benzene stan dard at 29 CFR 1910.1028); 25 ppm Ceiling (applies to industry segments exempt from the 1 ppm TWA and 5 ppm	

OSHA Vacated PELs: Benzene: 10 ppm TWA (unless specified in 1910.1028)

Engineering Controls:

Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. See 29CFR 1910.1028 for the regulatory requirements for the control of employee exposure to benzene.

Exposure Limits

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Color: clear colorless

Odor: sweetish odor - aromatic odor

pH: Not applicable

Vapor Pressure: 75 mm Hg @ 20 deg C

Vapor Density: 2.8 (air=1)

Evaporation Rate: Not available

Viscosity: 0.647mPa @ 20 deg C

Boiling Point: 80.1 deg C (176.18°F)

Freezing/Melting Point: 5.5 deg C (41.90°F)

Decomposition Temperature: Not available

Solubility in water: 0.180 g/100 ml @ 25°C

Specific Gravity/Density: 0.8765 @ 20°C

Molecular Formula: C6H6

Molecular Weight: 78.11

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Ignition sources, excess heat, confined spaces.

Incompatibilities with Other Materials: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: CAS# 71-43-2: CY1400000

RTECS:

CAS# 71-43-2: Dermal, guinea pig: LD50 = >9400 uL/kg;
Draize test, rabbit, eye: 88 mg Moderate;
Draize test, rabbit, eye: 2 mg/24H Severe;

LD50/LC50:
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, mouse: LC50 = 9980 ppm;
Inhalation, mouse: LC50 = 24 mL/kg/2H;
Inhalation, rat: LC50 = 10000 ppm/7H;
Inhalation, rat: LC50 = 34 mL/kg/2H;
Inhalation, rat: LC50 = 6.5 mL/kg/4H;
Oral, mouse: LD50 = 4700 mg/kg;
Oral, rat: LD50 = 930 mg/kg;
Oral, rat: LD50 = 1 mL/kg;
Oral, rat: LD50 = 1800 mg/kg;
Skin, rabbit: LD50 = >9400 uL/kg;

.

Other: Benzene is considered very toxic; probable human oral lethal dose would be 50-500 mg/kg. Human inhalation of approximately 20,000 ppm (2% in air) was fatal in 5-10 minutes.While percutaneous absorption of liquid benzene through intact human skin can be limited (e.g., 0.05% of the applied dose), the absorbed dose via direct dermal contact combined with that received from body surface exposure to benzene in workplace air is such that a substantial fraction (20-40%) of the total exposure is due to skin absorption.

Carcinogenicity: Benzene - ACGIH: A1 - Confirmed Human Carcinogen California: carcinogen, initial date 2/27/87 NTP: Known carcinogen IARC: Group 1 carcinogen

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity:
Fish: Mosquito Fish: TLm = 395 mg/L; 24 Hr; Unspecified
Fish: Goldfish: LC50 =46 mg/L; 24 Hr; Modified ASTM D 1345
Fish: Fathead Minnow: LC50 = 15.1 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)
Fish: Rainbow trout: LC50 = 5.3 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)
Fish: Bluegill/Sunfish: LD50 = 20 mg/L; 24-48 Hr; Unspecified

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: BENZENE
Hazard Class: 3
UN Number: UN1114
Packing Group: II
Canada TDG
Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

USA RQ: CAS# 71-43-2: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T F

Risk Phrases:

R 45 May cause cancer.

R 46 May cause heritable genetic damage.

R 11 Highly flammable.

R 36/38 Irritating to eyes and skin.

R 48/23/24/25 Toxic : danger of serious damage to health by prolonged exposure through inhalation, contact with skin and if swallowed.

R 65 Harmful: may cause lung damage if swallowed.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 71-43-2: 3

Canada

CAS# 71-43-2 is listed on Canada's DSL List

Canadian WHMIS Classifications: B2, D2A, D2B

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 71-43-2 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 71-43-2 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 6/11/1999

Revision #9 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility or any other warranty, express 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. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.

CAS# 64742-48-9
Blanket Cleaning
Solvent

MULTIGRAPHICS -- BLANKET CLEANING SOLVENT-83-9-770005
MATERIAL SAFETY DATA SHEET
IN: 685000D020055
nufacturer's CAGE: 0FTL5
Part No. Indicator: A
Part Number/Trade Name: BLANKET CLEANING SOLVENT-83-9-770005

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General Information

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Item Name: CLEANING SOLVENT, LITHOGRAPHIC BLANKET/ROLLER
Company's Name: AM MULTIGRAPHICS
Company's Street: 1800 WEST CENTRAL ROAD
Company's City: MT. PROSPECT
Company's State: IL
Company's Country: US
Company's Zip Code: 60056
Company's Emerg Ph #: 708-5121/ EVEN 708-398-1900
Company's Info Ph #: 708-5121/ EVEN 708-398-1900
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 01JUN89
Safety Data Review Date: 18SEP95
Supply Item Manager: CX
MSDS Serial Number: BTSBL
Hazard Characteristic Code: F5

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: PERCHLOROETHYLENE (TETRACHLOROETHYLENE) (SARA III)
Ingredient Sequence Number: 01
Percent: 25
NIOSH (RTECS) Number: KX3850000
CAS Number: 127-18-4
OSHA PEL: 100 PPM
ACGIH TLV: 25PPM/100,A3 STEL;94
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: ALIPHATIC HYDROCARBON
Ingredient Sequence Number: 02
Percent: 65-75
NIOSH (RTECS) Number: 1006236AH
CAS Number: 64742-48-9
OSHA PEL: 100 PPM
ACGIH TLV: 100 TWA, 200PPM STEL
Other Recommended Limit: SAME AS STOD SOLVENT

Proprietary: NO
Ingredient: VM&P NAPHTHA (LIGROINE)
Ingredient Sequence Number: 03
Percent: 5-10
NIOSH (RTECS) Number: OI6180000
CAS Number: 8032-32-4
OSHA PEL: 300 PPM
ACGIH TLV: 300 PPM; 9394
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: NAPHTHA, LIGHT AROMATIC
Ingredient Sequence Number: 04
Percent: 5-8
NIOSH (RTECS) Number: 1003693SN
CAS Number: 64742-95-6
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: 100 PPM TWA

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http://haz1.siri.org:80/msds/h/q334/q116635

Physical/Chemical Characteristics

pearance And Odor: BLUE LIQUID, ODOR OF PERCHLOROETHYLENE
iling Point: 250F,121C
Vapor Density (Air=1): 5.83
Specific Gravity: 0.97
Evaporation Rate And Ref: 1.4 (BU AC=1)
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: 108F,42C
Flash Point Method: TCC
Lower Explosive Limit: 1.1
Upper Explosive Limit: 5.9
Extinguishing Media: CO2, FOAM, DRY CHEMICAL. DO NOT USE WATER, IT WILL SPREAD FIRE.
Special Fire Fighting Proc: FIRE FIGHTERS SHOULD WEAR PROTECTIVE CLOTHING AND SELF-CONTAINED BREATHING APPARATUS.
Unusual Fire And Expl Hazrds: CHLORINATED HYDROCARBONS INVOLVED IN FIRES CAN DECOMPOSE TO TOXIC HRDROGEN CHLORIDE AND POSSIBLE TRACES OF PHOSGENE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): OPEN FLAMES, HOT SURFACES.
Materials To Avoid: STRONG OXIDIZING AGENTS, ACID OR BASES.
Hazardous Decomp Products: BURNING MAY PRODUCE CO, CO2, HYDROGEN CHLORIDE AND TRACES OF PHOSGENE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE-EYE:IRRITATION & LACRYMATKON CAN OCCUR FROM PERCHLOROETHYLENE. SKIN:PROLONGED CONTACT MAY CAUSE DERMATITIS. INHALATION: HAS NARCOTIC EFFECT. INGESTION: GI IRRITATION, IF ASPIRATED MAY BE RAPIDLY ABSORBED THROUGH LUNGS, RESULTING IN INJURY TO OTHER BODY SYSTEMS. TARGET ORGANS:SKIN, EYES, LUNGS, CNS, LIVER, KIDNEY.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: ANTICIPATED CARCINOGEN BY NTP.
Signs/Symptoms Of Overexp: INHALATION: LOSS OF COORDINATION, TREMORS OR NAUSEA, VOMITING.
Med Cond Aggravated By Exp: BLOOD PRESSURE, HEART, LIVER, KIDNEY OR PULMONARY PROBLEMS. NERVOUS CONDITIONS, EXCESSIVE OBESITY OR ALCOHOL CONSUMPTION PROBLEMS.
Emergency/First Aid Proc: EYE:IRRIGATE IMMEDIATLEY W/WATER 10-15 MIN. MOVE TO FRESH AIR, IF NOT BREATHING, GIVE MOUTH TO MOUTH RESUSCITATION; IF BREATHING DIFFICULTY, GIVE OXYGEN, CALL PHYSICIAN. INGESTION: DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION IMMEDIATLEY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REMOVE PERSONNEL. ABSORB SPILLS WITH ABSORBENT MATERIAL OR RECOVER BY PUMPING.
Waste Disposal Method: DISPOSE OF WASTE SOLVENT AND ANY ABSORBENT IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS. DO NOT POUR INTO SEWER OR SEPTIC TANKS.
Precautions-Handling/Storing: STORE IN A COOL, DRY PLACE IN A SAFE AREA FOR CLASS II COMBUSTIBLE LIQUIDS. KEEP FROM REACH OF CHILDREN.
Other Precautions: FOR COMMERCIAL/INDUSTRIAL USE ONLY. DEPOSIT WIPING CLOTHES IN A SAFETY CONTAINER TO AVOID COMBUSTION. DO NOT REUSE CONTAINER.

Control Measures

spiratory Protection: IF REQUIRED, AN APPROVED SELF-CONTAINED BREATHING PARATUS.
ventilation: LOCAL EXHAUST: ONLY IF 50% OF TLV IS EXCEEDED.
Protective Gloves: NITRILE NBR
Eye Protection: SAFETY GLASSES.
Other Protective Equipment: RUBBER APRON TO KEEP SOLVENT OFF CLOTHING.
Work Hygienic Practices: DO NOT EAT, DRINK OR SMOKE WHILE WORKING WITH THIS PRODUCT.
Suppl. Safety & Health Data: USE IN WELL VENTILATED AREA, AVOID CONTACT.

Transportation Data

Trans Data Review Date: 94206
DOT PSN Code: GJL
DOT Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
DOT Class: 3
DOT ID Number: UN1993
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HIA
IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S.
IMO Regulations Page Number: 3345
IMO UN Number: 1993
IMO UN Class: 3.3
IATA PSN Code: MCA
IATA UN ID Number: 1993
IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MCA
AFI Prop. Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
FI Class: 3
FI ID Number: UN1993
AFI Pack Group: III
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7
MMAC Code: NK
Additional Trans Data: PSN PER MFR

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 25JUL94
Label Status: F
Common Name: BLANKET CLEANING SOLVENT-83-9-770005
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: FLAMMABLE LIQUID, CONTAINS NAPHTHA. KEEP AWAY FROM HEAT, SPARKS, AND FLAME. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. IN CASE OF FIRE, USE WATER FOG, FOAM, DRY CHEMICAL, OR CO2. CAUSES IRRITATION OF EYES, SKIN AND RESPIRATORY TRACT. AVOID PROLONGED INHALATION OF VAPORS. TARGET ORGANS-EYES, SKIN, CNS, LIVER AND KIDNEY. FIRST AID- INHALATION:REMOVE TO FRESH AIR, PROVIDE OXYGEN/CPR IF NEEDED. GET MEDICAL HELP. EYES:FLUSH WITH WATER FOR 15 MINUTES. IF IRRITATION PERSISTS CONSULT A PHYSICION. SKIN: WASH WITH SOAP AND WATER. INGESTION:DO NOT INDUCE VOMITING. GET MEDICAL HELP.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: AM MULTIGRAPHICS
Label Street: 1800 WEST CENTRAL ROAD

http://haz1.siri.org:80/msds/h/q334/q116635

Label City: MT. PROSPECT
Label State: IL
Label Zip Code: 60056
Label Country: US
Label Emergency Number: 708-5121/ EVEN 708-398-1900
Year Procured: 1994

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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 sent updates to dan@siri.org.

Material Safety Data Sheet

Version 4.0
Revision Date 03/12/2010
Print Date 03/30/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Boric acid
Product Number	:	B0394
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich Canada, Ltd 2149 Winston Park Drive OAKVILLE ON L6H 6J8 CANADA
Telephone	:	+19058299500
Fax	:	+19058299292
Emergency Phone #	:	800-424-9300

2. HAZARDS IDENTIFICATION

Emergency Overview

Target Organs

Testes.

WHMIS Classification

D2A	Very Toxic Material Causing Other Toxic Effects	Teratogen Reproductive hazard

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)

H303	May be harmful if swallowed.
H360	May damage fertility or the unborn child.

Precautionary statement(s)

P201	Obtain special instructions before use.
P308 + P313	IF exposed or concerned: Get medical advice/attention.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula	:	H_3BO_3
Molecular Weight	:	61.83 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Boric acid			
10043-35-3	233-139-2	005-007-00-2	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
The product itself does not burn.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Moisture sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Boric acid	10043-35-3	TWAE V	2 mg/m3	2005-11-28	Canada. Ontario OELs

		STEV	6 mg/m3	2005-11-28	Canada. Ontario OELs
		TWA	2 mg/m3	2005-04-01	Canada. British Columbia OEL
Remarks	Adverse reproductive effect				
		STEL	6 mg/m3	2005-04-01	Canada. British Columbia OEL
	Adverse reproductive effect				
		TWAEV	2 mg/m3	2005-12-17	Canada. Ontario OELs
		STEV	6 mg/m3	2005-12-17	Canada. Ontario OELs
		TWA	2 mg/m3	2006-11-29	Canada. British Columbia OEL
		STEL	6 mg/m3	2006-11-29	Canada. British Columbia OEL
		TWA	2 mg/m3	2009-07-01	Canada. British Columbia OEL
		STEL	6 mg/m3	2009-07-01	Canada. British Columbia OEL

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Safety glasses with side-shields conforming to EN166

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid

Safety data

pH	5.1 at 1.8 g/l at 25 °C (77 °F)
Melting point	160 °C (320 °F)
Boiling point	300 °C (572 °F)
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	3.5 hPa (2.6 mmHg) at 20 °C (68 °F)
Density	1.440 g/cm3

Water solubility	soluble

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
Exposure to moisture.

Materials to avoid
Potassium, Acid anhydrides

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Borane/boron oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 2,660 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
fetotoxicity
Presumed human reproductive toxicant

Presumed human reproductive toxicant

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure

Toxicity reported for borates in humans: ingestion or absorption may cause nausea, vomiting, diarrhea, abdominal cramps, anderythematous lesions on the skin and mucous membranes. Other symptoms include: circulatory collapse, tachycardia, cyanosis, delirium, convulsions, and coma. Death has been reported to occur in infants from less than 5 grams and in adults from 5 to 20 grams.

Additional Information
RTECS: ED4550000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Ptychocheilus lucius - 279 mg/l - 96 h
	LC0 - Lepomis macrochirus (Bluegill) - > 1,021 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	LC50 - Daphnia magna (Water flea) - 53.2 mg/l - 21 d
	EC50 - Daphnia magna (Water flea) - 133 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

DSL Status
All components of this product are on the Canadian DSL list.

WHMIS Classification

D2A	Very Toxic Material Causing Other Toxic Effects	Teratogen Reproductive hazard

16. OTHER INFORMATION

Further Information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
Bldg. 202 Rm. 211
Gaithersburg, Maryland 20899

SRM Number: 3108
MSDS Number: 3108
SRM Name: Cadmium Standard Solution
Date of Issue: May 1988
Date of Revision: March 23, 1999

MSDS Coordinator: Joylene W.L. Thomas
Phone: (301) 975-6776
ChemTrec: 1-800-424-9300

FAX: (301) 926-4751
E-mail: SRMMSDS@nist.gov

SECTION I. MATERIAL IDENTIFICATION

Material Name: Cadmium Standard Solution

Description: SRM 3108 is a single element solution prepared gravimetrically to contain an approximate 9 mg/g of cadmium with a nitric acid volume fraction of 10 %.

Other Designations: Cadmium in **Nitric Acid** (aqua fortis; hydrogen nitrate; azotic acid; engravers acid). **Cadmium Nitrate*** (cadmium dinitrate; nitric acid cadmium salt) in **Spectrometric Standard Solution**.

Name	Chemical Formulas	CAS Registration Numbers
Nitric Acid	HNO_3	7697-37-2
Cadmium Nitrate	$Cd(NO_3)_2$	10325-94-7
Cadmium	Cd	7440-43-9

DOT Classification: Nitric Acid Solution, UN2031

Manufacturer/Supplier: Available from a number of suppliers

*The addition of cadmium to nitric acid, along with other intermediate chemical reactions, forms cadmium nitrate which will precipitate upon evaporation or drying of the solution.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Nitric Acid	10	ACGIH TLV-TWA: 2 mg/kg or 5 mg/m^3
		OSHA TLV-TWA: 2 mg/kg or 5 mg/m^3
		Human, Oral: LD_{LO}: 430 mg/kg
Cadmium Nitrate	1.9	ACGIH TLV: 0.002 mg/m^3 (respirable particulate)
		OSHA TLV-TWA: 0.005 mg/m^3
		Rat, Oral: LD_{50}: 300 mg/kg
Cadmium	0.9	ACGIH TLV: 0.002 mg/m^3 (respirable particulate)
		OSHA TLV-TWA: 0.005 mg/m^3
		Rat, Oral: TD_{LO}: 155 mg/kg (13 weeks)

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Nitric Acid	Cadmium Nitrate	Cadmium
Appearance and Odor: A white to slightly yellow liquid that darkens to a brownish color upon aging and exposure to light; an irritating odor.	**Appearance and Odor:** A solid, colorless or white, hygroscopic crystal with no odor.	**Appearance and Odor:** A solid, lustrous white powder.
Relative Molecular Mass: 63.02	**Relative Molecular Mass:** 236.42	**Relative Atomic Mass:** 112.41
Density: 1.0543 (10% nitric acid)	**Density:** N/A	**Density:** 8.642
Solubility in Water: Soluble	**Solubility in Water:** Soluble	**Solubility in Water:** Insoluble
Solvent Solubility: Decomposes in alcohol.	**Solvent Solubility:** Soluble in acids, ethyl acetate, ammonia, and alcohol.	**Solvent Solubility:** Soluble in acids, ammonium nitrate, hot sulfuric acid, and hydrochloric acid.

Note: The physical and chemical data provided are for pure compounds. Physical and chemical data for this cadmium/nitric acid solution do not exist. The actual behavior of this solution may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A **Method Used:** N/A **Autoignition Temperature:** N/A

Flammability Limits in Air (Volume %): **UPPER:** N/A
LOWER: N/A

Unusual Fire and Explosion Hazards: Although nitric acid does not burn, it is a powerful oxidizing agent that can react with combustible materials to cause fires. Cadmium nitrate is a negligible fire hazard, but may ignite or explode when exposed to combustible materials. The sensitivity for explosion may increase with the presence of metal powders. Cadmium forms an explosive reaction with ammonium nitrate, hydrazoic acid, and strong oxidizers.

Extinguishing Media: Do not use dry chemicals, carbon dioxide, or halogenated extinguishing media because of cadmium nitrate. Use extinguishing media that is appropriate to the surrounding fire. Use a water spray to dilute nitric acid and to absorb liberated oxides of nitrogen.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: __X__ **Stable** _____ **Unstable**

Conditions to Avoid: Avoid contact with combustible and other incompatible materials.

Incompatibility (Materials to Avoid): Keep nitric acid away from organic materials, plastics, rubber, and some forms of coatings. Nitric acid is incompatible with chlorine and metal ferrocyanide. Avoid metals, metal oxides, hydroxides, amines, carbonates, and other alkaline materials, cyanides, sulfides, sulfates, and formaldehyde. Cadmium nitrate is incompatible with combustible materials, metals, metal salts, reducing agents, and acids. Cadmium is incompatible with oxidizing materials, acids, and metals.

See Section IV: *Unusual Fire and Explosion Hazards.*

Hazardous Decomposition or Byproducts: Hazardous decomposition of nitric acid and/or cadmium nitrate can produce various nitrogen oxides, including nitric oxide (NO), nitrogen dioxide (NO_2), nitrous oxide (N_2O), as well as nitric acid mist or vapor. Thermal

decomposition of cadmium may produce oxides of cadmium.

Hazardous Polymerization: ____ **Will Occur** __X__ **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: __X__ **Inhalation** __X__ **Skin** __X__ **Ingestion**

Health Hazards (Acute and Chronic): Nitric Acid: Nitric acid may be fatal if inhaled, swallowed, or absorbed through skin. This material causes burns and is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

Cadmium Nitrate and Cadmium: Cadmium nitrate and cadmium may be harmful by inhalation or ingestion. These materials may cause irritation to skin, eyes, mucous membranes, and upper respiratory tract. Cadmium and its compounds are highly cumulative and respiratory effects from repeated or prolonged exposure to dusts or fumes may include rhinitis, bronchitis, emphysema, cough, dyspnea, abnormal lung function, obstructive disease, and possible fibrosis. Ulceration of the nasal septum and yellow discoloration of the teeth may occur. Cadmium induced kidney damage is irreversible and may progress after exposure ceases. Occupational exposure to cadmium is implicated in a significant increase in the incidence of cancer of the lung and prostate.

Signs and Symptoms of Exposure: Irritation, difficulty breathing, burning sensation, and yellow skin discoloration can result from contact with nitric acid. Stomach pains, vomiting, and dizziness are connected with exposure to cadmium and cadmium compounds.

Medical Conditions Generally Aggravated by Exposure: Eye, skin, kidney and respiratory disorders and allergies

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens*	X	
In the International Agency for Research on Cancer (IARC) Monographs**	X	
By the Occupational Safety and Health Administration (OSHA)	X	

*The NTP classifies cadmium and its compounds as substances that are reasonably *Anticipated to be Human Carcinogens.*
**The IARC classifies cadmium and its compounds as *Carcinogenic to Humans.*

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance.

Ingestion: If ingestion occurs, wash out mouth with water. **DO NOT** induce vomiting. Obtain medical assistance immediately.

Note (Nitric Acid): Wash affected skin areas with 5 % solution of sodium bicarbonate ($NaHCO_3$). If ingested, the risk versus the benefit of the passage of a naso-gastric tube is debatable. Activated charcoal is of no value. DO NOT give the exposed person bicarbonate to neutralize the material.

TARGET ORGAN(S) OF ATTACK: **Nitric Acid:** Skin, teeth, eyes, and upper respiratory tract
Cadmium and Cadmium Nitrate: Kidneys and respiratory system

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled: Notify safety personnel of spills. Surfaces contaminated with spills should be covered with soda ash or sodium bicarbonate to neutralize the acid. Place the neutralized material into containers suitable for eventual disposal, reclamation, or destruction.

Waste Disposal: Follow all federal, state, and local laws governing disposal.

Handling and Storage: Provide general and local explosion proof ventilation systems to maintain airborne concentrations below the TLV. Provide approved respiratory apparatus for nonroutine or emergency use. Use an approved filter and vapor respirator when the vapor or mist concentrations are high. Wear gloves and chemical safety glasses where contact with the liquid or high vapor concentrations may occur. An eye wash station and washing facilities should be readily available near handling and use areas. Wash exposed skin areas several times a day with soap and warm water.

Store under normal laboratory conditions in the original container.

Note: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources:
MDL Information Systems, Inc., MSDS *Cadmium*, December 8, 1998.
MDL Information Systems, Inc., MSDS *Cadmium Nitrate*, December 8, 1998.
MDL Information Systems, Inc., MSDS *Nitric Acid*, March 12, 1998.
Substance Safety Data Sheet, *Cadmium*, 1910.1027 App A.
http://www.osha-sic.gov/oshastd-data/1910-1027-app-a.html.
Merck Index, 11th ed., 1989.
The Sigma Aldrich Library of Chemical Safety Data, Ed. II, 1988.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.

Material Safety Data Sheet

Version 4.0
Revision Date 03/12/2010
Print Date 05/05/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Carbon disulfide
Product Number	:	180173
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Target Organ Effect, Irritant, Reproductive hazard

Target Organs

Eyes, Nerves., Liver, Kidney, Heart, Cardiovascular system., Male reproductive system., Female reproductive system.

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H402	Harmful to aquatic life.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P281	Use personal protective equipment as required.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P314	Get medical advice/attention if you feel unwell.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	3
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : CS_2
Molecular Weight : 76.14 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Carbon disulphide			
75-15-0	200-843-6	006-003-00-3	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Specific hazards arising from the chemical
Flash back possible over considerable distance. Container explosion may occur under fire conditions. Vapours may form explosive mixture with air. May explode when heated.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

Refrigerate before opening.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Carbon disulphide	75-15-0	TWA	1 ppm	2008-01-01	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen: Agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of a lack of data. In vitro or animal studies do not provide indications of carcinogenicity which are sufficient to classify the agent into one of the other categories. Danger of cutaneous absorption				
		TWA	31 mg/m3	1994-09-01	USA. ACGIH Threshold Limit Values (TLV)
	Skin contact does contribute to exposure. Not classifiable as a human carcinogen: Agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of a lack of data. In vitro or animal studies do not provide indications of carcinogenicity which are sufficient to classify the agent into one of the other categories. Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Substances for which the TLV is higher than the OSHA Permissible Exposure Limit (PEL) and/or the NIOSH Recommended Exposure Limit (REL). See CFR 58(124) :36338-33351, June 30, 1993, for revised OSHA PEL.				
		TWA	4 ppm 12 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation				
		STEL	12 ppm 36 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation				
		TWA	20 ppm	2007-01-01	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.3-1968				
		CEIL	30 ppm	2007-01-01	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.3-1968				
		Peak	100 ppm	2007-01-01	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.3-1968				

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	colourless
Odour	Stench.

Safety data

pH	no data available
Melting point	112 °C (234 °F) - lit.
Boiling point	46 °C (115 °F) - lit.
Flash point	-30 °C (-22 °F) - closed cup
Ignition temperature	100 °C (212 °F)
Lower explosion limit	1.3 %(V)
Upper explosion limit	50 %(V)
Vapour pressure	394.956 hPa (296.241 mmHg) at 20 °C (68 °F) 1,342.711 hPa (1,007.116 mmHg) at 55 °C (131 °F)
Density	1.266 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 2.16
Relative vapour density	2.63 - (Air = 1.0)

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Alkali metals, Zinc, Amines, Azides, Oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 1,200 mg/kg

LC50 Inhalation - rat - 2 h - 25 mg/l

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Genotoxicity in vivo - Human
Sister chromatid exchange

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

Suspected human reproductive toxicant

May cause reproductive disorders.

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
Inhalation - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
May cause convulsions.

Additional Information
RTECS: FF6650000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - other fish - 162 mg/l - 96 h
Toxicity to algae	Growth inhibition EC50 - Chlorella pyrenoidosa - 21 mg/l - 96 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1131 Class: 3 (6.1) Packing group: I
Proper shipping name: Carbon disulfide
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1131 Class: 3 (6.1) Packing group: I EMS-No: F-E, S-D
Proper shipping name: CARBON DISULPHIDE
Marine pollutant: No

IATA
UN-Number: 1131 Class: 3 (6.1)
Proper shipping name: Carbon disulphide
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Target Organ Effect, Irritant, Reproductive hazard

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

SARA 313 Components

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date

Carbon disulphide	75-15-0	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Carbon disulphide	CAS-No. 75-15-0	Revision Date 2008-06-17

16. OTHER INFORMATION

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CARBON TETRACHLORIDE

MSDS Number: C0979 — *Effective Date: 12/08/96*

1. Product Identification

Synonyms: Tetrachloromethane, carbon tet, carbon chloride
CAS No.: 56-23-5
Molecular Weight: 153.84
Chemical Formula: CCl4

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Carbon tetrachloride	56-23-5	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure. AFFECTS CENTRAL NERVOUS SYSTEM, LUNGS, LIVER AND KIDNEYS.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code:
Blue (Health)

Potential Health Effects

Inhalation:
Inhalation has a narcotic effect. Symptoms include headache, dizziness, nausea and dullness. Following exposures of high concentrations, victim may become unconscious, and if exposure is not terminated, death can result from respiratory failure.

Ingestion:
Abdominal pain, vomiting, diarrhea, visual disturbances, dizziness and unconsciousness can occur. Severe gastrointestinal upset progressing to serious kidney and liver damage can occur. Death can occur immediately or be delayed for as much as one week.

Skin Contact:
Can be absorbed through skin, with symptoms paralleling ingestion exposure. A dermatitis may be produced following long or repeated contact. Skin oils are removed upon contact, and the skin becomes red, cracked, and dry.

Eye Contact:
Severe irritant as vapor or liquid. Symptoms of burning and intense irritation occur.

Chronic Exposure:
Affects nervous system. Delayed effects from exposure include damage to the heart, liver and kidneys. Repeated or prolonged exposures may cause skin irritation, optic nerve damage with possible blindness, and hearing loss. Symptoms of darkened urine and liver cirrhosis have been reported.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give

oxygen. Get medical attention immediately.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
To minimize hepatorenal damage, consider intravenous acetylcysteine. Hyperbaric oxygen is also utilized for significant exposures. Dialysis has also been suggested in severe cases. Give cardiorespiratory support as indicated and carefully monitor fluid and electrolytes. Closely monitor hepatic and renal functions. Avoid epinephrine because of myocardial sensitization and potential for inducing ventricular arhythymias.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. Under fire conditions, produces hydrochloric acid and phosgene.

Explosion:
Not considered to be an explosion hazard.

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

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

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6. Accidental Release Measures

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7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL): 10 ppm (TWA); ceiling = 25 ppm, maximum 200 ppm (5-minute maximum peak in any 4 hours); - ACGIH Threshold Limit Value (TLV): 5 ppm (TWA), 10 ppm (STEL), skin; A2 suspected human carcinogen - NIOSH Recommended Expoisure Limits (RELs): 2 ppm, 60-minute (STEL).

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

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Ether odor.

Solubility:

Negligible in water.

Specific Gravity:
1.59 @ 20C(68F)

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
76.8C (171F)

Melting Point:
-23C (-9F)

Vapor Density (Air=1):
5.3

Vapor Pressure (mm Hg):
91 @ 20C (68F)

Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Reacts violently with fluorine gas, alkali metals, and aluminum. Incompatible with chemically active metals such as sodium, potassium, and magnesium. Will attack some forms of plastics, rubber, and coatings.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

Oral rat LD50: 2350 mg/kg; skin rat LD50: 5070 mg/kg. Oral rat LD50: 2350 mg/kg; Inhalation rat LC50: 8000 ppm/4H; Skin rabbit LD50: >20 gm/kg; Irritation data, rabbit - std Draize: skin 4 mg, mild; eye 500 mg/24H, mild. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Carbon tetrachloride (56-23-5)	No	Yes	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to have a half-life of greater than 30 days.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Carbon tetrachloride (56-23-5)	Yes	NE*	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Carbon tetrachloride (56-23-5)	Yes	Yes	No	Yes

*NE - Not Evaluated

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Carbon tetrachloride (56-23-5)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Carbon tetrachloride (56-23-5)	10	U211	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Prop 65:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2Z
Poison Schedule: S7

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

Health: 3 **Flammability:** 0 **Reactivity:** 0

Label Hazard Warning:
DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure. AFFECTS CENTRAL NERVOUS SYSTEM, LUNGS, LIVER AND KIDNEYS.

Label Precautions:
Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

Product Use:
Laboratory Reagent

Revision Information:
New 16 section MSDS format, all sections have been revised.

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AIR PRODUCTS

Material Safety Data Sheet

Version 1.6
Revision Date 04/30/2006

MSDS Number 300000000028
Print Date 12/17/2006

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Chlorine trifluoride
Chemical formula	:	ClF3
Synonyms	:	Chlorine trifluoride, Chlorine fluoride, Chlorotrifluoride, Trifluorochlorine
Product Use Description	:	General Industrial
Company	:	Air Products and Chemicals,Inc 7201 Hamilton Blvd. Allentown, PA 18195-1501
Telephone	:	1-800-345-3148 Chemicals 1-800-752-1597 Gases and Electronic Chemicals
Emergency telephone number	:	800-523-9374 USA 01-610-481-7711 International

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Volume)
Chlorine trifluoride	7790-91-2	100 %

Concentration is nominal. For the exact product composition, please refer to Air Products technical specifications.

3. HAZARDS IDENTIFICATION

Emergency Overview

Can cause severe burns if inhaled or upon skin contact.
Vigorously accelerates combustion.
May react violently with combustible materials.
Keep oil, grease, and combustibles away.
Do not breathe gas.
Compressed liquefied gas.

Potential Health Effects

Inhalation	:	May be fatal if inhaled. If inhaled, remove to fresh air.
Eye contact	:	Causes severe eye burns. May cause eye irritation. May cause permanent eye injury. May cause blindness.
Skin contact	:	Causes severe burns which may not be immediately painful or visible. Potential for hydrogen fluoride formation exists, which may cause additional tissue destruction and possibly a systemic reaction that can be fatal. Causes skin irritation. Causes skin burns. Contact with liquid may cause cold burns/frost

bite.

Ingestion : Causes severe digestive tract burns. May be fatal if swallowed. Systemic effects may occur and can be fatal.

Chronic Health Hazard : Chronic fluoride exposure may cause bone or joint changes in humans (fluorosis).

Exposure Guidelines

Primary Routes of Entry : Inhalation

Target Organs : Lungs.
Kidney.
Liver.
Heart.
Teeth and bone.

Aggravated Medical Condition

Acute or chronic respiratory conditions.

Environmental Effects

Dangerous for the environment.

4. FIRST AID MEASURES

General advice : If additional information is needed call the Air Products Emergency Number or consult the Air Products Safetygram 29:Treatment Protocol for Hydrofluoric Acid Burns, available on our web site at http//www.airproducts.com/productstewardship/. Prompt medical attention is required in all cases of overexposure. The potential for hydrogen fluoride formation exists with every exposure, therefore its toxicity must also be considered. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact : Seek medical treatment immediately. Irrigate eye intermittently for 20 minutes with an aqueous calcium gluconate 1% solution, if available. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Keep eye wide open while rinsing.

Skin contact : A physician should be consulted for all exposures. Alternative treatment is to soak the affected areas in an iced 0.13% water solution (1:750) of Zephiran® chloride (benzalkonium chloride solution, NF). Use ice cubes, not shaved ice, to prevent frostbite. If soaking is impractical, soaks or compresses may be used. (Do not us Zephiran® for burns of the eye.) Burns covering an area greater than eight square inches require immediate treatment by a physician. If immersion is impractical, soaked compresses of the same solution should be applied to the area. Immersion or compresses must be used continuously for two hours. With gloved hand apply 2.5% calcium gluconate gel to the burn area. Burns covering an area greater than fifty-two square centimeters (8 square inches) require immediate treatment by a medical doctor. Remove contaminated clothing. Immediate medical treatment is necessary as untreated

wounds from corrosion of the skin heal slowly and badly. Flush with copious amounts of water until treatment is available. Remove contaminated clothing. Drench affected area with water for at least 15 minutes

Ingestion : Ingestion is not considered a potential route of exposure.

Inhalation : As soon as possible give 2.5% to 3% calcium gluconate solution by nebulizer. Move to fresh air. In case of shortness of breath, give oxygen. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. Mouth to mouth resuscitation is not recommended. If unconscious place in recovery position and seek medical advice. Consult a doctor.

Notes to physician

Treatment : This advice is provided to the attending physician because of the specific properties of hydrogen fluoride and hydrofluoric acid. All cases of ingestion and airway exposure, and skin burns with hydrofluoric acid >20% should be regarded as potentially fatal. Patients who have burns and pain within minutes of exposure can be assumed to have been exposed to concentrated acid and are at risk ofrapid clinical deterioration and death. Burns can be accompanied by absorption of fluoride through the skin with sequestration of circulating calcium leading to hypocalcemia and hyperkalemia from the release of cell contents. Fatal cardiac dysrhythmias may ensue. A person who has HF burns greater than 25 square inches or who has been burned with concentrated HF should be admitted immediately to an intensive care unit and carefully monitored by EKG for 24 to 48 hours. Blood sampling should be taken to monitor circulating fluoride, potassium and calcium levels. Hemodialysis may be necessary for fluoride removal and correction of hyperkalemia. HF inhaled in high concentrations may cause acute inflammation and edema of the airway and acute pulmonary edema. Anyone who has been exposed to HF gas or mists and experiences respiratory irritation should be admitted to and monitored in an intensive care unit. In some cases, If the eyes are exposed to HF, it may penetrate to internal structures resulting in irreversible damage. HF skin burns are usually accompanied by severe, throbbing pain, which is thought to be due to irritation of nerve endings by increased levels of potassium ions entering the extracellular space to compensate for the reduced levels of calcium ions, which have been bound to the fluoride. RELIEF OF PAIN IS AN IMPORTANT GUIDE TO THE SUCCESS OF TREATMENT.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : None.

Extinguishing media which must not be used for safety reasons : Most common media will react with product and will not extinguish the fire.

Specific hazards : Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Oxidant. Strongly supports combustion. May react violently with combustible materials. Some materials which are noncombustible in air may burn in the presence of an oxidizer. Use of water may result in the formation of very toxic aqueous solutions. Move away from container and cool with water from a protected position. Keep adjacent cylinders cool by spraying with large

amounts of water until the fire burns itself out. Keep containers and surroundings cool with water spray. Do not allow run-off from fire fighting to enter drains or water courses. Gas is heavier than air and may collect in low areas or travel along the ground where there may be an ignition source present.

Special protective equipment for fire-fighters : Use self-contained breathing apparatus and chemically protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Liquid releases should be isolated and ventilated with no entry permitted to release area. Evacuate personnel to safe areas. Use self-contained breathing apparatus or positive pressure air line with mask and escape pack in areas where concentration is unknown or above the exposure limits. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Use chemically protective clothing. Ventilate the area.

Environmental precautions : Should not be released into the environment. Prevent further leakage or spillage if safe to do so. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

Methods for cleaning up : Contact Air Products' Emergency Response Center for advice. Do not attempt to neutralize product. Ventilate the area. Approach suspected leak areas with caution.

Additional advice : Danger: Releases of liquid chlorine trifluoride pose an extremely dangerous situation. It will react violently with most materials it contacts, including asphalt and water. Evacuate area and do not approach spilled product. Do not attempt to neutralize product. Call the Air Products' Emergency Number for assistance. If possible, stop flow of product. Increase ventilation to the release area and monitor concentrations. If leak is from cylinder or cylinder valve, call the Air Products emergency telephone number. If the leak is in the user's system, close the cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs.

7. HANDLING AND STORAGE

Handling

Carbon steel, stainless steel or copper are suitable materials of construction. Any equipment that uses this product must be first thoroughly cleaned, rinsed with solvent, and dried. The equipment should then be treated (passivated) with increasing concentrations and/or pressures of fluorine as a final cleaning process. This treatment or passivation process, will allow the fluorine to react with and eliminate any impurities without ignition of equipment and will impart a protective fluoride surface layer. (Contact your supplier for proper passivation procedures.) Monel and nickel are preferred materials for high temperature applications. Systems for handling chlorine trifluoride must be of compatible materials that have been rigorously cleaned for oxidizer service, dried, and passivated with fluorine or gradual introduction of ClF3 to form a protective fluoride layer. Further information on this product can be found on our web site at http//www.airproducts.com/productstewardship/ or by contacting supplier. Lead or nickel are the preferred gasket materials. Use behind barricades with remote extensions on valves or regulators. Cylinder valves should be operated remotely either by using an automatic remote valve actuator or valve handle extensions that passthrough a suitable (e.g. steel) barricade to protect the operator. Due to the low vapor pressure of chlorine trifluoride at normal temperatures, the use of a pressure

reducing regulator is normally not necessary. A control valve that is made of monel or other suitable alloy may be used in its place. WARNING: It is extremely important that the precautions and procedures listed below are understood and implemented. Failure to do so can result in a violent, catastrophic failure of the operating system. Chlorine trifluoride must not be allowed to liquefy in process systems intended for vapor phase use. To assure this will not occur, all system components and lines must be kept warmer than the source cylinder. Inexperienced or first time users of this product should contact Air Products to arrange for proper training. Systems that contain moisture may form hydrofluoric acid. To initially limit the amount of gas in the system introduce it in steps by opening and closing the valves in succession. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Only experienced and properly instructed persons should handle compressed gases. Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Open valve slowly. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Close valve after each use and when empty. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shocks which may cause damage to their valve or safety devices. Never attempt to lift a cylinder by its valve protection cap or guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Keep container valve outlets clean and free from contaminates particularly oil and water. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Avoid suckback of water, acid and alkalis. Installation of a cross purge assembly between the cylinder and the regulator is recommended. When returning cylinder install valve outlet cap or plug leak tight. Never permit oil, grease, or other readily combustible substances to come into contact with valves or containers containing oxygen or other oxidants. Do not use rapidly opening valves (e.g. ball valves). Open valve slowly to avoid pressure shock. Never pressurize the entire system at once. Use only with equipment cleaned for oxygen service and rated for cylinder pressure. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F). Prolonged periods of cold temperature below -30°C (-20°F) should be avoided. Never attempt to increase liquid withdrawal rate by pressurizing the container without first checking with the supplier. Never permit liquefied gas to become trapped in parts of the system as this may result in hydraulic rupture.

Storage

Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Full containers should be stored so that oldest stock is used first. Keep containers tightly closed in a cool, well-ventilated place. Stored containers should be periodically checked for general condition and leakage. Observe all regulations and local requirements regarding storage of containers. Local codes may have special requirements for toxic gas storage. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion.

Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Keep container tightly closed in a dry and well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Display "No Smoking or Open Flames" signs in the storage areas. Return empty containers in a timely manner. Flammable storage areas should be separated from oxygen and other oxidizers by a minimum distance of 20 ft. (6.1 m.) or by a barrier of non-combustible material at least 5 ft. (1.5 m.) high, having a fire resistance rating of at least 1/2 hour.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance with local regulations. Keep away from combustible material. Where necessary containers containing oxygen and oxidants should be separated from flammable gases by a fire resistant partition. Segregate from flammable gases and other flammable materials in store.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

Personal protective equipment

Respiratory protection	:	Use self-contained breathing apparatus or positive pressure air line with mask and escape pack in areas where concentration is unknown or above the exposure limits. Users of breathing apparatus must be trained.
Hand protection	:	Inner gloves of smooth leather and outer gloves of 17 mil nitrile. Sturdy work gloves are recommended for handling cylinders. The breakthrough time of the selected glove(s) must be greater than the intended use period.
Eye protection	:	Polycarbonate full faceshield over safety glasses when connecting, disconnecting or opening cylinders. Safety glasses recommended when handling cylinders. A full faceshield should be worn in addition to safety glasses when connecting, disconnecting or opening cylinders.
Skin and body protection	:	Direct contact with high concentrations of this product can react with and may ignite most materials used for personal protective equipment. PVC splash suit and double gloves (smooth leather inner, 17 mil nitrile outer) when connecting, disconnecting or opening cylinders. Emergency Situation: Totally encapsulating chemical protective suit with only natural fiber clothing worn underneath. Inner gloves of smooth leather and outer gloves of 17 mil nitrile. Safety shoes are recommended when handling cylinders.
Special instructions for protection and hygiene	:	Ensure adequate ventilation, especially in confined areas. Provide good ventilation and/or local exhaust to prevent accumulation of concentrations above exposure limits. Gloves must be clean and free of oil and grease.

Exposure limit(s)

Chlorine trifluoride	Ceiling Limit Value: ACGIH	0.1 ppm	-
Chlorine trifluoride	Ceiling Limit Value and Time Period (if specified): NIOSH	0.1 ppm	0.4 mg/m3
Chlorine trifluoride	Ceiling Limit Value: OSHA Z1	0.1 ppm	0.4 mg/m3
Chlorine trifluoride	Time Weighted Average (TWA): OSHA Z2	-	2.5 mg/m3
Chlorine trifluoride	Ceiling Limit Value: OSHA Z1A	0.1 ppm	0.4 mg/m3
Chlorine trifluoride	Ceiling Limit Value: US CA OEL	0.1 ppm	0.4 mg/m3

9. PHYSICAL AND CHEMICAL PROPERTIES

Form : Liquefied gas.

Color : Gives off white fumes in moist air

Odor : Pungent.

Molecular Weight : 92.45 g/mol

Relative vapor density : 3.192 (air = 1)

Relative density : 1.9 (water = 1)

Vapor pressure : 21.75 psia (1.50 bar) at 20 °C

Density : 0.243 lb/ft3 (0.0039 g/cm3) at 70 °F (21 °C)
Note: (as vapor)

Specific Volume : 4.09 ft3/lb (0.2553 m3/kg) at 70 °F (21 °C)

Boiling point/range : 53 °F (11.7 °C)

Critical temperature : 345 °F (174 °C)

Melting point/range : -105 °F (-76.3 °C)

Autoignition temperature : Not applicable.

Water solubility : Hydrolyses.
Reacts violently with water.

10. STABILITY AND REACTIVITY

Stability : Stable under normal conditions.

Materials to avoid : Water.
Brass.
Viton, Buna-N or Neoprene elastomers.
Avoid oil, grease and all other combustible materials.
Organic materials.
Flammable materials.

Hazardous decomposition products	:	Hydrogen fluoride.
Hazardous reactions	:	Will react with water to form hydrogen fluoride, and chloro-oxy fluorides.

11. TOXICOLOGICAL INFORMATION

Acute Health Hazard

Ingestion	:	No data is available on the product itself.
Inhalation	:	LC50 (1 h) : 299 ppm Species : Rat.
Skin.	:	No data is available on the product itself.

Chronic Health Hazard

The potential for hydrogen fluoride formation exists with every exposure; therefore, its toxicity must also be considered. Animals exposed to hydrogen fluoride have exhibited kidney, lung, heart and liver damage. Direct toxicity of this material may be accompanied by fluoride absorption and systemic depletion of calcium ion, an essential electrolyte. Chronic exposure may cause abnormal calcification in the bone structure (fluorosis) due to low level systemic absorption offluoride. Fluoride toxicity from acute inhalation exposure to this product is unlikely due to the noxious and corrosive nature of this gas. Death from respiratory tract damage would likely occur before significant amounts of fluoride are absorbed.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity	:	May cause pH changes in aqueous ecological systems.May cause pH changes in aqueous ecological systems.
Toxicity to other organisms	:	No data available.

Persistence and degradability

Mobility	:	No data available.
Bioaccumulation	:	No data is available on the product itself.

Further information

Toxic to aquatic organisms.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products	:	The flow rate of the gas must be controlled to prevent overheating the disposal unit. Do not use water. Do not attempt to dispose of product in liquid phase. A five to fifteen percent (by weight in water) solution of potassium hydroxide is a common liquid scrubbing medium. Do not attempt to dispose of residual or unused quantities. Small quantities may be disposed by slowly flowing gas in to a caustic liquid or solid scrubber. Soda lime, a sodium hydroxide-calcium oxide

mixture, or calcium carbonate are suitable solid scrubber media. Do not use activated carbon or charcoal as a disposal media. Doing so may cause an explosive reaction. In accordance with local and national regulations. Return unused product in orginal cylinder to supplier. Contact supplier if guidance is required. Must not be discharged to atmosphere.

Contaminated packaging : Return cylinder to supplier.

14. TRANSPORT INFORMATION

CFR

Proper shipping name : Chlorine trifluoride
Class : 2.3 (5.1, 8)
UN/ID No. : UN1749

IATA

Proper shipping name : Chlorine trifluoride
UN/ID No. : UN1749

IMDG

Proper shipping name : CHLORINE TRIFLUORIDE
Class : 2.3 (5.1, 8)
UN/ID No. : UN1749

CTC

Proper shipping name : CHLORINE TRIFLUORIDE
Class : 2.3 (5.1, 8)
UN/ID No. : UN1749

Further Information
Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard (29 CFR 1910.1200) Hazard Class(es)
Highly Toxic. Oxidizer. Corrosive. Compressed Gas.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on Inventory.
Canada	DSL	Not on Inventory.
Australia	AICS	Not on Inventory.
Japan	ENCS	Included on Inventory.
South Korea	ECL	Included on Inventory.
Philippines	PICCS	Included on Inventory.
China	SEPA	Included on Inventory.

EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification:
Acute Health Hazard Chronic Health Hazard

Fire Hazard. Sudden Release of Pressure Hazard. Reactivity Hazard.

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

16. OTHER INFORMATION

NFPA Rating

Health	: 4
Fire	: 0
Instability	: 3
Special	: W

HMIS Rating

Health	: 3
Flammability	: 0
Physical hazard	: 3

Prepared by : Air Products and Chemicals, Inc. Global EH&S Product Safety Department

For additional information, please visit our Product Stewardship web site at
http://www.airproducts.com/productstewardship/

Material Safety Data Sheet

Version 4.0
Revision Date 03/14/2010
Print Date 03/30/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Chlorobenzene
Product Number	:	284513
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich Canada, Ltd 2149 Winston Park Drive OAKVILLE ON L6H 6J8 CANADA
Telephone	:	+19058299500
Fax	:	+19058299292
Emergency Phone #	:	800-424-9300

2. HAZARDS IDENTIFICATION

Emergency Overview

Target Organs

Liver, Kidney, Central nervous system, Thymus., Spleen., Bone marrow, Lungs, Testes.

WHMIS Classification

B2 Flammable liquid Flammable liquid

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H226	Flammable liquid and vapour.
H302 + H332	Harmful if swallowed or if inhaled.
H401	Toxic to aquatic life.

Precautionary statement(s) none

HMIS Classification

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula	:	C_6H_5Cl
Molecular Weight	:	112.56 g/mol

CAS-No.	EC-No.	Index-No.	Concentration

Chlorobenzene			
108-90-7	203-628-5	602-033-00-1	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control	Update	Basis

			parameters		
Chlorobenzene	108-90-7	TWA	10 ppm	2006-11-29	Canada. British Columbia OEL
		TWAE V	10 ppm	2005-12-17	Canada. Ontario OELs
		TWA	10 ppm 46 mg/m3	2007-01-01	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
		TWAE V	50 ppm 230 mg/m3	2006-12-29	Canada. Quebec OELs

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid, clear
Colour	colourless

Safety data

pH	no data available
Melting point	-45 °C (-49 °F) - lit.
Boiling point	132 °C (270 °F) - lit.
Flash point	27.0 °C (80.6 °F) - closed cup
Ignition temperature	637 °C (1,179 °F)
Lower explosion limit	1.3 %(V)
Upper explosion limit	7.1 %(V)
Vapour pressure	15.7 hPa (11.8 mmHg) at 25.0 °C (77.0 °F)
Density	1.106 g/cm3 at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 2.89

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LC50 Inhalation - rat - 2965 ppm

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity

no data available

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Incoordination., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: CZ0175000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC100 - Leuciscus idus (Golden orfe) - 0.03 - 28 mg/l - 48.0 h

	LC50 - Cyprinodon variegatus (sheepshead minnow) - 10 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 4.5 - 7.4 mg/l - 76.0 h
	NOEC - Cyprinodon variegatus (sheepshead minnow) - 6.2 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 4.30 - 16.00 mg/l - 24 h
	EC50 - No information available. - 7.60 mg/l - 24 h
	NOEC - Daphnia magna (Water flea) - < 1.4 mg/l - 11 d
	LC50 - Daphnia magna (Water flea) - 10.7 mg/l - 48 h
Toxicity to algae	EC50 - No information available. - 235.00 mg/l - 48 h
	EC50 - Pseudokirchneriella subcapitata (green algae) - 12.50 mg/l - 96 h

Persistence and degradability

Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d Bioconcentration factor (BCF): 75

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1134 Class: 3 Packing group: III
Proper shipping name: Chlorobenzene
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1134 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: CHLOROBENZENE
Marine pollutant: No

IATA
UN-Number: 1134 Class: 3 Packing group: III
Proper shipping name: Chlorobenzene

15. REGULATORY INFORMATION

DSL Status
All components of this product are on the Canadian DSL list.

WHMIS Classification

B2	Flammable liquid	Flammable liquid

16. OTHER INFORMATION

Further information

Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MSDS Number: **C2915** * * * * * *Effective Date:* ***05/04/07*** * * * * * *Supercedes:* ***09/17/04***

MSDS Material Safety Data Sheet

From: **Mallinckrodt Baker, Inc.**
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CHLOROFORM

1. Product Identification

Synonyms: Trichloromethane; Methyl trichloride; Methane trichloride
CAS No.: 67-66-3
Molecular Weight: 119.38
Chemical Formula: CHCl3
Product Codes:
J.T. Baker: 9174, 9175, 9180, 9181, 9182, 9183, 9184, 9186, 9187, 9257
Mallinckrodt: 1473, 2175, 4432, 4434, 4439, 4440, 4441, 4443, 4444, H407, V551

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Chloroform	67-66-3	98 - 100%	Yes
Ethyl Alcohol	64-17-5	0 - 1%	Yes

3. Hazards Identification

Emergency Overview

DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY AFFECT CENTRAL NERVOUS SYSTEM, CARDIOVASCULAR SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Acts as a relatively potent anesthetic. Irritates respiratory tract and causes central nervous system effects, including headache, drowsiness, dizziness. Exposure to higher concentrations may result in unconsciousness and even death. May cause liver injury and blood disorders. Prolonged exposure may lead to death due to irregular heart beat and kidney and liver disorders.
Ingestion:
Causes severe burning in mouth and throat, pain in the chest and vomiting. Large quantities may cause symptoms similar to inhalation.
Skin Contact:
Causes skin irritation resulting in redness and pain. Removes natural oils. May be absorbed through skin.
Eye Contact:
Vapors causes pain and irritation to eyes. Splashes may cause severe irritation and possible eye damage.
Chronic Exposure:
Prolonged or repeated exposure to vapors may cause damage to the nervous system, the heart and the liver and kidneys. Contact with liquid has defatting effect and may cause chronic irritation of skin with cracking and drying, and corresponding dermatitis. Chloroform is a suspected human carcinogen.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Because kidney and liver effects may be delayed, keep victim under observation for 24 to 48 hr. Administration of fluids may help to prevent kidney failure. Obtain blood glucose, urinalysis, liver function tests, chest x-ray, and monitor cardiac function and fluid/electrolyte status. Monitor liver and kidney function for 4 to 5 days after

exposure. Disulfiram, its metabolites, and a high carbohydrate diet appear to protect somewhat against chloroform toxicity. Do not give adrenalin! Tests may show increased bilirubin, ketosis, lowered blood prothombin, and fibrogen.

5. Fire Fighting Measures

Fire:
Slight fire hazard when exposed to high heat; otherwise, practically not flammable.
Explosion:
Sealed containers may rupture when heated.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed light-resistant container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Chloroform odor threshold: 250 mg/m3. The odor threshold only serves as a warning of exposure; not smelling it does not mean you are not being exposed.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Chloroform:
-OSHA Permissible Exposure Limit (PEL):
50 ppm (TWA) Ceiling
-ACGIH Threshold Limit Value (TLV):
10 ppm (TWA), Listed as A3 animal carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne

Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Characteristic ethereal odor.

Solubility:
0.8g/100g water @ 20C (68F).

Specific Gravity:
1.48 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
62C (144F)

Melting Point:
-63.5C (-83F)

Vapor Density (Air=1):
4.1

Vapor Pressure (mm Hg):
160 @ 20C (68F)

Evaporation Rate (BuAc=1):
11.6

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. pH decreases on prolonged exposure to light and air due to formation of HCl.

Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong caustics and chemically active metals such as aluminum, magnesium powder, sodium, or potassium; acetone, fluorine, methanol, sodium methoxide, dinitrogen tetroxide, tert-butoxide, triisopropylphosphine.

Conditions to Avoid:
Light, heat, air and incompatibles.

11. Toxicological Information

Toxicological Data:
Chloroform: oral rat LD50: 908 mg/kg; skin rabbit LD50: > 20 gm/kg; inhalation rat LC50: 47702 mg/m3/4H; irritation data: skin rabbit 10 mg/24H open mild; eye rabbit: 20 mg/24H moderate; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Birth defects have been seen in rats and mice exposed by inhalation of chloroform at concentrations greater than 100 ppm in air. Ingestion of chloroform by pregnant laboratory animals has resulted in fetotoxicity but not birth defects, and only at levels causing severe maternal effects.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Chloroform (67-66-3)	No	Yes	2B
Ethyl Alcohol (64-17-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material is expected to have a half-life of greater than 30 days.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, CHLOROFORM
Hazard Class: 6.1

UN/NA: UN1888
Packing Group: III
Information reported for product/size: 52L

International (Water, I.M.O.)

Proper Shipping Name: CHLOROFORM
Hazard Class: 6.1
UN/NA: UN1888
Packing Group: III
Information reported for product/size: 52L

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Chloroform (67-66-3)	Yes	Yes	Yes	Yes
Ethyl Alcohol (64-17-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Chloroform (67-66-3)	Yes	Yes	No	Yes
Ethyl Alcohol (64-17-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Chloroform (67-66-3)	10	10000	Yes	No
Ethyl Alcohol (64-17-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Chloroform (67-66-3)	10	U044	No
Ethyl Alcohol (64-17-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2Z
Poison Schedule: S6

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY AFFECT CENTRAL NERVOUS SYSTEM, CARDIOVASCULAR SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not breathe vapor.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
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****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Chromium

MSDS # 186.00

ScholAR Chemistry

Section 1: Product and Company Identification

Chromium

Synonyms/General Names: Chromium; Chrome
Product Use: For educational use only
Manufacturer: Columbus Chemical Industries, Inc., Columbus, WI 53925.

24 Hour Emergency Information Telephone Numbers

CHEMTREC (USA): 800-424-9300 **CANUTEC (Canada): 613-424-6666**

ScholAR Chemistry; 5100 W. Henrietta Rd, Rochester, NY 14586; (866) 260-0501; www.Scholarchemistry.com

Section 2: Hazards Identification

Steel-grey pieces or granules; no odor.

HMIS (0 to 4)

Reactivity	0

WARNING! Known carcinogen. Beware of breathing in chromium dust.
Target organs: Lungs, kidneys.

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Section 3: Composition / Information on Ingredients

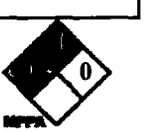
Chromium Metal, (7440-47-3), 100%

Section 4: First Aid Measures

Always seek professional medical attention after first aid measures are provided.

Eyes: Immediately flush eyes with excess water for 15 minutes, lifting lower and upper eyelids occasionally.
Skin: Immediately flush skin with excess water for 15 minutes while removing contaminated clothing.
Ingestion: Call Poison Control immediately. Rinse mouth with cold water. Give victim 1-2 cups of water or milk to drink. Induce vomiting immediately.
Inhalation: Remove to fresh air. If not breathing, give artificial respiration.

Section 5: Fire Fighting Measures



Nonflammable solid. When heated to decomposition, emits acrid CrOx fumes.
Protective equipment and precautions for firefighters: Use foam or dry chemical to extinguish fire. Firefighters should wear full fire fighting turn-out gear and respiratory protection (SCBA). Cool container with water spray. Material is not sensitive to mechanical impact or static discharge.

Section 6: Accidental Release Measures

Use personal protection recommended in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Sweep up spill and place in sealed bag or container for disposal. Wash spill area after pickup is complete. See Section 13 for disposal information.

Section 7: Handling and Storage Green

Handling: Use with adequate ventilation and do not breathe dust or vapor. Avoid contact with skin, eyes, or clothing. Wash hands thoroughly after handling.
Storage: Store in General Storage Area [Green Storage] with other items with no specific storage hazards. Store in a cool, dry, well-ventilated, locked store room away from incompatible materials.

Section 8: Exposure Controls / Personal Protection

Use ventilation to keep airborne concentrations below exposure limits. Have approved eyewash facility, safety shower, and fire extinguishers readily available. Wear chemical splash goggles and chemical resistant clothing such as gloves and aprons. Wash hands thoroughly after handling material and before eating or drinking. Use NIOSH-approved respirator with a dust cartridge. Exposure guidelines: Chromium: OSHA PEL: 1 mg/m^3, ACGIH: TLV: 0.5 mg/m^3, STEL: Not Available.

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Section 9: Physical and Chemical Properties

Molecular formula	Cr.	**Appearance**	Steel-grey pieces or granules.
Molecular weight	52.	**Odor**	No odor.
Specific Gravity	7.15 g/mL @ 20°C.	**Odor Threshold**	N/A.
Vapor Density (air=1)	N/A.	**Solubility**	Insoluble.
Melting Point	1830°C.	**Evaporation rate**	N/A *(Butyl acetate = 1).*
Boiling Point/Range	2200°C.	**Partition Coefficient**	N/A *(log P_{OW}).*
Vapor Pressure (20°C)	N/A.	**pH**	N/A.
Flash Point:	N/A.	**LEL**	N/A.
Autoignition Temp.:	N/A.	**UEL**	N/A.

N/A = Not available or applicable

Section 10: Stability and Reactivity

Avoid heat and moisture.
Stability: Stable under normal conditions of use and storage.
Incompatibility: Caustic alkalis and alkali carbonates, acids, strong oxidizers.
Shelf life: Indefinite if stored properly.

Section 11: Toxicology Information

Acute Symptoms/Signs of exposure: ***Eyes***: Redness, tearing, itching, burning, conjunctivitis. ***Skin***: Redness, itching. ***Ingestion***: Irritation and burning sensations of mouth and throat, nausea, vomiting and abdominal pain. ***Inhalation***: Irritation of mucous membranes, coughing, wheezing, shortness of breath,
Chronic Effects: Carcinogen, IARC group 3; ACGIH A4
Sensitization: none expected
Chromium: LD50 [oral, rat]; N/A; LC50 [rat]; N/A; LD50 Dermal [rabbit]; N/A
Material has been found to be a carcinogen when breathed in as a dust or fume.

Section 12: Ecological Information

Ecotoxicity (aquatic and terrestrial): Contains a heavy metal – Toxic to terrestrial and aquatic plants and animals. Do not release to the environment

Section 13: Disposal Considerations

Check with all applicable local, regional, and national laws and regulations. Local regulations may be more stringent than regional or national regulations. Use a licensed chemical waste disposal firm for proper disposal.

Section 14: Transport Information

DOT Shipping Name:	Not regulated by DOT.	**Canada TDG:**	Not regulated by TDG.
DOT Hazard Class:		**Hazard Class:**	
Identification Number:		**UN Number:**	

Section 15: Regulatory Information

EINECS: Listed (231-157-5) .
TSCA: All components are listed or are exempt.
WHMIS Canada: Not WHMIS Controlled.
California Proposition 65: Listed causing cancer.

The product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

Section 16: Other Information

Current Issue Date: January 23, 2009
Disclaimer: Scholar Chemistry and Columbus Chemical Industries, Inc., ("S&C") believes that the information herein is factual but is not intended to be all inclusive. The information relates only to the specific material designated and does not relate to its use in combination with other materials or its use as to any particular process. Because safety standards and regulations are subject to change and because S&C has no continuing control over the material, those handling, storing or using the material should satisfy themselves that they have current information regarding the particular way the material is handled, stored or used and that the same is done in accordance with federal, state and local law. ***S&C makes no warranty, expressed or implied, including (without limitation) warranties with respect to the completeness or continuing accuracy of the information contained herein or with respect to fitness for any particular use.***

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Manufacturer's Name:	UNIVERTICAL CHEMICAL COMPANY	Emergency Telephone # (260) 665-1500
Address:	203 Weatherhead Street Angola, Indiana 46703	Other Information Calls (260) 665-1500
Signature of Person Responsible for Preparation:	R a Berger	**Date Prepared:** January 16, 2008

Chemical Identity	**Common Name, Trade Name & Synonyms:**	Copper Cyanide	**CAS Number:**	544-92-3
	Chemical Name:	Copper Cyanide	**Chemical Family:**	Inorganic Metal Salt
	Formula:	CuCN		

Ingredients

Material or Component	%	TLV	Toxicity Data
Copper Cyanide	>93%	50 mg	5mg/m^3 (as CN)
Water	<7%		

Physical Data

Melt/Freeze Point	473°C (883°F)	Specific Gravity (Water = 1)	2.9
Boiling Point	Decomposes	Solubility in Water	Insoluble
Vapor Pressure	N/A	%Volatiles by volume	<7%
Vapor Density (air =1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A
Room Temperature, Appearance & State	Light tan or white	pH (as is)	N/A
Odor	None	pH (1% solution)	N/A

Fire & Explosion Data

Flash Point N/A	Flammable Limit (Air)	Upper	N/A
Auto Ignition Temperature N/A		Lower	N/A

Extinguishing Media ☒ Water ☐ Water Fog ☐ CO2 ☐ Dry Chemical ☐ Other

Special Fire Fighting Procedures:

Stay upwind. Intense heat will decompose copper cyanide possibly releasing cyanogen

Unusual Fire & Explosion Hazards:

None

Employee Protection Information	**Ventilation Requirements:**	Use in well ventilated area.
	Recommended Personal Protection Equipment:	Use respirator if danger of exposure to dust.
	Respirators (Specific Type):	Follow the OSHA respirator regulations found in 29 CFR 1910.134
	Eyes:	Goggles and / or face shield.
	Gloves:	Rubber gloves
	Special Clothing & Equipment:	Rubber apron

Precautionary Statement

Always have a cyanide First Aid Kit on hand.

Study this sheet before using any cyanides.

Storage & Handling

Store away from acids, oxidizers, and edibles. Keep in a cool, dry area.

Disposal, Spill or Leak Procedures

Aquatic Toxicity Classification: **Source** **Date**

96-hour LC_{50}; Fathead minnow: 0.32mg/L

Procedure for Release or Spill:

Avoid skin contact, do not flush into drain or sewers.

Waste Disposal Method:

Contact Federal, State, and Local Officials. If approved, cyanide can be destroyed by sodium or calcium hypochlorite.

Neutralizing Chemicals

Hypochlorites will oxidize cyanides.

Reactivity Data		
	☒ Stable ☐ Unstable	**Hazardous Polymerization** ☐ May Occur ☐ Won't Occur
	Conditions To Avoid:	Very hazardous when in contact with acids.
	Incompatibilities (Materials to Avoid):	Acids, oxidizing compounds
	Hazardous Decomposition Products:	When mixed with acids forms lethal Hydrogen Cyanide gas.

Acute and Chronic Effects of Overexposure		
	Inhalation:	Dizziness, red eyes, nausea, shortness of breath.
	Skin Contact:	Can be absorbed.
	Skin Absorption:	Same as inhalation.
	Eye Contact:	Irritant, red eyes
	Ingestion:	Ingestion could be fatal.

Emergency and First Aid Procedures		
	Eyes:	Flush with plenty of water for at least 15 minutes.
	Skin:	Wash with soap & water for at least 15 minutes.
	Inhalation:	Keep patient warm and in well ventilated area. If severe, proceed with steps listed below.
	Ingestion:	If patient is conscious, give a pint of 1% sodium thiosulfate by mouth. Use gastric lavage if needed.
	Decontamination Procedures:	Remove contaminated clothing but keep patient warm.
	Note to Physician: Make patient breathe amyl nitrite on and off in 15 second intervals. Use artificial respiration if needed. As the last option if patient is unconscious due to severe poisoning inject in vein 10 mLs of 3% solution of sodium nitrite at a rate of 3 mLs/minute followed by 50 mLs of 25% solution of sodium thiosulfate at a rate of 2.5 mLs/minute. Same vein may be used.	

Transportation Data

National Response Center : (800) 424 - 8802	
Proper Shipping Name:	Copper Cyanide, 6.1 (Toxic), UN 1587, II.
DOT Classification:	6.1
DOT Labels:	6.1
DOT Marking:	6.1
DOT Placard:	6.1
UN/NA Number:	UN 1587
Hazardous Substance RQ:	10 lbs. 4.54 kg.
EPA Hazardous Waste #:	F007

Emergency Accident Precautions & Procedures:

Avoid skin contact. Do not work in poorly ventilated area.

Precautions to be taken in Transportation:

Secure and strap properly. Do not ship with acids or edibles.

Type of Packages:

100 lb. Fiber of steel drums; 40 lb. Plastic pails

Additional Regulatory Concerns

Materials or Components are on EPA/TSCA Inventory List? ☒ Yes ☐ No

HMIS Health 3 Flammability 0 Reactivity 1

This product contains the following Toxic Chemicals subject to the reporting requirements of Section 313 of the emergency planning and community Right to Know Act of 1986 and CFR 372:

Sara/Title III Hazard Categories & Lists

Chronic Health:	- NO	**Reactivity Hazard:**	- YES
Acute Health:	- YES	**Extremely Hazardous:**	- YES
Fire Hazard:	- NO	**Cercla Hazardous:**	- YES
Pressure Hazard:	- NO	**Toxic Chemical:**	- YES

References:

Code of Federal Reg. 49, parts 100-177

40, parts 261-262

National Fire Protection Manual 49-491M

CRC Handbook of Physics & Chemistry

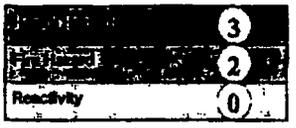
Chemical Abstract Service

American Conference of Fed. Hygienist (1983-84)

SPECTRUM®

GARDENA, CA
NEW BRUNSWICK, NJ

Material Safety Data Sheet

NFPA	HMIS	Personal Protective Equipment
		
		See Section 15.

Section 1. Chemical Product and Company Identification

Common Name/ Trade Name	**Cresols**	**Catalog Number(s).**	CR112
		CAS#	1319-77-3
Manufacturer	SPECTRUM CHEMICAL MFG. CORP. 14422 S. SAN PEDRO STREET GARDENA, CA 90248	**RTECS**	GO5950000
		TSCA	TSCA 8(b) inventory: Cresols
Commercial Name(s)	Not available.	**CI#**	Not available.
Synonym	Cresylic acid	**IN CASE OF EMERGENCY**	
Chemical Name		**CHEMTREC (24hr) 800-424-9300**	
Chemical Family	Not available.	CALL (310) 516-8000	
Chemical Formula	C7H8O		
Supplier	SPECTRUM CHEMICAL MFG. CORP. 14422 S. SAN PEDRO STREET GARDENA, CA 90248		

Section 2. Composition and Information on Ingredients

		Exposure Limits			
Name	**CAS #**	**TWA (mg/m³)**	**STEL (mg/m³)**	**CEIL (mg/m³)**	**% by Weight**
1) Cresols	1319-77-3	22			100

Toxicological Data on Ingredients

Cresols:
ORAL (LD50): Acute: 1454 mg/kg [Rat]. 760 mg/kg [Mouse].
DERMAL (LD50): Acute: 2000 mg/kg [Rabbit].

Section 3. Hazards Identification

Potential Acute Health Effects Extremely hazardous in case of skin contact (irritant), of ingestion. Very hazardous in case of skin contact (corrosive, sensitizer), of eye contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Continued on Next Page

Potential Chronic Health Effects	Extremely hazardous in case of skin contact (irritant), of ingestion. Very hazardous in case of skin contact (corrosive, sensitizer), of eye contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). **CARCINOGENIC EFFECTS:** Not available. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to blood, kidneys, lungs, the nervous system, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.
Skin Contact	If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.
Serious Skin Contact	Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.
Inhalation	Allow the victim to rest in a well ventilated area. Seek immediate medical attention.
Serious Inhalation	Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.
Ingestion	Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.
Serious Ingestion	Not available.

Section 5. Fire and Explosion Data

Flammability of the Product	Combustible.
Auto-Ignition Temperature	Not available.
Flash Points	CLOSED CUP: 81.11°C (178°F).
Flammable Limits	LOWER: 1.35%
Products of Combustion	These products are carbon oxides (CO, CO2).
Fire Hazards in Presence of Various Substances	Not available.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.
Fire Fighting Media and Instructions	SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.
Special Remarks on Fire Hazards	Not available.
Special Remarks on Explosion Hazards	Not available.

Continued on Next Page

Section 6. Accidental Release Measures

Small Spill	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
Large Spill	Combustible material. Corrosive liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. If the product is in its solid form: Use a shovel to put the material into a convenient waste disposal container. If the product is in its liquid form: Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Absorb with an inert material and put the spilled material in an appropriate waste disposal. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7. Handling and Storage

Precautions	Keep container dry. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes
Storage	Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.
Personal Protection	Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.
Exposure Limits	TWA: 5 (ppm) TWA: 22 (mg/m^3) Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state and appearance	Liquid. (Hygroscopic liquid.)
Molecular Weight	108.14 g/mole
pH (1% soln/water)	Not available.
Odor	Not available.
Taste	Not available.
Color	Colorless to light yellow.
Boiling Point	200°C (392°F)
Melting Point	30°C (86°F)
Critical Temperature	Not available.
Specific Gravity	1.034 (Water = 1)
Vapor Pressure	0.357 mm of Hg (@ 20°C)
Vapor Density	3.72 (Air = 1)
Volatility	Not available.
Odor Threshold	Not available.
Water/Oil Dist. Coeff.	The product is equally soluble in oil and water; log(oil/water) = 0

Continued on Next Page

Ionicity (in Water)	Not available.
Dispersion Properties	See solubility in water, methanol, diethyl ether.
Solubility	Soluble in methanol, diethyl ether. Partially soluble in cold water.

Section 10. Stability and Reactivity Data

Stability	The product is stable.
Instability Temperature	Not available.
Conditions of Instability	Not available.
Incompatibility with various substances	Not available.
Corrosivity	Non-corrosive in presence of glass.
Special Remarks on Reactivity	Not available.
Special Remarks on Corrosivity	Not available.
Polymerization	No.

Section 11. Toxicological Information

Routes of Entry	Dermal contact. Eye contact. Inhalation. Ingestion.
Toxicity to Animals	Acute oral toxicity (LD50): 760 mg/kg [Mouse]. Acute dermal toxicity (LD50): 2000 mg/kg [Rabbit].
Chronic Effects on Humans	The substance is toxic to blood, kidneys, lungs, the nervous system, liver, mucous membranes.
Other Toxic Effects on Humans	Extremely hazardous in case of skin contact (irritant), of ingestion. Very hazardous in case of skin contact (corrosive, sensitizer), of inhalation. Hazardous in case of skin contact (permeator).
Special Remarks on Toxicity to Animals	Not available.
Special Remarks on Chronic Effects on Humans	Not available.
Special Remarks on other Toxic Effects on Humans	Not available.

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
Products of Biodegradation	Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation	The products of degradation are more toxic.
Special Remarks on the Products of Biodegradation	Not available.

Continued on Next Page

Section 13. Disposal Considerations

Waste Disposal

Section 14. Transport Information

DOT Classification	CLASS 6.1: Poisonous material.
Identification	: Cresol : UN2076 PG: II
Special Provisions for Transport	Not available.
DOT (Pictograms)	

Section 15. Other Regulatory Information and Pictograms

Federal and State Regulations

Pennsylvania RTK: Cresols
Massachusetts RTK: Cresols
TSCA 8(b) inventory: Cresols
SARA 313 toxic chemical notification and release reporting: Cresols
CERCLA: Hazardous substances.: Cresols

California Proposition 65 Warnings

Other Regulations

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications

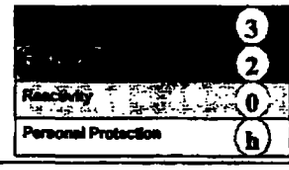
WHMIS (Canada)

CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS E: Corrosive liquid.

DSCL (EEC)

R34- Causes burns.
R43- May cause sensitization by skin contact.
R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed.

HMIS (U.S.A.)



National Fire Protection Association (U.S.A.)

WHMIS (Canada) (Pictograms)

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DSCL (Europe) (Pictograms)

TDG (Canada) (Pictograms)

ADR (Europe) (Pictograms)

Protective Equipment

Gloves.

Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

Section 16. Other Information

MSDS Code	**C4770**
References	Not available.
Other Special Considerations	Not available.

Validated by Sonia Owen on 8/11/2006.

Verified by Sonia Owen.

Printed 9/11/2006.

CALL (310) 516-8000

Notice to Reader

All chemicals may pose unknown hazards and should be used with caution. This Material Safety Data Sheet (MSDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this MSDS. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this MSDS is based on technical data judged to be reliable, Spectrum Quality Products, Inc. assumes no responsibility for the completeness or accuracy of the information contained herein.

Material Safety Data Sheet

Version 3.0
Revision Date 12/29/2008
Print Date 08/06/2009

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Cresol red
Product Number	:	114472
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone #	:	(314) 776-6555

2. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms	:	o-Cresolsulfonphthalein
Formula	:	$C_{21}H_{18}O_5S$
Molecular Weight	:	382.43 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Cresol red			
1733-12-6	217-064-2	-	-

3. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Irritant

HMIS Classification

Health Hazard:	2
Flammability:	0
Physical hazards:	0

NFPA Rating

Health Hazard:	2
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	May be harmful if swallowed.

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Flammable properties

Flash point	no data available
Ignition temperature	no data available

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.

Environmental precautions
Do not let product enter drains.

Methods for cleaning up
Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Storage
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	powder
Colour	red brown

Safety data

pH	no data available
Melting point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Density	0.998 g/cm3
Water solubility	no data available

10. STABILITY AND REACTIVITY

Storage stability
Stable under recommended storage conditions.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity

no data available

Irritation and corrosion

no data available

Sensitisation

no data available

Chronic exposure

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	May be harmful if swallowed.

12. ECOLOGICAL INFORMATION

Elimination information (persistence and degradability)

no data available

Ecotoxicity effects

no data available

Further information on ecology

no data available

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

OSHA Hazards
Irritant

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Cresol red	1733-12-6	

New Jersey Right To Know Components

	CAS-No.	Revision Date
Cresol red	1733-12-6	

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

16. OTHER INFORMATION

Further information
Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Anachemia

255 Norman.
Lachine (Montreal), Que
H8R 1A3

Material Safety Data Sheet

EMERGENCY NUMBERS:

(USA) CHEMTREC : 1(800) 424-9300 (24hrs)
(CAN) CANUTEC : 1(613) 996-6666 (24hrs)
(USA) Anachemia : 1(518) 297-4444
(CAN) Anachemia : 1(514) 489-5711

WHMIS	Protective Clothing	TDG Road/Rail
WHMIS CLASS: D-1A E D-2A		TDG CLASS: 6.1 PIN: UN2261 PG: II

Section I. Product Identification and Uses

Product name	**CRESYLIC ACID**
Chemical formula	Not applicable.
Synonyms	AC-2626P, 27830
Supplier	Anachemia Canada. 255 Norman. Lachine (Montreal), Que H8R 1A3
Material uses	For laboratory use only.

CI#	Not available.
CAS#	Not applicable.
Code	AC-2626P
Formula weight	Not applicable.
Supersedes	

Section II. Ingredients

Name	CAS #	%	TLV
1) PHENOL	108-95-2	10.3	Exposure limits: ACGIH TWA 5 ppm (19 mg/m3) (skin)
2) CRESOL	1319-77-3	7.7	Exposure limits: ACGIH TWA 5 ppm (22 mg/m3) (skin)
3) XYLENOL	1300-71-6	45.2	Not available by ACGIH
4) ETHYL PHENOL	Not available	18.7	Not available by ACGIH
5) TRIMETHYLPHENOL	Not available	18.1	Not available by ACGIH

Toxicity values of the hazardous ingredients

CRESYLIC ACID:
ORAL (LD50): Acute: 1454 mg/kg (Rat). 760 mg/kg (Mouse).
DERMAL (LD50): Acute: 2000 mg/kg (Rabbit).
PHENOL:
ORAL (LD50): Acute: 317 mg/kg (Rat). 270 mg/kg (Mouse).
ORAL (LDLo): Acute: 140 mg/kg (Human).
DERMAL (LD50): Acute: 630 mg/kg (Rabbit). 669 mg/kg (Rat).
VAPOR (LC50): Acute: 316 mg/m3 (Rat). 177 mg/m3 (Mouse).
XYLENOL:
ORAL (LDLo): Acute: 5000 mg/kg (Man).

Section III. Physical Data

Physical state and appearance / Odor	Clear liquid. Phenol odor.
pH (1% soln/water)	6.0-6.9 (5 g/L H2O @ 20°C)
Odor threshold	Not available.
Percent volatile	Not available.
Freezing point	<0°C
Boiling point	205 to 225°C
Specific gravity	1.025-1.035 (Water = 1)
Vapor density	Not available.
Vapor pressure	<0.1 mbar (20°C)
Water/oil dist. coeff.	Not available.
Evaporation rate	Not available.
Solubility	Partially soluble in cold water.

Section IV. Fire and Explosion Data

Flash point	CLOSED CUP: 98°C (DIN 51584)
Flammable limits	Not available.
Auto-ignition temperature	Not available.
Fire degradation products	Oxides of carbon (CO, CO2).
Fire extinguishing procedures	Use DRY chemical, carbon dioxide, foam or water spray. Wear adequate personal protection to prevent contact with material or its combustion products. Self contained breathing apparatus with a full facepiece operated in a pressure demand or other positive pressure mode. Cool containing vessels with flooding quantities of water until well after fire is out.
Fire and Explosion Hazards	Vapor may travel considerable distance to source of ignition and flash back, eliminate all sources of ignition. Vapor forms explosive mixture with air. Container explosion may occur under fire conditions or when heated. Contact with oxidizers may cause fire and/or explosion. The sensitivity to impact is not available. May be sensitive to static discharge, particularly at elevated temperatures. Emits toxic fumes under fire conditions.

Section V. Toxicological Properties

Routes of entry	Ingestion and inhalation. Eye contact. Skin contact. Skin absorption.
Effects of Acute Exposure	May be fatal by ingestion, inhalation, or by skin absorption. Corrosive. Acute effects may be delayed. Target organs: liver, kidneys, skin, eyes, pancreas, respiratory system, central nervous system, cardiovascular system. 250 ppm (PHENOL) is immediately dangerous to life or health.
Eye	Vapors, liquids and mists are extremely corrosive to the eyes. Brief contact of the vapors will be severely irritating. Brief contact of the liquid or mist will severely damage the eyes and prolonged contact may cause permanent eye injury which may be followed by blindness.
Skin	Causes severe burns. Causes burns which may be delayed. Readily absorbed through skin. See inhalation.
Inhalation	Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract. Inhalation may be fatal as a result of spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. See ingestion.
Ingestion	Burns in mouth, pharynx and gastrointestinal tract. Central nervous system effects (nausea, dizziness, headache, etc), abdominal pain, pale complexion covered with cold sweat, weakness, perforation of the intestine, hypotension, peripheral vasodilation, cyanosis, muscular weakness, tremor, convulsions, liver, spleen, pancreas, blood, central nervous system and kidney damage and death possible. Ingestion of amounts as small as 1 gram may be fatal to humans (Phenol).

Section V. Toxicological Properties

Effects of Chronic Overexposure	Phenol: Carboluria. Ingestion: vomiting, dysphagia, copious salivation, diarrhea, anorexia and dark urine. Nervous system: headache, fainting, dizziness, mental disorders. Skin: ochronosis, muscular pains, dermatitis, possibility of skin rash. Possibility of liver, kidney, spleen, and pancreas damage. Fetotoxic in animals. Mutagenic in one of seven strains of bacteria tested. Passes through the placental barrier in animal. Excreted in maternal milk in animal. See acute effects. Carcinogenic effects: Not available. Mutagenic effects: Not available. Teratogenic effects: Not available. Toxicity of the product to the reproductive system: Not available. To the best of our knowledge, the chemical, physical, and toxicity of this substance has not been fully investigated.

Section VI. First Aid Measures

Eye contact	Immediately flush eyes with copious quantities of water for at least 15 minutes holding lids apart to ensure flushing of the entire surface. Seek immediate medical attention.
Skin contact	Immediately flush skin with plenty of water and soap for at least 15 minutes while removing contaminated clothing and shoes. Seek immediate medical attention. Wash contaminated clothing before reusing.
Inhalation	Remove patient to fresh air. Administer approved oxygen supply if breathing is difficult. Administer artificial respiration or CPR if breathing has ceased. Seek immediate medical attention.
Ingestion	DO NOT induce vomiting. Seek immediate medical attention. Never give anything by mouth to an unconscious or convulsing person.

Section VII. Reactivity Data

Stability	Stable. Conditions to avoid: High temperatures, sparks, open flames and all other sources of ignition, electrostatic charging, poor ventilation.
Hazardous decomp. products	Not available.
Incompatibility	Reacts violently with: Strong acids, chlorosulfonic acid, nitric acid, oleum, strong oxidizers, alkali metals, bases, brass, magnesium, copper, aluminum, zinc, lead and their alloys.
Reaction Products	Not available. Hazardous polymerization will not occur.

Section VIII. Preventive Measures

Protective Clothing in case of spill and leak	Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves. Full suit.
Spill and leak	Evacuate the area. Eliminate all sources of ignition. Absorb on sand or vermiculite and place in a closed container for disposal. Use non-sparking tools. Ventilate area and wash spill site after material pick up is complete. DO NOT empty into drains. DO NOT touch damaged container or spilled material. Runoff to sewer may create fire or explosion hazard.
Waste disposal	Dispose of waste material at an approved (hazardous) waste treatment/ disposal facility in accordance with applicable local, provincial and federal regulations. Harmful to aquatic life at very low concentrations. Can be dangerous if allowed to enter drinking water intakes. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers.
Storage and Handling	Store in a cool place away from heated areas, sparks, and flame. Store in a well ventilated area. Store away from incompatible materials. Do not add any other material to the container. Do not wash down the drain. Do not breathe gas/fumes/vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. Keep away from direct sunlight or strong incandescent light. Keep container tightly closed and dry. Manipulate under an adequate fume hood. Take precautionary measures against electrostatic discharges. Ground the container while dispensing. Ground all equipment containing material. Use only explosion proof equipment. Use non-sparking tools. Watch for accumulation in low confined areas. Empty containers may contain a hazardous residue. Do not use pressure to dispense. Do not store in brass, bronze, copper, aluminum, lead or magnesium containers. Handle and open container with care. Take off immediately all contaminated clothing. This product must be manipulated by qualified personnel. Do not get in eyes, on skin, or on clothing. Wash well after use. In accordance with good storage and handling practices. Do not allow smoking and food consumption while handling. Wear suitable protective clothing. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. In case of accident or if you feel unwell, seek medical advice immediately (show the label when possible.).

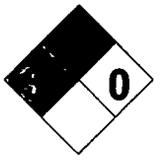
Section IX. Protective Measures

Protective clothing	Face shield and splash goggles. Impervious rubber gloves, apron, coveralls, and/or other resistant protective clothing. Sufficient to protect skin. If use conditions generate vapors or mists, wear a NIOSH-approved respirator appropriate for those emission levels. Appropriate respirators may be a full facepiece or a half mask air-purifying cartridge respirator equipped for organic vapors/mists, a self-contained breathing apparatus in the pressure demand mode, or a supplied-air respirator. Do not wear contact lenses. Make eye bath and emergency shower available. Ensure that eyewash station and safety shower is proximal to the work-station location.
Engineering controls	Use only in a chemical fume hood to keep airborne levels below recommended exposure limits. Use explosion-proof ventilation equipment. Do not use in unventilated spaces. Vapors are heavier than air and may travel along the ground or pool in low areas. Because vapor is heavy, ventilation must be provided at floor level as well as at higher levels.

Section X. Other Information

Special Precautions or comments

Highly toxic! Corrosive! Causes severe burns which may be delayed! Do not breathe vapor. Avoid all contact with the product. Avoid prolonged or repeated exposure. Use only in a chemical fume hood. Keep away from heat, sparks and flame. Take precautionary measures against static discharges. To the best of our knowledge, the chemical, physical and toxicity of this substance has not been fully investigated. Handle and open container with care. Container should be opened only by a technically qualified person.
Synergistic materials: Not available.
RTECS NO: SJ3325000 (Phenol).
RTECS NO: GO5950000 (Cresol).
RTECS NO: ZE5425000 (Xylenol).



NFPA

Prepared by MSDS Department/Département de F.S..

Validated 28-Apr-2006

Telephone# (514) 489-5711

While the company believes the data set forth herein are accurate as of the date hereof, the company makes no warranty with respect thereto and expressly disclaims all liability for reliance thereon. Such data are offered solely for your consideration, investigation and verification.

---------- 000031.MSD
96.35.031

TRADE NAME: CS Inks DATE: January 2006 (Revised)

I. PRODUCT IDENTIFICATION

Name/Synonym: Lithographic Ink Part Numbers: CS-174-C
CS-174-5
CS-174-P

Manufactured for/Distributed by:

Presstek, Inc.
55 Executive Drive
Hudson, NH 03051

Emergency Phone - Day - (603) 595-7000
Night - Chemtrec (800) 424-9300

II. INGREDIENTS - Confidential Information for Safety/Health Use Only

Chemical Name	CAS#	OSHA PEL	ACGIH, NIOSH TLV, EXPOSURE LIMITS TWA	ACGIH, NIOSH TLV, EXPOSURE LIMITS STEL	NTP, IARC OSHA CARCINOGEN	WT %
*modified rosin esters & hydrocarbon resins	N/E	N/E	N/E	N/E	No	20-25
carbon black***	1333-86-4	3.5mg/m3	N/E	N/E	No	20-25
petroleum distillate (severely hydrotreated)	N/E	N/E	N/E	N/E	No	20-25
technical white oil	8042-47-5	5mg/m3**	N/E	N/E	No	10-15
vegetable oils	N/E	5mg/m3**	N/E	N/E	No	3-5
*vegetable oil alkyds	N/E	N/E	N/E	N/E	No	3-5
*bodied linseed oil	67746-08-1	N/E	N/E	N/E	No	3-5
*anti-oxidant compound	N/E	N/E	N/E	N/E	No	3-5

* non-hazardous as defined by 29CFR1910.1200. ** as oil mist. *** When wetted with vehicle, as in this product, it is no longer considered to be a health hazard.

III. PHYSICAL PROPERTIES

Boiling Point (°F): > 200oF
Vapor Pressure (mmHg): N/A
Vapor Density (Air=1): N/A
Solubility in Water: < 0.1 %
Appearance/Odor:Black paste, oily odor

Specific Gravity (H2O=1): 1.0+
Melting Point: N/A
Evaporation Rate(butyl acetate=1): Slower
pH: N/A
% VOC: 4.5%

IV. FIRE AND EXPLOSION HAZARD

Flash Point: 260°F PMCC Flammable Limits: LEL: N/E UEL: N/E
Extinguishing Media: Foam, CO2, dry chemical.
Special Fire Fighting Procedure: Water can be used to keep material cool. Self-contained breathing apparatus may be required.
Unusual Fire/Explosion Hazards: Dense smoke generated while burning.

N/A = Not Applicable
N/E = Not Established

V. REACTIVITY DATA

Stability: Stable Conditions to Avoid: Excess heat.
Incompatibility, Materials to Avoid: Strong oxidizing agents.
Hazardous Decomposition Products: Dense smoke and possible carbon dioxide and carbon monoxide.
Hazardous Polymerization: Will not occur.

VI. SPILL OR LEAK PROCEDURE/WASTE DISPOSAL

Wipe up spills with rags. Dispose of rags in containers for oily waste. Disposal: Landfill or incineration in accordance with local, state and federal regulations for non-hazardous waste.

VII. HEALTH HAZARD DATA

A) Routes of entry, signs and symptoms of overexposure, acute and chronic effects.
Eye: Contact may cause burning and irritation.
Skin: Prolonged or repeated exposure may cause irritation or dermatitis.
Inhalation: Excessive inhalation of vapors may cause headaches, dizziness, drowsiness and nausea.
Ingestion: May cause irritation or gastric disturbance.
Target Organs: Skin
B) Carcinogenicity: Ingredients not found in NTP, OSHA or IARC.
C) Medical conditions generally aggravated by normal exposure: Some skin disorders, such as dermatitis.
D) Emergency and First Aid
Eye: Rinse with water, at least 15 minutes. If irritation persists, consult a physician.
Skin: Wash with mild soap and water.
Inhalation: Remove to fresh air. Apply respiration or oxygen if needed. Consult a physician.
Ingestion: DO NOT induce vomiting. Get medical aid.

VIII. SPECIAL PROTECTION INFORMATION

Respiration Protection: Not normally required.
Ventilation: General ventilation as per local or state regulations.
Protective Gloves: Not required Eye Protection: Optional
Other Protection: Apron, footwear, impervious clothing as needed to avoid excessive skin contact.

IX. SPECIAL PRECAUTIONS

Handling and Storage: Keep containers closed when not in use. Keep away from heat, sparks and open flame.
Other: Wash hands and face with soap and water before eating. Do not reuse container. Keep from reach of children. For Commercial/Industrial use only.

X. ENVIRONMENTAL DATA

Hazardous Substance (40 CFR 372: SARA Sec. 313)
None
Reportable Quantity (40 CFR 355: SARA Sec. 302)
None
Hazardous Substance (40 CFR 302: CERCLA Table 302.4)
None
RCRA Waste Number
None
Volatile Organic Compounds
0.42 lbs/gal or 51 g/l (EPA method 24)
SARA Hazard Class
Acute: no Chronic: no Fire: no Pressure: no Reactivity: no

H.M.I.S Rating
Health: 1 Flammability: 1 Reactivity: 0

XI. DOT SHIPPING INFORMATION

Surface: Not Regulated Air: Not Regulated
Proper Shipping Name: N/A
UN N/E Class: N/E Labels: None required

NOTE:

The chemicals in this product are listed on the TSCA inventory.

XII. DISCLAIMER

The information contained in this Material Safety Data Sheet is furnished without warranty of any kind. Presstek believes that the information contained herein is current as of the revision data of this MSDS. Since the conditions of use of this product are beyond the control of Presstek, it is the obligation of the user to determine the conditions for safe use.

PORTS MSDS #: 309

PRODUCT: STANDARD, INORGANIC PRIORITY POLLUTANT-SOIL(CYANIDE)

PART NUMBER:

FORMULA:

KEYWORD: STANDARD

PORTS NUMBER: 00190038-40

PORTS MISC INFO:
NOT GIVEN

PORTS RATING: HFR=100

MANUFACTURER:
ENVIRONMENTAL RESOURCES ASSOCIATION
5540 MARSHALL ST.
ARVADA
CO

80002
PHONE: PHONE: 303-431-8454
EMERGENCY PHONE: 303-431-8454

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

Boiling Point. . . . NA
Melting Point. . . . NA
Freezing Point . . . NG
Pour Point . . . . . NG
Softening Point. . . NG

Specific Gravity . . EQ 1.20
Vapor Pressure . . . NA
Vapor Density. . . . GT 1 NOTE: HEAVIER.
Percent Volatiles. . NG
Evaporation Rate . . NA
pH . . . . . NA
Molecular Weight . . NG
Viscosity. . . . . NG
Solubility in Water. COMPLETE.
Odor/Appearance/Other Characteristics:
LIGHT BROWN SOIL, ODORLESS.

===== Fire & Explosive Hazard Data =====

Flash Point, Closed Cup . . N* NOTE: NOT IGNITABLE.
Flash Point, Open Cup . . . N* NOTE: NOT IGNITABLE.
Fire Point. . . . . NG
Auto Ignition. . . . . NG
Explosive/Flammable Limits
Lower (LEL). . . . . NA
Upper (UEL). . . . . NA

Shipping Regulations
UN/NA Number. . . . . NG
D.O.T. Hazard Class. . . NG
Label . . . . . NOT GIVEN
Proper Shipping Name . . NOT GIVEN

==========

Preparer/Contact Information: NOT GIVEN

Date Prepared/Revised 7/29/94

===== Component Information =====

BLANK SOILS
OSHA PEL (PPM): NA
OSHA PEL (MG/M3):
ACGIH TLV (PPM): NA
ACGIH TLV (MG/M3):
STEL (PPM): NG
STEL (MG/M3):
Product %: EQ 100
C.A.S. No.: NOT GIVEN

BLANK SANDS
OSHA PEL (PPM): NA
OSHA PEL (MG/M3):
ACGIH TLV (PPM): NA
ACGIH TLV (MG/M3):
STEL (PPM): NG
STEL (MG/M3):
Product %: EQ 100
C.A.S. No.: NOT GIVEN

===== IDENTIFICATION =====

IDENTITY: Blank Soil and Sand (laboratory standard)

EMERGENCY TEL: 303) 431-8454

INFO. TEL. NUM: 303) 431-8454

DATE: JULY 29, 1994

MANUFACTURER'S NAME AND ADDRESS:

ENVIRONMENTAL RESOURCE ASSOCIATES
5540 MARSHAL STREET
ARVADA, COLORADO 80002

===== HAZARDOUS INGREDIENTS/IDENTITY =====

SEE COMPONENT INFORMATION.

Blank Soil and Sand products consist of either precleaned soil or silica sand. They do not contain any hazardous components at a concentration that might be expected to cause any toxic effects under ordinary conditions of use and handling.

===== PHYSICAL/CHEMICAL CHARACTERISTICS =====

SEE PHYSICAL/CHEMICAL CHARACTERISTICS OR FIRE & EXPLOSIVE HAZARD DATA.

===== FIRE AND EXPLOSION HAZARD DATA =====

FLASH POINT (METHOD): Not ignitable

FLAMMABLE LIMITS:

LEL: N/A
UEL: N/A

EXTINGUISHING MEDIA: None

SPECIAL FIRE PROCEDURES: None

UNUSUAL FIRE/EXPLOSION HAZARDS: None

===== REACTIVITY DATA =====

STABILITY: Stable

CONDITIONS TO AVOID: None

HAZARDOUS POLYMERIZATION: No

CONDITIONS TO AVOID: None

===== HEALTH HAZARD DATA =====

ROUTE(S) OF ENTRY:

INHN: Yes
SKIN: Yes
INGESTION: Yes

HEALTH HAZARDS:

CARCINOGENICITY:

NTP: NO
IARC MONOGRAPHS: No
OSHA REGULATED: No

SIGNS AND SYMPTOMS: Irritation of nasal passages, sneezing, tearing of eyes

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Dermititis, Bronchitis, asthma

EMERGENCY AND FIRST AID PROCEDURES: Remove from exposure. Wash skin and eyes with clear water.

===== PRECAUTIONS FOR SAFE HANDLING AND USE =====

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Collect the spilled material being careful to avoid creating excessive dust.

WASTE DISPOSAL METHOD: Dispose of as non-hazardous waste

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Protect from rough handling might cause breakage

OTHER PRECAUTIONS: Avoid breathing dust

===== CONTROL MEASURES =====

RESPIRATORY PROTECTION (SPECIFY TYPE): Use adequate ventilation

VENTILATION:

LOCAL EXHAUST: Adequate Vent
Mechanical hood
SPECIAL:
OTHER:

PROTECTIVE GLOVES: Neoprene or Vinyl

EYE PROTECTION: Safety glasses

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Laboratory coat and closed shoes

WORK/HYGIENIC PRACTICES: Wash hands with soap and warm water

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 2/22/10
MSDS No: M00188

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Cyclohexanone
Catalog Number: 1403332

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00188
Chemical Name: Cyclohexanone
CAS No.: 108-94-1
Chemical Formula: $C_6H_{10}O$
Chemical Family: Ketones
Hazard: Combustible. Causes severe eye irritation. Experimental mutagen.
Date of MSDS Preparation:
Day: 22
Month: February
Year: 2010

2. COMPOSITION / INFORMATION ON INGREDIENTS

Cyclohexanone
CAS No.: 108-94-1
TSCA CAS Number: 108-94-1
Percent Range: 100.0
Percent Range Units: weight / weight
LD50: Oral rat LD_{50} = 1535 mg/kg; Oral mouse LD_{50} = 1400 mg/kg; Oral rat LD_{50} = 1620 mg/kg; Oral rat LD_{50} = 1840 mg/kg.
LC50: Inhalation rat LC_{50} = 8000 ppm/4 hrs; Inhalation human TCLo = 75 ppm -nose, eye respiratory irritation.
TLV: 25 ppm - skin
PEL: 25 ppm - skin
Hazard: Combustible. Causes severe eye irritation. Experimental mutagen.

3. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance: Clear, colorless liquid
Odor: Peppermint
HARMFUL IF ABSORBED THROUGH SKIN CAUSES EYE IRRITATION MAY CAUSE SKIN AND RESPIRATORY TRACT IRRITATION

COMBUSTIBLE LIQUID AND VAPOR

HMIS:
Health: 1
Flammability: 2
Reactivity: 0
Protective Equipment: X - See protective equipment, Section 8.
NFPA:
Health: 1
Flammability: 2
Reactivity: 0

Symbol: Not applicable
Potential Health Effects:
Eye Contact: Causes severe irritation
Skin Contact: Causes mild irritation
Skin Absorption: Harmful if absorbed through the skin Effects similar to those of inhalation
Target Organs: Kidneys Liver
Ingestion: May cause: central nervous system depression diarrhea dizziness drowsiness headache loss of coordination nausea vomiting weakness
Target Organs: Liver Kidneys
Inhalation: May cause: respiratory tract irritation nausea, vomiting diarrhea headache dizziness weakness incoordination central nervous system depression drowsiness loss of consciousness
Target Organs: Liver Kidneys
Medical Conditions Aggravated: Pre-existing: Kidney conditions Liver conditions
Chronic Effects: Chronic overexposure may cause liver damage kidney damage
Cancer / Reproductive Toxicity Information:
O.S.H.A. Listed: No

IARC Group 3: Non-classifiable
Cyclohexanone
NTP Listed: No

Additional Cancer / Reproductive Toxicity Information: Contains: an experimental mutagen.
Toxicologically Synergistic Products: None reported

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.
Skin Contact (First Aid): Wash skin with soap and plenty of water. Remove contaminated clothing. Call physician immediately.
Ingestion (First Aid): Do not induce vomiting. Give 1-2 glasses of water. Never give anything by mouth to an unconscious person. Call physician immediately.
Inhalation: Remove to fresh air. Give artificial respiration if necessary. Call physician.

5. FIRE FIGHTING MEASURES

Flammable Properties: Combustible Liquid Vapors can travel to a source of ignition and flash back.
Flash Point: 44°C (111°F)
Method: Closed cup
Flammability Limits:
Lower Explosion Limits: 1.1 %
Upper Explosion Limits: 8.1 %
Autoignition Temperature: 420°C (788°F)
Hazardous Combustion Products: Toxic fumes of: carbon monoxide, carbon dioxide.
Fire / Explosion Hazards: Combustible liquid Do not expose to flames. Do not expose to sparks or other ignition sources. May react violently with: aldehydes strong acids strong bases strong oxidizers strong reducers
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Carbon dioxide Dry chemical. Alcohol foam.
Fire Fighting Instruction: Containers can build up pressure if exposed to heat. As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear. Evacuate area and fight fire from a safe distance.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Releases of this material may contaminate the environment. Remove all combustible material from spill area. Remove all ignition and spark-creating sources from the spill area. Cover spilled liquid with a commercially available flammable liquid sorbent such as vapor barrier blanket or activated carbon to avoid evolution of fumes. Vapors may travel to a source of ignition and flash back. May be ignited by: heat, sparks, or flames. Material will float on water creating a fire hazard. Dike the material to create a barrier to combustibles.
Clean-up Technique: Eliminate all sources of ignition. Do not breathe the fumes. Cover with an inert material, such as sand. Use only non-sparking tools. Sweep up material. Incinerate material at an E.P.A. approved hazardous waste facility. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: any quantity is spilled. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Product is regulated as RCRA hazardous waste.
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: 127

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin clothing Do not breathe mist or vapors. Wash thoroughly after handling. Use with adequate ventilation. Maintain general industrial hygiene practices when using this product.
Storage: Store between 10° and 25°C. Protect from: heat light Keep away from: acids alkalies oxidizers reducers
Flammability Class: Class II

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Use a fume hood to avoid exposure to dust, mist or vapor. Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: disposable latex gloves lab coat
Inhalation Protection: laboratory fume hood
Precautionary Measures: Avoid contact with: eyes skin clothing Do not breathe: mist/vapor Wash thoroughly after handling. Use with adequate ventilation. Protect from: heat light Keep away from: acids/acid fumes alkalies oxidizers reducers
TLV: 25 ppm - skin
PEL: 25 ppm - skin

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Clear, colorless liquid
Physical State: Liquid
Molecular Weight: 98.14 g/mol
Odor: Peppermint
pH: Not determined
Vapor Pressure: 136 mm at 100°C
Vapor Density (air = 1): 3.4
Boiling Point: 155.6°C (312.1°F)
Melting Point: Not applicable
Specific Gravity (water = 1): 0.948
Evaporation Rate (water = 1): Not determined
Volatile Organic Compounds Content: 100 %
Partition Coefficient (n-octanol / water): Not determined
Solubility:
Water: Slightly soluble
Acid: Not determined
Other: Soluble in most organic solvents
Metal Corrosivity:
Steel: Not determined
Aluminum: Not determined

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Contact with heat, sparks, open flames or other ignition sources. Exposure to light.
Reactivity / Incompatibility: Incompatible with: acids alkalies oxidizers reducers
Hazardous Decomposition: Heating to decomposition releases toxic fumes of carbon monoxide and carbon dioxide.
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
LD50: Oral rat LD_{50} = 1535 mg/kg; Oral mouse LD_{50} = 1400 mg/kg; Oral rat LD_{50} = 1620 mg/kg; Oral rat LD_{50} = 1840 mg/kg.
LC50: Inhalation rat LC_{50} = 8000 ppm/4 hrs; Inhalation human TCLo = 75 ppm -nose, eye respiratory irritation.
Dermal Toxicity Data: Skin rabbit LD_{50} = 948 mg/kg.
Skin and Eye Irritation Data: Skin irritation rabbit: 500 mg = MILD; Eye irritation rabbit: 20 mg = SEVERE; Eye irritation rabbit: 250 µg/24 hrs = SEVERE.
Mutation Data: Cytogenetic analysis in human leukocytes @ 100 µmol/l; Cytogenetic analysis in human lymphocytes @ 5 µg/l; Sister chromatid exchange in hamster ovary @ 7500 µl/l; Mutation in mammalian somatic cells in hamster ovary @ 7500 µl/l.
Reproductive Effects Data: Inhalation rat (female) TCLo = 105 mg/m³/4 hrs (Fertility: pre-implantation mortality); Oral mouse (female) TDLo = 11 g/kg (Effects on newborn: growth statistics).
Ingredient Toxicological Data: --
Not applicable

12. ECOLOGICAL INFORMATION

Product Ecological Information: Aquatic toxicity: Golden ides LC50 = 536 mg/l/48 hrs; No inhibition of bacteria in effluent if properly introduced into acclimated biological treatment facility.

Ingredient Ecological Information: --
Not applicable

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: D001
Special Instructions (Disposal): Incinerate material at an E.P.A. approved hazardous waste facility.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Cyclohexanone
--
DOT Hazard Class: 3
DOT Subsidiary Risk: NA
DOT ID Number: UN1915
DOT Packing Group: III
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Cyclohexanone
--
ICAO Hazard Class: 3
ICAO Subsidiary Risk: NA
ICAO ID Number: UN1915
ICAO Packing Group: III

I.M.O.:
I.M.O. Proper Shipping Name: Cyclohexanone
I.M.O. Hazard Class: 3
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: UN1915
I.M.O. Packing Group: III
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Immediate (Acute) Health Hazard Delayed (Chronic) Health Hazard Fire Hazard
S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.
302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Cyclohexanone 5000 lbs.
304 EHS RQ (40 CFR 355): Not applicable
Clean Water Act (40 CFR 116.4): Not applicable
RCRA: Contains RCRA regulated substances. See Section 13, EPA Waste ID Number.
C.P.S.C.: Not applicable
State Regulations:
California Prop. 65: No Prop. 65 listed chemicals are present in this product.
Identification of Prop. 65 Ingredient(s): Not applicable
California Perchlorate Rule CCR Title 22 Chap 33:
Trade Secret Registry: Not applicable
National Inventories:
U.S. Inventory Status: TSCA Listed: Yes
TSCA CAS Number: 108-94-1

16. OTHER INFORMATION

Intended Use: Laboratory Reagent
References: CCINFO MSDS/FTSS. Canadian Centre for Occupational Health and Safety.. Hamilton, Ontario Canada: 30 June 1993. Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Association, 1991. NIOSH Registry of Toxic Effects of Chemical Substances, 1985-86. Cincinnati: U.S. Department of Health and Human Services, April, 1987. Patty, Frank A. Industrial Hygiene and Toxicology, 3rd Revised Edition. Volume 2. New York: A Wiley-Interscience Publication, 1981. Technical Judgment. Sax, N. Irving. Dangerous Properties of Industrial Materials, 7th Ed. New York: Van Nostrand Reinhold Co., 1989. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. The Merck Index, 11th Ed. Rahway, New Jersey: Merck and Co., Inc., 1989. Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor). IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans. World Health Organization (Volumes 1-42) Supplement 7. France: 1987. List of Dangerous Substances Classified in Annex I of the EEC Directive (67/548) - Classification, Packaging and Labeling of Dangerous Substances, Amended July 1992. Sixth Annual Report on Carcinogens, 1991. U.S. Department of Health and Human Services. Rockville, MD: Technical Resources, Inc. 1991. Vendor Information. EU Occupational Exposure Limits On Line.

Revision Summary: Updates in Section(s) 14,

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

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MULTIGRAPHICS DIV; AM INTERNATIONAL -- DEGLAZING SOLV. #S 83-0-105532, 83-9-105533 -
MATERIAL SAFETY DATA SHEET
SN: 6850002011269
anufacturer's CAGE: 09177
Part No. Indicator: B
Part Number/Trade Name: DEGLAZING SOLV. #S 83-0-105532, 83-9-105533

CAS# 71-55-6
MSDS Ser BJMBQ
Deglazing Solv.

General Information

Item Name: LITHOGRAPHING FOUNTAIN SOLUTION
Company's Name: MULTIGRAPHICS DIVISION; AM INTERNATIONAL, INC.
Company's Street: 1800 WEST CENTRAL ROAD
Company's City: MT.PROSPECT
Company's State: IL
Company's Country: US
Company's Zip Code: 60056-2293
Company's Emerg Ph #: 312-870-5121 (DAY) 398-1900 (NIGHT)
Company's Info Ph #: 312-870-5121
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 004
Status: SE
Date MSDS Prepared: 01APR89
Safety Data Review Date: 14JAN91
Supply Item Manager: CX
MSDS Preparer's Name: NORMAN J. ENGLBRECHT
MSDS Serial Number: BJMBQ
Hazard Characteristic Code: N1

Ingredients/Identity Information

Proprietary: NO
Ingredient: METHYL CHLOROFORM (1,1,1-TRICHLOROEHANE) (SARA III)
Ingredient Sequence Number: 01
Percent: 96%
NIOSH (RTECS) Number: KJ2975000
CAS Number: 71-55-6
OSHA PEL: 350 PPM/450 STEL
ACGIH TLV: 350 PPM/450STEL;9192
Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR COLORLESS LIQUID WITH ETHERAL ODOR.
Boiling Point: 154F,68C
Vapor Pressure (MM Hg/70 F): 120
Vapor Density (Air=1): 4.54
Specific Gravity: 1.31
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 0.35 (BUTYL ACETATE= 1)
Solubility In Water: NEGLIGIBLE
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: NONE
Flash Point Method: TCC
Lower Explosive Limit: 7
Upper Explosive Limit: 15
Extinguishing Media: USE WATER FOG, CARBON DIOXIDE OR DRY CHEMICAL.
Special Fire Fighting Proc: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT FOR POSSIBLE EXPOSURE TO HYDROGEN CHLORIDE AND POSSIBLE TRACES OF PHOSGENE.
Unusual Fire And Expl Hazrds: VAPORS CONCENTRATED IN A CONFINED OR POORLY VENTILATED AREA CAN BE IGNITED UPON CONTACT WITH A HIGH ENERGY SPARK, FLAME, OR HIGH HEAT SOURCE.

Reactivity Data

Stability: YES

Cond To Avoid (Stability): HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES
Materials To Avoid: CAUSTICS, OXIDIZERS AND ALUMINUM.
Hazardous Decomp Products: HYDROGEN CHLORIDE AND POSSIBLE TRACE OF PHOSGENE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: EYE IRRITANT, MILDLY IRRITATING TO SKIN, WILL DEFAT SKIN. SLIGHTLY TOXIC, ANASTHETHIC EFFECTS MAY OCCUR IN RANGES OF 1000 PPM IF INHALED. NOT SIGNIFICANTLY TOXIC IF INGESTED.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE OF THE COMPOUNDS IN THIS PRODUCT IS LISTED BY IARC, NTP, OR OSHA AS A CARCINOGEN.
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: INCREASED SENSITIVITY TO ADRENALIN MAY BE CAUSED BY OVEREXPOSURE.
Emergency/First Aid Proc: INHALATION:REMOVE TO FRESH AIR. RESUSCITATE IF NOT BREATHING. GET MEDICAL ATTENTION. EYES:IMMEDIATELY FLUSH WITH PLENTY OF REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. IF IRRITATION PERSISTS, GET MEDICAL ADVICE. INGESTION:DO NOT INDUCE VOMITING. GIVE MILK OR USP MINERAL OIL. GET IMMEDIATE MEDICAL ATTENTION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SMALL SPILL: WIPE/SOAK UP WITH TOWELS OR RAGS. LARGE SPILL: WEAR SUITABLE MASK - EVAPORATES RAPIDLY. DO NOT POUR DOWN DRAIN.
Neutralizing Agent: NOT APPLICABLE.
Waste Disposal Method: DISPOSAL SHOULD BE MADE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL, DRY, WELL VENTILATED AREA. KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE. PROTECT CONTAINERS FROM PHYSICAL DAMAGE.
Other Precautions: READ AND FOLLOW DIRECTIONS ON LABEL. DO NOT REUSE CONTAINER. DO NOT USE WITH ALUMINUM.

Control Measures

Respiratory Protection: IF VENTILATION DOES NOT MAINTAIN INHALATION EXPOSURES BELOW PEL(TLV), USE NIOSH/MSHA APPROVED ORGANIC VAPOR CARTRIDGE AND DUST/MIST PRE-FILTER RESPIRATORS AS PER CURRENT 29 CFR 1910.134, INSTRUCTIONS/WARNINGS AND NIOSH-RESPIRATOR SELECTION.
Ventilation: LOCAL EXHAUST ONLY TO REMAIN BELOW 50% OF TLV.
Protective Gloves: NEOPRENE
Eye Protection: SAFETY GLASSES WITH OPTIONAL FACE SHIELD
Other Protective Equipment: EYE WASH STATION AND SAFETY SHOWER. INDUSTRIAL-TYPE WORK CLOTHING AND APRON AS REQUIRED.
Work Hygienic Practices: OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND RECOMMENDED PROCEDURES. DO NOT WEAR CONTAMINATED CLOTHING OR FOOTWEAR.
Suppl. Safety & Health Data: AVOID PROLONGED OR REPEATED EXPOSURE. DO NOT GET ON SKIN OR IN EYES. DO NOT BREATHE VAPORS OR MISTS.

Transportation Data

Disposal Data

Label Data

Label Required: YES

http://haz1.siri.org:80/msds/h/q362/q130945

Technical Review Date: 14JAN91
Label Status: F
Common Name: DEGLAZING SOLV. #S 83-0-105532, 83-9-105533
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: VAPORS MAY CAUSE DIZZINESS OR SUFFOCATION. EXPOSURE IN AN ENCLOSED AREA MAY BE VERY HARMFUL. CONTACT MAY IRRITATE OR BURN SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION. EYE IRRITANT, MILDLY IRRITATING TO SKIN, WILL DEFAT SKIN. SLIGHTLY TOXIC, ANASTHETHIC EFFECTS MAY OCCUR IN RANGES OF 1000 PPM IF INHALED. NOT SIGNIFICANTLY TOXIC IF INGESTED.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: MULTIGRAPHICS DIVISION; AM INTERNATIONAL, INC.
Label Street: 1800 WEST CENTRAL ROAD
Label City: MT.PROSPECT
Label State: IL
Label Zip Code: 60056-2293
Label Country: US
Label Emergency Number: 312-870-5121 (DAY) 398-1900 (NIGHT)

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

TRADE NAME: Electrostatic Solution DATE: January, 1996 (Revised)

I. PRODUCT IDENTIFICATION

Name/Synonym: Conversion Solution Part Numbers: 83-1-104054 1 gal.
83-0-104055 5 gal.
200-1050-50A 50 gal.

Manufactured/Distributed by: AM MULTIGRAPHICS
1800 West Central Road
Mt. Prospect, Illinois 60056

Emergency Phone - Day - (847) 375-5956
Night - Chemtrec (800) 424-9300

II. INGREDIENTS - Confidential Information for Safety/Health Use Only

(ALL EXPOSURE LIMITS ARE PPM UNLESS OTHERWISE NOTED)

Chemical Name	CAS#	OSHA PEL	ACGIH, NIOSH TLV, EXPOSURE LIMITS TWA	STEL	NTP,IARC OSHA Carcinogen	WT %
*potassium hexacyanoferrate	13943-58-3	N/E	N/E	N/E	No	2-5
*monoammonium phosphate	7722-76-1	N/E	N/E	N/E	No	8-10
**glycerine	56-81-5	10mg/m3	N/E		No	12-14
*gum arabic	9000-01-5	N/E	N/E	N/E	No	1-2
*water	7732-18-5	N/E	N/E	N/E	No	74-79

* non-hazardous as defined by 29CFR 1910.1200. ** as mist only.

III. PHYSICAL PROPERTIES

Boiling Point (°F): 212°F Specific Gravity (H_2O = 1): 1.08
Vapor Pressure (mm Hg.): 15 @ 25°C Melting Point: N/A
Vapor Density (Air = 1): N/E Evaporation Rate: slower
Solubility in Water: complete (butyl acetate = 1) then water
Appearance/Odor: Yellow green liquid, slight almond odor pH: 4.5

IV. FIRE AND EXPLOSION HAZARD

Flash Point (Method): None Flammable Limits: LEL:N/A UEL:N/A
Extinguishing Media: Compatible with all extinguishing media.
Special Fire Fighting Procedure: None
Unusual Fire/Explosion Hazards: Catastrophic accidents, involving large quantities of product and accompanied by fire or contact with large quantities of strong acid, response personnel will be required to wear NIOSH/MSHA approved self-contained breathing apparatus due to, and dependent upon, the quantities of cyanide.

N/A = Not Applicable
N/E = Not Established

V. REACTIVITY DATA

Stability: Stable under normal conditions of use Conditions to Avoid: Strong light & heat
Incompatibility, Materials to Avoid: Chlorine bleach, strong acids.
Hazardous Decomposition Products: Product will slowly decompose with formation of hydrocyanic acid, complex cyanoferrates and cyanides.
Hazardous Polymerization: Will not occur.

VI. SPILL OR LEAK PROCEDURE/WASTE DISPOSAL

Flush with water to drain. Disposal: Small quantities such as employed in normal use may be flushed with water to drain. Do not mix with acid wastes. Larger quantities should not be dumped into waterways, check Federal, State and Local regulations regarding disposal of hexacyanoferrate salts (Generally 2 ppm maximum in streams and lakes).

VII. HEALTH HAZARD DATA

A) Routes of entry, signs and symptoms of overexposure, acute and chronic effects.
Eye: May cause eye irritation.
Skin: Prolonged contact may cause skin irritation.
Inhalation: Not a normal route of entry.
Ingestion: Large doses may cause gastro-intestinal irritation.
Target Organs: None known
B) Carcinogenicity: Not found in NTP, IARC or OSHA.
C) Medical conditions generally aggravated by normal exposure: None. Hexacyanoferrate salts are considered slightly toxic to humans, regardless of whether exposure is acute dermal, acute ingestion or chronic systemic. Any effect on the human body is temporary and reversible and the effect disappears following termination of exposure.
D) Emergency and First Aid

Eye: Flush with water for 15 minutes. Get medical aid.
Skin: Wash with soap and water
Inhalation: Not a normal route of entry.
Ingestion: Induce vomiting, get medical aid.

VIII. SPECIAL PROTECTION INFORMATION

Respiration Protection: N/A
Ventilation: Normal air conditioning
Protective Gloves: Not required Eye Protection: optional
Other Protection: N/A

IX. SPECIAL PRECAUTIONS

Handling and Storage: Store in a cool, dark place, away from strong acids and fire hazards. Wash thoroughly after handling.
Other: Read label precautions. Do not reuse container.
For Commercial use only. Keep from reach of children.

X. ENVIRONMENTAL DATA

Hazardous Substance (40 CFR 372: SARA Sec. 313)
None

Reportable Quantity (40 CFR 355: SARA Sec. 302)
None

Hazardous Substance (40 CFR 302: CERCLA Table 302.4)
None

RCRA Waste Number
None

Volatile Organic Compounds
None

SARA Hazard Class
Acute: no Chronic: no Fire: no Pressure: no Reactivity: no

NFPA Hazard Rating
Health: 1 Flammability: 0 Reactivity: 0 Specific Hazard: N/A

XI. DOT SHIPPING INFORMATION

Surface: non-hazardous Air: non-hazardous
Proper Shipping Name: N/A
UN N/E Class N/E Labels: none required

NOTE:

The chemicals in this product are listed on the TSCA inventory.

XII. DISCLAIMER

The information contained in this Material Safety Data Sheet is furnished without warranty of any kind. AM Multigraphics believes that the information contained herein is current as of the revision date of this MSDS. Since the conditions of use of this product are beyond the control of AM Multigraphics, it is the obligation of the user to determine the conditions for safe use.

MATERIAL SAFETY DATA SHEET

ECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Company: AccuStandard, Inc.
125 Market Street
New Haven, CT 06513

Date MSDS Printed: 10/4/2007
Preparation Date: 10/4/2007
Information Phone Number: 203-786-5290
Emergency Phone Number: 203-786-5290
Hours: Mon. to Fri. 8am-5pm EDT

Catalog Number: **P-045S**
Product Name: Endrin
Synonyms: N/A
Formula: N/A
Molecular Weight: N/A

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Component(s) (1)	CAS #	Appr. %	ACGIH-TLV (mg/m3) TWA	ACGIH-TLV (mg/m3) STEL skin	OSHA-PEL (mg/m3) TWA	OSHA-PEL (mg/m3) STEL skin
Endrin	72-20-8	0.01	0.1	x	0.1	x
Methanol	67-56-1	99.99	262	328 x	260	

SECTION 3 - HAZARDS IDENTIFICATION

Health and Environmental Hazards/Symptoms of Exposure:

Over exposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure. After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours. May cause eye, kidney, liver, and skin damage. May cause central nervous system damage. POISON: May be fatal or cause blindness if swallowed. Fetal development abnormalities and effects on embryo or fetus have been reported from prolonged exposure to methanol in laboratory tests involving pregnant rats.

Potential Health Effects:

Irritating to eyes.
Irritating to skin.
Toxic if absorbed through skin.
Irritating to mucous membrane and upper respiratory system.
Toxic if inhaled or swallowed.

Routes of Entry:

Inhalation, ingestion or skin contact.

Carcinogenicity:

This product is or contains components that are not listed (ACGIH, IARC, NTP, OSHA) as a cancer causing agent.

SECTION 4 - FIRST AID MEASURES

Emergency First Aid:

Get medical assistance for all cases of overexposure.
Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.
Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.
Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

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Ingestion: Do NOT induce vomiting. Call a physician immediately. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: 52 °F (11 °C) (tcc)
Flammable Limits LEL (%): 6.7
Flammable Limits UEL (%): 36.5
Autoignition Temperature: 385 °C

Dangerous fire and explosive hazard.
Containers can build up pressure if exposed to heat.
Vapors can travel to a source of ignition and flash back.
During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Fire Fighting Procedures:

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spill Response:

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tighly closed container.
Keep refrigerated.
Avoid breathing vapors or mists.
Use with adequate ventilation.
Do not get in eyes, on skin or clothing.
Avoid prolonged or repeated exposure.
This product should only by used by persons trained in the safe handling of hazardous chemicals.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls and Personal Protection Equipment (PPE):

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.
Material should be handled or transferred in an approved fume hood or with adequate ventilation.
(Chloroprene, natural rubber, nitrile, or equivalent)
Safety glasses with side shields must be worn at all times.
Safety glasses with side shields must be worn at all times.

General Hygiene Considerations:

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid
Odor: N/A
pH: N/A
Vapor Pressure: 97 mmHg (20 °C)

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Vapor Density (Air = 1): 1.1 g/L
Boiling Point: 65 °C
Melting Point: -93.9 °C
Solubility in Water (%): Very soluble
Specific Gravity (H_2O = 1): 0.791 g/cm3
Flash Point: 52 °F (11 °C) (tcc)
Explosion Limits (%): 6.7 to 36.5
Autoignition Temperature: 385 °C
Percent Volatile: 99.9+
Evaporation Rate (BuAc = 1): 5.9
Molecular Weight: N/A
Molecular Formula: N/A

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Conditions To Avoid: Heat; Contact with ignition sources
Materials To Avoid: Acids
Oxidizers
Alkali metals; Reducing agents

Hazardous Decomposition: Carbon oxides; Formaldehyde
Hazardous Polymerization: Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

See section 3 for specific toxicological information for the ingredients of this product.

SECTION 12 - ECOLOGICAL INFORMATION

By complying with sections 6 and 7 there will be no release to the environment.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

DOT UN Number: UN1230 Shipping Class: 3 Packing Group: II FLAMMABLE

SECTION 15 - REGULATORY INFORMATION

In addition to Federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

Not all components are listed on the TSCA Inventory. For research and development use only. Not for manufacturing or commercial purposes.
WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI and CHIPs regulations.

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The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. It is intended for use only by persons having the necessary technical skill and at their own discretion and risk. Since conditions and manner of use are outside our control, we make
NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

* * * End of Document * * *

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SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006
Version 4.0 Revision Date 14.03.2010
Print Date 21.04.2010
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product name	:	Ethanol
Product Number	:	493546
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

According to Regulation (EC) No1272/2008
Flammable liquids (Category 2)

According to European Directive 67/548/EEC as amended.
Highly flammable.

Label elements

Pictogram

Signal word — Danger

Hazard statement(s)
H225 — Highly flammable liquid and vapour.

Precautionary statement(s)
P210 — Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Hazard symbol(s)
F — Highly flammable

R-phrase(s)
R11 — Highly flammable.

S-phrase(s)
S 7 — Keep container tightly closed.
S16 — Keep away from sources of ignition - No smoking.

Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms	:	Ethyl alcohol
Formula	:	C_2H_6O
Molecular Weight	:	46,07 g/mol

CAS-No.	EC-No.	Index-No.	Classification	Concentration
Ethanol				
64-17-5	200-578-6	603-002-00-5	Flam. Liq. 2; H225 F, R11	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

hygroscopic

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid, clear
Colour	colourless

Safety data

pH	no data available
Melting point	-114 °C - lit.
Boiling point	78 °C - lit.
Flash point	14,0 °C - closed cup
Ignition temperature	363 °C
Lower explosion limit	3,3 %(V)
Upper explosion limit	19 %(V)
Vapour pressure	59,5 hPa at 20,0 °C
Density	0,789 g/cm3 at 25 °C
Water solubility	completely soluble

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Alkali metals, Ammonia, Oxidizing agents, Peroxides

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 7.060 mg/kg
Remarks: Lungs, Thorax, or Respiration:Other changes.

LC50 Inhalation - rat - 10 h - 20000 ppm

Skin corrosion/irritation
Skin - rabbit - Irritating to skin. - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation - 24 h

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

Carcinogenicity - mouse - Oral
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Liver:Tumors. Blood:Lymphomas including Hodgkin's disease.

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity

Reproductive toxicity - Human - female - Oral
Effects on Newborn: Apgar score (human only). Effects on Newborn: Other neonatal measures or effects. Effects on Newborn: Drug dependence.

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Central nervous system depression, narcosis, Damage to the heart., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: KQ6300000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 13.000,00 mg/l - 96 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 10.400,00 mg/l - 96 h
	LC50 - Pimephales promelas (fathead minnow) - 15.300,00 mg/l - 96 h
	LC50 - other fish - 10.000,00 mg/l - 24 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 9,30 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

ADR/RID
UN-Number: 1170 Class: 3 Packing group: II
Proper shipping name: ETHANOL

IMDG
UN-Number: 1170 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ETHANOL
Marine pollutant: No

IATA
UN-Number: 1170 Class: 3 Packing group: II
Proper shipping name: Ethanol

15. REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
F	Highly flammable
R11	Highly flammable.

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Fisher Scientific

Material Safety Data Sheet

Creation Date 15-Apr-2009 **Revision Date** 26-Sep-2009 **Revision Number** 1

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **Ethyl ether**

Cat No. **E134-1; E134-4; E134-20; E136-150; E137RS-19; E138-1; E138-4; E138-20; E138-500; E138RS-19; E138RS-28; E138RS-50; E492-4; E492-20**

Synonyms Diethyl ether; Ethyl oxide; Ether (Laboratory/BHT Stabilized/Certified ACS)

Recommended Use Laboratory chemicals

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 703-527-3887

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Extremely flammable liquid and vapor. Vapor may cause flash fire. May form explosive peroxides. Harmful if swallowed. Irritating to eyes and skin. Vapors may cause drowsiness and dizziness. Aspiration hazard if swallowed - can enter lungs and cause damage. May cause irritation of respiratory tract. Repeated exposure may cause skin dryness or cracking. Hygroscopic.

Appearance Colorless **Physical State** Liquid **odor** aromatic

Target Organs Central nervous system (CNS), Eyes, Respiratory system, Skin, Liver

Potential Health Effects

Acute Effects
Principle Routes of Exposure

Eyes	Irritating to eyes.
Skin	Irritating to skin. May be harmful in contact with skin. Repeated exposure may cause skin dryness or cracking.
Inhalation	May cause drowsiness and dizziness. May cause irritation of respiratory tract. May be harmful if inhaled.
Ingestion	Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Aspiration hazard if swallowed - can enter lungs and cause damage.

Chronic Effects May cause adverse liver effects. Mutagenic effects have occurred in experimental animals..

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Central nervous system disorders. Preexisting eye disorders. Skin disorders.

Haz/Non-haz

Component	CAS-No	Weight %
Ethyl ether	60-29-7	>95

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Obtain medical attention.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Notes to Physician Treat symptomatically.

Flash Point -45°C / -49°F

Method No information available.

Autoignition Temperature 160°C / 320°F

Explosion Limits
Upper 36.0 vol %
Lower 1.9 vol %

Suitable Extinguishing Media CO_2, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media Water may be ineffective.

Hazardous Combustion Products No information available.

Sensitivity to mechanical impact No information available.
Sensitivity to static discharge No information available.

Specific Hazards Arising from the Chemical
Extremely flammable. Risk of ignition. Vapors may travel to source of ignition and flash back. Vapors may form explosive mixtures with air. Containers may explode when heated. May form explosive peroxides.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA **Health** 1 **Flammability** 4 **Instability** 1 **Physical hazards** N/A

[redacted]

Personal Precautions Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Remove all sources of ignition. Soak up with inert absorbent material. Take precautionary measures against static discharges. Keep in suitable and closed containers for disposal.

[redacted]

Handling Wear personal protective equipment. Handle under an inert atmosphere. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Do not breathe vapors or spray mist. Keep away from open flames, hot surfaces and sources of ignition. If peroxide formation is suspected, do not open or move container.

Storage Flammables area. Store under an inert atmosphere. Keep away from open flames, hot surfaces and sources of ignition. May form explosive peroxides. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals.

[redacted]

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Ethyl ether	TWA: 400 ppm STEL: 500 ppm	(Vacated) TWA: 400 ppm (Vacated) TWA: 1200 mg/m^3 (Vacated) STEL: 500 ppm (Vacated) STEL: 1500 mg/m^3 TWA: 1200 mg/m^3 TWA: 400 ppm	IDLH: 1900 ppm

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Ethyl ether	TWA: 1210 mg/m^3 TWA: 400 ppm STEL: 500 ppm STEL: 1520 mg/m^3	TWA: 1200 mg/m^3 TWA: 400 ppm STEL: 1500 mg/m^3 STEL: 500 ppm	TWA: 1210 mg/m^3 TWA: 400 ppm STEL: 1515 mg/m^3 STEL: 500 ppm

NIOSH IDLH: *Immediately Dangerous to Life or Health*

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Physical State	Liquid
Appearance	Colorless
odor	aromatic
Odor Threshold	No information available.
pH	No information available.
Vapor Pressure	587 mbar @ 20 °C
Vapor Density	2.55 (Air = 1.0)
Viscosity	0.2448 cP at 20 °C
Boiling Point/Range	34.6°C / 94.3°F
Melting Point/Range	-116°C / -176.8°F
Decomposition temperature °C	No information available.
Flash Point	-45°C / -49°F
Evaporation Rate	37.5 (Butyl Acetate = 1.0)
Specific Gravity	0.714
Solubility	Slightly soluble in water
log Pow	No data available
Molecular Weight	74.12
Molecular Formula	C4 H10 O

Stability	May form explosive peroxides. Air sensitive. Light sensitive. Hygroscopic.
Conditions to Avoid	Incompatible products. Heat, flames and sparks. Exposure to air. Exposure to light. Exposure to moisture.
Incompatible Materials	Strong oxidizing agents, Strong acids
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2), peroxides
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions .	May form explosive peroxides..

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethyl ether	1215 mg/kg (Rat)	20 mL/kg (Rabbit)	Not listed

Irritation Irritating to eyes and skin

Toxicologically Synergistic Products No information available.

Chronic Toxicity

Carcinogenicity There are no known carcinogenic chemicals in this product

Sensitization No information available.

Mutagenic Effects Mutagenic effects have occurred in experimental animals.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

Other Adverse Effects See actual entry in RTECS for complete information.

Endocrine Disruptor Information No information available

Ecotoxicity

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Ethyl ether	Not listed	Not listed	EC50 = 5600 mg/L 15 min	EC50 = 165 mg/L/24h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available

Mobility

Component	log Pow
Ethyl ether	0.82

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification

Component	RCRA - U Series Wastes	RCRA - P Series Wastes

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Ethyl ether - 60-29-7	U117	-

[illegible]

DOT

UN-No	UN1155
Proper Shipping Name	DIETHYL ETHER
Hazard Class	3
Packing Group	I

TDG

UN-No	UN1155
Proper Shipping Name	DIETHYL ETHER
Hazard Class	3
Packing Group	I

IATA

UN-No	UN1155
Proper Shipping Name	DIETHYL ETHER
Hazard Class	3
Packing Group	I

IMDG/IMO

UN-No	UN1155
Proper Shipping Name	DIETHYL ETHER
Hazard Class	3
Packing Group	I

[illegible]

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Ethyl ether	X	X	-	200-467-2	-		X	X	X	X	KE-27690 X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313
Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
Not applicable

Clean Air Act
Not applicable

OSHA
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Ethyl ether	100 lb	-

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ethyl ether	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security

This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Ethyl ether	7500 lb STQ

Other International Regulations

Mexico - Grade Severe risk, Grade 4

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
B2 Flammable liquid

Prepared By	Regulatory Affairs Thermo Fisher Scientific Tel: (412) 490-8929
Creation Date	15-Apr-2009
Print Date	26-Sep-2009
Revision Summary	"****", and red text indicates revision

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

FREON 113 REFRIGERANT
2024FR Revised 20-APR-2004

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

"FREON" is a registered trademark of DuPont.

Corporate MSDS Number : DU000126
Formula : CCl2FCClF2
Molecular Weight : 187.38

Tradenames and Synonyms

TRICHLOROTRIFLUOROETHANE
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE
"FREON" TF SOLVENT
"FREON" TF CLEANING AGENT
"FREON" PRECISION CLEANING AGENT
"FREON" TF
"FREON" PCA
"FREON" TF 113

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Fluoroproducts
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
*1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE ("FREON" 113)	76-13-1	100

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

HAZARDS IDENTIFICATION

Potential Health Effects

Short-term overexposure by inhalation may cause central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness. Repeated and/or prolonged exposure may cause suffocation, if air is displaced by vapors, irregular heart beat with a strange sensation in the chest, "heart thumping", apprehension, lightheadedness, feeling of fainting, dizziness, weakness, sometimes progressing to loss of consciousness and death.

Short-term overexposure by skin contact may cause defatting of the skin with itching, redness or rash. Significant skin permeation, and systemic toxicity, after contact appears unlikely.

Short-term overexposure by eye contact may cause irritation with tearing, pain or blurred vision.

The major ingestion hazard is aspiration (liquid entering the lungs during ingestion or vomiting) which may result in "chemical pneumonia". Symptoms include coughing, gasping, choking, shortness of breath, bluish discoloration of the skin, rapid breathing and heart rate, and fever. Pulmonary edema or bleeding, drowsiness, confusion, coma and seizures may occur in more serious cases. Symptoms may develop immediately or as late as 24 hours after exposure, depending on how much chemical entered the lungs.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

Flush skin with water after contact. Wash contaminated clothing before reuse.

EYE CONTACT

(FIRST AID MEASURES - Continued)

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

If swallowed, do not induce vomiting. Immediately give 2 glasses of water. Never give anything by mouth to an unconscious person. Call a physician.

Notes to Physicians

Activated charcoal mixture may be beneficial. Suspend 50 g activated charcoal in 400 mL water and mix well. Administer 5 mL/kg, or 350 mL for an average adult.

Because of the danger of aspiration, emesis or gastric lavage should not be employed unless the risk is justified by the presence of additional toxic substances. Activated charcoal may be given but should be used with caution since it may induce vomiting.

THIS MATERIAL MAY MAKE THE HEART MORE SUSCEPTIBLE TO ARRHYTHMIAS. Catecholamines such as adrenaline, and other compounds having similar effects, should be reserved for emergencies and then used only with special caution.

Skin discomfort caused by de-fatting after contact with certain solvents may be relieved by application of emollient creams or lotions.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: Will not burn
Autodecomposition	: 300 C (572 F)

Fire and Explosion Hazards:

Drums may rupture under fire conditions. Decomposition may occur.

Extinguishing Media

As appropriate for combustibles in area.

Fire Fighting Instructions

Use water spray or fog to cool container. Self-contained breathing apparatus (SCBA) is required if drums rupture and contents are spilled under fire conditions.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Accidental Release Measures

Ventilate area. Do not flush into sewers. Dike spill. Collect on absorbent material and transfer to steel drums for recovery or disposal. Use self-contained breathing apparatus (SCBA) for large spills. Comply with Federal, State, and local regulations on reporting releases.

HANDLING AND STORAGE

Handling (Personnel)

Avoid breathing vapors and prolonged skin exposure. Use with sufficient ventilation to keep employee exposure below recommended limits.

Storage

Clean, dry area. Do not heat above 125 deg F.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Normal ventilation for standard use procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

Personal Protective Equipment

Impervious gloves should be used to avoid prolonged or repeated exposure. Chemical splash goggles should be worn as needed to prevent eye contact. Under normal use conditions, no respiratory protection is required when using this product. Self-contained breathing apparatus (SCBA) is required if a large spill occurs.

Exposure Guidelines

Applicable Exposure Limits
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE

PEL	(OSHA)	: 1,000 ppm, 7,600 mg/m3, 8 Hr. TWA
TLV	(ACGIH)	: 1,000 ppm, 7,670 mg/m3, 8 Hr. TWA, A4 STEL 1,250 ppm, 9,590 mg/m3, A4
AEL *	(DuPont)	: None Established

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point	: 48 C (118 F)
Vapor Pressure	: 6.46 psia at 25 deg C (77 deg F)
Vapor Density	: 2.9 (Air = 1.0) at 25 deg C (77 deg F)
% Volatiles	: 100 WT%
Evaporation Rate	: (CCl4 = 1) Greater than 1
Solubility in Water	: 0.02 WT% @ 25 C (77 F)
pH	: Neutral
Odor	: Slight ethereal
Form	: Liquid
Color	: Clear, colorless
Density	: 1.57 g/cc at 25 deg C (77 deg F) - Liquid

STABILITY AND REACTIVITY

Chemical Stability

Material is stable. However, avoid open flames and high temperatures.

Incompatibility with Other Materials

Incompatible with alkali or alkaline earth metals- powdered Al, Zn, Be, etc.

Polymerization

Polymerization will not occur.

Other Hazards

Decomposition : Decomposition products are hazardous. This compound can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrochloric and hydrofluoric acids, and possibly carbonyl halides.

TOXICOLOGICAL INFORMATION

Animal Data

SKIN: ALD, rabbit: >11,000 mg/k
INGESTION: LD50, rat: 43,000 mg/kg
INHALATION: 4 hour, LC50, rat: 50,000 ppm

Animal testing indicates this material is a slight eye irritant.

Animal testing indicates this material is a mild skin irritant, and is a skin sensitizer. Repeated exposure caused inflammation of the skin and pathological changes of the liver.

Single exposure by ingestion caused pathological changes of the lungs, liver, stomach, gastrointestinal tract, kidneys. Other effects include lethargy, and altered respiratory rate. Repeated exposure caused increased mortality.

Single exposure by inhalation caused pathological changes of the kidneys, liver, lungs and increased lung weight. Other effects include altered respiratory rate, incoordination, excessive activity, tremors or convulsions, inactivity or anaesthesia, cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of epinephrine, cyanosis and increased mortality.

Long-term exposure caused decreased body weight. Other effects include altered hematology and clinical chemistry.

Reproductive data on rats show no change in reproductive performance.

This material has not produced genetic damage in bacterial cultures. In mammalian cell cultures this material has caused genetic toxicity. In animal testing, this material has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic damage).

In animal testing this material has not caused carcinogenicity or developmental toxicity.

ECOLOGICAL INFORMATION

Ecotoxicological Information

Aquatic Toxicity:

96-hour LC50, rainbow trout : 7.4 mg/L
96 hour LC50, fathead minnows: 1250 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal

Comply with Federal, State, and local regulations. Remove to a permitted waste disposal facility. EPA Hazardous Waste Nos. F001 and F002 may apply to waste materials.

TRANSPORTATION INFORMATION

Shipping Information

Shipping Containers

Tank Cars.
Tank Trucks.

Drums
NOT REGULATED AS A HAZARDOUS MATERIAL BY DOT OR IMO.

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : No
Fire : No
Reactivity : No
Pressure : No

HAZARDOUS CHEMICAL LISTS

SARA Extremely
Hazardous Substance - No
CERCLA Hazardous Substance - No
SARA Toxic Chemical - See Components Section

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating

Health	: 1
Flammability	: 0
Reactivity	: 1

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS	: MSDS Coordinator
>	: DuPont Fluoroproducts
Address	: Wilmington, DE 19898
Telephone	: (800) 441-7515

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

Shell Canada Limited
Material Safety Data Sheet

Effective Date: 2010-05-07
Supersedes: 2007-05-25

Class B2 Flammable Liquid

Class D2A Carcinogenicity

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**REGULAR UNLEADED GASOLINE**
SYNONYMS:	Automotive Fuel Petrol
PRODUCT USE:	Fuel
PRODUCT CODE:	**211-001**

SUPPLIER
Shell Canada Limited (SCL)
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

TELEPHONE NUMBERS

Shell Emergency Number	1-800-661-7378
CANUTEC 24 HOUR EMERGENCY NUMBER	1-613-996-6666
For general information:	1-800-661-1600
	www.shell.ca

This MSDS was prepared by the Toxicology and Product Stewardship Section of Shell Canada Limited.
*An asterisk in the product name designates a trade-mark of Shell Brands International AG. Used under license.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Gasoline	86290-81-5	> 90	Yes
Benzene	71-43-2	< 1.5	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Volatile Liquid Colourless Typical Gasoline Odour
Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.
Hazards:

Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Flammable Liquid.
Contains Benzene.
May cause cancer.

Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
May be absorbed by skin contact.
In rare cases may sensitize heart muscle causing heart arrythmia.

Handling: Eliminate all ignition sources.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Avoid prolonged exposure to vapours.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID MEASURES

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for at least 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Do not give anything by mouth to an unconscious person.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

Firefighting Instructions: Flammable. Clear area of unprotected personnel. Do not use a direct stream of water as it may spread fire. Product will float and can be reignited on surface of water. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Avoid breathing vapours. Use water to cool fire exposed containers. Vapours may travel along ground and flashback along vapour trail may occur. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus. Delayed lung damage can be experienced after exposure to combustion products, sometimes hours after the exposure.

Hazardous Combustion Products: Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Flammable". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling

equipment must be grounded. Work upwind of spill if it is safe to do so. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain spills to water by booming. Use water fog to knock down vapours; contain runoff. Adsorb residue or small spills with adsorbent material and remove to non-leaking containers for disposal. Notify appropriate environmental agency(ies). After area has been cleaned up to the satisfaction of regulatory authorities, flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations.

7. HANDLING AND STORAGE

Handling: Flammable. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Avoid breathing vapours and prolonged or repeated contact with skin. Vapours may accumulate and travel to distant ignition sources and flashback. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not pressurize drum containers to empty them. Do not cut, drill, grind, weld or perform similar operations on or near containers. Provide adequate ventilation. Launder contaminated clothing prior to reuse. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities.

Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Use explosion-proof ventilation to prevent vapour accumulation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

The following information, while appropriate for this product, is general in nature. The selection of personal protective equipment will vary depending on the conditions of use.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

The exposure limits listed here are provided for guidance only. Consult local, provincial and territorial authorities for specific values.
Gasoline: 300 ppm (STEL: 500 ppm)
Benzene (skin) : 0.5 ppm (STEL: 2.5 ppm)
Benzene: Shell internal standard is 0.5 ppm or 1.6 mg/m3 (8-12 hour time-weighted average limit), 2.5 ppm or 8 mg/m3 (15-minute short term limit)
Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation: Concentrations in air should be maintained below the occupational exposure limit if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. Local ventilation recommended where general ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.

Skin Protection: Avoid contact with skin. Use protective clothing and gloves manufactured from nitrile. Safety showers should be available for emergency use.

Respiratory Protection: Avoid breathing vapour or mists. If exposure has the potential to exceed occupational exposure limits, use an appropriate NIOSH-approved respirator. For high airborne concentrations, use a NIOSH-approved supplied-air respirator, either self-contained or airline breathing apparatus, operated in positive pressure mode.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Volatile Liquid
Appearance:	Colourless
Odour:	Typical Gasoline Odour
Odour Threshold:	< 0.25 ppm
Freezing/Pour Point:	Not available
Boiling Point:	35 - 220 °C
Density:	720 - 760 kg/m3 @ 15 °C
Vapour Density (Air = 1):	3.5
Vapour Pressure (absolute):	< 107 kPa @ 38 °C
Specific Gravity (Water = 1):	0.74
pH:	Not applicable
Flash Point:	TCC -30 °C
Lower Flammable Limit:	1.4 % (vol.)
Upper Flammable Limit:	7.6 % (vol.)
Autoignition Temperature:	280 °C
Viscosity:	< 1 mm2/s @ 38 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{OW}):	2.3
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents
Formula:	C4 - C11

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Incompatible Materials:	Avoid contact with strong oxidizing agents and acids.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
Gasoline	LD50 Oral Rat > 18 mL/kg LD50 Dermal Rabbit > 5 mL/kg
Benzene	LD50 Oral Rat 690 - 3400 mg/kg LC50 Inhalation Rat 13700 ppm for 4 hours LD50 Dermal Rabbit > 8260 mg/kg

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.

Formulation: No data is specifically available for this product and therefore this toxicological information is based on testing completed with the ingredients.

Irritancy: Based on testing with similar materials, this product is not expected to be a primary skin irritant after exposure of short duration, would not be a skin sensitizer and would not be irritating to the eye.

Acute Toxicity: Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.

Chronic Effects: Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression. Prolonged and repeated exposure may cause serious injury to blood forming organs, resulting in anemia and similar conditions. Myelodysplastic syndrome (MDS) has been observed in people exposed to very high levels (50 to 300 ppm) of benzene over a long period of time in the workplace. The relevance of these results to lower levels of exposure is not known.

Carcinogenicity and Mutagenicity: According to the International Agency for Research on Cancer (IARC) this product is considered to be possibly carcinogenic to humans. This product contains benzene. Carcinogenic hazard. Repeated exposure to benzene concentrations greater than the recommended TLV/TWA may reduce the cellular components of peripheral blood and bone marrow. Epidemiological studies indicate that long term inhalation of benzene vapour can cause leukaemia in man. Benzene has also produced chromosomal aberrations in peripheral blood lymphocytes. May cause heritable genetic damage.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches.

Biodegradability: Inherently biodegradable.
Rapid volatilization.

Bioaccumulation: Potential for bioaccumulation.

Partition Coefficient (log K_{ow}): 2.3

Aquatic Toxicity: Product is expected to be toxic to aquatic organisms.

Ingredient:	Toxicological Data
Gasoline	LL50 (WAF method) Rainbow Trout (96hr) 1 - 10 mg/L. EL50 (WAF method) Daphnia Magna (48hr) 1 - 10 mg/L. EL50 - growth rate (WAF method) Algae (72hr) 1 - 10 mg/L.
Benzene	LL50 Rainbow Trout (96hr) 1 - 10 mg/L. EL50 Daphnia Magna (48hr) 10 - 100 mg/L. EL50 - growth rate Algae (72hr) 10 - 100 mg/L.

Definition(s): LL and EL are the lethal loading concentration and effective loading concentration respectively. The concentration represents the amount of substance added to the system to obtain a toxic concentration. They replace the traditional LC and EC for low solubility substances.
WAF is the water accommodated fraction. A slightly soluble hydrocarbon is stirred

into water and the insoluble portions are removed. The remaining solution is the water accommodated fraction.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORT INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1203
Proper Shipping Name	GASOLINE
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG II
Additional Information	Marine Pollutant
Shipping Description	GASOLINE Class 3 UN1203 PG II Marine Pollutant

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Class:	Class B2 Flammable Liquid Class D2A Carcinogenicity
DSL/NDSL Status:	This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act. This product and/or all components are listed on the U.S. EPA TSCA Inventory.
Other Regulatory Status:	The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

16. OTHER INFORMATION

LABEL STATEMENTS

Hazard Statement :	Flammable Liquid. Contains Benzene. May cause cancer.
Handling Statement:	Eliminate all ignition sources. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Avoid prolonged exposure to vapours. Empty containers are hazardous, may contain flammable/ explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.
First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water.

If overcome by vapours remove to fresh air.
Do not induce vomiting.
Obtain medical attention.

Revisions: This MSDS has been reviewed and updated. Section 4 Section 5 Section 7 Section 8 Section 11 Section 15

MATERIAL SAFETY DATA SHEET

1 - PRODUCT AND COMPANY IDENTIFICATION

Supplier: AccuStandard, Inc.
125 Market Street
New Haven, CT 06513

Date MSDS Printed: 10/5/2007
Preparation Date: 10/5/2007
Information Phone Number: 203-786-5290
Emergency Phone Number: 203-786-5290
Hours: Mon. to Fri. 8am-5pm EDT

Catalog Number: **P-053S-10X**
Product Name: Heptachlor
Synonyms: N/A
Formula: N/A

Molecular Weight: N/A

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Component(s) (1)	CAS #	Appr. %	ACGIH-TLV (mg/m3) TWA	ACGIH-TLV (mg/m3) STEL skin	OSHA-PEL (mg/m3) TWA	OSHA-PEL (mg/m3) STEL skin
Heptachlor	76-44-8	0.10	0.05	x	0.5	x
Methanol	67-56-1	99.90	262	328 x	260	

SECTION 3 - HAZARDS IDENTIFICATION

Health and Environmental Hazards/Symptoms of Exposure:

Over exposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure. After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours. May cause eye, kidney, liver, and skin damage. May cause central nervous system damage. POISON: May be fatal or cause blindness if swallowed. Fetal development abnormalities and effects on embryo or fetus have been reported from prolonged exposure to methanol in laboratory tests involving pregnant rats.

Potential Health Effects:

Irritating to eyes.
Irritating to skin.
Toxic if absorbed through skin.
Irritating to mucous membrane and upper respiratory system.
Toxic if inhaled or swallowed.

Routes of Entry:

Inhalation, ingestion or skin contact.

Carcinogenicity:

This product is or contains a component that is classified (ACGIH, IARC, NTP, OSHA) as a possible cancer hazard.

SECTION 4 - FIRST AID MEASURES

Emergency First Aid:

Get medical assistance for all cases of overexposure.
Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.
Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.
Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

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Ingestion: Do NOT induce vomiting. Call a physician immediately. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: 52 °F (11 °C) (tcc)
Flammable Limits LEL (%): 6.7
Flammable Limits UEL (%): 36.5
Autoignition Temperature: 385 °C

Dangerous fire and explosive hazard.
Containers can build up pressure if exposed to heat.
Vapors can travel to a source of ignition and flash back.
During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Fire Fighting Procedures:

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spill Response:

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tighly closed container.
Store in a cool area away from ignition sources and oxidizers.
Avoid breathing vapors or mists.
Use with adequate ventilation.
Do not get in eyes, on skin or clothing.
Avoid prolonged or repeated exposure.
This product should only by used by persons trained in the safe handling of hazardous chemicals.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls and Personal Protection Equipment (PPE):

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.
Material should be handled or transferred in an approved fume hood or with adequate ventilation.
(Chloroprene, natural rubber, nitrile, or equivalent)
Safety glasses with side shields must be worn at all times.
Safety glasses with side shields must be worn at all times.

General Hygiene Considerations:

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid
Odor: N/A
pH: N/A
Vapor Pressure: 97 mmHg (20 °C)

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Vapor Density (Air = 1): 1.1 g/L
Boiling Point: 65 °C
Melting Point: -93.9 °C
Solubility in Water (%): Very soluble
Specific Gravity (H_2O = 1): 0.791 g/cm3
Flash Point: 52 °F (11 °C) (tcc)
Explosion Limits (%): 6.7 to 36.5
Autoignition Temperature: 385 °C
Percent Volatile: 99.9+
Evaporation Rate (BuAc = 1): 5.9
Molecular Weight: N/A
Molecular Formula: N/A

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Conditions To Avoid: Heat; Contact with ignition sources
Materials To Avoid: Acids
Oxidizers
Alkali metals; Reducing agents

Hazardous Decomposition: Carbon oxides; Formaldehyde
Hazardous Polymerization: Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

See section 3 for specific toxicological information for the ingredients of this product.

SECTION 12 - ECOLOGICAL INFORMATION

By complying with sections 6 and 7 there will be no release to the environment.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

DOT UN Number: UN1230 Shipping Class: 3 Packing Group: II FLAMMABLE

SECTION 15 - REGULATORY INFORMATION

In addition to Federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

Not all components are listed on the TSCA Inventory. For research and development use only. Not for manufacturing or commercial purposes.
WARNING: This product contains chemical(s) known to the state of California to cause cancer and to cause birth defects or other reproductive harm.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI and CHIPs regulations.

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The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. It is intended for use only by persons having the necessary technical skill and at their own discretion and risk. Since conditions and manner of use are outside our control, we make
NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

* * * End of Document * * *

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MATERIAL SAFETY DATA SHEET (MSDS)

Click here for the WHMIS English version

Material Safety Data Sheet

Section 1. Product and Company Identification

Product Name **n-Hexane**
Product Code HX0295
Manufacturer EM Science
A Division of EM Industries
P.O. Box 70
480 Democrat Road
Gibbstown, N.J. 08027
Effective Date **4/29/2002**

For More Information Call
856-423-6300 Technical Service
Monday-Friday: 8:00 AM - 5:00 PM

In Case of Emergency Call
800-424-9300 CHEMTREC (USA)
613-996-6666 CANUTEC (Canada)
24 Hours/Day: 7 Days/Week

Synonym HEXANE
Material Uses Analytical reagent.
Chemical Family Solvent.

Section 2. Composition and Information on Ingredients

Component	CAS #	% by Weight
N-HEXANE	110-54-3	100

Section 3. Hazards Identification

Physical State and Appearance Liquid. (Colorless.)

Emergency Overview DANGER!
EXTREMELY FLAMMABLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FLASH FIRE.
ASPIRATION HAZARD.
HARMFUL IF INHALED OR SWALLOWED.
CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
CAUSES DAMAGE TO THE FOLLOWING ORGANS: PERIPHERAL NERVOUS SYSTEM, RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.

Routes of Entry Absorbed through skin. Eye contact. Inhalation. Ingestion.

Potential Acute Health Effects

Eyes Hazardous in case of eye contact (irritant). Inflammation of the eye is characterized by redness, watering, and itching.

Skin Hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Inhalation Hazardous in case of inhalation (lung irritant).

Ingestion Hazardous in case of ingestion. Aspiration hazard if swallowed- can enter lungs and cause damage.

Potential Chronic Health Effects

Carcinogenic Effects This material is not known to cause cancer in animals or humans.
Additional information See Toxicological Information (section 11)

Medical Conditions Aggravated by Overexposure: Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention immediately.
Skin Contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion	If swallowed, do NOT induce vomiting. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Section 5. Fire Fighting Measures

Flammability of the Product	Product will burn.
Auto-ignition Temperature	224.9°C (436.8°F)
Flash Points	CLOSED CUP: -23.1°C (-9.6°F).
Flammable Limits	LOWER: 1.1% UPPER: 7.5%
Products of Combustion	These products are carbon oxides (CO, CO2).
Fire Hazards in Presence of Various Substances	Extremely flammable in presence of open flames, sparks and static discharge, of shocks, of heat, of oxidizing materials.
Explosion Hazards in Presence of Various Substances	**Risks of explosion of the product in presence of static discharge:** Extremely flammable in presence of open flames, sparks and static discharge. Highly explosive in presence of open flames, sparks and static discharge. **Risks of explosion of the product in presence of mechanical impact:** Extremely flammable in presence of shocks. Extremely explosive in presence of shocks.
Fire Fighting Media and Instructions	Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.
Protective Clothing (Fire)	Be sure to use an approved/certified respirator or equivalent.
Special Remarks on Fire Hazards	Vapor may travel considerable distance to source of ignition and flash back.
Special Remarks on Explosion Hazards	Not available.

Section 6. Accidental Release Measures

Small Spill and Leak	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
Large Spill and Leak	Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.
Spill Kit Information	The following EM SCIENCE SpillSolv (TM) absorbent is recommended for this product: SX1330 Solvent Treatment Kit

+ Section 7. Handling and Storage

Handling	Keep away from heat, sparks and flame. Do not ingest. Use only with adequate ventilation. Do not get in eyes, on skin, or on clothing.
Storage	Keep container in a cool, well-ventilated area. Keep container tightly closed.

Section 8. Exposure Controls/Personal Protection

Engineering Controls Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

rsonal Protection

Eyes Splash goggles.

Body Lab coat.

Respiratory Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Hands Gloves.

Feet Not applicable.

Personal Protection in Case of a Large Spill Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Product Name	Exposure Limits
N-HEXANE	**BAUA (Germany, 1997).** Spitzenbegrenzung: 720 mg/m3 PEAK: 720 mg/m3 PEAK: 200 ppm MAK: 180 mg/m3 MAK: 180 mg/m3 MAK: 50 ppm **DK-Arbejdstylsinet (Denmark, 1996).** GV: 90 mg/m3 GV: 90 mg/m3 GV: 25 ppm **Tyoterveyslaitos (Finland, 1998).** STEL: 540 mg/m3 TWA: 180 mg/m3 **Tyterveyslaitos (Finland, 1998).** STEL: 540 mg/m3 STEL: 150 ppm TWA: 180 mg/m3 TWA: 50 ppm **INRS (France, 1996).** VME: 170 mg/m3 VME: 170 mg/m3 VME: 50 ppm **National Authority for Occupational Safety/Health (Ireland, 1999).** OEL: 70 mg/m3 OEL: 20 ppm **Arbeidsinspectie (Netherlands, 1999).** TGG 8 uur: 90 mg/m3 TGG 8 uur: 90 mg/m3 TGG 8 uur: 25 ppm **N-Arbeidstylsinet (Norway, 1996).** AN: 90 mg/m3 AN: 90 mg/m3 AN: 25 ppm **EH40-OES (United Kingdom (UK), 1997).** MEL: 72 mg/m3 MEL: 20 ppm **ACGIH (United States, 1998). Skin** TWA: 50 ppm **NIOSH REL (United States, 1994).** TWA: 180 mg/m3 Period: 10 hour(s). TWA: 50 ppm Period: 10 hour(s). **OSHA (United States, 1989).**

TWA: 180 mg/m3
OSHA Final Rule (United States, 1989).
TWA: 180 mg/m3
TWA: 50 ppm

Section 9. Physical and Chemical Properties

Odor	Characteristic.
Color	Colorless.
Physical State and Appearance	Liquid. (Colorless.)
Molecular Weight	86.2 g/mole
Molecular Formula	C6-H14
pH	Not available.
Boiling/Condensation Point	68.94°C (156.1°F)
Melting/Freezing Point	-139.39°C (-218.9°F)
Critical Temperature	234.3°C (453.7°F)
Specific Gravity	0.659 (Water = 1)
Vapor Pressure	Not available.
Vapor Density	3 (Air = 1)
Odor Threshold	130 ppm
Evaporation Rate	6.82 compared to (n-BUTYL ACETATE=1)
LogKow	Not available.
Dispersion Properties	See solubility in water.
Solubility	Partially soluble in water.

Section 10. Stability and Reactivity

Stability and Reactivity	The product is stable.
Conditions of Instability	Not available.
Incompatibility with Various Substances	Highly reactive with oxidizing agents.
Rem/Incompatibility	Not available.
Hazardous Decomposition Products	Not available.
Hazardous Polymerization	Will not occur.

Section 11. Toxicological Information

	n-Hexanes MN9275000
RTECS Number:	
Toxicity	Acute oral toxicity (LD50): 25000 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 48000 ppm 4 hour(s) [Rat].
Chronic Effects on Humans	**TERATOGENIC EFFECTS**: Classified 3 by European Union.
Acute Effects on Humans	Hazardous in case of eye contact (irritant). Inflammation of the eye is characterized by redness, watering, and itching. Hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Hazardous in case of inhalation (lung irritant). Hazardous in case of ingestion.
Synergetic Products (Toxicologically)	Not available.
Irritancy	Draize Test (Rabbit): Eyes: 10 mg/time not available. Reaction: Mild.
Sensitization	Not available.
Carcinogenic Effects	This material is not known to cause cancer in animals or humans.
Toxicity to Reproductive System	Tests on laboratory animals for reproductive effects are cited in Registry of Toxic Effects on Chemical Substances (RTECS).
Teratogenic Effects	Classified 3 by European Union.
Mutagenic Effects	Tests on laboratory animals for mutagenic effects are cited in Registry of Toxic Effects of Chemical Substances (RTECS).

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
icity of the Products	The products of degradation are less toxic than the product itself.
Biodegradation	

Section 13. Disposal Considerations

EPA Waste Number	D001
Treatment	Incineration, fuels blending or recycle. Contact your local permitted waste disposal site (TSD) for permissible treatment sites. Always contact a permitted waste disposal (TSD) to assure compliance with all current local, state, and Federal Regulations.

Section 14. Transport Information

DOT Classification	Not available.
TDG Classification	Not available.
IMO/IMDG Classification	Not available.
ICAO/IATA Classification	Not available.

Section 15. Regulatory Information

U.S. Federal Regulations

TSCA 4(a) final test rules: N-HEXANE
TSCA 8(b) inventory: N-HEXANE
SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: N-HEXANE
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: N-HEXANE: Fire Hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard
SARA 313 toxic chemical notification and release reporting: N-HEXANE
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: No products were found.
Clean air act (CAA) 112 accidental release prevention: No products were found.
Clean air act (CAA) 112 regulated flammable substances: No products were found.
Clean air act (CAA) 112 regulated toxic substances: No products were found.

WHMIS (Canada)

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
Class D-2B: Material causing other toxic effects (TOXIC).
CEPA DSL: N-HEXANE
This product has been classiifed in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.

International Regulations

EINECS

N-HEXANE 203-777-6

DSCL (EEC)

R11- Highly flammable.
R38- Irritating to skin.
R48/20- Harmful: danger of serious damage to health by prolonged exposure through inhalation.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R62- Possible risk of impaired fertility.
R65- Harmful: may cause lung damage if swallowed.
R67- Vapors may cause drowsiness and dizziness.

International Lists

Australia (NICNAS): N-HEXANE

Japan (MITI): N-HEXANE

Korea (TCCL): N-HEXANE

Philippines (RA6969): N-HEXANE
China: No products were found.

State Regulations	Pennsylvania RTK: N-HEXANE: (generic environmental hazard) Massachusetts RTK: N-HEXANE New Jersey: N-HEXANE California prop. 65: No products were found.

Section 16. Other Information

National Fire Protection Association (U.S.A.)	**Health**	**3**	**Fire Hazard**
		1	**0 Reactivity**
			Specific Hazard

Changed Since Last Revision +

Notice to Reader

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Material Safety Data Sheet

Version 3.1
Revision Date 03/03/2010
Print Date 05/04/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Hydrochloric acid
Product Number	:	H1758
Brand	:	Sigma
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Corrosive

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)

H314	Causes severe skin burns and eye damage.
H371	May cause damage to organs.

Precautionary statement(s)

P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P309 + P311	IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.
P310	Immediately call a POISON CENTER or doctor/physician.
P321	Specific treatment (see supplemental first aid instructions on this label).
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/container to an approved waste disposal plant.

HMIS Classification

Health hazard:	3
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	3
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Skin	May be harmful if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.
Ingestion	May be harmful if swallowed. Causes burns.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : HCl

CAS-No.	EC-No.	Index-No.	Concentration
Hydrochloric acid			
7647-01-0	231-595-7	017-002-01-X	37 %
Water			
7732-18-5	231-791-2	-	63 %

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Continue rinsing eyes during transport to hospital.Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
The product itself does not burn.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Do not let product enter drains.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid inhalation of vapour or mist.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Hydrochloric acid	7647-01-0	C	2 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Upper Respiratory Tract irritation Not classifiable as a human carcinogen: Agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of a lack of data. In vitro or animal studies do not provide indications of carcinogenicity which are sufficient to classify the agent into one of the other categories.				
		C	5 ppm 7 mg/m3	2006-02-28	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate. Ceiling limit is to be determined from breathing-zone air samples.				
		C	5 ppm 7 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Tightly fitting safety goggles. Faceshield (8-inch minimum).

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	light yellow
Odour	pungent

Safety data

pH	no data available
Melting point	-30 °C (-22 °F)

Boiling point	110 °C (230 °F)
Flash point	not applicable
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	227 hPa (170 mmHg) at 21.1 °C (70.0 °F) 547 hPa (410 mmHg) at 37.7 °C (99.9 °F)
Density	1.2 g/cm3 at 25 °C (77 °F)
Water solubility	soluble
Viscosity, dynamic	2.3 mPa.s at 15 °C (59 °F)

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Bases, Amines, Alkali metals, Metals, permanganates, e.g. potassium permanganate, Fluorine, metal acetylides, hexalithium disilicide

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rabbit - 900 mg/kg (Hydrochloric acid)

LC50 Inhalation - rat - 1 h - 3124 ppm(Hydrochloric acid)

Skin corrosion/irritation
no data available (Hydrochloric acid)

Serious eye damage/eye irritation
no data available (Hydrochloric acid)

Respiratory or skin sensitization
no data available (Hydrochloric acid)

Germ cell mutagenicity
(Hydrochloric acid)
no data available (Hydrochloric acid)

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification. (Hydrochloric acid)

(Hydrochloric acid)

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
(Hydrochloric acid)
no data available (Hydrochloric acid)

Specific target organ toxicity - single exposure (GHS)
May cause damage to organs. (Hydrochloric acid)

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available (Hydrochloric acid)

Potential health effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion	May be harmful if swallowed. Causes burns.
Skin	May be harmful if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. (Hydrochloric acid)

Additional Information
RTECS: MW4025000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Gambusia affinis (Mosquito fish) - 282 mg/l - 96 h (Hydrochloric acid)

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available (Hydrochloric acid)

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1789 Class: 8 Packing group: II
Proper shipping name: Hydrochloric acid
Reportable Quantity (RQ): 13514 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG

UN-Number: 1789 Class: 8 Packing group: II EMS-No: F-A, S-B
Proper shipping name: HYDROCHLORIC ACID
Marine pollutant: No

IATA
UN-Number: 1789 Class: 8 Packing group: II
Proper shipping name: Hydrochloric acid

15. REGULATORY INFORMATION

OSHA Hazards
Corrosive

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

	CAS-No.	Revision Date
Hydrochloric acid	7647-01-0	1993-04-24

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Hydrochloric acid	7647-01-0	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Hydrochloric acid	7647-01-0	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Hydrochloric acid	7647-01-0	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Mallinckrodt Baker

Mallinckrodt CHEMICALS

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	HYDROFLUORIC ACID
Version #	03
Revision date	01-06-2010
CAS #	Mixture
Product Codes	J.T.Baker: 20659, 5368, 5659, 5818, 5823, 5824, 5840, 5865, 5900, 5901, 6904, 9559, 9560, 9563, 9564, 9567, 9570, 9572, 9573, 9574, 9785 Mallinckrodt: 2640, 2648, V141, V580
Synonym(s)	FLUOROHYDRIC ACID * FLUORIC ACID * HYDROGEN FLUORIDE SOLUTION
Manufacturer	Mallinckrodt Baker, Inc.
Address	222 Red School Lane Phillipsburg, NJ 08865 US
Customer Service	800-582-2537
24 Hour Emergency	908-859-2151
Chemtrec	800-244-4444

2. Hazards Identification

Emergency overview	DANGER Extremely hazardous liquid and vapor. May be fatal if swallowed. May be fatal if absorbed through skin. May be fatal if inhaled. Corrosive. Causes skin and eye burns. Prolonged exposure may cause chronic effects. Contact with metals may evolve flammable hydrogen gas.
OSHA regulatory status	This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects	
Routes of exposure	Inhalation. Ingestion. Skin contact. Eye contact.
Eyes	Corrosive to the eyes and may cause severe damage including blindness. Causes eye burns. Very toxic in contact with eyes. Risk of serious damage to eyes. Do not get this material in contact with eyes.
Skin	Corrosive. Very toxic in contact with skin. Causes severe skin burns. The fluoride ion readily penetrates the skin causing destruction of deep tissue layers and even bone. Do not get this material in contact with skin.
Inhalation	Corrosive. Causes burns. Very toxic by inhalation. Prolonged inhalation may be harmful. Sore throat. Coughing. Difficulty in breathing. Do not breathe dust/fume/gas/mist/vapors/spray.
Ingestion	Corrosive. Very toxic if swallowed. Components of the product may be absorbed into the body by ingestion. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Do not ingest.
Target organs	Bone. Eyes. RESPIRATORY SYSTEM. Skin.
Chronic effects	Intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream.
Signs and symptoms	Contact with this material will cause burns to the skin, eyes and mucous membranes. Symptoms are prostration, gasping, pallor, and uncoordinated movements. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Symptoms may include redness, edema, drying, defatting and cracking of the skin. Irritation of nose and throat. Irritation of eyes and mucous membranes.
Potential environmental effects	*Components of this product are hazardous to aquatic life. May cause long-term adverse effects in the environment.*

3. Composition / Information on Ingredients

Components	CAS #	Percent
HYDROGEN FLUORIDE	7664-39-3	40 - 60
Other components below reportable levels		40 - 60

4. First Aid Measures

First aid procedures

Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

Skin contact
Immediately remove contaminated clothing under a shower and flush exposed areas with large quantities of water for five minutes. Wash carefully behind ears, under nails and in skin folds. Get immediate medical assistance. For those providing assistance, avoid further skin contact to yourself and others. Wear HF impervious clothing with face shield or goggles and HF impervious gloves. If available, apply calcium gluconate gel (2.5%) into burn area continuously for 15 minutes. If calcium gluconate gel is not available, continue to wash exposed areas with water until patient is seen by a physician and is taken to a hospital. Insure that contaminated clothing and shoes are properly bagged and discarded. Insure that jewelry is removed and soaked in calcium gluconate solution to decontaminate.

Inhalation
Move to fresh air. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician or poison control center immediately.

Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting without advice from poison control center. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Rinse mouth thoroughly. If vomiting occurs, kee head low so that stomach content doesn't get into the lungs.

Notes to physician
In case of shortness of breath, give oxygen. Keep victim warm.

General advice
Immediate medical attention is required. In case of shortness of breath, give oxygen. Keep victim warm. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Calcium gluconate gel 2.5% should be available in close proximity to the work place.

5. Fire Fighting Measures

Flammable properties
The product is not flammable. Not flammable, but reacts with most metals to form flammable hydrogen gas.

Extinguishing media

Suitable extinguishing media
Water.

Protection of firefighters

Protective equipment and precautions for firefighters
In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Specific methods
In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers.

6. Accidental Release Measures

Personal precautions
Ventilate the area. Remove sources of ignition. Keep unnecessary personnel away. Local authorities should be advised if significant spillages cannot be contained. Keep out of low areas. Keep people away from and upwind of spill/leak. Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Avoid skin contact and inhalation of vapors during disposal of spills.

Environmental precautions	Prevent further leakage or spillage if safe to do so. Do not contaminate water.
Methods for containment	Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.
Methods for cleaning up	Should not be released into the environment. Large Spills: Dike far ahead of spill for later disposal. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Never return spills in original containers for re-use. Following product recovery, flush area with water. Clean surface thoroughly to remove residual contamination. Porous materials (concrete, wood, plastic, etc.) will absorb HF and become a hazard for an indefinite time. J. T. Baker Hydrofluoric Acid Emergency Cleanup Kit is recommended for spills of this product.

7. Handling and Storage

Handling	Do not breathe dust/fume/gas/mist/vapors/spray. Do not get this material in contact with eyes. Do not get this material in contact with skin. Do not get this material on clothing. Do not use in areas without adequate ventilation. Wear personal protective equipment. Avoid prolonged exposure. Wash thoroughly after handling. Handle and open container with care. Considerable heat is generated when water or acid is added, therefore when making solutions always add the caustic to the water or acid with constant stirring.
Storage	Store locked up. Store in a well-ventilated place. Keep container tightly closed. Keep out of the reach of children. Use care in handling/storage. Keep away from food, drink and animal feedingstuffs. Do not store in metal containers.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components	Type	Value
HYDROGEN FLUORIDE (7664-39-3)	Ceiling	2.0000 ppm
	TWA	0.5000 ppm
		2.5000 mg/m3

U.S. - OSHA

Components	Type	Value
HYDROGEN FLUORIDE (7664-39-3)	PEL	2.5000 mg/m3
	STEL	6.0000 ppm
	TWA	2.5000 mg/m3
		3.0000 ppm

Engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal protective equipment

Eye / face protection	Do not get in eyes. Chemical goggles are recommended. Face-shield. Provide eyewash station and safety shower.
Skin protection	Do not get this material in contact with skin. Do not get this material on clothing. Wear chemical protective equipment that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations. Use chemical splash goggles and face shield (ANSI Z87.1 or approved equivalent). Chemical resistant gloves.

Respiratory protection	Do not breathe dust/fume/gas/mist/vapors/spray. Wear positive pressure self-contained breathing apparatus (SCBA). Chemical respirator with acid gas cartridge.
General hygeine considerations	Do not get in eyes. Do not get this material in contact with skin. Do not get this material on clothing. When using, do not eat, drink or smoke. Keep away from food and drink. Handle in accordance with good industrial hygiene and safety practice.

9. Physical & Chemical Properties

Appearance	Fuming liquid.
Color	Colorless.
Odor	Strong. Irritating.
Odor threshold	Not available.
Physical state	Liquid.
Form	Liquid.
pH	1 (0.1M solution)
Melting point	-43.6 °F (-41.68 °C) estimated
Freezing point	-43.6 °F (-41.68 °C) estimated
Boiling point	140 °F (60 °C) estimated
Flash point	Not available.
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	611 hPa estimated
Vapor density	1.97
Specific gravity	0.9909 estimated
Relative density	Not available.
Solubility (water)	Miscible.
Partition coefficient (n-octanol/water)	Not available
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Percent volatile	50 % estimated
Molecular weight	20.01
Molecular formula	HF in Aqueous Solution.

10. Chemical Stability & Reactivity Information

Chemical stability	Stable at normal conditions. Contact with certain metals liberates flammable gas.
Conditions to avoid	Reacts violently with strong alkaline substances. This product may react with reducing agents. Do not mix with other chemicals.
Incompatible materials	Incompatible with bases. This product may react with reducing agents. May be corrosive to metals.
Hazardous decomposition products	Hydrogen fluoride.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Product	Test Results
HYDROFLUORIC ACID (Mixture)	Acute Inhalation LC50 Mouse: 1000 mg/l estimated
Components	**Test Results**
HYDROGEN FLUORIDE (7664-39-3)	Acute Inhalation LC50 Mouse: 500 mg/l 1.00 Hours
	Acute Inhalation LC50 Rat: 1278 mg/l 1.00 Hours

* Estimates for product may be based on additional component data not shown.

Sensitization

US ACGIH Threshold Limit Values: Skin designation

HYDROGEN FLUORIDE (CAS 7664-39-3) Can be absorbed through the skin.

Acute effects Causes burns.

Local effects Very toxic by inhalation, in contact with skin and if swallowed.

Chronic effects Hazardous by OSHA criteria. Prolonged exposure may cause chronic effects.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

ACGIH Carcinogens

HYDROGEN FLUORIDE (CAS 7664-39-3) A4 Not classifiable as a human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

HYDROGEN FLUORIDE (CAS 7664-39-3) 3 Not classifiable as to carcinogenicity to humans.

Skin corrosion/irritation Hazardous by OSHA criteria.

Epidemiology Not available.

Neurological effects Not available.

12. Ecological Information

Ecotoxicity Components of this product are hazardous to aquatic life. Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.

Environmental effects Harmful to aquatic organisms.

Persistence and degradability Not available.

13. Disposal Considerations

Waste codes D002: Waste Corrosive material [pH <=2 or =>12.5, or corrosive to steel]

US RCRA Hazardous Waste U List: Reference

HYDROGEN FLUORIDE (CAS 7664-39-3) U134

Disposal instructions Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. Dispose in accordance with all applicable regulations.

14. Transport Information

DOT

Basic shipping requirements:

UN number UN1790

Proper shipping name Hydrofluoric acid (with not more than 60% strength) (RQ = 200 LBS)

Hazard class 8

Subsidiary hazard class 6.1

Packing group II

Additional information:

Special provisions A6, A7, B15, IB2, N5, N34, T8, TP2, TP12

Packaging exceptions 154

Packaging non bulk	202
Packaging bulk	243
ERG number	157

IATA

Basic shipping requirements:

UN number	1790
Proper shipping name	Hydrofluoric acid 60% or less strength
Hazard class	8
Subsidiary hazard class	6.1
Packing group	II

IMDG

Basic shipping requirements:

UN number	1790
Proper shipping name	HYDROFLUORIC ACID solution, with not more than 60% hydrogen flouride
Hazard class	8
Subsidiary hazard class	6.1
Packing group	II

DOT

IATA

IMDG

15. Regulatory Information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Spill: Reportable quantity

HYDROGEN FLUORIDE (CAS 7664-39-3) 100 LBS

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold Planning Quantity

HYDROGEN FLUORIDE (CAS 7664-39-3) 100 LBS

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

HYDROGEN FLUORIDE (CAS 7664-39-3) 1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

HYDROGEN FLUORIDE (CAS 7664-39-3) Listed.

CERCLA (Superfund) reportable quantity

HYDROGEN FLUORIDE: 100.0000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - No Pressure Hazard - No Reactivity Hazard - Yes
Section 311 hazardous chemical	Yes

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

HYDROGEN FLUORIDE (CAS 7664-39-3)	100 LBS
	500 LBS

US - Pennsylvania RTK - Hazardous Substances: Listed substance

HYDROGEN FLUORIDE (CAS 7664-39-3)	Listed.

Saf-T-Data

Health: 4 - Extreme (Poison)
Flammability: 0 - None
Reactivity: 2 - Moderate
Contact: 4 - Extreme (Corrosive)
Lab Protective Equip: D - GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: W - White (Corrosive)

16. Labeling Info

Label Hazard Warning DANGER

Extremely hazardous liquid and vapor. Corrosive. Causes skin and eye burns. May be fatal if inhaled, absorbed through skin, or swallowed. Prolonged exposure may cause chronic effects. Contact with metals may evolve flammable hydrogen gas.

Label Precautions Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed.

Label First Aid	Immediately flush eyes with plenty of water for at least 15 minutes. Continue rinsing. Get medical attention immediately. Immediately remove contaminated clothing under a shower and flush exposed areas with large quantities of water for five minutes. Wash carefully behind ears, under nails and in skin folds. Get immediate medical assistance. For those providing assistance, avoid further skin contact to yourself and others. Wear HF impervious clothing with face shield or goggles and HF impervious gloves. If available, apply calcium gluconate gel (2.5%) into burn area continuously for 15 minutes. If calcium gluconate gel is not available, continue to wash exposed areas with water until patient is seen by a physician and is taken to a hospital. Insure that contaminated clothing and shoes are properly bagged and discarded. Insure that jewelry is removed and soaked in calcium gluconate solution to decontaminate. If gas/fume/vapor/dust/mist from the material is inhaled, remove the affected person immediately to fresh air. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Get medical attention immediately. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do not induce vomiting without advice from poison control center. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Rinse mouth thoroughly. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

17. Other Information

NFPA ratings	Health: 4 Flammability: 0 Instability: 1
Disclaimer	The information in the sheet was written based on the best knowledge and experience currently available. Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
Issue date	01-06-2010

MATERIAL SAFETY DATA SHEET

CORCO

CORCO CHEMICAL CORPORATION • TYBURN ROAD & CEDAR LANE • FAIRLESS HILLS, PA. 19030 • 215/295-5006
Manufacturers of Reagent and Electronic Chemicals

IDENTITY (As Used on Label and List)	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
isoPropyl Alcohol #1901	

Section I

Manufacturer's Name Corco Chemical Corporation	Emergency Telephone Number (215) 295-5006/5007
Address (Number, Street, City, State, and ZIP Code) Tyburn Rd. & Cedar Lane	Telephone Number for Information
Fairless Hills, Penna. 19030	Date Prepared 6/13/06 (3/02-3/04)
	Signature of Preparer (optional)

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
isoPropyl Alcohol, C_3H_8O	400 ppm	not reported	IDLH	
	980 mg/m^3		12000 ppm	

Common Names (Synonyms)

iso-Propanol
2-Propanol
~~Sec-Propyl Alcohol~~
Dimethylcarbinol
Petrohol
IPA

NOTE: NIOSH STEL
500 ppm (1225 mg/m^3)

Indexed as:
CAS 67-63-0
RTECS NT 8050000
UN 1219
NFPA 130
DOT Flammable Liquid

Section III — Physical/Chemical Characteristics

Boiling Point 82.5°C	180°F	Specific Gravity (H_2O = 1) @ 20°/4°C	0.7854
Vapor Pressure (mm Hg) @ 20°C	33	Melting Point -89°C	-128°F
Vapor Density (AIR = 1)	2.07	Evaporation Rate (Butyl Acetate = 1)	n/a

Solubility in Water
Miscible

Appearance and Odor
Colorless liquid, Odor of Rubbing Alcohol

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
53°F (11.6°C) C. C.		2%	12%

Extinguishing Media
CO_2, Dry chemical, Alcohol Foam, Water Spray

Special Fire Fighting Procedures
Wear self-contained breathing apparatus and full protective equipment.
Cool flame exposed containers with water until well after fire is out.

Unusual Fire and Explosion Hazards
Auto ignition @ 852°F. Flame of alcohol fire may not be visible!!

Container may explode in heat of fire.

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		Heat, Spark, Flame
	Stable	x	

Incompatibility (*Materials to Avoid*)
Strong Oxidizers

Hazardous Decomposition or Byproducts
CO_x

Hazardous Polymerization			Conditions to Avoid
	May Occur		Heat, Spark, Flame, Oxidizers
	Will Not Occur	x	

Section VI — Health Hazard Data

Route(s) of Entry	Inhalation?	Skin?	Ingestion?
	yes	yes	yes

Health Hazards (*Acute and Chronic*)
Eye, Nose, Throat irritant. Narcosis at high concentrations. Product not considered an important toxic hazard and has good warning properties.

Ingestion of 100 ml may be fatal.

Carcinogenicity	NTP?	IARC Monographs?	OSHA Regulated?
	not reported	Reported: Indefinite	not as carcinogen

Note: Possible carcinogen-consult literature.

Signs and Symptoms of Exposure
Flushing, Headache, Mental depression, Nausea, Vomiting, Narcosis, Coma, Ingestion may be fatal.

Medical Conditions
Generally Aggravated by Exposure
Eye, Skin, Sinuses, Respiratory

Emergency and First Aid Procedures
Eye, Skin- immediate water flush. Inhalation--Fresh air, Artificial respiration. Ingestion- if conscious induce vomit. Call Physician!!

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled Eliminate ignition sources. For major spill, wear self-contained breathing apparatus and full protective equipment. Use water spray to recuce vapors. Take up with non-combustible absorbent and containerize for later disposal.

Waste Disposal Method
To be performed in compliance with all Local, State, and Federal regulations.

Precautions to Be Taken in Handling and Storing
Avoid breathing vapor. Do not get liquid or vapor in Eyes, on Skin, on Clothing. Keep container closed, away from heat and flame.

Other Precautions
Observe all precautions when handling "Empty" containers and possible residue therein.

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)
Full face organic vapor chemical cartridge respirator @ 1000 ppm

Ventilation		
	Local Exhaust: Recommended (Explosion Proof)	Special
	Mechanical (General): Recommended (Explosion Proof)	Other

Protective Gloves	Eye Protection
Rubber	Full face shield; Splash goggles

Other Protective Clothing or Equipment
Grounded containers. Protective coveralls. Eye wash. Safety Shower.

Work/Hygienic Practices
Work safely. Respect the material. Wash after handling.

• USOPO 1986-491-529/45775-EA

Material Safety Data Sheet

1. Chemical product and company identification

Product name	KEROSENE
MSDS #	0000002686
Historic MSDS #:	None.
Code	0000002686
Synonyms	1-K Kerosene, 2-K Kerosene
Supplier	BP Products North America Inc. 150 West Warrenville Road Naperville, Illinois 60563-8460 USA
EMERGENCY HEALTH INFORMATION:	1 (800) 447-8735 Outside the US: +1 703-527-3887 (CHEMTREC)
EMERGENCY SPILL INFORMATION:	1 (800) 424-9300 CHEMTREC (USA)
OTHER PRODUCT INFORMATION	1 (866) 4 BP - MSDS (866-427-6737 Toll Free - North America) email: bpcares@bp.com

2. Composition/information on ingredients

Ingredient name	CAS #	%
.erosene	8008-20-6	100
Contains:		
xylene	1330-20-7	< 1
Naphthalene	91-20-3	0.5 - 1

3. Hazards identification

Physical state Liquid.

Color Clear. (may be dyed)

Emergency overview WARNING!

COMBUSTIBLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FLASH FIRE.
HARMFUL IF SWALLOWED.
ASPIRATION HAZARD.
HARMFUL OR FATAL IF LIQUID IS ASPIRATED INTO LUNGS.
CAUSES SKIN IRRITATION.
MAY CAUSE RESPIRATORY TRACT IRRITATION.
INHALATION CAUSES HEADACHES, DIZZINESS, DROWSINESS AND NAUSEA AND MAY LEAD TO UNCONSCIOUSNESS.

Do not ingest. If ingested do not induce vomiting. Avoid contact with eyes, skin and clothing. Do not breathe vapor or mist. Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation Wash thoroughly after handling.

Routes of entry Dermal contact. Eye contact. Inhalation. Ingestion.

Potential health effects

Eyes	Slightly irritating to the eyes.
Skin	Causes skin irritation.
Inhalation	May cause respiratory tract irritation. Inhalation causes headaches, dizziness, drowsiness, and nausea, and may lead to unconsciousness. See toxicological Information (section 11).
Ingestion	Aspiration hazard if swallowed – harmful or fatal if liquid is aspirated into lungs. Ingestion may cause gastrointestinal irritation and diarrhea. See toxicological Information (section 11).
Medical conditions aggravated by over-exposure	None identified.

See toxicological Information (section 11).

4. First aid measures

Eye contact	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get medical attention if irritation develops.
Skin contact	Immediately wash exposed skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion	If swallowed, do NOT induce vomiting. Never give anything by mouth to an unconscious person. Aspiration hazard if swallowed- can enter lungs and cause damage. Get medical attention immediately.

5. Fire-fighting measures

Flammability of the product	Combustible liquid.
Auto-ignition temperature	210 °C (410 F)
sh point	>37.778 °C (Closed cup) Tagliabue.
Explosion limits	Lower: >0.7 % Upper: <5 %
Products of combustion	carbon oxides (CO, CO_2) (carbon monoxide, carbon dioxide) and sulfur oxides (SO_2. SO_3 etc.), aldehydes
Unusual fire/explosion hazards	Combustible liquid and vapor. Vapor may cause flash fire. Vapors may accumulate in low or confined areas, travel considerable distance to source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. Container explosion may occur under fire conditions or when heated.
Fire-fighting media and instructions	In case of fire, use water fog, foam, dry chemicals, or carbon dioxide. DO NOT FIGHT FIRE WHEN IT REACHES MATERIAL. Withdraw from fire and let it burn. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. First move people out of line-of-sight of the scene and away from windows. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.
Protective clothing (fire)	Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.
Special remarks on fire hazards	Do not use water jet.

6. Accidental release measures

Personal precautions	Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (See Section: "Exposure controls/personal protection"). Follow all fire fighting procedures (See Section: "Fire-fighting measures"). Do not touch or walk through spilled material.
Environmental precautions and clean-up methods	If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion proof means to transfer material to a sealed, appropriate container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal. Avoid contact of spilled material with soil and prevent runoff entering surface waterways. See Section 13 for Waste Disposal Information.
Personal protection in case of a large spill	Splash goggles. Chemical resistant protective suit. Boots. Chemical resistant gloves. Vapor respirator or a self-contained breathing apparatus. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. CAUTION: The protection provided by air-purifying respirators is limited. Use a positive pressure air-supplied respirator if there is any potential for an uncontrolled release, if exposure levels are not known, or if concentrations exceed the protection limits of air-purifying respirator.

7. Handling and storage

Handling	Aspiration hazard if swallowed- can enter lungs and cause damage. Never siphon by mouth. Do not ingest. If ingested do not induce vomiting. When using do not eat, drink or smoke. Avoid contact with skin and clothing. Avoid prolonged or repeated contact with skin. Avoid breathing vapors or spray mists. Avoid contact with eyes. Use only with adequate ventilation Avoid breathing vapor or mist. Do not breathe vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Empty containers may contain toxic, flammable/combustible or explosive residue or vapors. Do not cut, grind, drill, weld, reuse or dispose of containers unless adequate precautions are taken against these hazards.
orage	Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

8. Exposure controls/personal protection

Occupational exposure limits

Ingredient name	Occupational exposure limits
Kerosene	**ACGIH TLV (United States, 1/2007). Skin** TWA: 200 mg/m³ 8 hour(s).
Contains: xylene	**ACGIH TLV (United States, 1/2007).** STEL: 651 mg/m³ 15 minute(s). STEL: 150 ppm 15 minute(s). TWA: 434 mg/m³ 8 hour(s). TWA: 100 ppm 8 hour(s). **OSHA PEL (United States, 11/2006).** TWA: 435 mg/m³ 8 hour(s). TWA: 100 ppm 8 hour(s).
Naphthalene	**ACGIH TLV (United States, 1/2007).** STEL: 79 mg/m³ 15 minute(s). STEL: 15 ppm 15 minute(s). TWA: 52 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s). **OSHA PEL (United States, 11/2006).** TWA: 50 mg/m³ 8 hour(s).

TWA: 10 ppm 8 hour(s).

Some states may enforce more stringent exposure limits.

Control Measures	Provide exhaust ventilation or other engineering controls to keep the relevant airborne concentrations below their respective occupational exposure limits.
ygiene measures	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.
Personal protection	
Eyes	Avoid contact with eyes. Safety glasses with side shields.
Skin and body	Avoid contact with skin and clothing. Wear clothing and footwear that cannot be penetrated by chemicals or oil.
Respiratory	Use only with adequate ventilation Do not breathe vapor or mist. If ventilation is inadequate, use a NIOSH certified respirator with an organic vapor cartridge and P95 particulate filter.
Hands	Avoid prolonged or repeated contact with skin. Wear protective gloves if prolonged or repeated contact is likely. Wear gloves that cannot be penetrated by chemicals or oil. The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions. Consult your supervisor or S.O.P. for special handling directions

Consult local authorities for acceptable exposure limits.

9. Physical and chemical properties

Physical state	Liquid.
Odor	Hydrocarbon.
lor	Clear. (may be dyed)
Heat of combustion	Not available.
Boiling point / Range	171 to 288°C (339.8 to 550.4°F)
Pour Point	-34.4 °C (-30 F)
Specific gravity	0.83 (at 15.6°C)
Vapor pressure	0.053 kPa (0.4 mm Hg) at 20°C
Vapor Density (Air = 1)	4.7
Volatility	100% (v/v)
Evaporation rate	<1
Solubility	negligible
Viscosity	Kinematic: 1 to 1.9 mm^2/s (1 to 1.9 cSt) at 40°C

10. Stability and reactivity

Stability and reactivity	Stable under recommended storage and handling conditions (See Section: "Handling and storage").
Conditions to avoid	Keep away from heat, sparks and flame. Avoid all possible sources of ignition (spark or flame).
Incompatibility with various substances	Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis. halogenated compounds .
Hazardous decomposition products	carbon oxides (CO, CO_2) (carbon monoxide, carbon dioxide)

Hazardous polymerization Will not occur.

11. Toxicological information

:ute toxicity

Aspiration of this product into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this product. Do not siphon by mouth.

Chronic toxicity

Carcinogenic effects

CONTAINS MATERIAL WHICH CAN CAUSE CANCER.
Risk of cancer depends on duration and level of exposure.
Classified 2B (Possible for human.) by IARC: [Naphthalene]
Classified 2 (Reasonably Anticipated To Be Human Carcinogens.) by NTP: [Naphthalene]

Other chronic toxicity data

Middle distillate: From skin-painting studies of petroleum distillates of similar composition and distillate range, it has been shown that these types of materials often possess weak carcinogenic activity in laboratory animals. In these tests, the material is painted on the shaved backs of mice twice a week for their lifetime. The material is not washed off between applications. Therefore, there may be a potential risk of skin cancer from prolonged or repeated skin contact with this product in the absence of good personal hygiene. This particular product has not been tested for carcinogenic activity, but we have chosen to be cautious in light of the findings with other distillate streams.

Occasional skin contact with this product is not expected to have serious effects, but good personal hygiene should be practiced and repeated skin contact avoided. This product can also be expected to produce skin irritation upon prolonged or repeated skin contact. Personal hygiene measures taken to prevent skin irritation are expected to be adequate to prevent risk of skin cancer. Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis.

NIOSH has recommended that whole diesel exhaust be regarded as a potential occupational carcinogen, exposure should be minimized to reduce potential risk.

Naphthalene has been reported to cause developmental toxicity in mice after oral exposure to relatively high dose levels, but developmental toxicity was not observed in NTP (National Toxicology Program) sponsored studies in rats and rabbits. Ingestion or inhalation of naphthalene can result in hemolysis and other blood abnormalities, and individuals (and infants) deficient in glucose-6-phosphate dehydrogenase may be especially susceptible to these effects. Inhalation of naphthalene may cause headache and nausea. Airborne exposure can result in eye irritation. Naphthalene exposure has been associated with cataracts in animals and humans.

Xylenes: Xylene has been reported to cause central nervous system effects at concentrations above the recommended exposure limit. Xylene vapor becomes irritating at relatively high levels. In one study, eye irritation was reported at exposures of 460 ppm and in one person at 230 ppm after 15 minutes. In another study, no one reported eyes, nose and throat irritation at mixed xylene exposures up to 230 ppm for 30 minutes. Dermal LD50 is expected to be greater than 10g/kg in rabbits, based on test results from similar materials.

Mixed xylenes caused slight hearing loss in rats exposed to 800 ppm in the air for 14 hours/day for six weeks. There is no information available for lower concentrations; however, similar chemicals that have caused these hearing effects at similar concentrations have not caused effects at lower concentrations.

Pregnant animals exposed to xylene or its isomers have been reported to cause development toxicity in rodents when exposed by inhalation. The developmental effects observed consisted of delayed development and minor skeletal variations, but no malformations. Because of the high exposure levels used in these studies, we do not believe that these results imply an increased risk of reproductive toxicity to workers exposed to xylene levels at or below the exposure limits.

Xylene and its isomers are not genotoxic.

Technical grade xylene has been tested in a National Toxicology Program carcinogenicity study in rats and mice dosed orally for two years. There was no evidence of carcinogenicity.

12. Ecological information

Ecotoxicity

No testing has been performed by the manufacturer.

Persistence/degradability	The biodegradability of this material has not been determined.
Mobility	Spillages may penetrate the soil causing ground water contamination.
Bioaccumulative potential	This product is not expected to bioaccumulate through food chains in the environment.
Other ecological information	Spills may form a film on water surfaces causing physical damage to organisms. Oxygen transfer could also be impaired.

13. Disposal considerations

Waste information Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Dispose of in accordance with all applicable local and national regulations.

Consult your local or regional authorities.

14. Transport information

International transport regulations

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1223	Kerosene	Combustible liquid.	III	—	**Reportable quantity** 100 lbs. (45.36 kg)
TDG Classification	UN1223	Kerosene	3	III		Not determined.
IMDG Classification	UN1223	Kerosene	3	III		Not determined.
IATA/ICAO Classification	UN1223	Kerosene	3	III		Not determined.

15. Regulatory information

U.S. Federal regulations

United States inventory (TSCA 8b): All components are listed or exempted.

TSCA 12(b) one-time export notification:: Naphthalene

This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA 311/312 MSDS distribution - chemical inventory - hazard identification. KEROSENE: Fire hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard

SARA 313

Product name	CAS number	Concentration

Reporting ents	Naphthalene xylene	91-20-3 1330-20-7	0.5 - 1 0 - 1
ıier notification	Naphthalene xylene	91-20-3 1330-20-7	0.5 - 1 0 - 1

CERCLA Sections 102a/103 Hazardous Substances (40 CFR Part 302.4):: Naphthalene: 100 lbs. (45.36 kg); xylene: 100 lbs. (45.36 kg);

ıte regulations

Massachusetts Substances: **Massachusetts RTK**: The following components are listed: Kerosene; NAPHTHALENE;XYLENE

New Jersey Hazardous Substances: **New Jersey Hazardous Substances**: The following components are listed: Kerosene; NAPHTHALENE;XYLENES

Pennsylvania RTK Hazardous Substances: **Pennsylvania RTK**: The following components are listed: Kerosene; NAPHTHALENE;BENZENE, DIMETHYL-

WARNING: This product contains a chemical known to the State of California to cause cancer. Naphthalene

May generate diesel exhaust particulate if used as fuel in compression ignition engines.

Inventories

Canada inventory: All components are listed or exempted.

Europe inventory: All components are listed or exempted.

Australia inventory (AICS): All components are listed or exempted.

China inventory (IECSC): All components are listed or exempted.

Japan inventory (ENCS): Not determined.

Korea inventory (KECI): All components are listed or exempted.

Philippines inventory (PICCS): All components are listed or exempted.

6. Other information

Label requirements

WARNING!

COMBUSTIBLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FLASH FIRE.
HARMFUL IF SWALLOWED.
ASPIRATION HAZARD.
HARMFUL OR FATAL IF LIQUID IS ASPIRATED INTO LUNGS.
CAUSES SKIN IRRITATION.
MAY CAUSE RESPIRATORY TRACT IRRITATION.
INHALATION CAUSES HEADACHES, DIZZINESS, DROWSINESS AND NAUSEA AND MAY LEAD TO UNCONSCIOUSNESS.

HMIS® Rating :

Health	* 1
Flammability	2
Physical Hazard	0
Personal protection	X

National Fire Protection Association (U.S.A.)

History

Date of issue 08/29/2007.

Date of previous issue 08/29/2007.

Prepared by Product Stewardship

Notice to reader

NOTICE : This Material Safety Data Sheet is based upon data considered to be accurate at the time of its preparation. Despite our efforts, it may not be up to date or applicable to the circumstances of any particular case. We are not responsible for any damage or injury resulting from abnormal use, from any failure to follow appropriate practices or from hazards inherent in the nature of the product.

MATERIAL SAFETY DATA SHEET

========== CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ==========

TRADE NAME: LOW SULFUR K1
CAS NUMBER: 64741-77-1
SYNONYM(S): S-147; AB0/AA9-4; AG13; AK3; MIDDLE DISTILLATE; HYDROCRACKED DISTILLATE, LIGHT..C10-18
MSDS NUMBER: 1025
PRODUCT CODE: NA
HIERARCHY: 040.020
MANUFACTURER/SUPPLIER: BP Oil Company
ADDRESS: 200 Public Square, Cleveland, OH 44114-2375
TELEPHONE NUMBERS - 24 HOUR EMERGENCY ASSISTANCE:
BP America: 800-321-8642
CHEMTREC Assistance (In U.S.): 800-424-9300
CHEMTREC Assistance (Elsewhere): 703-527-3887
TELEPHONE NUMBERS - GENERAL ASSISTANCE: (Normal Office Hours): (8:00-4:30 M-F, EST):
Technical: 216-586-6184
MSDS Contact: 216-586-8023

========== COMPOSITION/INFORMATION ON INGREDIENTS ==========

COMPONENT:Light Hydrocracked Distillate (Petroleum)
CAS NO.: 64741-77-1
% BY WT.: 99 - 100
EXPOSURE LIMITS:
100 mg/m3 REL NIOSH for kerosene

The OSHA Permissible Exposure Limits listed above were promulgated by OSHA in 1989. This standard was vacated by the U.S. Court of Appeals for the Eleventh Circuit. Exposure limits defined in specific chemical standards found in 29 CFR 1910.1000-1048 are not covered by this ruling and are still enforceable.

========== HAZARDS IDENTIFICATION ==========

EMERGENCY OVERVIEW:

Colorless, Clear Liquid With a Hydrocarbon Odor.
Danger! Harmful or Fatal If Swallowed. Aspiration Hazard If

Swallowed--Can Enter Lungs and Cause Damage. May Be Irritating To the Skin, Eyes and Respiratory Tract. Vapors May Be Harmful. Skin Cancer Hazard Based on Tests With Laboratory Animals. Combustible Liquid & Vapor.

POTENTIAL HEALTH EFFECTS:

SKIN:

Repeated or prolonged contact may result in defatting, redness, itching, inflammation, cracking and possible secondary infection. May cause allergic reactions in some individuals. Absorption from prolonged or massive skin contact may cause poisoning. Contact with heated material may cause thermal burns. High pressure skin injections are Serious Medical Emergencies. Injury may not appear serious at first; within a few hours, tissue will become swollen, discolored and extremely painful (see Notes to Physician section).

EYE:

Exposure to vapors, fumes or mists may cause irritation. Contact with heated material may cause thermal burns.

INHALATION:

May cause respiratory tract irritation. Exposure may cause central nervous system symptoms similar to those listed under "Ingestion" (see Ingestion section). Degenerative changes in the liver, kidneys and bone marrow may occur with prolonged, high concentrations. Repeated or prolonged exposures may cause behavioral changes.

INGESTION:

Aspiration into lungs may cause pneumonitis. May cause gastrointestinal disturbances. Symptoms may include irritation, nausea, vomiting and diarrhea. May cause harmful central nervous system effects. Effects may include excitation, euphoria, headache, dizziness, drowsiness, blurred vision, fatigue, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death.

SPECIAL TOXIC EFFECTS:

Products of similar composition have produced skin cancer in laboratory animals and have been positive in mutagenic test systems. IARC has determined that occupational exposures in petroleum refining are probably carcinogenic to humans.

FIRST AID MEASURES

SKIN:

Remove contaminated clothing immediately. Wash area of contact thoroughly with soap and water. Get medical attention if irritation persists. High pressure skin injections are serious medical emergencies. Get immediate medical attention. Thermal burns require immediate medical attention.

EYE:

Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get medical attention if irritation persists. Thermal burns require immediate medical attention.

INHALATION:

Remove affected person from source of exposure. If not breathing, ensure clear airway and institute cardiopulmonary resuscitation (CPR). If breathing is difficult, administer oxygen if available. After administration of oxygen, continue to monitor closely. Get medical attention.

INGESTION:

Do not induce vomiting because of danger of aspirating liquid into lungs. Get immediate medical attention. If spontaneous vomiting occurs, monitor for breathing difficulty.

NOTES TO PHYSICIAN:

In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption. Consideration should be given to the use of an endotracheal tube, to prevent aspiration. Individuals intoxicated by 1-K Kerosine should be hospitalized immediately, with acute and continuing attention to neurologic and cardiopulmonary function. Positive pressure ventilation may be necessary. After the initial episode, individuals should be followed for changes in blood variables and the delayed appearance of pulmonary edema and chemical pneumonitis. Such patients should be followed for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated. In case of skin injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss.

========== FIREFIGHTING MEASURES ==========

FLASH POINT:	> 37.7778 C (100 F)
AUTOIGNITION TEMPERATURE:	210 C (410 F) Estimated
FLAMMABILITY LIMITS IN AIR (% BY VOL.) LOWER:	> 0.7
FLAMMABILITY LIMITS IN AIR (% BY VOL.) UPPER:	< 5

HAZARDOUS COMBUSTION PRODUCTS:

Combustion may produce CO, CO2 and reactive hydrocarbons.

BASIC FIRE FIGHTING PROCEDURES:

Use water spray, dry chemical, foam or carbon dioxide to extinguish fire. Use water spray to cool fire-exposed containers, structures and to protect personnel. If leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop leak. Use water to flush spills away from sources of ignition. Do not flush down public sewers or other

drainage systems. Exposed firefighters must wear MSHA/NIOSH approved positive pressure self-contained breathing apparatus with full face mask and full protective clothing.

UNUSUAL FIRE & EXPLOSION HAZARDS:

Irritating and/or toxic substances may be emitted upon thermal decomposition. Dangerous when exposed to heat or flame. Runoff to sewer may cause fire or explosion hazard. Containers may explode in heat of fire. Vapors or gas may accumulate in low areas.

========== ACCIDENTAL RELEASE MEASURES ==========

If your facility or operation has an "Oil or Hazardous Substance Contingency Plan", activate its procedures. Take immediate steps to stop and contain the spill. Caution should be exercised regarding personnel safety and exposure to the spilled material. For technical advice and assistance related to chemicals, contact CHEMTREC (800/424-9300) and your local fire department. Notify the National Response Center, if required. Also notify appropriate state and local regulatory agencies, the LEPC and the SERC. Contact the local Coast Guard if the release is into a waterway. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. (Also see Personal Protection Information section.) Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Water spray may reduce vapor; but it may not prevent ignition in closed spaces. Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large Spills: Dike far ahead of liquid spill for later disposal.

When reporting a spill to the National Response Center or the Coast Guard, you may need to supply the Coast Guard Chemical Hazard Response Information System (CHRIS) code:

Group Number: 33
CHRIS Code: KRS

Additional spill related information may be found in the U.S. Coast Guard Chemical Hazard Response Information System (CHRIS) Manual.

During an accidental release, personal protection equipment may be required (see Section EXPOSURE CONTROLS/PERSONAL PROTECTION). Additional regulatory requirements may apply (see Section REGULATORY INFORMATION).

========== HANDLING AND STORAGE ==========

HANDLING:

Use non-sparking tools. Ground lines and equipment used during transfer to reduce the possibility of static spark-initiated fire or explosion.

Empty containers may contain toxic, flammable/combustible or explosive residue or vapors. Do not cut, grind, drill, weld, reuse or dispose containers unless adequate precautions are taken against

these hazards.

STORAGE:

Store in tightly closed containers in cool, dry, isolated, well-ventilated area away from heat, sources of ignition and incompatibles.

========== EXPOSURE CONTROLS / PERSONAL PROTECTION ==========

ENGINEERING CONTROLS:

Ventilation and other forms of engineering controls are often the preferred means for controlling chemical exposures.

PERSONAL PROTECTION EQUIPMENT (PPE):

EYE PROTECTION:

Avoid eye contact with this material. Wear safety glasses or chemical goggles. Provide an eyewash station immediately accessible to the work area. Do not wear contact lenses when working with this substance.

SKIN PROTECTION:

Avoid skin contact. When working with this substance, wear appropriate chemical protective gloves. Depending upon conditions of use, additional protection may be necessary such as face shield, apron, armcovers, etc.

RESPIRATORY PROTECTION:

If exposure limits are exceeded or if irritation is experienced, NIOSH approved respiratory protection should be worn. Respiratory protection may be needed for non-routine or emergency situations.

See Section COMPOSITION/INFORMATION ON INGREDIENTS For Exposure Guidelines.

========== PHYSICAL AND CHEMICAL PROPERTIES ==========

BOILING POINT:	148.9 C (300.02 F)
SP. GRAVITY (Water=1):	0.825 @ 15.56 C (60.008 F)
MELTING POINT:	NA
% VOLATILE:	100
VAPOR PRESSURE:	0.4 MM HG @ 15.56 C (60.008 F)
EVAPORATION RATE:	Slower
VAPOR DENSITY (Air=1):	4.7
VISCOSITY:	1.3 - 2.2 CST @ 37.8 C (100.04 F)
% SOLUBILITY IN WATER:	Negligible
POUR POINT:	-34.4 C (-29.92 F)
pH:	Neutral
MOLECULAR WEIGHT:	NA
MOLECULAR FORMULA:	Mixture

ODOR/APPEARANCE:
Colorless, Clear Liquid With a Hydrocarbon Odor.

STABILITY AND REACTIVITY

STABILITY/INCOMPATIBILITY:

Stable. Avoid contact with strong oxidizers.

TOXICOLOGICAL INFORMATION

SKIN EFFECTS:

Practically Non-Toxic (Acute Exposure). Rabbit dermal LD50 = >5 ml/kg.

ACUTE ORAL EFFECTS:

Moderately Toxic (Acute Exposure). Human oral LDLo = ~10 mls.

DISPOSAL CONSIDERATIONS

WASTE DISPOSAL (Resource Conservation & Recovery Act - RCRA):

This substance, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however it could be characteristically hazardous if it is considered toxic, corrosive, ignitable, or reactive according to Federal definitions (40 CFR 261). Additionally, it could be designated as hazardous according to state regulations. This substance could also become a hazardous waste if it is mixed with or comes in contact with a hazardous waste. Check 40 CFR 261 to determine whether it is a hazardous waste. If it is a hazardous waste, regulations at 40 CFR 262, 263, 264, 268 and 270 apply. The transportation, storage, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, state, and local regulations.

There may be specific current regulations at the local, regional, or state level that pertain to this information. Chemical additions, processing, or otherwise altering this material may make the waste management information presented in this MSDS, incomplete, inaccurate, or otherwise inappropriate.

TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (D.O.T.):

Proper Shipping Name (49 CFR 172.101):	Kerosene
Hazard Class (49 CFR 172.101):	3
UN/NA Code (49 CFR 172.101):	UN 1223
Packing Group (49 CFR 179.101):	PG III
Bill Of Lading Desc. (49 CFR 172.101):	Kerosene, 3, UN 1223, PG III
Labels Required (49 CFR 172.101):	None
Placards Required (49 CFR 172.101):	Combustible

INTERNATIONAL AND DOMESTIC AIR TRANSPORTATION:

IATA Proper Shipping Name:	Kerosene
Hazard Class:	3
Subsidiary Risk:	None

UN Code:	UN 1223
Package Specification:	U309, 309, 310
Labels Required:	Flammable Liquid, Orientation Arrows

INTERNATIONAL WATER TRANSPORTATION:

IMDG Proper Shipping Name:	Kerosene
Hazard Class:	3.3
UN Code:	UN 1223
IMDG Page Number:	3375
Labels Required:	Flammable Liquid, Orientation Arrows
Placards Required:	Flammable

CANADIAN TRANSPORTATION OF DANGEROUS GOODS (T.D.G.):

Shipping Name:	Kerosene
PIN (UN/NA):	UN 1223
Regulated Class:	3
Division:	NA
Packaging Group:	PG III
Labels Required:	Flammable Liquid, Orientation Arrows
Placards Required:	Flammable

REGULATORY INFORMATION

NOTIFICATION:

Any spill or release, or substantial threat of release, of this material to navigable water (virtually any surface water) sufficient to cause a visible sheen upon the water must be reported immediately to the National Response Center (800/424-8802), as required by U.S. Federal Law. Failure to report may result in substantial civil and criminal penalties. Also contact the Coast Guard and appropriate state and local regulatory agencies.

US EPA TOXIC SUBSTANCE CONTROL ACT (TSCA):

All components of this product are listed on the TSCA inventory.

US EPA SUPERFUND AMENDMENTS & REAUTHORIZATION ACT (SARA) TITLE III INFORMATION:

Listed below are the hazard catagories for SARA Section 311/312 (40 CFR 370):

Immediate Hazard:	X
Delayed Hazard:	X
Fire Hazard:	X
Pressure Hazard:	-
Reactivity Hazard:	-

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA):

All components of this product are listed on the Canadian DSL Inventory.

CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) CATEGORIES:

The following WHMIS categories apply to this product:

Compressed Gas:	-	Other Toxic Effects:	X
Flammable/Combustible:	X	Bio Hazardous:	-
Oxidizer:	-	Corrosive:	-
Acutely Toxic:	X	Dangerously Reactive:	-

========== OTHER INFORMATION ==========

NFPA RATINGS:		HMIS RATINGS:	
Health:	0	Health:	0
Flammability:	2	Flammability:	2
Reactivity:	0	Reactivity:	0
Special Hazards:	-	Personal Protective Equipment:	H

REVISION DATE: 09-aug-1996
REPLACES SHEET DATED: 09-feb-1996
COMPLETED BY: BP OIL HSEQ DEPARTMENT
REVISION SUMMARY: The following section(s) have been revised since the previous issue of this MSDS:

- HAZARDS IDENTIFICATION
- FIRST AID MEASURES
- TRANSPORT INFORMATION

NOTICE: The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet. However, no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

ND: No Data NA: Not Applicable *See specific note or section

LEAD STANDARD MSDS
REVISION DATE: 05/25/07

VHG LABS, INC
276 Abby Road
MANCHESTER, NH 03103
TEL: (603) 622-7660 FAX: (603) 622-5180

SECTION I - PRODUCT IDENTIFICATION

Product Name:	Lead Standard - 10 - 10,000 µg/mL
Common Synonyms:	N/A
Product No.	APBN-XXX, LPBN-XXX, PPBN-XXX, TPBN-XXX (XXX = Size of Bottle)
Chemical Family:	Solution Standards
Formula:	N/A
Formula Wt.:	N/A
CAS No.:	N/A
NIOSH/RTECS No.:	N/A
Product Use:	Laboratory Reagent

SECTION II - COMPONENTS

Component	CAS No.	Weight %	OSHA/PEL	ACGIH/TLV
Lead	7439-92-1	0.0010 - 1.0	0.05 mg/m3	0.15 mg/m3
Nitric Acid	7697-37-2	2-5	2 ppm	2 ppm
Water	7732-18-5	Balance	N/E	N/E

SECTION III - PHYSICAL DATA

Boiling Point: ≈ 100°C
Melting Point: ≈ 0°C
Specific Gravity: ≈ 1 (H_2O=1)
Solubility(H_2O): Complete (100%)
pH: N/A
Odor Threshold (ppm): N/A
Coefficient Water/Oil Distribution: N/A
Appearance & Odor: Colorless liquid. Odorless.

Vapor Pressure (mmHg): N/A
Vapor Density (air=1): N/A
Evaporation Rate: N/A
% Volatiles by Volume: ≈ 99 (21°C)

Physical State: Liquid

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Closed Cup): N/A
Autoignition Temperature: N/A
Flammable Limits: Upper - N/A Lower - N/A

Fire Extinguishing Media
Use extinguishing media appropriate for surrounding fire.

Special Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Unusual Fire & Explosion Hazards
Reacts with most metals to produce hydrogen gas, which can form an explosive mixture with air.

Toxic Gases Produced
Oxides of nitrogen.

Explosion Data-Sensitivity to Mechanical Impact
None identified.

Explosion Data-Sensitivity to Static Discharge
None identified.

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA):	5.2 mg/m_3	(2 ppm)
TLV is for Nitric acid.		
Short-Term Exposure Limit (STEL):	10 mg/m_3	(4 ppm)
STEL is for Nitric acid.		
Permissible Exposure Limit (PEL):	5.2 mg/m_3	(2 ppm)
PEL is for Nitric acid.		

Toxicity of components

Inhalation-1Hr Rat LC_{50} for Nitric Acid	2500 ppm
Intraperitoneal Mouse LD_{50} for Water	190 g/kg
Intravenous Mouse LD_{50} for Water	25 g/kg

Carcinogenicity: NTP: No IARC: Yes Z List: No OSHA Reg: No

Carcinogenicity
Lead is listed as a possible human carcinogen in IARC (Group 2B).

Reproductive Effects
This product contains a chemical known to the State of California to cause birth defects and other reproductive harm.

Effects of Overexposure

INHALATION:	severe irritation or burns of respiratory system, headache, nausea, vomiting, dizziness, pulmonary edema, lung inflammation, may be fatal
SKIN CONTACT:	severe irritation
EYE CONTACT:	severe irritation
SKIN ABSORPTION:	none identified
INGESTION:	burns to mouth, throat, and stomach, nausea, vomiting, kidney dysfunction
CHRONIC EFFECTS:	damage to lungs, teeth, anemia, kidney damage, blurred vision, lead build-up in the central nervous system

Target Organs
eyes, skin, mucous membranes, GI tract, central nervous system, gingival tissue, respiratory system, lungs, kidneys, blood, teeth

Medical Conditions Generally Aggravated by Exposure
damaged skin, eye disorders, cardiopulmonary disease, lung disease

SECTION V - HEALTH HAZARD DATA (CONTINUED)

Primary Routes of Entry
inhalation, ingestion, skin contact, eye contact

Emergency and First Aid Procedures

INGESTION:	CALL A PHYSICIAN. If swallowed, do NOT induce vomiting. If conscious, give water, milk, or milk of magnesia.
INHALATION:	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
SKIN CONTACT:	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
EYE CONTACT:	In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

Acute: Yes Chronic: Yes Flammability: No Pressure: No Reactivity: No

Extremely Hazardous Substance:	Yes	Contains Nitric Acid (RQ = 1,000 LBS, TPQ = 1,000 LBS)
CERCLA Hazardous Substance:	Yes	Contains Lead (RQ = 1 LB) and Nitric Acid (RQ = 1000 LBS)
SARA 313 Toxic Chemicals:	Yes	Contains Lead and Nitric Acid
Generic Class:	C15, C16	
TSCA Inventory:	Yes	

State Lists: For products sold in the state of California, requires that we provide to users and their employees the following message: WARNING: THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS AND OTHER REPRODUCTIVE HARM.

SECTION VI - REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Conditions to Avoid:	Heat
Incompatibles:	strong bases, strong reducing agents, alkalies, most common metals
Decomposition Products:	oxides of nitrogen

SECTION VII - SPILL & DISPOSAL PROCEDURES

Steps to be Taken in the Event of a Spill or Discharge
Wear self-contained breathing apparatus and full protective clothing. Stop leak if you can do so without risk. Ventilate area. Neutralize spill with soda ash or lime. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

Disposal Procedure
Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: D002 (Corrosive Waste)

SECTION VIII - PROTECTION INFORMATION

Eye/Face Protection:	Safety Glasses or Goggles
Protective Clothing:	Lab Coat
Protective Gloves:	Rubber or Latex Gloves
Ventilation Requirements:	Vent Hood

SECTION IX - STORAGE DATA AND ADDITIONAL INFORMATION

Storage Requirements
Keep container tightly closed. Store in secure poison area. Isolate from incompatible materials.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

Proper Shipping Name: Corrosive Liquid, Acidic, Inorganic, N.O.S. (Contains Nitric Acid)
UN: UN3264
Packaging Group: III
Label: CORROSIVE

N/A = Not Applicable or Not Available
N/E = Not Established

The information in this Material Safety Data Sheet meets the requirements of the United States OCCUPATIONAL SAFETY AND HEALTH ACT and regulations promulgated thereunder (29 CFR 1910.1200 et. seq.) and the Canadian WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. This document is intended only as a guide to the appropriate precautionary handling of the material by a person trained in, or supervised by a person trained in, chemical handling. The user is responsible for determining the application. Depending on usage, protective clothing including eye and face guards and respirators must be used to avoid contact with material or breathing chemical vapors/fumes. Exposure to this product may have serious adverse health effects. This chemical may interact with other substances. Since the potential uses are so varied, we cannot warn of all of the potential dangers of use or interaction with other chemicals or materials. We warrant that the chemical meets the specifications set forth on the label. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE. The user should recognize that this product can cause severe injury and even death, especially if improperly handled or the known dangers of use are not heeded. READ ALL PRECAUTIONARY INFORMATION.

Approved by Quality Assurance Department.

MERCURY STANDARD MSDS
REVISION DATE: 09/17/03

VHG LABS, INC
276 ABBY ROAD
MANCHESTER, NH 03103
TEL: (603) 622-7660 FAX: (603) 622-5180

SECTION I - PRODUCT IDENTIFICATION

Product Name:	Standard Hg
Common Synonyms:	N/A
Product No.:	SSHG
Chemical Family:	Solution Standards
Formula:	N/A
Formula Wt.:	N/A
CAS No.:	N/A
Product Use:	Laboratory Reagent

SECTION II - COMPONENTS

Component	CAS No.	Weight %	OSHA/PEL	ACGIH/TLV
Mercury	7439-97-6	0.001	0.05 mg/m3	0.05 mg/m3
Nitric Acid	7697-37-2	5	2 ppm	2 ppm
Water	7732-18-5	Balance	N/E	N/E

SECTION III - PHYSICAL DATA

Boiling Point: ≈ 100°C
Melting Point: ≈ 0°C
Specific Gravity: ≈ 1 (H_2O = 1)
Solubility(H_2O): Complete (100%)
pH: N/A
Odor Threshold (ppm): N/A
Coefficient Water/Oil Distribution: N/A
Appearance & Odor: Colorless liquid. Odorless.

Vapor Pressure (mmHg): N/A
Vapor Density (air = 1): N/A
Evaporation Rate: N/A
% Volatiles by Volume: ≈ 99 (21°C)

Physical State: Liquid

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Closed Cup): N/A
Autoignition Temperature: N/A
Flammable Limits: Upper - N/A Lower - N/A

Fire Extinguishing Media
Use extinguishing media appropriate for surrounding fire.

Special Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

Unusual Fire & Explosion Hazards
Reacts with most metals to produce hydrogen gas, which can form an explosive mixture with air.

Toxic Gases Produced
Oxides of nitrogen.

Explosion Data-Sensitivity to Mechanical Impact
None identified.

Explosion Data-Sensitivity to Static Discharge
None identified.

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA):	5 mg/m3	(2 ppm)
TLV is for Nitric acid.		
Short-Term Exposure Limit (STEL):	10 mg/m3	(4 ppm)
STEL is for Nitric acid.		
Permissible Exposure Limit (PEL):	5 mg/m3	(2 ppm)
PEL is for Nitric acid.		

Toxicity of components

Inhalation-1Hr Rat LC_{50} for Nitric Acid	2500 ppm
Intraperitoneal Mouse LD_{50} for Water	190 g/kg
Intravenous Mouse LD_{50} for Water	25 g/kg

Carcinogenicity: NTP: No IARC: No Z List: No OSHA Reg: No

Carcinogenicity
None identified

Reproductive Effects
None identified

Effects of Overexposure

INHALATION:	headache, nausea, vomiting, dizziness, irritation of respiratory system
SKIN CONTACT:	severe irritation
EYE CONTACT:	severe irritation
SKIN ABSORPTION:	none identified
INGESTION:	burns to mouth, throat, and stomach, kidney dysfunction
CHRONIC EFFECTS:	none identified

Target Organs
respiratory system, eyes, skin, teeth

Medical Conditions Generally Aggravated by Exposure
damaged skin, eye disorders, cardiopulmonary disease

Primary Routes of Entry
inhalation, ingestion, skin contact, eye contact

SECTION V - HEALTH HAZARD DATA (CONTINUED)

Emergency and First Aid Procedures

INGESTION:	CALL A PHYSICIAN. If swallowed, do NOT induce vomiting. If conscious, give water, milk, or milk of magnesia.
INHALATION:	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
SKIN CONTACT:	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
EYE CONTACT:	In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

Acute: Yes Chronic: Yes Flammability: No Pressure: No Reactivity: No

Extremely Hazardous Substance:	Yes	Contains Nitric Acid (RQ = 1,000 LBS, TPQ = 1,000 LBS)
CERCLA Hazardous Substance:	Yes	Contains Nitric Acid (RQ = 1,000 LBS)
SARA 313 Toxic Chemicals:	Yes	Contains Nitric Acid
TSCA Inventory:	Yes	

SECTION VI - REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Conditions to Avoid:	Heat
Incompatibles:	strong bases, strong reducing agents, alkalies, most common metals
Decomposition Products:	oxides of nitrogen

SECTION VII - SPILL & DISPOSAL PROCEDURES

Steps to be Taken in the Event of a Spill or Discharge

Wear self-contained breathing apparatus and full protective clothing. Stop leak if you can do so without risk. Ventilate area. Neutralize spill with soda ash or lime. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: D002 (Corrosive Waste)

SECTION VIII - PROTECTION INFORMATION

Eye/Face Protection:	Goggles & Shield
Protective Clothing:	Lab Coat & Apron
Protective Gloves:	Rubber
Ventilation Requirements:	Vent Hood

SECTION IX - STORAGE DATA AND ADDITIONAL INFORMATION

Storage Requirements
Keep container tightly closed. Store in secure poison area. Isolate from incompatible materials.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

Proper Shipping Name: Corrosive Liquid, Acidic, Inorganic, N.O.S. (Contains Nitric Acid)
UN: UN3264
Packaging Group: III
Label: CORROSIVE

N/A = Not Applicable or Not Available
N/E = Not Established

The information in this Material Safety Data Sheet meets the requirements of the United States OCCUPATIONAL SAFETY AND HEALTH ACT and regulations promulgated thereunder (29 CFR 1910.1200 et. seq.) and the Canadian WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. This document is intended only as a guide to the appropriate precautionary handling of the material by a person trained in, or supervised by a person trained in, chemical handling. The user is responsible for determining the application. Depending on usage, protective clothing including eye and face guards and respirators must be used to avoid contact with material or breathing chemical vapors/fumes. Exposure to this product may have serious adverse health effects. This chemical may interact with other substances. Since the potential uses are so varied, we cannot warn of all of the potential dangers of use or interaction with other chemicals or materials. We warrant that the chemical meets the specifications set forth on the label.
WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
The user should recognize that this product can cause severe injury and even death, especially if improperly handled or the known dangers of use are not heeded. READ ALL PRECAUTIONARY INFORMATION.

Approved by Quality Assurance Department.

Material Safety Data She

Version 5.0
Revision Date 03/12/2010
Print Date 05/17/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Methanol
Product Number	:	646377
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Target Organ Effect, Toxic by ingestion, Toxic by skin absorption, Irritant

Target Organs

Eyes, Kidney, Liver, Heart, Central nervous systemEyes, Kidney, Liver, Heart, Central nervous system

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H301 + H311	Toxic if swallowed or in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H370	Causes damage to organs.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P280	Wear protective gloves/protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P307 + P311	IF exposed: Call a POISON CENTER or doctor/physician.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	3

Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	Toxic if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : CH4O
Molecular Weight : 32.04 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Methanol			
67-56-1	200-659-6	603-001-00-X	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

. . HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully reseal and kept upright to prevent leakage. Store in cool place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Methanol	67-56-1	TWA	200 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Headache Eye damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Danger of cutaneous absorption				
		STEL	250 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
	Headache Eye damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Danger of cutaneous absorption				
		TWA	200 ppm 260 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation				
		STEL	250 ppm 325 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation				
		TWA	200 ppm 260 mg/m3	1997-08-04	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.				

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	colourless

Safety data

pH	no data available
Melting point	-98.0 °C (-144.4 °F)
Boiling point	64.0 - 65.0 °C (147.2 - 149.0 °F) at 1,013 hPa (760 mmHg)
Flash point	11.0 °C (51.8 °F) - closed cup
Ignition temperature	455 °C (851 °F)
Lower explosion limit	6 %(V)
Upper explosion limit	36 %(V)
Vapour pressure	546.6 hPa (410.0 mmHg) at 50.0 °C (122.0 °F) 130.3 hPa (97.7 mmHg) at 20.0 °C (68.0 °F)
Density	0.79 g/cm3
Water solubility	completely miscible
Partition coefficient: n-octanol/water	log Pow: -0.77

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Acid chlorides, Acid anhydrides, Oxidizing agents, Alkali metals, Reducing agents, Acids

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 5,628 mg/kg

LC50 Inhalation - rat - 4 h - 64000 ppm

LD50 Dermal - rabbit - 15,800 mg/kg

Skin corrosion/irritation
Skin - rabbit - Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Eye irritation - 24 h

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

,A: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (GHS)
Causes damage to organs.

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	Toxic if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
Methyl alcohol may be fatal or cause blindness if swallowed., Cannot be made non-poisonous., Effects due to ingestion may include:, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Dizziness, Weakness, Confusion., Drowsiness, Unconsciousness, May cause convulsions.

Additional Information
RTECS: PC1400000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 19,000.00 mg/l - 96 h
	LC50 - Cyprinus carpio (Carp) - 36,000.00 mg/l - 48 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 24,500.00 mg/l - 48 h
	EC100 - Daphnia magna (Water flea) - 10,000.00 mg/l - 24 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1230 Class: 3 Packing group: II
Proper shipping name: Methanol
Reportable Quantity (RQ): 5000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1230 Class: 3 (6.1) Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHANOL
Marine pollutant: No

IATA
UN-Number: 1230 Class: 3 (6.1) Packing group: II
Proper shipping name: Methanol

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Target Organ Effect, Toxic by ingestion, Toxic by skin absorption, Irritant

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Fisher Scientific

Material Safety Data Sheet

Creation Date 13-Apr-2009 **Revision Date** 23-Sep-2009 **Revision Number** 1

Product Name **Methyl Ethyl Ketone**

Cat No. **M208-1; M208-4; M208-20; M209-1; M209-4; M209-20; M209-200; M209-500; M209FB-19; M209FB-50; M209FB-115; M209FB-200; M209RB-115; M209RS-19; M209RS-28; M209RS-50; M209RS-200; M209S-4; M209SS-28; M209SS-50; M209SS-115; M209SS-200**

Synonyms 2-Butanone; MEK; Ethyl methyl ketone (Technical/Certified ACS)

Recommended Use Laboratory chemicals

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 703-527-3887

DANGER!

Emergency Overview

Flammable liquid and vapor. Irritating to eyes and skin. Vapors may cause drowsiness and dizziness. May cause irritation of respiratory tract. Repeated exposure may cause skin dryness or cracking.

Appearance Colorless **Physical State** Liquid **odor** Characteristic - sweet

Target Organs Skin, Eyes, Central nervous system (CNS), Liver, Kidney

Potential Health Effects

Acute Effects
Principle Routes of Exposure

Eyes	Irritating to eyes.
Skin	Irritating to skin. May be harmful in contact with skin. Repeated exposure may cause skin dryness or cracking.
Inhalation	May cause drowsiness and dizziness. May cause irritation of respiratory tract. May be harmful if inhaled.
Ingestion	May be harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Chronic Effects Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse liver effects. May cause adverse kidney effects.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Central nervous system disorders. Preexisting eye disorders. Skin disorders.

Haz/Non-haz

Component	CAS-No	Weight %
Methyl ethyl ketone	78-93-3	100

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Notes to Physician Treat symptomatically.

Flash Point -7°C / 19.4°F

Method No information available.

Autoignition Temperature 404°C / 759.2°F

Explosion Limits
Upper 11.4 vol %
Lower 1.4 vol %

Suitable Extinguishing Media CO_2, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media Water may be ineffective.

Hazardous Combustion Products No information available.

Sensitivity to mechanical impact No information available.
Sensitivity to static discharge No information available.

Specific Hazards Arising from the Chemical
Flammable. Risk of ignition. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA **Health** 1 **Flammability** 3 **Instability** 0 **Physical hazards** N/A

Personal Precautions Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable and closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharges.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Methyl ethyl ketone	TWA: 200 ppm STEL: 300 ppm	(Vacated) TWA: 590 mg/m³ (Vacated) TWA: 200 ppm (Vacated) STEL: 885 mg/m³ (Vacated) STEL: 300 ppm TWA: 590 mg/m³ TWA: 200 ppm	IDLH: 3000 ppm TWA: 590 mg/m³ TWA: 200 ppm STEL: 300 ppm STEL: 885 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Methyl ethyl ketone	TWA: 150 mg/m³ TWA: 50 ppm STEL: 300 mg/m³ STEL: 100 ppm	TWA: 200 ppm TWA: 590 mg/m³ STEL: 300 ppm STEL. 885 mg/m³	TWA: 200 ppm TWA: 590 mg/m³ STEL: 885 mg/m³ STEL: 300 ppm

NIOSH IDLH: *Immediately Dangerous to Life or Health*

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Physical State	Liquid
Appearance	Colorless
odor	Characteristic - sweet
Odor Threshold	No information available.
pH	No information available.
Vapor Pressure	105 mbar @ 20 °C
Vapor Density	2.41 (Air = 1.0)
Viscosity	0.42 mPa.s @ 15°C
Boiling Point/Range	80°C / 176°F
Melting Point/Range	-87°C / -124.6°F
Decomposition temperature °C	No information available.
Flash Point	-7°C / 19.4°F
Evaporation Rate	3.7 (Butyl Acetate = 1.0)
Specific Gravity	0.806
Solubility	Soluble in water
log Pow	No data available
Molecular Weight	72.11
Molecular Formula	C4 H8 O

Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products. Heat, flames and sparks.
ncompatible Materials	Strong oxidizing agents, Strong acids, Strong bases, Strong reducing agents, Ammonia, copper, Amines
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2), Thermal decomposition can lead to release of irritating gases and vapors
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions .	None under normal processing..

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Methyl ethyl ketone	2737 mg/kg (Rat)	6480 mg/kg (Rabbit)	32 g/m³ (Mouse) 4 h

Irritation	Irritating to eyes and skin
Toxicologically Synergistic Products	No information available.

Chronic Toxicity

Carcinogenicity *There are no known carcinogenic chemicals in this product*

Sensitization No information available.

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity Teratogenic effects have occurred in experimental animals..

Other Adverse Effects See actual entry in RTECS for complete information.

Endocrine Disruptor Information No information available

Ecotoxicity

Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methyl ethyl ketone	Not listed	Not listed	EC50 = 3403 mg/L 30 min EC50 = 3426 mg/L 5 min	EC50 48 h 520 mg/L EC50 48 h 5091 mg/L EC50 48 h 520 mg/L

Persistence and Degradability Readily biodegradable.

Bioaccumulation/ Accumulation No information available

Mobility

Component	log Pow
Methyl ethyl ketone	0.29

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Methyl ethyl ketone - 78-93-3	U159	-

DOT

UN-No UN1193

Proper Shipping Name	Ethyl methyl ketone
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1193
Proper Shipping Name	ETHYL METHYL KETONE
Hazard Class	3
Packing Group	II

IATA

UN-No	UN1193
Proper Shipping Name	Methyl ethyl ketone
Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	UN1193
Proper Shipping Name	Ethyl methyl ketone (Methyl ethyl ketone)
Hazard Class	3
Packing Group	II

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Methyl ethyl ketone	X	X	-	201-159-0	-		X	X	X	X	KE-24094 X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313
Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
Not applicable

Clean Air Act
Not applicable

OSHA
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Methyl ethyl ketone	5000 lb	-

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methyl ethyl ketone	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
B2 Flammable liquid
D2B Toxic materials

Prepared By	Regulatory Affairs Thermo Fisher Scientific Tel: (412) 490-8929
Creation Date	13-Apr-2009
Print Date	23-Sep-2009
Revision Summary	"****", and red text indicates revision

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

Material Safety Data Sheet

Creation Date 09-Feb-2010 **Revision Date** 09-Feb-2010 **Revision Number** 1

Product Name	**Methyl Isobutyl Ketone**
Cat No.	**M213-1; M213-4; M213-20; M213-200**
Synonyms	Hexone; Isobutyl methyl ketone; Isopropylacetone; 4-Methyl-2-pentanone (Certified ACS)
Recommended Use	Laboratory chemicals

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 703-527-3887

DANGER!

Emergency Overview

Flammable liquid and vapor. May form explosive peroxides. Harmful by inhalation. Irritating to eyes, respiratory system and skin. May cause central nervous system effects. Repeated exposure may cause skin dryness or cracking. Aspiration hazard if swallowed - can enter lungs and cause damage.

Appearance Clear **Physical State** Liquid **odor** sweet

Target Organs Central nervous system (CNS), Eyes, Respiratory system, Skin, Kidney, Liver, Heart, spleen, Blood

Potential Health Effects

Acute Effects
Principle Routes of Exposure

Eyes	Irritating to eyes.
Skin	Irritating to skin. May be harmful in contact with skin. Repeated exposure may cause skin dryness or cracking.
Inhalation	Harmful by inhalation. Irritating to respiratory system. Inhalation may cause central nervous system effects.
Ingestion	Aspiration hazard. May be harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Chronic Effects Tumorigenic effects have been reported in experimental animals.. Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse liver effects. May cause adverse kidney effects. Repeated exposure may cause skin dryness or cracking.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Central nervous system disorders. Preexisting eye disorders. Kidney disorders. Liver disorders. Skin disorders.

Haz/Non-haz

Component	CAS-No	Weight %
Methylisobutyl ketone	108-10-1	> 98.5

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Notes to Physician Treat symptomatically.

Flash Point 14°C / 57.2°F

Method No information available.

Autoignition Temperature 448°C / 838.4°F

Explosion Limits
Upper 8.0% @ 93°C
Lower 1.2% @ 93°C

Suitable Extinguishing Media CO_2, dry chemical, dry sand, alcohol-resistant foam.

Unsuitable Extinguishing Media Water may be ineffective.

Hazardous Combustion Products No information available.

Sensitivity to mechanical impact No information available.
Sensitivity to static discharge No information available.

Specific Hazards Arising from the Chemical
Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. May form explosive peroxides.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA **Health** 2 **Flammability** 3 **Instability** 1 **Physical hazards** N/A

Personal Precautions Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Do not get in eyes, on skin, or on clothing.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Remove all sources of ignition. Soak up with inert absorbent material. Keep in suitable and closed containers for disposal. Take precautionary measures against static discharges.

Handling Use only under a chemical fume hood. Use explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition. Wear personal protective equipment. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Take precautionary measures against static discharges. If peroxide formation is suspected, do not open or move container.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area. May form explosive peroxides. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals.

Engineering Measures Use only under a chemical fume hood. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Methylisobutyl ketone	TWA: 50 ppm STEL: 75 ppm	(Vacated) TWA: 205 mg/m³ (Vacated) TWA: 50 ppm (Vacated) STEL: 75 ppm (Vacated) STEL: 300 mg/m³ TWA: 410 mg/m³ TWA: 100 ppm	IDLH: 500 ppm TWA: 50 ppm TWA: 205 mg/m³ STEL: 300 mg/m³ STEL: 75 ppm

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Methylisobutyl ketone	TWA: 205 mg/m³ TWA: 50 ppm STEL: 307 mg/m³ STEL: 75 ppm	TWA: 205 mg/m³ TWA: 50 ppm STEL: 307 mg/m³ STEL: 75 ppm	TWA: 205 mg/m³ TWA: 50 ppm STEL: 75 ppm

NIOSH IDLH: Immediately Dangerous to Life or Health

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced

Physical State	Liquid
Appearance	Clear
odor	sweet
Odor Threshold	No information available.
pH	No information available.
Vapor Pressure	19.9 mmHg @ 25 °C
Vapor Density	3.45 (Air = 1.0)
Viscosity	No information available.
Boiling Point/Range	117°C / 242.6°F@ 760 mmHg
Melting Point/Range	-84°C / -119.2°F
Decomposition temperature °C	No information available.
Flash Point	14°C / 57.2°F
Evaporation Rate	1.6 (Butyl Acetate = 1.0)
Specific Gravity	0.80
Solubility	Soluble in water
'og Pow	No data available
Molecular Weight	100.16
Molecular Formula	C6H12O

Stability	Unstable if heated. May form explosive peroxides.
Conditions to Avoid	Incompatible products. Heat, flames and sparks.
Incompatible Materials	Strong oxidizing agents, Strong reducing agents, Strong bases
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2), peroxides
Hazardous Polymerization	Hazardous polymerization does not occur
Hazardous Reactions .	May form explosive peroxides..

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation

Methylisobutyl ketone	2080 mg/kg (Rat)	16000 mg/kg (Rabbit)	8.2 mg/L (Rat) 4 h

Irritation Irritating to eyes, respiratory system and skin

Toxicologically Synergistic Products No information available.

Chronic Toxicity

Carcinogenicity There are no known carcinogenic chemicals in this product

Sensitization No information available.

Mutagenic Effects No information available.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity Teratogenic effects have occurred in experimental animals..

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.. See actual entry in RTECS for complete information.

Endocrine Disruptor Information No information available

Ecotoxicity

. Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methylisobutyl ketone	EC50: 400 mg/L/96h	Not listed	EC50 = 79.6 mg/L 5 min	EC50: 4280.0 mg/L/24h EC50: 170 mg/L/48h EC50: 4280.0 mg/L/24h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available

Mobility

Component	log Pow
Methylisobutyl ketone	1.19

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Methylisobutyl ketone - 108-10-1	U161	-

DOT

UN-No	UN1245
Proper Shipping Name	METHYL ISOBUTYL KETONE
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1245
Proper Shipping Name	METHYL ISOBUTYL KETONE
Hazard Class	3
Packing Group	II

IATA

UN-No	UN1245
Proper Shipping Name	METHYL ISOBUTYL KETONE
Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	UN1245
Proper Shipping Name	METHYL ISOBUTYL KETONE
Hazard Class	3
Packing Group	II

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Methylisobutyl ketone	T	X	-	203-550-1	-		X	X	X	X	KE-24725 X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Methylisobutyl ketone	108-10-1	> 98.5	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
Not applicable

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methylisobutyl ketone	X		-

OSHA
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Methylisobutyl ketone	5000 lb	-

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methylisobutyl ketone	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
B2 Flammable liquid

Prepared By	Regulatory Affairs Thermo Fisher Scientific Tel: (412) 490-8929
Creation Date	09-Feb-2010
Print Date	09-Feb-2010
Revision Summary	"***", and red text indicates revision

Disclaimer
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End of MSDS

ısher Scientific

.rial Safety Data Sheet

.chloromethane

MSDS# 14930

Section 1 - Chemical Product and Company Identification

MSDS Name:	Dichloromethane
Catalog Numbers:	AC113460000, AC113460010, AC113460025, AC113460050, AC113460051, AC113460100 AC113460100, AC113460250, AC124050000, AC124050010, AC124050025, AC124050050 AC124050050, AC124050100, AC124050250, AC167770000, AC167770025, AC167775000 AC167775000, AC268330000, AC268330010, AC268330025, AC326600000, AC326600010 AC326600010, AC326600025, AC326760000, AC326760010, AC326760025, AC326850000 AC326850000, AC326850010, AC326850025, AC326851000, AC326852500, AC327870000 AC327870000, AC327870010, AC348460000, AC348460010, AC348460025, AC348461000 AC348461000, AC348465000, AC354800000, AC354800025, AC364230000, AC364230010 AC364230010, AC364230025, AC379130000, AC379130010, AC379130025, AC383780000 AC383780000, AC383780010, AC383780025, AC383780050, AC383780250, AC390700000 AC390700000, AC390700010, AC390700025, AC406910000, AC406910010, AC406910040 AC406910040, AC406910200, AC406920000, AC406930000, AC406935000, AC61030019, AC61030019 AC61030019, AC61030050, AC61030050, AC61030115, AC61030115, AC61030200, AC61030200 AC61030200, 32660-0040, 40692-0010, 40692-0040, 40692-5000, 61005-0040, 61016-0040, 61030-0010, 61030-1000, 61093-1000, BP1186-4, BP1186POP-200, BP1186POP20, BP1186SS-19, BP1186SS-200, BP1186SS-28, BP1186SS-50, BP2608-100, D138-1, D138-4, D138SK-4, D142-4, D142RS-115, D142RS-19, D142RS-50, D142RS200, D142RS28, D142SS-115, D142SS-200, D142SS-28, D142SS-50, D143-1, D143-4, D143-4LC, D143N2-19, D143POP28, D143RS-19, D143RS-200, D143RS-28, D143RS-50, D143SK-1, D143SK-4, D143SK4LC, D143SS-115, D143SS-19, D143SS-200, D143SS-28, D143SS-50, D149RS-19, D149RS-200, D149RS-50, D150-1, D150-4, D1504LC, D150SK-1, D150SK-4, D151-1, D151-4, D151-4LC, D151RS-115, D151RS-19, D151RS-200, D151RS-28, D151RS-50, D151SK-4, D151SS-115, D151SS-19, D151SS-200, D151SS-28, D151SS-50, D154-4, D1544LC, D158-4, D35-1, D35-4, D37-1, D37-20, D37-200, D37-4, D37-500, D37FB-115, D37FB-19, D37FB-200, D37FB-50, D37POP19, D37POPB-200, D37POPB-50, D37RB-115, D37RB-19, D37RB-200, D37RB-50, D37RS-115, D37RS-19, D37RS-200, D37RS-28, D37RS-50, D37RS19, D37SK-4, D37SS-115, D37SS-200, D37SS-28, D37SS-50, D37SS1350, NC9026865, NC9195811, NC9206961, NC9445086, NC9520903, NC9734652, NC9744832
Synonyms:	Methylene chloride; Methane dichloride; Methylene bichloride; Methylene dichloride; Dichloromethane; DCM.

Company Identification:	Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	201-796-7100
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#:	75-09-2
Chemical Name:	Methylene chloride
%:	>99.5
EINECS#:	200-838-9

Hazard Symbols: XN

[redacted]

[redacted]

Risk Phrases: 40

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Warning! This substance has caused adverse reproductive and fetal effects in animals. Harmful if swallowed. May cause kidney damage. May cause central nervous system effects. Potential cancer hazard. May be harmful if inhaled. Methylene chloride is metabolically converted to carbon monoxide after systemic absorption, which yields increased concentrations of carboxyhemoglobin in the blood. Causes eye, skin, and respiratory tract irritation. Target Organs: Blood, central nervous system.

Potential Health Effects

Eye:	Contact with eyes may cause severe irritation, and possible eye burns.
Skin:	May be absorbed through the skin. Causes irritation with burning pain, itching, and redness. Prolonged exposure may result in skin burns.
Ingestion:	Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause kidney damage. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause carboxyhemoglobinemia.
Inhalation:	Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause narcotic effects in high concentration. Vapors may cause dizziness or suffocation. May cause blood changes. Overexposure may cause an increase in carboxyhemoglobin levels in the blood. Can produce delayed pulmonary edema.
Chronic:	Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause dermatitis. May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects. Chronic exposure may cause lung, liver, and pancreatic tumors. May cause conjunctivitis and/or corneal burns.

Section 4 - First Aid Measures

Eyes:	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.
Skin:	In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion:	If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation:	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:	Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information:	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. No flash point in conventional closed tester, but forms flammable vapor-air mixtures in larger volumes and may be an explosion hazard in a confined space.
Extinguishing Media:	Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: 556 deg C (1,032.80 deg F)

Flash Point: Not applicable.

Explosion Limits: Lower: 13 vol %

Explosion Limits: Upper: 23 vol %

NFPA Rating: health: 2; flammability: 1; instability: 0;

Section 6 - Accidental Release Measures

General Information:	Use proper personal protective equipment as indicated in Section 8.

Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid

Spills/Leaks: runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Keep away from heat, sparks and flame. Use only with adequate ventilation. Avoid breathing vapor or mist.

Storage: Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Store below 40°C. Keep away from active metals.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Methylene chloride	50 ppm	2300 ppm IDLH	25 ppm TWA; 12.5 ppm Action Level; 25 ppm TWA; 125 ppm STEL (15 min, Cancer, cardiac effects , central nervous system effects, liver effects, and skin and eye irritation - see 29 CFR 1910.1052)

OSHA Vacated PELs: Methylene chloride: 500 ppm TWA

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Viton gloves are recommended.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Color: colorless

Odor: ethereal odor - chloroform-like

pH: Not available

Vapor Pressure: 350 mm Hg @ 20 deg C

Vapor Density: 2.93 (Air=1)

Evaporation Rate: Not available

Viscosity: Not available

Boiling Point: 40 deg C (104.00°F)

Freezing/Melting Point: -97 deg C (-142.60°F)

Decomposition Temperature: Not available

Solubility in water: Slightly soluble

Specific Gravity/Density: 1.33 (Water=1)

Molecular Formula: CH2Cl2

Molecular Weight: 84.93

Section 10 - Stability and Reactivity

Chemical Stability:	Stable at room temperature in closed containers under normal storage and handling conditions. May form explosive mixtures in atmospheres having high oxygen content.
Conditions to Avoid:	Excess heat, attacks some plastics, rubber, and coatings, confined spaces, When no water is present, dichloromethane is not corrosive to metals. At high temperatures and in the presence of water (causing slow decomposition forming HCl), corrosion of iron, some stainless steels, copper and aluminum can occur..
Incompatibilities with Other Materials	Strong oxidizing agents, strong bases, chemically active metals.
Hazardous Decomposition Products	Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization	Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS# 75-09-2: PA8050000

LD50/LC50:

RTECS:
CAS# 75-09-2: Draize test, rabbit, eye: 162 mg Moderate;
Draize test, rabbit, eye: 10 mg Mild;
Draize test, rabbit, eye: 500 mg/24H Mild;
Draize test, rabbit, skin: 810 mg/24H Severe;
Draize test, rabbit, skin: 100 mg/24H Moderate;
Inhalation, mouse: LC50 = 14400 ppm/7H;
Inhalation, mouse: LC50 = 49100 mg/m3/6H;
Inhalation, mouse: LC50 = 54000 mg/m3/2H;
Inhalation, mouse: LC50 = 56220 mg/m3/7H;
Inhalation, rat: LC50 = 52 gm/m3;
Inhalation, rat: LC50 = 76000 mg/m3/4H;
Inhalation, rat: LC50 = 52000 mg/m3/6H;
Oral, mouse: LD50 = 873 mg/kg;
Oral, rabbit: LD50 = 2000 mg/kg;
Oral, rat: LD50 = 1600 mg/kg;
Oral, rat: LD50 = 985 mg/kg;
.

Carcinogenicity: Methylene chloride - ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
California: carcinogen, initial date 4/1/88 NTP: Suspect carcinogen IARC: Group 2B carcinogen

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 230mg/L; 24H; Static
Fish: Fathead Minnow: 196mg/L; 96H

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN Number: UN1593
Packing Group: III
Canada TDG
'hipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN Number: UN1593
Packing Group: III

USA RQ: CAS# 75-09-2: 1000 lb final RQ; 454 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN

Risk Phrases:

R 40 Limited evidence of a carcinogenic effect.

Safety Phrases:

S 23 Do not inhale gas/fumes/vapour/spray.

S 24/25 Avoid contact with skin and eyes.

S 36/37 Wear suitable protective clothing and gloves.

WGK (Water Danger/Protection)

CAS# 75-09-2: 2

Canada

CAS# 75-09-2 is listed on Canada's DSL List

Canadian WHMIS Classifications: D1B, D2B, D2A

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 75-09-2 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 75-09-2 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 4/20/1999

Revision #11 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility or any other warranty, express 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. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.

MSDS BJRJQ

MULTIGRAPHICS -- CLEAN PRINT - CLEANING SOLUTION,DESENSITIZE
MATERIAL SAFETY DATA SHEET
NSN: 6750012976177
Manufacturer's CAGE: 09177
Part No. Indicator: A
Part Number/Trade Name: CLEAN PRINT

General Information

Item Name: CLEANING SOLUTION,DESENSITIZE
Company's Name: MULTIGRAPHICS *
Company's Street: 1800 W CENTRAL ROAD *
Company's City: MT.PROSPECT *
Company's State: IL *
Company's Country: US *
Company's Zip Code: 60056-2293 *
Company's Emerg Ph #: 312-870-5121 (DAY) 398-1900 (NIGHT) *
Company's Info Ph #: 312-870-5121/708-870-5087 *
Distributor/Vendor # 1: AM MULTIGRAPHICS (804-353-0111) *
Distributor/Vendor # 1 Cage: 1A714 *
Safety Data Action Code: C
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 01APR89
Safety Data Review Date: 12SEP96 *
Supply Item Manager: CX *
MSDS Serial Number: BJRJG
Hazard Characteristic Code: J6
Unit Of Issue: PT
Unit Of Issue Container Qty: 1 PINT

Ingredients/Identity Information

Proprietary: YES
Ingredient: PROPRIETARY
Ingredient Sequence Number: 01

Proprietary: YES
Ingredient: PROPRIETARY
Ingredient Sequence Number: 02

Proprietary: YES
Ingredient: PROPRIETARY
Ingredient Sequence Number: 03

Proprietary: YES
Ingredient: PROPRIETARY
Ingredient Sequence Number: 04

Physical/Chemical Characteristics

Appearance And Odor: ORANGE LIQUID. MILD SOLVENT ODOR.
Boiling Point: 212F,100C
Vapor Pressure (MM Hg/70 F): UNKNOWN
Vapor Density (Air=1): UNKNOWN
Specific Gravity: 1.025
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: <1 (WATER = 1)
Solubility In Water: 100%
pH: 12.5
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: NONE
Flash Point Method: TCC
Extinguishing Media: NON-FLAMMABLE. USE EXTINGUISHING MEDIA APPROPIATE FOR SURROUNDING FIRE.

http://haz1.siri.org/msds/h/q375/q137426

Special Fire Fighting Proc: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
Unusual Fire And Expl Hazrds: COMBUSTION OR HEAT OF FIRE MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS AND VAPORS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE
Materials To Avoid: STRONG ACIDS.
Hazardous Decomp Products: CARBON MONOXIDE, CARBON DIOXIDE.
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: HEALTH HAZARDS- ACUTE: EYE BURNS AND SKIN IRRITATION. CHRONIC: NONE SPECIFIED BY MANUFACTURER.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Signs/Symptoms Of Overexp: EYES: IRRITATION, BURNS. SKIN: IRRITATION. INGESTION: GASTROINTESTINAL IRRITATION.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: FLUSH WITH LARGE AMOUNTS OF WATER FOR AT NOT APPLICABLE. INGESTION: DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL AID.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: VENTILATE AREA. USE APPROPIATE PROTECTIVE CLOTHING AND EQUIPMENT. CLEAN SPILLS WITH WARM WATER AND SOAP. ABSORB IN INERT MATERIAL, AND PLACE IN APPROPIATE DISPOSAL CONTAINER AND COVER. FLUSH AREA WITH PLENTY OF WATER.
Neutralizing Agent: 5% ACETIC ACID SOLUTION.
Waste Disposal Method: CONTACT YOUR LOCAL ENVIRONMENTAL OFFICER. DISPOSE OF IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: AVOID FREEZING. STORE BETWEEN 40F AND 140F.
Other Precautions: READ AND FOLLOW LABEL PRECAUTIONS. AVOID EXCESSIVE SKIN CONTACT.

Control Measures

Respiratory Protection: NONE NORMALLY REQUIRED.
Ventilation: NO SPECIAL REQUIREMENT. *
Protective Gloves: NEOPRENE.
Eye Protection: GOGGLES.
Other Protective Equipment: APRON. EYE WASH STATION.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING AND BEFORE SMOKING OR EATING.
Suppl. Safety & Health Data: NONE.

Transportation Data

Trans Data Review Date: 91087
DOT PSN Code: DWG
DOT Proper Shipping Name: CORROSIVE LIQUIDS, N.O.S.
DOT Class: 8
DOT ID Number: UN1760
DOT Pack Group: III
DOT Label: CORROSIVE
IMO PSN Code: ESH
IMO Proper Shipping Name: CORROSIVE LIQUID, N.O.S.
IMO Regulations Page Number: 8147
IMO UN Number: 1760
IMO UN Class: 8

IMO Subsidiary Risk Label: -
IATA PSN Code: HKW
IATA UN ID Number: 1760
IATA Proper Shipping Name: CORROSIVE LIQUID, N.O.S. *
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: HKW
AFI Prop. Shipping Name: CORROSIVE LIQUID, N.O.S.
AFI Class: 8
AFI ID Number: UN1760
AFI Pack Group: III
AFI Label: CORROSIVE
AFI Basic Pac Ref: 12-5
N.O.S. Shipping Name: SODIUM METASILICATE.

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 28MAR91
MFR Label Number: NONE
Label Status: F
Common Name: CLEAN PRINT
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: HEALTH HAZARDS- ACUTE: EYE BURNS AND SKIN IRRITATION. CHRONIC: NONE SPECIFIED BY MANUFACTURER. AVOID FREEZING. STORE BETWEEN 40F AND 140F. FIRST AID: EYES: FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES .SEE DOCTOR. SKIN: WASH WITH SOAP AND WATER. INHALATION: NOT APPLICABLE. INGESTION: DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL AID.
Protect Eye: Y
Protect Skin: Y
Label Name: MULTIGRAPHICS
Label Street: 1800 W CENTRAL ROAD
Label City: MT.PROSPECT
Label State: IL
Label Zip Code: 60056-2293
Label Country: US
Label Emergency Number: 708-870-5121 (DAY) 398-1900 (NIGHT)
Year Procured: 1991

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

http://haz1.siri.org:80/msds/h/q344/q121794

MULTIGRAPHICS -- ELECTROSTATIC SOLUTION
MATERIAL SAFETY DATA SHEET
NSN: 675000N001225
Manufacturer's CAGE: 09177
Part No. Indicator: A
Part Number/Trade Name: ELECTROSTATIC SOLUTION

CAS# 13943-58-3
MSDS BCHHW

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General Information

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Company's Name: MULTIGRAPHICS
Company's Street: 1800 W CENTRAL ROAD
Company's City: MT.PROSPECT
Company's State: IL
Company's Country: US
Company's Zip Code: 60056-2293
Company's Emerg Ph #: 312-870-5121 (DAY) 398-1900 (NIGHT)
Company's Info Ph #: 312-870-5121/708-870-5087
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01APR89
Safety Data Review Date: 20SEP95
MSDS Serial Number: BCHHW
Hazard Characteristic Code: N1
NRC/State License Number: N/A
Net Propellant Weight-Ammo: N/A

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: FERRATE (4-), HEXACYANO-, TETRAPOTASSIUM; (POTASSIUM HEXACYANOFERRATE)
Ingredient Sequence Number: 01
Percent: 2-5
NIOSH (RTECS) Number: LJ8219000
CAS Number: 13943-58-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: 5 MG/M3

Proprietary: NO
Ingredient: NON HAZARDOUS INGREDIENTS
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 1000314NH
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

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Physical/Chemical Characteristics

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Appearance And Odor: YELLOWISH GREEN LIQUID,SLIGHT ALMOND ODOR
Boiling Point: 212F,100C
Melting Point: N/A
Vapor Pressure (MM Hg/70 F): 15 @ 25C
Specific Gravity: 1.08 (H*2O=1)
Evaporation Rate And Ref: SLOWER/WATER (BU AC=1)
Solubility In Water: COMPLETE
pH: 4.5

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Fire and Explosion Hazard Data

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Flash Point: NONE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: USE MEDIA SUITABLE FOR SURROUNDING FIRE CONDITIONS (FP N).
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: CATASTROPHIC ACCIDENTS, INVOLVING LGE QTYS OF PROD & ACCOMPANIED BY FIRE OR CONT W/LGE QTYS OF STRONG ACID, WILL REQ RESPONSE PERS TO WEAR PROPER (SUP DAT)

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Reactivity Data

Stability: YES
Cond To Avoid (Stability): STRONG LIGHT & HEAT.
Materials To Avoid: CHLORINE BLEACH & STRONG ACIDS.
Hazardous Decomp Products: PRODUCT WILL SLOWLY DECOMPOSE W/FORMATION OF HYDROCYANIC ACID, COMPLEX CYANOFERRATES & CYANIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: NO
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYES:MAY CAUSE IRRITATION. SKIN:PRLONGED LARGE DOSES MAY CAUSE GI IRRITATION. HEXACYANOFERRATE SALTS ARE CONSIDERED TO BE OF SLIGHT TOXICITY TO HUMANS, REGARDLESS OF WHETHER EXPOSURE IS ACUTE DERMAL, ACUTE INGESTION OR CHRONIC (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ:SYSTEMIC. ANY EFFECT ON THE HUMAN BODY IS SLIGHT, TEMPORARY & REVERSIBLE & THE EFFECT DISAPPEARS FOLLOWING TERMINATION OF EXPOSURE.
Med Cond Aggravated By Exp: NONE.
Emergency/First Aid Proc: INHAL:REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE OXYGEN/ARTIFICIAL RESPIRATION). CALL MD (FP N). EYES:FLUSH W/WATER FOR AT LEAST 15 MINS. IF IRRITATION PERSISTS, SEEK MEDICAL AID. SKIN:WASH W/SOAP & WATER. INGEST:INDUCE VOMITING. GET MEDICAL AID IMMEDIATELY.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: FLUSH W/WATER TO DRAIN.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: SMALL QTYS EMPLOYED IN NORM USE MAY BE FLUSHED W/ WATER TO DRAIN. DO NOT MIX W/ACID WASTES. LGR QTYS SHOULD NOT BE DUMPED INTO WATERWAY. CHECK FED, STATE & LOC REGS REGARDING DISP OF HEXACYANOFERRATE SALTS. (GENERALLY 2 PPM MAX IN STREAMS/LAKES).
Precautions-Handling/Storing: STORE IN A COOL, DARK PLACE AWAY FROM STRONG ACIDS & FIRE HAZARDS. READ LABEL PRECAUTIONS. DO NOT REUSE CONTAINER.
Other Precautions: NONE SPECIFIED BY MANUFACTURER.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N). NOT APPLICABLE.
Ventilation: NORMAL AIR CONDITIONING.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: NOT APPLICABLE.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: EXPLO HAZ:EQUIP DUE TO & DEPENDENT UPON THE QUANTITIES OF CYANIDE.

Transportation Data

Trans Data Review Date: 83209
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR SHIPPING.

http://haz1.siri.org:80/msds/h/q344/q121794

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Disposal Data

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Label Data

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Label Required: YES
Technical Review Date: 24FEB93
Label Status: G
Common Name: ELECTROSTATIC SOLUTION
Chronic Hazard: NO
Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
CONTACT MAY CAUSE EYE AND SKIN IRRITATION. INGESTION MAY CAUSE GASTROINTESTINAL IRRITATION. CHRONIC: NONE LISTED BY MANUFACTURER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: AM INTERNATIONAL INC, MULTIGRAPHICS DIVISION
Label Street: 1800 WEST CENTRAL ROAD
Label City: MT PROSPECT
Label State: IL
Label Zip Code: 60056
Label Country: US
Label Emergency Number: 708-398-1900

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IGRAPHICS -- MULTILITH CYLINDER CLEANER 83-5-101395 - SOLUTION, DEGREASING
ERIAL SAFETY DATA SHEET
N: 6850000666630
nufacturer's CAGE: 09177
art No. Indicator: A
Part Number/Trade Name: MULTILITH CYLINDER CLEANER 83-5-101395

General Information

Item Name: SOLUTION, DEGREASING
Company's Name: MULTIGRAPHICS
Company's Street: 1800 W CENTRAL ROAD
Company's City: MT.PROSPECT
Company's State: IL
Company's Country: US
Company's Zip Code: 60056-2293
Company's Emerg Ph #: 708-870-5121 (DAY) 398-1900 (NIGHT)
Company's Info Ph #: 708-870-5121
Distributor/Vendor # 1: AM MULTIGRAPHICS
Distributor/Vendor # 1 Cage: 1A714
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 003
Status: SP
Date MSDS Prepared: 01APR89
Safety Data Review Date: 31OCT92
Supply Item Manager: CX
MSDS Preparer's Name: UNKNOWN
MSDS Serial Number: BPDWV
Specification Number: NONE
Spec Type, Grade, Class: NOT APPLICABLE
Hazard Characteristic Code: J6
Unit Of Issue: PT
Unit Of Issue Container Qty: 1
Type Of Container: STD COML PKG
et Unit Weight: 1.2 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: NITRIC ACID (SARA III)
Ingredient Sequence Number: 01
Percent: 4
NIOSH (RTECS) Number: QU5775000
CAS Number: 7697-37-2
OSHA PEL: 2 PPM/4 STEL
ACGIH TLV: 2 PPM/4 STEL; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: ALPHA-ALUMINA (ALUMINUM OXIDE) (EPA LISTS ONLY FIBROUS FORMS) (SARA III)
Ingredient Sequence Number: 02
Percent: 10-15
NIOSH (RTECS) Number: BD1200000
CAS Number: 1344-28-1
OSHA PEL: 15 MG/M3 TDUST
ACGIH TLV: 10 MG/M3 TDUST; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 03
Percent: 79
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NOT ESTABLISHED

Proprietary: NO
Ingredient: ALUMINUM SULFATE (SARA III)
Ingredient Sequence Number: 04
Percent: 10-15
NIOSH (RTECS) Number: BD1700000
CAS Number: 10043-01-3
OSHA PEL: 2 MG/M3
ACGIH TLV: 2 MG/M3; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: SILICA GEL
Ingredient Sequence Number: 05
Percent: 2-5
NIOSH (RTECS) Number: VV7310000
CAS Number: 112945-52-5
OSHA PEL: 6 MG/M3 TDUST
ACGIH TLV: 10 MG/M3 TDUST
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: WHITE, MILKY SOLUTION
Boiling Point: 212F,100C
Specific Gravity: 1.08
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: SLOWER THAN WATER
Solubility In Water: APPRECIABLE
Percent Volatiles By Volume: 50
Viscosity: UNKNOWN
pH: 3
Corrosion Rate (IPY): UNKNOWN
Autoignition Temperature: NONE

Fire and Explosion Hazard Data

Flash Point: NONE
Extinguishing Media: NONCOMBUSTIBLE. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE CONDITIONS.
Special Fire Fighting Proc: WEAR A NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE EQUIPMENT WHEN FIGHTING FIRES. USE WATER SPRAY TO COOL FIRE EXPOSED CONTAINERS.
Unusual Fire And Expl Hazrds: NONE

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NOT APPLICABLE
Materials To Avoid: STRONG ALKALIS
Hazardous Decomp Products: CARBON MONOXIDE AND CARBON DIOXIDE
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT) IS UNKNOWN
Route Of Entry - Inhalation: NO
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYE, SKIN, GASTRO AND RESPIRATORY TRACT IRRITATION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: THIS COMPOUND CONTAINS NO INGREDIENTS AT CONCENTRATIONS OF 0.1% OR GREATER THAT ARE CARCINOGENS OR SUSPECT CARCINOGENS.
Signs/Symptoms Of Overexp: EYE, SKIN, GASTRO & RESPIRATORY TRACT IRRITATION.

Med Cond Aggravated By Exp: NONE KNOWN
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH WITH RUNNING WATER FOR
T LEAST 15 MINUTES WHILE LIFTING EYELIDS OPEN. IF IRRITATION DEVELOPS OR
ERSISTS, GET MEDICAL ATTENTION. SKIN: WASH WITH SOAP AND PLENTY OF WATER.
IF IRRITATION DEVELOPS OR PERSISTS, GET MEDICAL ATTENTION. VAPOR INHALATION
UNLIKELY: REMOVE TO FRESH AIR. GET MEDICAL ATTENTION IF REQUIRED.
INGESTION: DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ABSORB WITH INERT MATERIAL AND PLACE IN DISPOSCAL CONTAINER. NEUTRALIZE AND FLUSH SPILL AREA WITH WATER TO FLUSH RESIDUE.
Neutralizing Agent: SODIUM BICARBONATE
Waste Disposal Method: DISPOSE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL, DRY PLACE. KEEP CONTAINERS CLOSED WHEN NOT IN USE. PROTECT FROM PHYSICAL DAMAGE
Other Precautions: NONE

Control Measures

Respiratory Protection: NONE NORMALLY REQUIRED.
Ventilation: USE ADEQUATE MECHANICAL VENTILATION.
Protective Gloves: RUBBER
Eye Protection: SAFETY GLASSES/CHEMICAL SPLASH GOGGLES
Other Protective Equipment: READ AND FOLLOW PRECAUTIONS ON LABEL. DO NOT REUSE BOTTLE.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING AND BEFORE EATING, DRINKING OR SMOKING. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Suppl. Safety & Health Data: NONE

Transportation Data

Trans Data Review Date: 92305
DOT PSN Code: DWC
DOT Proper Shipping Name: CORROSIVE LIQUIDS, N.O.S.
DOT Class: 8
DOT ID Number: UN1760
DOT Pack Group: I
DOT Label: CORROSIVE
IMO PSN Code: ESH
IMO Proper Shipping Name: CORROSIVE LIQUID, N.O.S.
IMO Regulations Page Number: 8147
IMO UN Number: 1760
IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: HKM
IATA UN ID Number: 1760
IATA Proper Shipping Name: CORROSIVE LIQUID, N.O.S. *
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: HKM
AFI Prop. Shipping Name: CORROSIVE LIQUID, N.O.S.
AFI Class: 8
AFI ID Number: UN1760
AFI Pack Group: I
AFI Label: CORROSIVE
AFI Special Prov: A7
AFI Basic Pac Ref: 12-4
Additional Trans Data: MFGR. STATES THAT MATERIAL IS REGULATED.

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 31OCT92

MFR Label Number: NOT APPLICABLE
Label Status: F
Common Name: MULTILITH CYLINDER CLEANER
Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: EYE, SKIN, GASTRO & RESPIRATORY TRACT IRRITATION. STORE IN A COOL, DRY PLACE. KEEP CONTAINERS CLOSED WHEN NOT IN USE. IN CASE OF SPILL: ABSORB WITH INERT MATERIAL & PLACE IN DISPOSCAL CONTAINER. NEUTRALIZE & FLUSH SPILL AREA WITH WATER TO FLUSH RESIDUE. FIRST AID: EYES: IMMEDIATELY FLUSH WITH RUNNING WATER FOR AT LEAST 15 MINUTES WHILE LIFTING EYELIDS OPEN. IF IRRITATION DEVELOPS OR PERSISTS, GET MEDICAL ATTENTION. SKIN: WASH WITH SOAP AND WATER. IF IRRITATION DEVELOPS OR PERSISTS, GET MEDICAL ATTENTION. VAPOR INHALATION UNLIKELY: REMOVE TO FRESH AIR. GET MEDICAL ATTENTION IF REQUIRED. INGESTION: DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.
Protect Eye: Y
Protect Skin: Y
Label Name: MULTIGRAPHICS
Label Street: 1800 W CENTRAL ROAD
Label City: MT.PROSPECT
Label State: IL
Label Zip Code: 60056-2293
Label Country: US
Label Emergency Number: 708-870-5121 (DAY) 398-1900 (NIGHT)
==========
URL for this msds http://siri.org. If you wish to change, add to, or delete information in this archive please sent updates to dan@siri.org.

VM&P NAPHTHA
69068

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Ashland P.O. Box 2219 Columbus, OH 43216	Regulatory Information Number Telephone Emergency telephone	1-800-325-3751 614-790-3333 1-800-ASHLAND (1-800-274-5263)

Product name	VM&P NAPHTHA
Product code	69068
Product Use Description	No data

2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance: liquid.. colourless

WARNING! FLAMMABLE LIQUID AND VAPOR. MAY AFFECT THE CENTRAL NERVOUS SYSTEM CAUSING DIZZINESS, HEADACHE OR NAUSEA. MAY BE HARMFUL IF INHALED OR SWALLOWED. PROLONGED OR REPEATED CONTACT MAY DRY THE SKIN AND CAUSE IRRITATION AND BURNS.

Potential Health Effects

Exposure routes

Inhalation, Skin absorption, Skin contact, Eye Contact, Ingestion

Eye contact

May cause mild eye irritation. Symptoms include stinging, tearing, and redness.

Skin contact

May cause mild skin irritation. Prolonged or repeated contact may dry the skin. Symptoms may include redness, burning, drying and cracking of skin, and skin burns. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.

Ingestion

Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful. This material can get into the lungs during swallowing or vomiting. This results in lung inflammation and other lung injury.

Inhalation

Breathing of vapor or mist is possible. Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful. Symptoms are not expected at air concentrations below the recommended exposure limits, if applicable (see Section 8.).

Aggravated Medical Condition

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material:, Skin, lung (for example, asthma-like conditions), Individuals with preexisting heart disorders maybe more susceptible to arrhythmias (irregular heartbeats) if exposed to high concentrations of this material.

Symptoms

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include:, stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), central nervous system excitation (giddiness, liveliness, light-headed feeling) followed by central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness) and other central nervous system effects

Target Organs

Exposure to this material (or a component) has been found to cause kidney damage in male rats. The mechanism by which this toxicity occurs is specific to the male rat and the kidney effects are not expected to occur in humans.

Carcinogenicity

This material is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA).

Reproductive hazard

Based on the available information, risk to the fetus from maternal exposure to this material cannot be assessed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components	CAS-No.	Concentration
SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	64742-89-8	<=100%

4. FIRST AID MEASURES

Eyes

If symptoms develop, move individual away from exposure and into fresh air. Flush eyes gently with water while holding eyelids apart. If symptoms persist or there is any visual difficulty, seek medical attention.

Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

Ingestion

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, move individual away from exposure and into fresh air. If symptoms persist, seek medical attention. If breathing is difficult, administer oxygen. Keep person warm and quiet; seek immediate medical attention.

Notes to physician

Hazards: Inhalation of high concentrations of this material, as could occur in enclosed spaces or during deliberate abuse, may be associated with cardiac arrhythmias. Sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to this material. This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity (See Section 2 - Swallowing) when deciding whether to induce vomiting.

Treatment: No information available.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Dry chemical, Carbon dioxide (CO2), Foam

Hazardous combustion products

carbon dioxide and carbon monoxide, Hydrocarbons

Precautions for fire-fighting

Material is volatile and readily gives off vapors which may travel along the ground or be moved by ventilation and ignited by pilot lights, flames, sparks, heaters, smoking, electric motors, static discharge or other ignition sources at locations near the material handling point. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively.Wear full firefighting turn-out gear (full Bunker gear), and respiratory protection (SCBA).

NFPA Flammable and Combustible Liquids Classification

Flammable Liquid Class IB

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

For personal protection see section 8. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks).

Environmental precautions

Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred.

Methods for cleaning up

Absorb liquid on vermiculite, floor absorbent or other absorbent material.

7. HANDLING AND STORAGE

Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing impervious protective gloves. As with all products of this nature, good personal hygiene is essential. Hands and other exposed areas should be washed thoroughly with soap and water after contact, especially before eating and/or smoking. Regular laundering of contaminated clothing is essential to reduce indirect skin contact with this material. Static ignition hazard can result from handling and use. Electrically bond and ground all containers, personnel and equipment before transfer or use of material. Special precautions may be necessary to dissipate static electricity for non-conductive containers. Use proper bonding and grounding during product transfer as described in

National Fire Protection Association document NFPA 77. Hydrocarbon solvents are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering or pumping at high flow rates. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Warning. Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product in elevated temperature processes should be thoroughly evaluated to establish and maintain safe operating conditions.

Storage

Do not store near extreme heat, open flame, or sources of ignition.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC		64742-89-8
OSHA Z1	time weighted average	500 ppm
ACGIH	time weighted average	300 ppm
ACGIH	time weighted average	1,370 mg/m3

General advice

These recommendations provide general guidance for handling this product. Personal protective equipment should be selected for individual applications and should consider factors which affect exposure potential, such as handling practices, chemical concentrations and ventilation. It is ultimately the responsibility of the employer to follow regulatory guidelines established by local authorities.

Exposure controls

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below exposure guidelines (if applicable) or below levels that cause known, suspected or apparent adverse effects.

Eye protection

Not required under normal conditions of use. Wear splash-proof safety goggles if material could be misted or splashed into eyes.

Skin and body protection

Wear resistant gloves (consult your safety equipment supplier).
Wear normal work clothing including long pants, long-sleeved shirts and foot covering to prevent direct contact of the product with the skin. Launder clothing before reuse. If skin irritation develops, contact your facility health and safety professional or your local safety equipment supplier to determine the proper personal protective equipment for your use.

Respiratory protection

A NIOSH-approved air-purifying respirator with an appropriate cartridge and/or filter may be persmissible under certain circumstancs where airborne concentrations are expected to exceed exposure limits (if applicable) or if overexposure has otherwise been determined. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are not known or any other circumstances where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	liquid
Form	No data
Colour	colourless, clear
Odour	hydrocarbon-like
Boiling point/boiling range	185.00 °F @ 760.00 mmHg
pH	No data
Flash point	10.00 °C Tag closed cup
Evaporation rate	3.5 (n-Butyl Acetate)
Lower explosion limit/Upper explosion limit	1.3 %(V) / 8.0 %(V)
Vapour pressure	12.000 mmHg @ 20 °C
Vapour density	3.65 (AIR=1)
Density	0.752 g/cm3 @ 60.00 °F / 15.56 °C 6.28 lb/gal @ 61 °F / 16 °C
Solubility	negligible in water
Partition coefficient: n-octanol/water	No data
log Pow	no data available
Autoignition temperature	450 °F / 232 °C

10. STABILITY AND REACTIVITY

Stability

Stable.

Conditions to avoid
Heat, flames and sparks.

Incompatible products
Strong oxidizing agents

Hazardous decomposition products
carbon dioxide and carbon monoxide, Hydrocarbons

Hazardous reactions
Product will not undergo hazardous polymerization.

Thermal decomposition
No data

11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	:	LD 50 Rat: > 8,000 mg/kg
Acute inhalation toxicity	:	LC 50 Rat: 3400 ppm, 4 h
Acute dermal toxicity	:	LD 50 Rat: > 4,000 mg/kg

12. ECOLOGICAL INFORMATION

Biodegradability
SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC : no data available

Bioaccumulation
SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC : no data available

Ecotoxicity effects

Toxicity to fish
SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC : no data available

Toxicity to daphnia and other aquatic invertebrates.

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	:	no data available

Toxicity to algae

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	:	no data available

Toxicity to bacteria

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	:	no data available

Biochemical Oxygen Demand (BOD)

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	:	no data available

Chemical Oxygen Demand (COD)

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	:	no data available

Additional ecological information

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	:	no data available

13. DISPOSAL CONSIDERATIONS

Waste disposal methods

Dispose of in accordance with all applicable local, state and federal regulations. Do not discharge effluent containing this product into lakes, streams, ponds or estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit, and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Ashland Distribution's Environmental Services Group at 800-637-7922.

14. TRANSPORT INFORMATION

REGULATION

ID NUMBER	PROPER SHIPPING NAME	*HAZARD CLASS	SUBSIDIARY HAZARDS	PACKING GROUP	MARINE POLLUTANT / LTD. QTY.

U.S. DOT - ROAD

UN	1268	Petroleum distillates, n.o.s.	3	II

U.S. DOT - RAIL

UN	1268	Petroleum distillates, n.o.s.	3	II

U.S. DOT - INLAND WATERWAYS

UN	1268	Petroleum distillates, n.o.s.	3	II

TRANSPORT CANADA - ROAD

UN	1268	PETROLEUM DISTILLATES, N.O.S.	3	II

TRANSPORT CANADA - RAIL

UN	1268	PETROLEUM DISTILLATES, N.O.S.	3	II

TRANSPORT CANADA - INLAND WATERWAYS

UN	1268	PETROLEUM DISTILLATES, N.O.S.	3	II

INTERNATIONAL MARITIME DANGEROUS GOODS

UN	1268	PETROLEUM DISTILLATES, N.O.S.	3	II

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

UN	1268	Petroleum distillates, n.o.s.	3	II

INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER

UN	1268	Petroleum distillates, n.o.s.	3	II

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES

UN	1268	DESTILADOS DE PETROLEO, N.E.P.	3	II

***ORM = ORM-D, CBL = COMBUSTIBLE LIQUID**

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

15. REGULATORY INFORMATION

California Prop. 65

WARNING! This product contains a chemical known in the State of California to cause cancer.	ETHYL BENZENE BENZENE
WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.	TOLUENE BENZENE

SARA Hazard Classification

Fire Hazard
Acute Health Hazard

New Jersey RTK Label Information

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	64742-89-8

Pennsylvania RTK Label Information

SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	64742-89-8

Notification status

Australia. Industrial Chemical (Notification and Assessment) Act	y (positive listing)
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	y (positive listing)
China. Inventory of Existing Chemical Substances	y (positive listing)
US. Toxic Substances Control Act	y (positive listing)
EU. EINECS	y (positive listing)
Korea. Toxic Chemical Control Law (TCCL) List	y (positive listing)
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	y (positive listing)
Japan. Kashin-Hou Law List	y (positive listing)
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	y (positive listing)

Reportable quantity - Product

US. EPA CERCLA Hazardous Substances (40 CFR 302)	66666 lbs

Reportable quantity-Components

XYLENE	1330-20-7	100 lbs

	HMIS	NFPA
Health	1	1
Flammability	3	3
Physical hazards	0	
Instability		0
Specific Hazard	--	--

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by Ashland's Environmental Health and Safety Department (1-800-325-3751).

Material Safety Data Sheet

Nitric acid

ACC# 94721

MSDS Name: Nitric acid
Catalog Numbers: A202-212, A202-500
Synonyms: Azotic acid; Engraver's acid; Aqua fortis.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

7697-37-2	Nitric acid	>90	231-714-2
10102-44-0	Nitrogen dioxide	>6	233-272-6
7732-18-5	Water	<5	231-791-2

EMERGENCY OVERVIEW

Appearance: yellow to brown-red liquid.
Danger! Causes severe eye and skin burns. Causes severe digestive and respiratory tract burns. Strong oxidizer. Contact with other material may cause a fire. May be fatal if inhaled. Acute pulmonary edema or chronic obstructive lung disease may occur from inhalation of the vapors of nitric acid. Check internal container upon receipt. Bottles should be vented periodically to relieve pressure.
Target Organs: Lungs, eyes, skin, mucous membranes.

Potential Health Effects
: Causes severe eye burns. May cause irreversible eye injury.
: Exposure of the skin to the liquid or concentrated vapor produces severe and penetrati burns. Concentrated nitric acid dyes human skin yellow on contact.
Ingestion: Causes gastrointestinal tract burns. May cause perforation of the digestive tract.

Inhalation: Effects may be delayed. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. May cause acute pulmonary edema, asphyxia, chemical pneumonitis, and upper airway obstruction caused by edema. Many human deaths from pulmonary edema, induced by the inhalation of high concentrations of nitrogen dioxide have been reported. There were at least 90 deaths prior to 1920 and over 60 between 1930 and 1956. The incidence of chronic effects from long exposures at low concentrations of NO2 is less well defined. (Doc of TLV)
Chronic: Exposure to high concentrations of nitric acid vapor may cause pneuomonitis and pulmonary edema which may be fatal. Symptoms may or may not be delayed. Continued exposure to the vapor & mist of nitric acid may result in a chronic bronchitis, & more severe exposure results in a chemical pneumonitis. The vapor & mists of nitric acid may erode the teeth, particularly affecting the canines & incisors. Monkeys exposed to nitrogen dioxide at 10 ppm for 1 month or at 5 ppm for 2 months showed a marked decrease in resistance to infections. (Documentation of the TLVs, 7th

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with other material may cause fire. Use water spray to keep fire-exposed containers cool. Vapors may accumulate in confined spaces Contact with metals may evolve flammable hydrogen gas. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Do NOT use straight streams of water. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 4; Flammability: 0; Instability: 1; Special Hazard: OX

nformation: Use proper personal protective equipment as indicated in Section 8.
eaks: Absorb spill using an absorbent, non-combustible material such as earth, sand, or ılite. Do not use combustible materials such as sawdust. Provide ventilation. Evacuate cessary personnel. Approach spill from upwind. Use water spray to cool and disperse va protect personnel.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep from contact with clothing and other combustible materials. Discard contaminated shoes. Do not use with metal spatula or other metal items. Do not breathe vapor or mist. Use only with adequate ventilation or respiratory protection. Always add the acid to water, never the reverse.
Storage: Do not store near combustible materials. Do not store in direct sunlight. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Store away from alkalies. Bottles should be vented periodically in order to overcome pressure buildup. Separate from organic materials. Avoid storage on wood floors. Shelves and floor material should be non-combustible and acid-resistant. Inspect periodically for damage or evidence of leaks or corrosion. This material may darken during storage due to photochemical reactions. Keep this bottle in a cool place and remove cap carefully to avoid spurting.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use a corrosion-resistant ventilation system.
Exposure Limits

Nitric acid	2 ppm TWA; 4 ppm STEL	2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH	2 ppm TWA; 5 mg/m3 TWA
Nitrogen dioxide	3 ppm TWA; 5 ppm STEL	20 ppm IDLH	5 ppm Ceiling; 9 mg/m3 Ceiling
Water	none listed	none listed	none listed

OSHA Vacated PELs: Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Nitrogen dioxide: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles and face shield.
Skin: Wear appropriate protective gloves to prevent skin exposure.
hing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

[redacted]

Physical State: Liquid
Appearance: yellow to brown-red
Odor: suffocating odor - strong odor - acrid odor
pH: Not available.
Vapor Pressure: 62 mm Hg @ 25 deg C
Vapor Density: 2.2 (air=1)
Evaporation Rate: Not available.
Viscosity: 0.761 cP 25 deg C
Boiling Point: 122 deg C
Freezing/Melting Point:-42 deg C
Decomposition Temperature: Not available.
Solubility: Freely Soluble.
Specific Gravity/Density:1.5
Molecular Formula:HNO3 and NO2
Molecular Weight:63.02

[redacted]

Chemical Stability: Stable under normal temperatures and pressures. May decompose when exposed to light. Turns reddish-brown on exposure to light. Darkens on exposure to light.
Conditions to Avoid: Light, excess heat, confined spaces.
Incompatibilities with Other Materials: Incompatible with many substances, alcohols, aldehydes, combustible materials, cyanides, metal powders, reducing agents, strong bases, organic solvents, turpentine, charcoal, Nitric acid reacts with over 150 chemicals. Reacts explosively with organic materials and combustible materials..
Hazardous Decomposition Products: Nitrogen oxides.
Hazardous Polymerization: Has not been reported.

[redacted]

RTECS#:
CAS# 7697-37-2: QU5775000; QU5900000
CAS# 10102-44-0: QW9800000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7697-37-2:
Inhalation, rat: LC50 = 260 mg/m3/30M;
Inhalation, rat: LC50 = 130 mg/m3/4H;
Inhalation, rat: LC50 = 67 ppm(NO2)/4H;

.

C. # 10102-44-0:
Inhalation, mouse: LC50 = 1000 ppm/10M;
Inhalation, mouse: LC50 = 800 mg/m3/25M;

Inhalation, mouse: LC50 = 900 mg/m3/2H;
Inhalation, rabbit: LC50 = 315 ppm/15M;
Inhalation, rabbit: LC50 = 60 mg/m3/15M;
Inhalation, rabbit: LC50 = 12 mg/m3/15M;
Inhalation, rat: LC50 = 88 ppm/4H;
Inhalation, rat: LC50 = 220 mg/m3/1H;
Inhalation, rat: LC50 = 310 mg/m3/30M;
Inhalation, rat: LC50 = 790 mg/m3/5M;

.

CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;

.

Carcinogenicity:
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 10102-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: Nitric acid effects on newborn: biochemical and metabolic, Oral-rat TDLo=2345 mg/kg (female 18D post). Fetotoxicity: Stunted fetus, Oral-rat TDLo=21150 mg/kg (female 1-21D post).
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

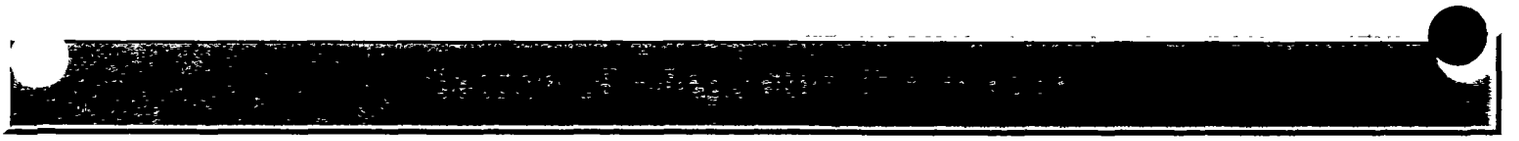
Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: CAS# 10102-44-0: waste number P078.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NITRIC ACID, RED FUMING	NITRIC ACID
Hazard Class:	8	8
UN Number:	UN2032	UN2031

Packing Group:	I	I



US FEDERAL

TSCA

CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 10102-44-0 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ CAS# 10102-44-0: 10 lb final RQ (Releases to the air in amounts less than 1000 pounds per 24 hour

SARA Section 302 Extremely Hazardous Substances

CAS# 7697-37-2: 1000 lb TPQ CAS# 10102-44-0: 100 lb TPQ

SARA Codes

CAS # 7697-37-2: immediate, delayed, fire.

Section 313

This material contains Nitric acid (CAS# 7697-37-2, >90%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA. CAS# 10102-44-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

CAS# 7697-37-2 is considered highly hazardous by OSHA. CAS# 10102-44-0 is considered highly hazardous by OSHA.

STATE

CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 10102-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

ard Symbols:

C

k Phrases:

R 35 Causes severe burns.
R 8 Contact with combustible material may cause fire.

Safety Phrases:

S 23 Do not inhale gas/fumes/vapour/spray.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36 Wear suitable protective clothing.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 7697-37-2: 1
CAS# 10102-44-0: 1
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL

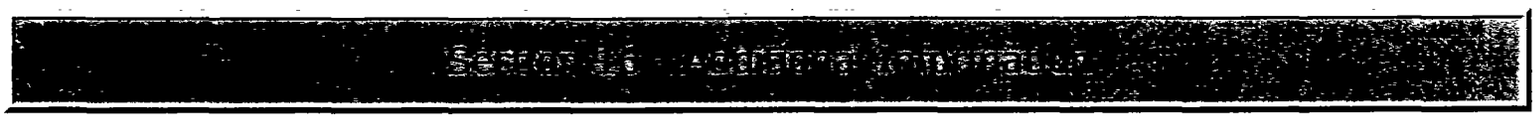
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 10102-44-0 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of E, C, D1A.
This product has been classified in accordance with the hazard criteria of the Controlled Products ılations and the MSDS contains all of the information required by those regulations.

adian Ingredient Disclosure List

CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 10102-44-0 is listed on the Canadian Ingredient Disclosure List.



MSDS Creation Date: 9/15/2008
Revision #1 Date: 9/15/2008

The information above 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, express 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. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Mallinckrodt Baker

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	PHOSPHORIC ACID
Version #	01
Revision date	01-21-2010
CAS #	Mixture
Product Codes	J.T.Baker: 0251, 0260, 0262, 0263, 0264, 0265, 0268, 0269, 0274, 5372, 5804, 5841, 5854, 6908 Mallinckrodt: 2788, 2796, 2797, H106
Synonym(s)	Ortho-phosphoric acid * White phosphoric acid
Manufacturer	Mallinckrodt Baker, Inc.
Address	222 Red School Lane Phillipsburg, NJ 08865 US
Customer Service	800-582-2537
24 Hour Emergency	908-859-2151
Chemtrec	800-244-4444

2. Hazards Identification

Emergency overview	DANGER Corrosive. Causes skin and eye burns. Harmful if inhaled or swallowed. Irritating to respiratory system. Prolonged exposure may cause chronic effects.
OSHA regulatory status	This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects	
Routes of exposure	Inhalation. Ingestion. Skin contact. Eye contact.
Eyes	Corrosive. Causes eye burns. Risk of serious damage to eyes. Do not get this material in contact with eyes.
Skin	Corrosive. Causes skin burns. Do not get this material in contact with skin.
Inhalation	Harmful if inhaled. Inhalation of vapors or mists of the product may be irritating to the respiratory system. Prolonged inhalation may be harmful. Do not breathe dust/fume/gas/mist/vapors/spray.
Ingestion	Corrosive. Harmful if swallowed. Components of the product may be absorbed into the body by ingestion. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract. Circulatory collapse. Unconsciousness, possibly death. Do not ingest.
Target organs	Eyes. RESPIRATORY SYSTEM. Skin.
Signs and symptoms	Upper respiratory tract irritation. Irritation of eyes and mucous membranes.
Potential environmental effects	Components of this product are hazardous to aquatic life. May cause long-term adverse effects in the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
PHOSPHORIC ACID	7664-38-2	80 - 90
Other components below reportable levels		10 - 20

4. First Aid Measures

First aid procedures	
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

Skin contact	Remove and isolate contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. For minor skin contact, avoid spreading material on unaffected skin. Wash clothing separately before reuse.
Inhalation	Move to fresh air. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth metho victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Get medical attention immediately.
Ingestion	Do not induce vomiting without advice from poison control center. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth thoroughly. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Notes to physician	In case of shortness of breath, give oxygen. Keep victim warm.
General advice	Immediate medical attention is required. In case of shortness of breath, give oxygen. Keep victim warm. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties	Not flammable, but reacts with most metals to form flammable hydrogen gas.
Extinguishing media	
Suitable extinguishing media	Water.
Protection of firefighters	
Protective equipment and precautions for firefighters	In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers. Cool containers exposed to flames with water until well after the fire is out.
Specific methods	In the event of fire, cool tanks with water spray. Use water spray to cool unopened containers.
Hazardous combustion products	May include oxides of phosphorus.

6. Accidental Release Measures

Personal precautions	Ensure adequate ventilation. Keep unnecessary personnel away. Local authorities should be advised if significant spillages cannot be contained. Keep people away from and upwind of spill/leak. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Wear appropriate protective equipment and clothing during clean-up. Ventilate closed spaces before entering them.
Environmental precautions	Prevent further leakage or spillage if safe to do so. Do not contaminate water.
Methods for containment	Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Prevent entry into waterways, sewer, basements or confined areas.
Methods for cleaning up	Should not be released into the environment. Large Spills: Dike far ahead of spill for later disposal. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Never return spills in original containers for re-use. Following product recovery, flush area with water. Neutralize spill area and washings with soda ash or lime. Clean surface thoroughly to remove residual contamination. J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Handling	Do not breathe dust/fume/gas/mist/vapors/spray. Do not get this material in contact with eyes. Do not get this material in contact with skin. Do not get this material on clothing. Do not use in areas without adequate ventilation. Avoid prolonged exposure. Wash thoroughly after handling. Avoid release to the environment. Handle and open container with care. Use caution when combining with water; DO NOT add water to acid, ALWAYS add acid to water while stirring to prevent release of heat, steam and fumes.
Storage	Store in a well-ventilated place. Keep container tightly closed. Keep from freezing. Protect against direct sunlight. Keep out of the reach of children. Use care in handling/storage. Keep away from food, drink and animal feedingstuffs.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components	Type	Value
PHOSPHORIC ACID (7664-38-2)	STEL	3.0000 mg/m3
	TWA	1.0000 mg/m3

U.S. - OSHA

Components	Type	Value
PHOSPHORIC ACID (7664-38-2)	PEL	1.0000 mg/m3
	STEL	3.0000 mg/m3
	TWA	1.0000 mg/m3

Engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal protective equipment

Eye / face protection	Chemical goggles are recommended. Face-shield. Provide eyewash station and safety shower. Do not get in eyes.
Skin protection	Wear appropriate chemical resistant clothing. Chemical resistant gloves. Do not get this material in contact with skin. Do not get this material on clothing.
Respiratory protection	Do not breathe dust/fume/gas/mist/vapors/spray. Wear positive pressure self-contained breathing apparatus (SCBA).
General hygeine considerations	Do not get in eyes. Do not get this material in contact with skin. Do not get this material on clothing. When using, do not eat, drink or smoke. Keep away from food and drink. Handle in accordance with good industrial hygiene and safety practice.

9. Physical & Chemical Properties

Appearance	Clear.
Color	Colorless.
Odor	Odorless.
Odor threshold	Not available.
Physical state	Liquid.
Form	Liquid.
pH	1.5 (0.1 N aqueous solution)
Melting point	98.6 °F (37.06 °C) estimated
Freezing point	98.6 °F (37.06 °C) estimated
Boiling point	390.2 °F (199 °C) estimated
Flash point	Not available.

Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	0.03 hPa estimated
Vapor density	3.4
Specific gravity	1.834 estimated
Relative density	Not available.
Solubility (water)	Miscible.
Partition coefficient (n-octanol/water)	Not available
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Percent volatile	12.5 % estimated
Molecular weight	98 Phosphoric acid
Molecular formula	H3PO4 in H2O

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	Reacts violently with strong alkaline substances. This product may react with reducing agents. Do not mix with other chemicals.
Incompatible materials	Incompatible with bases. This product may react with reducing agents. Ammonia. Caustics. Epoxides. Amines. Amides. Alcohols. Phenols. Fluoride. Cyanides. Cresol. Nitromethane. Orga peroxides/hydroperoxides. Contact with metals may evolve flammable hydrogen gas.
Hazardous decomposition products	Phosphoric acid. May include oxides of phosphorus.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Product	**Test Results**
PHOSPHORIC ACID (Mixture)	Acute Dermal LD50 Rabbit: 3131 mg/kg estimated
Components	**Test Results**
PHOSPHORIC ACID (7664-38-2)	Acute Dermal LD50 Rabbit: 2740 mg/kg
	Acute Oral LD50 Rat: 1530 mg/kg

* Estimates for product may be based on additional component data not shown.

Acute effects	Causes burns.
Local effects	Irritating to respiratory system.
Chronic effects	Hazardous by OSHA criteria. Prolonged exposure may cause chronic effects.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Skin corrosion/irritation	Hazardous by OSHA criteria.
Epidemiology	Not available.
Neurological effects	Not available.

12. Ecological Information

Ecotoxicity	Components of this product are hazardous to aquatic life. Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.
Environmental effects	Harmful to aquatic organisms.
Persistence and degradability	Not available.

13. Disposal Considerations

Waste codes	D002: Waste Corrosive material [pH <=2 or =>12.5, or corrosive to steel]
Disposal instructions	Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. Do not allow this material to drain into sewers/water supplies. Dispose in accordance with all applicable regulations.

14. Transport Information

DOT

Basic shipping requirements:

UN number	UN1805
Proper shipping name	Phosphoric acid solution (PHOSPHORIC ACID RQ = 5714 LBS)
Hazard class	8
Packing group	III

Additional information:

Special provisions	A7, IB3, N34, T4, TP1
Packaging exceptions	154
Packaging non bulk	203
Packaging bulk	241
ERG number	154

IATA

Basic shipping requirements:

UN number	1805
Proper shipping name	Phosphoric acid solution
Hazard class	8
Packing group	III

IMDG

Basic shipping requirements:

UN number	1805
Proper shipping name	PHOSPHORIC ACID SOLUTION
Hazard class	8
Packing group	III

DOT

IATA

IMDG

15. Regulatory Information

US federal regulations	This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.

CERCLA (Superfund) reportable quantity

PHOSPHORIC ACID: 5000.0000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
Section 311 hazardous chemical	Yes

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - Pennsylvania RTK - Hazardous Substances: Listed substance

PHOSPHORIC ACID (CAS 7664-38-2) Listed.

Saf-T-Data

Health: 3 - Severe
Flammability: 0 - None
Reactivity: 2 - Moderate
Contact: 4 - Extreme (Corrosive)
Lab Protective Equip: D - GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: W - White (Corrosive)

16. Labeling Info

Label Hazard Warning

DANGER

Corrosive. Causes skin and eye burns. Harmful if inhaled or swallowed. Irritating to respiratory system. Prolonged exposure may cause chronic effects.

Label Precautions Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

Label First Aid Immediately flush eyes with plenty of water for at least 15 minutes. Immediately flush skin with plenty of water. If gas/fume/vapor/dust/mist from the material is inhaled, remove the affected person immediately to fresh air. Oxygen or artificial respiration if needed. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do not induce vomiting without advice from poison control center. Rinse mouth thoroughly. Do not use mouth-to-mouth method if victi ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with , one-way valve or other proper respiratory medical device. Get medical attention immediately.

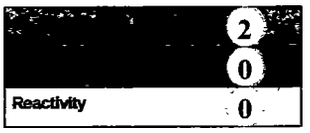
17. Other Information

NFPA ratings	Health: 3 Flammability: 0 Instability: 0
Disclaimer	Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
Issue date	01-21-2010

SPECTRUM®

GARDENA, CA
NEW BRUNSWICK, NJ

Material Safety Data Sheet

NFPA	HMIS	Personal Protective Equipment
		
		See Section 15.

Section 1. Chemical Product and Company Identification

Common Name/ Trade Name	**Potassium ferricyanide**
Manufacturer	SPECTRUM LABORATORY PRODUCTS INC. 14422 S. SAN PEDRO STREET GARDENA, CA 90248
Commercial Name(s)	Not available.
Synonym	Potassium hexacyanoferrate (III)
Chemical Name	potassium ferricyanide
Chemical Family	Not available.
Chemical Formula	K3Fe(CN)6
Supplier	SPECTRUM LABORATORY PRODUCTS INC. 14422 S. SAN PEDRO STREET GARDENA, CA 90248

Catalog Number(s).	P1285, P1286
CAS#	13746-66-2
RTECS	LJ8225000
TSCA	TSCA 8(b) inventory: Potassium ferricyanide
CI#	Not available.

IN CASE OF EMERGENCY
CHEMTREC (24hr) 800-424-9300

CALL (310) 516-8000

Section 2.Composition and Information on Ingredients

		Exposure Limits			
Name	CAS #	TWA (mg/m³)	STEL (mg/m³)	CEIL (mg/m³)	% by Weight
1) Potassium ferricyanide	13746-66-2				100

Toxicological Data on Ingredients

Potassium ferricyanide:
ORAL (LD50): Acute: 2970 mg/kg [Mouse].

Section 3. Hazards Identification

Potential Acute Health Effects

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects

CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure is not known to aggravate medical condition.

Continued on Next Page

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.
Skin Contact	In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
Serious Skin Contact	Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Serious Inhalation	Not available.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.
Serious Ingestion	Not available.

Section 5. Fire and Explosion Data

Flammability of the Product	Non-flammable.
Auto-Ignition Temperature	Not applicable.
Flash Points	Not applicable.
Flammable Limits	Not applicable.
Products of Combustion	Not available.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.
Fire Fighting Media and Instructions	Not applicable.
Special Remarks on Fire Hazards	Not available.
Special Remarks on Explosion Hazards	Not available.

Section 6. Accidental Release Measures

Small Spill	Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.
Large Spill	Use a shovel to put the material into a convenient waste disposal container.

Continued on Next Page

Section 7. Handling and Storage

Precautions	Keep locked up.. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as acids.
Storage	Light sentisitve Store in light-resistant containers. Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
Personal Protection	Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.
Exposure Limits	Not available.

Section 9. Physical and Chemical Properties

Physical state and appearance	Solid. (crystalline powder.)	**Odor**	Not available.
Molecular Weight	329.25 g/mole	**Taste**	Not available.
pH (1% soln/water)	Not available.	**Color**	Red.
Boiling Point	Not available.		
Melting Point	Decomposes.		
Critical Temperature	Not available.		
Specific Gravity	1.85 (Water = 1)		
Vapor Pressure	Not applicable.		
Vapor Density	Not available.		
Volatility	Not available.		
Odor Threshold	Not available.		
Water/Oil Dist. Coeff.	Not available.		
Ionicity (in Water)	Not available.		
Dispersion Properties	See solubility in water.		
Solubility	Soluble in cold water.		

Section 10. Stability and Reactivity Data

Stability	The product is stable.
Instability Temperature	Not available.
Conditions of Instability	Heat, light, incompatible materials.
Incompatibility with various substances	Reactive with acids.
Corrosivity	Non-corrosive in presence of glass.

Continued on Next Page

Special Remarks on Reactivity	Incompatible with ammonia, chromium trioxide + heat, sodium nitrite + heat, acids, and acid fumes. Sensitive to light. When heated to decompositon or comes in contact with acid or acid fumes, it emits toxic fumes of cyanides. It emits toxic fumes of cyanides, and oxides of nitrogen when heated to decompositon
Special Remarks on Corrosivity	Not available.
Polymerization	Will not occur.

Section 11. Toxicological Information

Routes of Entry	Inhalation. Ingestion.
Toxicity to Animals	Acute oral toxicity (LD50): 2970 mg/kg [Mouse].
Chronic Effects on Humans	**MUTAGENIC EFFECTS**: Mutagenic for bacteria and/or yeast.
Other Toxic Effects on Humans	Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).
Special Remarks on Toxicity to Animals	Lowest Published Lethal Dose: LDL [Rat] - route: Oral; Dose: 1600 mg/kg
Special Remarks on Chronic Effects on Humans	May affect genetic material.
Special Remarks on other Toxic Effects on Humans	Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: May cause eye irritaiton. Inhalation: May cause respiratory tract irritation with coughing and shortness of breath. Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea, and possible abdominal cramping. Chronic Potential Health: Inhalation: Prolonged or repeated inhalation may affect blood and urinary system. The toxicological properties of this substance have not been fully investigated.

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
Products of Biodegradation	Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation	The product itself and its products of degradation are not toxic.
Special Remarks on the Products of Biodegradation	Not available.

Section 13. Disposal Considerations

Waste Disposal	Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Continued on Next Page

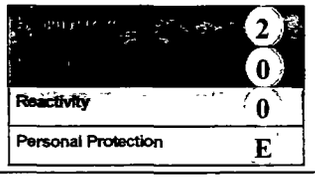
Section 14. Transport Information

DOT Classification	CLASS 9: Miscellaneous hazardous material.
Identification	: Environmentally hazardous substances. solid, N.O.S.(Potassium Ferricyanide) UNNA: 3077 PG: III
Special Provisions for Transport	Marine Pollutant
DOT (Pictograms)	

Section 15. Other Regulatory Information and Pictograms

Federal and State Regulations	TSCA 8(b) inventory: Potassium ferricyanide		
California Proposition 65 Warnings			
Other Regulations	EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.		
Other Classifications	WHMIS (Canada)	Not controlled under WHMIS (Canada).	
	DSCL (EEC)	R36/38- Irritating to eyes and skin.	S2- Keep out of the reach of children. S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.)

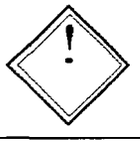


National Fire Protection Association (U.S.A.)

WHMIS (Canada) (Pictograms)

DSCL (Europe) (Pictograms)

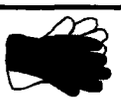
TDG (Canada) (Pictograms)



ADR (Europe) (Pictograms)

Protective Equipment

Continued on Next Page


Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent.

Splash goggles.

Section 16. Other Information

MSDS Code	P4290
References	Not available.
Other Special Considerations	Not available.

Validated by Sonia Owen on 8/11/2006.	**Verified by Sonia Owen.** **Printed 9/13/2006.**

CALL (310) 516-8000

Notice to Reader

All chemicals may pose unknown hazards and should be used with caution. This Material Safety Data Sheet (MSDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this MSDS. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this MSDS is based on technical data judged to be reliable, Spectrum Quality Products, Inc. assumes no responsibility for the completeness or accuracy of the information contained herein.

SIGMA-ALDRICH

Material Safety Data Sheet

Date Printed: 07/26/2006
Date Updated: 02/05/2006
Version 1.40

Section 1 - Product and Company Information

Product Name Propionaldehyde, reagent grade, 97%
Product Number 538124
Brand Sigma-Aldrich

Company Sigma-Aldrich
Street Address 3050 Spruce Street
City, State, Zip, Country SAINT LOUIS, MO 63103 US
Technical Phone: 800-325-5832 **Emergency Phone:** 314-776-6555
Fax: 800-325-5052

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313	EC no	Annex I Index Number
PROPIONALDEHYDE	123-38-6	Yes	204-623-0	605-016-00-8

Formula C3H6O
Synonyms Aldehyde propionique (French), Methylacetaldehyde, NCI-C61029, Propaldehyde, Propanal, Propionic aldehyde, Propyl aldehyde, Propylic aldehyde

Section 3 - Hazards Identification

Emergency Overview
Flammable (USA) *Highly flammable* (EU). *Corrosive.*
Causes burns. Harmful if swallowed.
Stench. Target organ(s): Liver.

HMIS Rating
Health: 3* Flammability: 3 Reactivity: 2

NFPA Rating
Health: 3 Flammability: 3 Reactivity: 2

*additional chronic hazards present.

Section 4 - First Aid Measures

Oral Exposure
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

Inhalation Exposure
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Dermal Exposure
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

Eye Exposure
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

Flammable Hazards: Yes

Explosion Hazards
Vapor may travel considerable distance to source of ignition and flash back.
Container explosion may occur under fire conditions.
Forms explosive mixtures in air.

Flash Point: -16 °F -27 °C

Explosion Limits: Lower: 2.6 % Upper: 17 %

Autoignition Temp: 207 °C **Flammability:** Yes

Extinguishing Media
Suitable
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Firefighting
Protective Equipment
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s)
Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill
Evacuate area. Shut off all sources of ignition.

Procedure(s) of Personal Precaution(s)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up
Cover with dry lime or soda ash, pick up, keep in a closed container, and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling
User Exposure
Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Open carefully.

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Storage
Suitable
Keep tightly closed. Keep away from heat, sparks, and open flame. Store under nitrogen. Store at 2-8°C

Special Requirements
May develop pressure. Open carefully.

Section 8 - Exposure Controls / PPE

Engineering Controls
Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust. Use only in a chemical fume hood.

Personal Protective Equipment
Respiratory
Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand
Compatible chemical-resistant gloves.
Eye
Chemical safety goggles.
Other
Faceshield (8-inch minimum).

General Hygiene Measures
Wash contaminated clothing before reuse. Discard contaminated shoes. Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

Appearance

Color	Form	Odor
Colorless	Clear liquid	Stench.

Molecular Weight:	58.08 AMU		
pH	N/A		
BP/BP Range	47 - 49 °C		
MP/MP Range	-81 °C		
Freezing Point	N/A		
Vapor Pressure	258 mmHg	20 °C	
Vapor Density	2 g/l		
Saturated Vapor Conc.	N/A		
SG/Density	0.798 g/cm3		
Bulk Density	N/A		
Odor Threshold	0.008 ppm		
Volatile%	N/A		
VOC Content	N/A		
Water Content	N/A		
Solvent Content	N/A		
Evaporation Rate	N/A		
Viscosity	0.47 Pas	10 °C	
Surface Tension	23.4 mN/m	20 °C	
Partition Coefficient	Log Kow: 0.59		
Decomposition Temp.	N/A		
Flash Point °F	-15 °F		Method: closed cup
Flash Point °C	-27 °C		Method: closed cup
Explosion Limits	Lower: 2.6 % 2.6 % 23 %	31 °C 26 °C	
	Upper: 17 % 16.1 % 21 %		
Flammability	N/A		
Autoignition Temp	207 °C		
Refractive Index	1.362		

Solubility
Solubility in Water: Complete

N/A = not available

Section 10 - Stability and Reactivity

Stability
Stable
Normally stable; however, on long term storage, materials containing similar functional groups form peroxides of unknown stability.
Materials to Avoid
Oxidizing agents, Strong bases, Strong reducing agents.

Hazardous Decomposition Products
Hazardous Decomposition Products
Carbon monoxide, Carbon dioxide.

Hazardous Polymerization
Hazardous Polymerization
May occur.
Hazardous Polymerization Reactions
Polymerizing initiators.

Section 11 - Toxicological Information

Route of Exposure
Skin Contact
Causes burns.
Skin Absorption
May be harmful if absorbed through the skin.
Eye Contact
Causes burns.
Inhalation
May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion
Harmful if swallowed.

Target Organ(s) or System(s)
Liver.

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynxand bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Exposure can cause: Nausea, dizziness, and headache.

RTECS Number: UE0350000

Toxicity Data

Oral - Rat: 800 - 1,600 mg/kg(LD50)

Oral - Mouse: 800 - 1,600 mg/kg(LD50)

Inhalation - Rat: 26,000 ppm(LC50)

Skin - Rabbit: 5 ML/KG(LD50)

Skin - Guinea pig: 10 - 20 ML/KG(LD50)

Oral - Rat: 1410 mg/kg (LD50)

Intraperitoneal - Rat: 200 MG/KG (LD50)
Remarks: Behavioral:General anesthetic.
Behavioral:Muscle weakness.

Subcutaneous - Rat: 920 MG/KG (LD50)
Remarks: Behavioral:General anesthetic.
Behavioral:Convulsions or effect on seizure threshold.

Inhalation - Mouse: 21,800 mg/m3 (LC50)

Intraperitoneal - Mouse: 200 MG/KG (LD50)
Remarks: Behavioral:General anesthetic.
Behavioral:Somnolence (general depressed activity).
Lungs, Thorax, or Respiration:Respiratory depression.

Subcutaneous - Mouse: 680 MG/KG (LD50)
Remarks: Behavioral:General anesthetic.
Behavioral:Convulsions or effect on seizure threshold.

Skin - Rabbit: 2460 mg/kg (LD50)
Remarks: Behavioral:Somnolence (general depressed activity).
Behavioral:Convulsions or effect on seizure threshold.
Lungs, Thorax, or Respiration:Dyspnea.

Skin - Guinea pig: 10 ML/KG (LD50)
Remarks: Skin and Appendages:Skin: After systemic exposure: Dermatitis, other

Oral - Mammal: 1400 mg/kg (LD50)

Inhalation - Mammal: 21,800 mg/m3 (LC50)

Irritation Data

Skin - Guinea pig:
Remarks: Severe irritation effect

Eyes - Rabbit:
Remarks: Severe irritation effect

Skin - Rabbit: 500 mg
Remarks: Open irritation test

Eyes - Rabbit: 41 mg
Remarks: Severe irritation effect

Eyes - Rabbit: 20 mg 24H
Remarks: Moderate irritation effect

Chronic Exposure - Mutagen

Species	*Dose*	*Cell Type*	*Mutation test*
Rat	30 UMOL/L	liver	Unscheduled DNA synthesis
Hamster	10 MMOL/L	lung	Mutation in mammalian somatic cells.
Mammal	100 MMOL/L	lymphocyte	DNA damage

Section 12 - Ecological Information

No data available.

Physical Properties Affecting Ecotoxicity
BOD: BOD after 5 Days:

Acute Ecotoxicity Tests
Test Type
LC50 Fish
Species
Lepomis macrochirus (Bluegill)
Time: Value:
96.0 h 130 mg/l

Test Type
LC50 Fish
Species
other fish
Time: Value:
96.0 h 100 mg/l
Test Type
LC50 Fish
Species
Pimephales promelas (Fathead minnow)
Time: Value:
96.0 h 14 mg/l

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation
Contact a licensed professional waste disposal service to dispose of this material.
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable.
Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Propionaldehyde
UN#: 1275
Class: 3
Packing Group: Packing Group II
Hazard Label: Flammable liquid
PIH: Not PIH

IATA
Proper Shipping Name: Propionaldehyde
IATA UN Number: 1275
Hazard Class: 3
Packing Group: II

Section 15 - Regulatory Information

EU Directives Classification
Symbol of Danger: F Xi
Indication of Danger
Highly Flammable. Irritant.
Risk Statements R: 11 36/37/38
Highly flammable. Irritating to eyes, respiratory system and skin.
Safety Statements S: 9 16 29
Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Do not empty into drains.

US Classification and Label Text
Indication of Danger
Flammable (USA) Highly Flammable (EU). Corrosive.
Risk Statements
Causes burns. Harmful if swallowed.
Safety Statements
Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Do not empty into drains.
US Statements
Stench. Target organ(s): Liver.

United States Regulatory Information
SARA Listed: Yes
Dominimis: 1 %

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Notes: This product is subject to SARA section 313 reporting requirements.

TSCA Inventory Item: Yes

Canada Regulatory Information
WHMIS Classification
This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

Disclaimer
For R&D use only. Not for drug, household or other uses.

Warranty
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2006 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

Material Safety Data Sheet

Version 4.0
Revision Date 03/14/2010
Print Date 04/20/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Pyridine

Product Number : 270407
Brand : Sigma-Aldrich

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +18003255832
Fax : +18003255052
Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Harmful by ingestion., Harmful by skin absorption., Irritant, Carcinogen

Target Organs

Kidney, Liver, Bone marrow, Nerves.

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H302 + H312	Harmful if swallowed or in contact with skin.
H316	Causes mild skin irritation.
H318	Causes serious eye damage.
H332	Harmful if inhaled.
H402	Harmful to aquatic life.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P280	Wear protective gloves/eye protection/face protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	3
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	Harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C_5H_5N
Molecular Weight : 79.1 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Pyridine			
110-86-1	203-809-9	613-002-00-7	-

4. FIRST AID MEASURES

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

00023415

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

Handle and store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Pyridine	110-86-1	TWA	1 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Liver & kidney damage Skin irritation Confirmed animal carcinogen with unknown relevance to humans: The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that may not be relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence does not suggest that the agent is likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.				
		TWA	5 ppm 15 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	5 ppm 15 mg/m3	1997-08-04	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.				

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	colourless
Odour	unpleasant

Safety data

pH	8.5 at 15.82 g/l at 25 °C (77 °F)
Melting point	-42 °C (-44 °F) - lit.
Boiling point	115 °C (239 °F) - lit.
Flash point	17.0 °C (62.6 °F) - closed cup
Ignition temperature	482 °C (900 °F)
Lower explosion limit	1.8 %(V)
Upper explosion limit	12.4 %(V)
Vapour pressure	13.3 hPa (10.0 mmHg) at 13.2 °C (55.8 °F) 26.7 hPa (20.0 mmHg) at 25.0 °C (77.0 °F)
Density	0.978 g/cm3 at 25 °C (77 °F)
Water solubility	soluble
Partition coefficient: n-octanol/water	log Pow: 0.65

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Strong oxidizing agents, Strong acids

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 891.0 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Ptosis. Behavioral:Somnolence (general depressed activity). Behavioral:Coma.

LC50 Inhalation - rat - 1 h - 25,500 mg/m3
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:Somnolence (general depressed activity). Lungs, Thorax, or Respiration:Dyspnea.

LD50 Dermal - rabbit - 1,121 mg/kg
Remarks: Behavioral:Ataxia. Gastrointestinal:Changes in structure or function of salivary glands. Liver:Other changes.

Skin corrosion/irritation
Skin - rabbit - Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Risk of serious damage to eyes. - 24 h

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Pyridine)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Dizziness, tachycardia, nervousness, Insomnia, Skin disorders, loss of appetite

Additional information
RTECS: UR8400000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 93.80 mg/l - 96 h
	LC50 - Cyprinus carpio (Carp) - 26.00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 940.00 mg/l - 48 h
	EC50 - Daphnia magna (Water flea) - 1,140.00 mg/l - 48 h
	EC50 - Daphnia pulex (Water flea) - 520.00 mg/l - 48 h
Toxicity to algae	EC50 - SELENASTRUM - 100.00 - 180.00 mg/l - 72 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

00004316

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1282 Class: 3 Packing group: II
Proper shipping name: Pyridine
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1282 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: PYRIDINE
Marine pollutant: No

IATA
UN-Number: 1282 Class: 3 Packing group: II
Proper shipping name: Pyridine

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Harmful by ingestion., Harmful by skin absorption., Irritant, Carcinogen

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

	CAS-No.	Revision Date
Pyridine	110-86-1	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Pyridine	110-86-1	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Pyridine	110-86-1	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Pyridine	110-86-1	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Pyridine	110-86-1	2007-09-28

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

SELENIUM STANDARD MSDS
REVISION DATE: 07/03/07

VHG LABS, INC
276 Abby Road
MANCHESTER, NH 03103
TEL: (603) 622-7660 FAX: (603) 622-5180

SECTION I - PRODUCT IDENTIFICATION

Product Name:	Selenium Standard - 10 - 10,000 µg/mL
Common Synonyms:	N/A
Product No.:	ASEN-XXX, LSEN-XXX, PSEN-XXX, TSEN-XXX (XXX = Size of Bottle)
Chemical Family:	Solution Standards
Formula:	N/A
Formula Wt.:	N/A
CAS No.:	N/A
NIOSH/RTECS No.:	N/A
Product Use:	Laboratory Reagent

SECTION II - COMPONENTS

Component	CAS No.	Weight %	OSHA/PEL	ACGIH/TLV
Selenium	7782-49-2	0.0010 - 1.0	0.2 mg/m³	0.2 mg/m³
Nitric Acid	7697-37-2	2-5	2 ppm	2 ppm
Water	7732-18-5	Balance	N/E	N/E

SECTION III - PHYSICAL DATA

Boiling Point: ≈ 100°C
Melting Point: ≈ 0°C
Specific Gravity: ≈ 1 (H_2O = 1)
Solubility(H_2O): Complete (100%)
pH: N/A
Odor Threshold (ppm): N/A
Coefficient Water/Oil Distribution: N/A
Appearance & Odor: Colorless liquid. Odorless.

Vapor Pressure (mmHg): N/A
Vapor Density (air = 1): N/A
Evaporation Rate: N/A
% Volatiles by Volume: ≈ 99 (21°C)

Physical State: Liquid

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Closed Cup): N/A
Flammable Limits: Upper - N/A

Autoignition Temperature: N/A
Lower - N/A

Fire Extinguishing Media
Use extinguishing media appropriate for surrounding fire.

Special Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

Unusual Fire & Explosion Hazards
Reacts with most metals to produce hydrogen gas, which can form an explosive mixture with air.

Toxic Gases Produced
Oxides of nitrogen.

Explosion Data-Sensitivity to Mechanical Impact
None identified.

Explosion Data-Sensitivity to Static Discharge
None identified.

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA):	5 mg/m$_3$	(2 ppm)
TLV is for Nitric acid.		
Short-Term Exposure Limit (STEL):	10 mg/m$_3$	(4 ppm)
STEL is for Nitric acid.		
Permissible Exposure Limit (PEL):	5 mg/m$_3$	(2 ppm)
PEL is for Nitric acid.		

Toxicity of components

Oral Rat LD_{50} for Selenium	6700 mg/kg
Intravenous Rat LD_{50} for Selenium	6 mg/kg
Inhalation-1Hr Rat LC_{50} for Nitric Acid	2500 ppm
Intraperitoneal Mouse LD_{50} for Water	190 g/kg
Intravenous Mouse LD_{50} for Water	25 g/kg

Carcinogenicity: NTP: No IARC: No Z List: No OSHA Reg: No

Carcinogenicity
None identified

Reproductive Effects
None identified

Effects of Overexposure

INHALATION:	headache, nausea, vomiting, dizziness, irritation of respiratory system
SKIN CONTACT:	severe irritation
EYE CONTACT:	severe irritation
SKIN ABSORPTION:	none identified
INGESTION:	burns to mouth, throat, and stomach, kidney dysfunction
CHRONIC EFFECTS:	none identified

Target Organs
respiratory system, eyes, skin, teeth

Medical Conditions Generally Aggravated by Exposure
damaged skin, eye disorders, cardiopulmonary disease

SECTION V - HEALTH HAZARD DATA (CONTINUED)

Primary Routes of Entry
inhalation, ingestion, skin contact, eye contact

Emergency and First Aid Procedures

INGESTION:	CALL A PHYSICIAN. If swallowed, do NOT induce vomiting. If conscious, give water, milk, or milk of magnesia.
INHALATION:	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
SKIN CONTACT:	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
EYE CONTACT:	In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

Acute: Yes Chronic: Yes Flammability: No Pressure: No Reactivity: No

Extremely Hazardous Substance:	Yes	Contains Nitric Acid (RQ = 1,000 LBS, TPQ = 1,000 LBS)
CERCLA Hazardous Substance:	Yes	Contains Nitric Acid (RQ = 1,000 LBS)
SARA 313 Toxic Chemicals:	Yes	Contains Nitric Acid
TSCA Inventory:	Yes	

SECTION VI - REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Conditions to Avoid:	Heat
Incompatibles:	strong bases, strong reducing agents, alkalies, most common metals
Decomposition Products:	oxides of nitrogen

SECTION VII - SPILL & DISPOSAL PROCEDURES

Steps to be Taken in the Event of a Spill or Discharge
Wear self-contained breathing apparatus and full protective clothing. Stop leak if you can do so without risk. Ventilate area. Neutralize spill with soda ash or lime. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

Disposal Procedure
Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: D002 (Corrosive Waste)

SECTION VIII - PROTECTION INFORMATION

Eye/Face Protection:	Safety Glasses or Goggles
Protective Clothing:	Lab Coat
Protective Gloves:	Rubber or Latex Gloves
Ventilation Requirements:	Vent Hood

SECTION IX - STORAGE DATA AND ADDITIONAL INFORMATION

Storage Requirements
Keep container tightly closed. Store in secure poison area. Isolate from incompatible materials.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

Proper Shipping Name: Corrosive Liquid, Acidic, Inorganic, N.O.S. (Contains Nitric Acid)
UN: UN3264
Packaging Group: III
Label: CORROSIVE

N/A = Not Applicable or Not Available
N/E = Not Established

The information in this Material Safety Data Sheet meets the requirements of the United States OCCUPATIONAL SAFETY AND HEALTH ACT and regulations promulgated thereunder (29 CFR 1910.1200 et. seq.) and the Canadian WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. This document is intended only as a guide to the appropriate precautionary handling of the material by a person trained in, or supervised by a person trained in, chemical handling. The user is responsible for determining the application. Depending on usage, protective clothing including eye and face guards and respirators must be used to avoid contact with material or breathing chemical vapors/fumes. Exposure to this product may have serious adverse health effects. This chemical may interact with other substances. Since the potential uses are so varied, we cannot warn of all of the potential dangers of use or interaction with other chemicals or materials. We warrant that the chemical meets the specifications set forth on the label. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE. The user should recognize that this product can cause severe injury and even death, especially if improperly handled or the known dangers of use are not heeded. READ ALL PRECAUTIONARY INFORMATION.

Approved by Quality Assurance Department.

Teck

SILVER METAL
MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Silver Metal

NOTE: In the form in which it is sold this product is not regulated. This MSDS is provided for information purposes only.

Manufacturer:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
Teck Metals Ltd.
1500-120 Adelaide Street, W.
Toronto, Ontario
M5H 1T1

MSDS Preparer:
Teck Metals Ltd.
Suite 3300 - 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of MSDS Last Review/Edit: January 4, 2010.

Product Use: Silver is used in the manufacture of photographic film, coins, electronics, tableware, mirrors, jewelry, ornaments, special batteries and vessels and equipment used to manufacture medicinal chemicals, process foods and beverages, and handle organic acids; for electroplating; as a catalyst in hydrogenation and oxidation processes, and as an ingredient in dental alloys.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)		LD_{50} / LC_{50} Species and Route
Silver	99.9%	7440-22-4	OSHA PEL NIOSH REL ACGIH TLV	0.01 mg/m^3 0.01 mg/m^3 0.1 mg/m^3	LD_{50}, mouse, oral >10,000 mg/kg

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit, PEL – Permissible Exposure Limit, TLV – Threshold Limit Value, REL – Recommended Exposure Limit.

Trade Names and Synonyms: Argentum; TADANAC® Silver; C.I. 77820.

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A lustrous white metal that does not burn in bulk but may form explosive mixtures if dispersed in air as a fine powder. This product is relatively non-toxic and poses little immediate hazard to the health of emergency response personnel or to the environment in an emergency situation.

Potential Health Effects: Metallic silver is relatively non-toxic to humans. This product may cause mild local irritation to eyes, nose, throat and upper airways, particularly if the product is heated to the point of fuming. Prolonged exposure to silver dust may cause a bluish or grayish pigmentation to the skin, eyes and mucous membranes. Silver is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. (see Toxicological Information, Section 11)

Potential Environmental Effects: In the form in which this product is sold, it has low bioavailability, and does not pose any significant environmental risks. Releases of the product to water and soil should, nevertheless, be prevented (see Ecological Information, Section 12).

EU Risk Phrase(s): Not applicable - Silver is not listed as a dangerous substance.

SECTION 4. FIRST AID MEASURES

Eye Contact: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, immediately obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice.

Inhalation: If symptoms are experienced remove source of contamination or move victim from exposure area to fresh air immediately. Obtain medical advice.

Ingestion: If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if irritation or discomfort occurs, obtain medical advice.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not considered a fire or explosion hazard. Finely-divided silver metal dust or powder may form flammable or explosive dust clouds when dispersed in the air at high concentrations and exposed to heat, flame, or other sources of ignition. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam. Do not use direct water streams on fires where molten metal is present.

Fire Fighting: Fire fighters should be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Not Applicable.

Autoignition Temperature: Not Applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection. Molten metal should be allowed to cool and harden before cleanup. Once solidified wear gloves, pick up and return to process. Powder or dust should be cleaned up using methods which will minimize dust generation (e.g., vacuum solids, dampen material and shovel or wet sweep). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labelled containers for later recovery in view of the economic value of silver. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Protective clothing, gloves, and a respirator are recommended for persons responding to an accidental release, especially of molten silver metal. Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust or fume. Where molten metal is involved, heat-resistant gloves and suitable clothing for protection from hot-metal splash should be worn.

Environmental Precautions: Silver metal has relatively low bioavailability and is not considered to pose immediate ecological risks. However, good management practices should always be applied in the storage and use of silver and its compounds; releases of the product to water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store silver in a secure, covered area away from incompatible materials. Solid metal suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture could expand explosively and spatter molten metal out of the bath. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas. No special packaging materials are required.

EU Safety Phrase(s): Not applicable - silver is not listed as a dangerous substance.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when silver is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat- resistant gloves, goggles or face-shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Ventilation: Use adequate local or general ventilation to maintain the concentration of silver fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is recommended for melting, casting, grinding and polishing, etching, or use of powders.

Respirators: Where silver dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-95 particulate filter cartridge or better).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: *Ductile lustrous white metal*	**Odour:** None	**Physical State:** *Solid*	**pH:** *Not Applicable*
Vapour Pressure: Negligible @ 20°C	**Vapour Density:** Not Applicable	**Boiling Point/Range:** 2212°C	**Melting Point/Range:** 961°C
Specific Gravity: 10.49	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Odour Threshold:** None
Solubility: Insoluble in water			

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur. Ozone, sulfur, and hydrogen sulfide blacken silver. Most silver salts are light sensitive.

Incompatibilities: Silver reacts with acetylene, acetylene compounds and ammonia to form explosive and shock sensitive compounds. Contact with strong hydrogen peroxide solutions will cause violent decomposition of the peroxide, releasing oxygen gas and increasing the fire and explosion potential. Silver is incompatible with bromine azide, chlorine trifluoride, ethyleneimine, oxalic and tartaric acids and with nitric acid in the presence of ethanol.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate silver oxide fume. The particle size of metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Solid silver presents few health hazards. Repeated long-term exposure to silver dust can cause permanent blue-grey staining of eyes, nose, mouth, throat, and skin.

Acute:
Skin/Eyes: Direct contact may cause mild local skin or eye irritation. There have been limited reports of allergic contact dermatitis following exposure to powdered silver, silver solutions, and dental amalgams.

Inhalation: Inhalation of silver fume or dust may be irritating to mucous membranes and the upper respiratory tract. Extremely high exposures have caused lung damage with pulmonary edema.

Ingestion: Ingestion of silver compounds may cause irritation of the stomach.

Chronic:
Prolonged exposure to silver dust may cause a bluish or grayish pigmentation to the skin, eyes and mucous membranes. This occurs slowly and may take years to develop. Once present, it does not go away and, in the most severe cases, may be quite disfiguring. Silver is not listed as a human carcinogen by the Occupational Safety and Health Administration (OSHA), the National

Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

SECTION 12. ECOLOGICAL INFORMATION

Silver metal is relatively insoluble, and therefore poses minimal ecological risks. However, its processing, use or extended exposure in aquatic and terrestrial environments may result in conversion of the metal to more bioavailable forms. In particular, silver compounds can be highly toxic to aquatic organisms.

SECTION 13. DISPOSAL CONSIDERATIONS

In view of the economic value of silver metal, every effort should be made to recover and reuse all spilled material. If material cannot be returned to process or recovered for its economic value, dispose of only in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

No special shipping or transportation requirements.

SECTION 15. REGULATORY INFORMATION

U.S.:

Listed on TSCA Inventory..... Yes

Hazardous Under Hazard Communication Standard..... Yes

CERCLA Section 103 Hazardous Substance..... Yes RQ 1,000lbs. (454 kg.)*

*reporting not required if the diameter of the metal pieces released is equal to or exceeds 100 micrometers (0.004 inches)

EPCRA Section 302 Extremely Hazardous Substance ..... No

EPCRA Section 311/312 Hazard Categories ..... No Hazard Categories Apply

EPCRA Section 313 Toxic Release Inventory: ..... Silver - CAS Number 7440-22-4 - Percent by Weight 99.9%

CANADIAN:

Listed on Domestic Substances List: ..... Yes

WHMIS Classification ..... Not applicable. Silver is not a controlled product under WHMIS. This Material Safety Data Sheet is provided for information purposes only.

EUROPEAN UNION:

Listed on the European Inventory of Existing Commercial Chemical Substances (EINECS): ..... Yes

EU Classification: ..... Not applicable. Silver is not listed as a dangerous substance.

SECTION 16. OTHER INFORMATION

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, Guide to Occupational Exposure Values - 2009.
- American Conference of Governmental Industrial Hygienists, 2009, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben Ed.) 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) CHEMINFO Chemical Substance Data Base.
- Commission de la santé et la sécurité du travail, Service du Répertoire toxicologique, – Argent Métal.
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.

- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank. (On-line version).
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C.H. Powell, Ed.
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition DHHS (NIOSH) September 2005.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck Metals Ltd. extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS

J.T.Baker

24 Hour Emergency Telephone 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SODIUM METAL

1. Product Identification

Synonyms: Sodium; Natrium
CAS No.: 7440-23-5
Molecular Weight: 22.99
Chemical Formula: Na
Product Codes:
J.T. Baker: 9410
Mallinckrodt: 7340, 7348

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium	7440-23-5	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! FLAMMABLE SOLID. CORROSIVE. WATER REACTIVE. CATCHES FIRE IF EXPOSED TO AIR. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO ALL BODY TISSUE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 3 - Severe (Water Reactive)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS D EXTINGUISHER
Storage Color Code: Red Stripe (Store Separately)

Potential Health Effects

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.
Ingestion:
Extremely dangerous, corrosive material. Will react immediately with saliva to cause serious burns and possible local combustion and even explosion of hydrogen in the mouth or esophagus. The metal's low melting point can cause further complications.
Skin Contact:
Corrosive, can cause serious burns due to almost immediate reaction with water, especially on moist skin. If metal ignites, very deep burns and tissue destruction can occur.
Eye Contact:
Corrosive. May cause redness, pain, blurred vision, and damage from severe alkali burns.
Chronic Exposure:
Continued or repeated skin contact may cause dermatitis, mucous membrane irritation, and lung damage..
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Keep patient quiet in half upright position. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Wipe off excess material from skin then immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Autoignition temperature: > 115C (> 239F)
Flammable solid, water reactive. Can react vigorously with water, steam, acids to release flammable/explosive hydrogen. Dangerous in presence of oxidants. May ignite spontaneously in moist air or oxygen. May re-ignite after fire is extinguished.
(Autoigintion temperature given in dry air.)
Explosion:
Reactions with water forms sodium hydroxide and hydrogen gas which may explode. Burns violently accompanied by explosions which cause spattering of the molten material.
Fire Extinguishing Media:
Use dry soda ash, dry salt, sand, graphite powder or metal-fire-extinguishing dry powder such as Met-L-X®. Do not use water, foam, carbon dioxide, dry chemical, or chlorinated fire extinguishers.
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.

. Accidental Release Measures

Collect spilled material quickly and transfer to a container of kerosene, light oil or similar hydrocarbon fluid for recovery. Minimize exposure to air. Do not use water on metal.
If the spilled sodium has come into contact with water, proceed cautiously. The reaction can rapidly proceed to self-ignition of hydrogen and spattering of molten sodium. Evacuate the area, put on protective equipment and proceed as with a metal fire.
Waste sodium should be packaged under a hydrocarbon fluid and sent to an approved disposal facility.
US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Keep away from water or locations where water may be needed for fire. Avoid high temperatures. Store under nitrogen or kerosene. Never store under halogenated hydrocarbons. A detached fire-resistive building is recommended for quantity storage. Isolate from air, acids, and oxidizing materials. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the dust or mist is apparent, a full-face dust/mist respirator should be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Light, silvery-white metal.
Odor:
Odorless.
Solubility:
Decomposes violently in water.
Density:

0.968 @ 20C / 4C.
pH:
Water solution alkaline (pH > 7).
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
881.4C (1618F)
Melting Point:
97.8C (208F)
Vapor Density (Air=1):
0.003 @ 900C.
Vapor Pressure (mm Hg):
1.2 @ 400C (752F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Unstable. Reacts violently with water.
Hazardous Decomposition Products:
Does not decompose but can form flammable hydrogen in contact with air.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Water, oxygen, carbon dioxide, carbon tetrachloride, halogens, acetylene, metal halides, ammonium salts, oxides, oxidizing agents, acids, alcohols, chlorinated organic compounds, many other substances.
Conditions to Avoid:
Air, heat, flames, ignition sources and incompatibles.

11. Toxicological Information

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium (7440-23-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SODIUM
Hazard Class: 4.3
UN/NA: UN1428
Packing Group: I
Information reported for product/size: 1LB

International (Water, I.M.O.)

Proper Shipping Name: SODIUM
Hazard Class: 4.3
UN/NA: UN1428
Packing Group: I
Information reported for product/size: 1LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Sodium (7440-23-5)	Yes	Yes	No	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium (7440-23-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\---------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium (7440-23-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\---------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium (7440-23-5)	10	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: Yes (Pure / Solid)

Australian Hazchem Code: 4W
Poison Schedule: None allocated.
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **3** Reactivity: **2** Other: **Water reactive**

Label Hazard Warning:

DANGER! FLAMMABLE SOLID. CORROSIVE. WATER REACTIVE. CATCHES FIRE IF EXPOSED TO AIR. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO ALL BODY TISSUE.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Use only with adequate ventilation.
Store in a tightly closed container.
Do not get wet.
Keep away from heat, sparks and flame.
Wash thoroughly after handling.
Remove and wash contaminated clothing promptly.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Fisher Scientific

Part of Thermo Fisher Scientific

Material Safety Data Sheet

Creation Date 11-Feb-2010 **Revision Date** 11-Feb-2010 **Revision Number** 1

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **Sodium hydroxide**

Cat No. **BP359-212; BP359-500; S318-1; S318-3; S318-3LC; S318-5; S318-10; S318-10LC; S318-50; S318-50LC; S318-100; S318-500; S320-1; S320-3; S320-10; S320-50; S320-500; S392-12; S392-50; S392-212; S392SAM-1; S392SAM-2; S392SAM-3; S399-1; S399-1LC; S399-50; S399-212; S399-500; S612-3; S612-50; S612-500LB; S612-3500LB; S613-3; S613-10; S613-50; S613-500LB**

Synonyms Caustic soda; Lye (Pellets/Granular/Beads/NF/FCC/EP/BP/JP/Certified ACS)

Recommended Use Laboratory chemicals

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 703-527-3887

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Causes severe burns by all exposure routes. Water reactive. Hygroscopic.

Appearance White **Physical State** Solid **odor** odorless

Target Organs Eyes, Respiratory system, Skin, Gastrointestinal tract (GI)

Potential Health Effects

Acute Effects
Principle Routes of Exposure

Eyes	Causes severe burns. May cause blindness or permanent eye damage.
Skin	Causes severe burns. May be harmful in contact with skin.
Inhalation	Causes severe burns. May be harmful if inhaled.
Ingestion	Causes severe burns. May be harmful if swallowed.

Chronic Effects Prolonged skin contact may defat the skin and produce dermatitis.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Preexisting eye disorders. Skin disorders.

Haz/Non-haz

Component	CAS-No	Weight %
Sodium hydroxide	1310-73-2	> 95
Sodium carbonate	497-19-8	< 3

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Notes to Physician Treat symptomatically.

Flash Point Not applicable
Method No information available.

Autoignition Temperature No information available.

Explosion Limits
Upper No data available
Lower No data available

Suitable Extinguishing Media Substance is nonflammable; use agent most appropriate to extinguish surrounding fire..

Unsuitable Extinguishing Media Carbon dioxide (CO2).

Hazardous Combustion Products No information available.

Sensitivity to mechanical impact No information available.
Sensitivity to static discharge No information available.

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Water reactive. Corrosive Material. Causes severe burns by all exposure routes.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

NFPA **Health** 3 **Flammability** 0 **Instability** 1 **Physical hazards** N/A

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Avoid dust formation. Do not get in eyes, on skin, or on clothing.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for disposal.

7. HANDLING AND STORAGE

Handling Use only under a chemical fume hood. Wear personal protective equipment. Avoid dust formation. Do not breathe dust. Do not get in eyes, on skin, or on clothing.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Sodium hydroxide	Ceiling: 2 mg/m³	(Vacated) Ceiling: 2 mg/m³ TWA: 2 mg/m³	IDLH: 10 mg/m³ Ceiling: 2 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Sodium hydroxide	Ceiling: 2 mg/m³	Peak: 2 mg/m³	CEV: 2 mg/m³

NIOSH IDLH: *Immediately Dangerous to Life or Health*

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State Solid
Appearance White

odor	odorless
Odor Threshold	No information available.
pH	14 (5 % Solution)
Vapor Pressure	1 mmHg @ 739 °C
Vapor Density	No information available.
Viscosity	No information available.
Boiling Point/Range	1390°C / 2534°F@ 760 mmHg
Melting Point/Range	318°C / 604.4°F
Decomposition temperature	No information available.
Flash Point	Not applicable
Evaporation Rate	No information available.
Specific Gravity	2.13
Solubility	Soluble in water
log Pow	No data available
Molecular Weight	40
Molecular Formula	NaOH

Stability	Hygroscopic. Water reactive.
Conditions to Avoid	Avoid dust formation. Incompatible products. Excess heat. Exposure to air or moisture over prolonged periods.
Incompatible Materials	Water, Metals, Acids
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2), Sodium oxides
Hazardous Polymerization	Hazardous polymerization does not occur
Hazardous Reactions .	None under normal processing.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium hydroxide	Not listed	1350 mg/kg (Rabbit)	Not listed
Sodium carbonate	4090 mg/kg (Rat)	Not listed	Not listed

Irritation	*Causes severe burns by all exposure routes*
Toxicologically Synergistic Products	No information available.

Chronic Toxicity

Carcinogenicity	There are no known carcinogenic chemicals in this product

Sensitization	No information available.
Mutagenic Effects	Mutagenic effects have occurred in experimental animals.
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
Other Adverse Effects	See actual entry in RTECS for complete information.
Endocrine Disruptor Information	No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity

Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Sodium carbonate	EC50 120 h 242 mg/L	Lepomis macrochirus: LC50: 300 mg/L/96h Gambusia affinis: LC50: 740 mg/L/96h	Not listed	EC50 48 h 265 mg/L

Persistence and Degradability	No information available
Bioaccumulation/ Accumulation	No information available
Mobility	No information available

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods	Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification

14. TRANSPORT INFORMATION

DOT

UN-No	UN1823
Proper Shipping Name	Sodium hydroxide, solid
Hazard Class	8
Packing Group	II

TDG

[redacted]

UN-No	UN1823
Proper Shipping Name	SODIUM HYDROXIDE, SOLID
Hazard Class	8
Packing Group	II

IATA

UN-No	UN1823
Proper Shipping Name	SODIUM HYDROXIDE, SOLID
Hazard Class	8
Packing Group	II

IMDG/IMO

UN-No	UN1823
Proper Shipping Name	SODIUM HYDROXIDE, SOLID
Hazard Class	8
Packing Group	II

[redacted]

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Sodium hydroxide	X	X	-	215-185-5	-		X	X	X	X	KE-31487 X
Sodium carbonate	X	X	-	207-838-8	-		X	X	X	X	KE-31380 X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313
Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Sodium hydroxide	X	1000 lb	-	-

Clean Air Act
Not applicable

OSHA
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Sodium hydroxide	1000 lb	-

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Sodium hydroxide	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
E Corrosive material

Prepared By	Regulatory Affairs Thermo Fisher Scientific Tel: (412) 490-8929
Creation Date	11-Feb-2010
Print Date	11-Feb-2010
Revision Summary	"****", and red text indicates revision

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SULFAMIC ACID

1. Product Identification

Synonyms: Amidosulfonic acid; amidosulfuric acid; aminosulfonic acid; sulfamidic acid
CAS No.: 5329-14-6
Molecular Weight: 97.09
Chemical Formula: H2NSO3H
Product Codes:
J.T. Baker: V145, V147
Mallinckrodt: 1931

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sulfamic Acid	5329-14-6	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES SEVERE IRRITATION AND BURNS TO EVERY AREA OF CONTACT. MAY CAUSE LUNG DAMAGE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Extremely destructive to tissues of the mucous membranes and upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. May cause pulmonary edema, a medical emergency. Pulmonary edema may be delayed up to 48 hours.
Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur.
Eye Contact:
Corrosive. Can cause blurred vision, redness, pain, severe tissue burns and eye damage.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
No information found.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
For severe exposures, monitor for delayed onset of pulmonary edema.

---

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear

appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the dust or mist is apparent, a half-face dust/mist respirator may be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls as needed to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
White to colorless crystals.
Odor:
Odorless.
Solubility:
Soluble in water.
Density:
2.1
pH:
1.18 (1% solution @ 25C (77F))
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
Decomposes.
Melting Point:
205C (401F)
Vapor Density (Air=1):
3.3
Vapor Pressure (mm Hg):
No information found.

Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Solutions are acidi c. In water solution slowly hydrolyzes to form ammonium sulfate and bisulfate.
Hazardous Decomposition Products:
May emit ammonia, oxides of sulfur, oxides of nitrogen, and oxides of carbon.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers, nitric acid, chlorine. Solutions are strong acids and react violently with bases.
Conditions to Avoid:
Dusting and incompatibles.

11. Toxicological Information

Oral rat LD50: 3160 mg/kg; Irritation data: skin human, standard Draize: 4%/5D-I mild. Skin rabbit, standard Draize, 500 mg/24H severe. Eye rabbit, standard Draize: 250 ug/24H Sever e.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sulfamic Acid (5329-14-6)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific d isposal requirements. Processing, use or contamination of this product may change the waste management options. S tate and local disposal regulations may differ from federal disposal regulations. Dispose of container and u nused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SULFAMIC ACID
Hazard Class: 8
UN/NA: UN2967

Packing Group: III
Information reported for product/size: 12KG

International (Water, I.M.O.)

Proper Shipping Name: SULPHAMIC ACID
Hazard Class: 8
UN/NA: UN2967
Packing Group: III
Information reported for product/size: 12KG

International (Air, I.C.A.O.)

Proper Shipping Name: SULPHAMIC ACID
Hazard Class: 8
UN/NA: UN2967
Packing Group: III
Information reported for product/size: 12KG

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Sulfamic Acid (5329-14-6)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sulfamic Acid (5329-14-6)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sulfamic Acid (5329-14-6)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sulfamic Acid (5329-14-6)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: 2T
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Cont rolled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES

SEVERE IRRITATION AND BURNS TO EVERY AREA OF CONTACT. MAY CAUSE LUNG DAMAGE.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

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. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

********** **********

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

********** **********

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

PORTS MSDS #: 5150

PRODUCT: SULFURIC ACID

PART NUMBER:

FORMULA: H2SO4

KEYWORD: ACID

PORTS NUMBER: 03-401-1075; 03-450-0110

PORTS MISC INFO:
01-01-1075
95-01-0120

PORTS RATING: HFR=302

MANUFACTURER:
ASARCO, INC.
180 MAIDEN LANE
NEW YORK
NY

10038
PHONE: PHONE: 212-510-2000
EMERGENCY PHONE:

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

Boiling Point. . . .	BT 529 538 F	NOTE: 276-281'C.
Melting Point. . . .	EQ -20 F	NOTE: @ 93.19%; -1'C @ 98%
Freezing Point . . .	NG	
Pour Point	NG	
Softening Point. . .	NG	
Specific Gravity . .	BT 1.835 1.844	
Vapor Pressure . . .	EQ .005	NOTE: MMHG @ 20'C, 90%.
Vapor Density. . . .	NA	NOTE: NOT APPLICABLE.
Percent Volatiles. .	NG	
Evaporation Rate . .	NA	NOTE: NOT APPLICABLE.
pH	EQ .9	NOTE: 1% SOLUTION.
Molecular Weight . .	EQ 98.08	
Viscosity.	NG	
Solubility in Water.	COMPLETE.	

Odor/Appearance/Other Characteristics:
OILY, COLORLESS TO SLIGHTLY YELLOW, CLEAR-TURBID LIQ. / ODOR THRESH:~1 MG/M3.

===== Fire & Explosive Hazard Data =====

Flash Point, Closed Cup . .	NA	NOTE: NOT APPLICABLE.
Flash Point, Open Cup . . .	NA	NOTE: NOT APPLICABLE.
Fire Point.	NG	
Auto Ignition.	NA	NOTE: NOT APPLICABLE.
Explosive/Flammable Limits		
Lower (LEL).	NA	NOTE: NOT APPLICABLE.
Upper (UEL).	NA	NOTE: NOT APPLICABLE.

Shipping Regulations

UN/NA Number.	UN1830
D.O.T. Hazard Class. . .	CORROSIVE MATERIAL
Label	NOT GIVEN
Proper Shipping Name . .	NOT GIVEN

==========

Preparer/Contact Information: SULFURIC ACID SALES DEPARTMENT, 800 433-2243

http://jupiter.ports/msds/data/5150

Date Prepared/Revised 12/08/94

==== Component Information =====

SULFURIC ACID
OSHA PEL (PPM):
OSHA PEL (MG/M3): 1.0
ACGIH TLV (PPM):
ACGIH TLV (MG/M3): 1.0
STEL (PPM): NG
STEL (MG/M3):
Product %: BT 93 99
C.A.S. No.: 7664939

===== A. PRODUCT/COMPANY IDENTIFICATION =====

PRODUCT NAME: SULFURIC ACID

TRADE NAME (COMMON NAME OR SYNONYM): Sulfuric Acid, Oil of Vitriol

CHEMICAL NAME: Sulfuric Acid

ASARCO PRODUCT CODE #: 1860

FORMULA: H2SO4

MOLECULAR WEIGHT: 98.08

14605

ISSUED DATE: 1/7/83
REVISED DATE: 12/8/94

PHONE: 212-510-2000

CONTACT:

GENERAL INFORMATION:

DEPARTMENT OF ENVIRONMENTAL SCIENCES:

DAY: 801-262-2459
NIGHT: 801-561-3044

FIRST AID INFORMATION - (MEDICAL DEPT.): 415-457-0383

TRANSPORTATION EMERGENCIES - CHEMTREC: 800-424-9300

MANUFACTURER'S NAME AND ADDRESS:

ASARCO INCORPORATED
180 MAIDEN LANE
NEW YORK, NEW YORK 10038

===== B. COMPOSITION/INFORMATION ON INGREDIENTS =====

SEE COMPONENT INFORMATION.

===== C. HAZARDS IDENTIFICATION =====

PRIMARY ROUTES OF ENTRY:

INGESTION: X
INHALATION: X
SKIN:

.CINOGENICITY: The International Agency for Research on Cancer (IARC) has .assified "strong inorganic acid mists containing sulfuric acid" as .arcinogenic to humans. This classification does not apply to sulfuric acid : sulfuric acid solutions.

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

ACUTE OVEREXPOSURE (SYMPTOMS AND EFFECTS):

Inhalation of fumes or mists can cause irritation or corrosive burns to the upper respiratory system. Lung irritation and pulmonary edema can occur.

Ingestion can cause irritation and corrosive burns to throat, mouth, and stomach. Can be fatal if swallowed.

Causes severe burns or irritation on skin contact.

Liquid contact with the eyes can cause irritation, corneal burns, and blindness. Mist contact may irritate or burn.

CHRONIC OVEREXPOSURE (SYMPTOMS AND EFFECTS): Long term exposure to high levels of acid fumes may cause erosion of teeth followed by jaw necrosis, bronchial irritation, coughing, and bronchial pneumonia, or gastrointestinal disturbances.

MEDICAL CONDITIONS POSSIBLY AGGRAVATED: Acute and chronic respiratory diseases.

===== D. FIRST AID MEASURES =====

INHALATION: Remove from exposure; place individual under care of a physician.

NGESTION: Drink large amounts of water (or milk, if available) to dilute the .cid. DO NOT INDUCE VOMITING!

SKIN AND EYE: Immediately flush with plenty of water for at least 15 minutes. Remove contaminated clothing. GET PROMPT MEDICAL ATTENTION!

===== E. FIRE FIGHTING MEASURES =====

FLASH POINT: Not Applicable

AUTO IGNITION TEMPERATURE: Not Applicable

FLAMMABLE LIMITS IN AIR (% BY VOL.): Not Applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable and explosive hydrogen gas can be generated inside metal drums and storage tanks. Concentrated acid can ignite combustible materials on contact. Acid plus active metal can also form explosive concentrations of hydrogen.

FIRE EXTINGUISHING AGENTS RECOMMENDED: If involved in a fire, use water spray; avoid spraying water into containers. If only a small amount of combustibles is present, smother fire with dry chemical.

FIRE EXTINGUISHING AGENTS TO AVOID: Direct stream of water may cause spattering.

SPECIAL FIRE FIGHTING PRECAUTIONS: Use NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing if involved in fire. At high temperatures, sulfuric acid or sulfur trioxide mists can be released from .ented or ruptured containers. If water is added to concentrated sulfuric .cid, violent spattering can occur and considerable heat may be evolved.

===== F. RELEASE MEASURES =====

SPILLS OR LEAKS: Dilute small spills or leaks cautiously with plenty of water. Neutralize with alkali such as soda ash or lime. Adequate ventilation is required for soda ash due to release of CO2 gas. No smoking in spill area. Major spills must be handled by a predetermined plan. Diking with soda ash is recommended. Attempt to keep out of sewer.

===== G. HANDLING AND STORAGE =====

NORMAL HANDLING:

Do not get in eyes, on skin, or clothing. Do not breathe vapor or mists.

Use protective equipment as outlined in Section H.

Do not add water to acid. When diluting, always add acid to water cautiously and with agitation. Use with adequate ventilation.

STORAGE: Protect from physical damage. Store in cool, well-ventilated area away from combustibles and reactive chemicals. Keep out of sun and away from heat. Keep containers in upright position. No smoking in storage areas.

===== H. EXPOSURE CONTROLS/PERSONAL PROTECTION =====

ENGINEERING CONTROLS: Adequate ventilation to maintain mist below permissible exposure limits. Packaging, unloading areas, or open processing equipment may require mechanical ventilation.

PERSONAL HYGIENE: Avoid inhalation or ingestion. Practice good housekeeping and personal hygiene procedures. Wash thoroughly before eating or smoking. Do not wear contaminated clothing home.

PECIAL PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS: Loosen closures carefully.

NFPA CLASSIFICATION: 3H, 0F, 2R, W/-
LABEL SIGNAL WORD: DANGER

RESPIRATORY PROTECTION: When airborne exposures may exceed OSHA/ACGIH permissible air concentrations, the minimum respiratory protection recommended is a negative pressure air purifying respirator with cartridges that are NIOSH/MSHA approved against dusts and mists having a TWA not less than 0.05 mg/cu.m.

EYES AND FACE: Chemical goggles or faceshield required.

OTHER CLOTHING AND EQUIPMENT: Rubber gloves and apron or equivalent required when handling sulfuric acid. Full protective clothing recommended when handling large quantities of sulfuric acid.

===== I. PHYSICAL/CHEMICAL PROPERTIES =====

SEE PHYSICAL/CHEMICAL CHARACTERISTICS OR FIRE & EXPLOSIVE HAZARD DATA.

MELTING POINT (DEGREES C): 93.19% at -29 C, 98% at -1C

VAPOR PRESSURE (MM HG): 95% = 0.0015 AT 35 C

===== J. STABILITY AND REACTIVITY =====

TABILITY: Stable

CONDITIONS TO AVOID: Not Applicable

INCOMPATIBILITY (MATERIALS TO AVOID): Sulfuric acid is not flammable but highly reactive and capable of igniting finely divided combustible materials

http://jupiter.ports/msds/data/5150

on contact. Reacts violently with water and organic materials with evolution of heat. Extremely hazardous in contact with many materials, particularly carbides, chlorates, fulminates, nitrates, picrates, powdered metals and other combustible materials. Attacks many metals releasing hydrogen. Examples of common inorganic chemicals that should be avoided include: sodium carbonate, sodium hydroxide, elemental sodium, potassium permanganate, ammonium hydroxide, and potassium chlorate. Common organic chemicals that have been reported as being incompatible with sulfuric acid include: ethylene glycol, aniline, and ethylene diamine.

HAZARDOUS DECOMPOSITION PRODUCTS: Sulfur Trioxide Mist

HAZARDOUS POLYMERIZATION: Will not occur

CONDITIONS TO AVOID: Not Applicable

===== K. TOXICOLOGICAL INFORMATION =====

LD50 (SPECIES, ROUTE):

SULFURIC ACID: 2140 mg/kg (rat, oral)

LC50 (SPECIES):

SULFURIC ACID: 510 mg/cu.m/2 hrs. (rat)

MUTAGENICITY: Not available

===== L. ECOLOGICAL =====

ECOTOXICITY: Not available

ENVIRONMENTAL FATE: Not available

===== M. DISPOSAL CONSIDERATIONS =====

WASTE DISPOSAL METHODS, (DISPOSER MUST COMPLY WITH FEDERAL, STATE, AND LOCAL DISPOSAL OR DISCHARGE LAWS): If hazardous under 40 CFR 261, Subparts B and C, material must be treated or disposed in a facility meeting the requirements of 40 CFR 264 or 265. If non-hazardous, material should be disposed in a facility meeting the requirements of 40 CFR 257.

EPA HAZARDOUS WASTE NUMBER: D002 (corrosive)

40 CFR 261:

RCRA STATUS OF UNUSED MATERIAL: If discarded in unaltered form, material should be tested to determine if it must be classified as a hazardous waste for disposal purposes. Under specific circumstances, application can be made to the EPA Administrator to have a particular waste designated non-hazardous.

===== N. TRANSPORT =====

DOT REGULATION AND ID (OR PIN) NUMBER: Sulfuric acid is regulated as a corrosive material with an identification number of UN1830.

===== O. REGULATORY INFORMATION =====

WHMIS CLASSIFICATION, SARA REGULATION AND OTHER INFORMATION:

WHMIS Classifies this material as Class C, D1A, and E.

TSCA STATUS: On TSCA Inventory

http://jupiter.ports/msds/data/5150

REGULATED UNDER SARA TITLE III:

SECT. 302: Sulfuric Acid
SECT. 311/312: Immediate and Delayed
SECT. 313 CHEMICALS: Sulfuric Acid

CERCLA REPORTABLE QUANTITY: 1000 pounds for Sulfuric Acid.

===== P. REFERENCES =====

PERMISSIBLE CONCENTRATION REFERENCES: OSHA regulations for airborne contaminants 29 CFR 1910.1000 and 1018; ACGIH Threshold Limit Values for Chemical Substances.

HAZARD INFORMATION REFERENCES:

DOCUMENTATION OF THE THRESHOLD LIMIT VALUES, 6th Ed., ACGIH
PATTY'S INDUSTRIAL HYGIENE AND TOXICOLOGY, Vol. 2A, 3rd Rev. Ed.
HANDBOOK OF TOXIC AND HAZARDOUS CHEMICALS; Sittig, Marshall; 1981
NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS, 10th Ed.
TOMES PLUS DATABASE; Micromedex, Inc. Vol. 17, 1993
DATATOX DATABASE; Spectrum Research, Inc., Version 2.0, 1992

GENERAL:

HANDBOOK OF CHEMISTRY AND PHYSICS, 57th Ed., 1967-77, Weast , R.C.,Editor, CRC Inc.

===== Q. ADDITIONAL INFORMATION =====

INFORMATION (HAZARDS, FIRST AID, ETC.) IS ABBREVIATED. MORE INFORMATION IS CONTAINED IN REFERENCES FOUND IN SECTION P.

ADDITIONAL INFORMATION CONTACT:

ASARCO INCORPORATED
SULFURIC ACID SALES DEPARTMENT
P.O. BOX 5747
TUCSON, AZ 85703-0747
(800) 433-2243

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, AND INVESTIGATION. ASARCO INCORPORATED PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.

Material Safety Data She

Version 4.0
Revision Date 03/12/2010
Print Date 06/18/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Toluene
Product Number	:	179965
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Irritant, Teratogen, Reproductive hazard

Target Organs

Bladder, Liver, Kidney, Brain.

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H361	Suspected of damaging fertility or the unborn child.
H371	May cause damage to organs.
H401	Toxic to aquatic life.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P281	Use personal protective equipment as required.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	3
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation. Vapours may cause drowsiness and dizziness.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C_7H_8
Molecular Weight : 92.14 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Toluene			
108-88-3	203-625-9	601-021-00-3	-

4. FIRST AID MEASURES

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

NDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Toluene	108-88-3	TWA	100 ppm 375 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	150 ppm 560 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	200 ppm	1997-08-04	USA. Occupational Exposure Limits (OSHA) - Table Z2
Remarks	Z37.12-1967				
		CEIL	300 ppm	1997-08-04	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.12-1967				
		Peak	500 ppm	1997-08-04	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.12-1967				
		TWA	20 ppm	2008-01-01	USA. ACGIH Threshold Limit Values (TLV)
	Visual impairment Female reproductive Pregnancy loss 2008 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen: Agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of a lack of data. In vitro or animal studies do not provide indications of carcinogenicity which are sufficient to classify the agent into one of the other categories.				

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves.

Eye protection
Face shield and safety glasses

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid
Colour	colourless

Safety data

pH	no data available
Melting point	-93 °C (-135 °F)
Boiling point	110 - 111 °C (230 - 232 °F)
Flash point	4.0 °C (39.2 °F) - closed cup
Ignition temperature	535 °C (995 °F)
Lower explosion limit	1.2 %(V)
Upper explosion limit	7 %(V)
Vapour pressure	29.1 hPa (21.8 mmHg) at 20.0 °C (68.0 °F)
Density	0.865 g/mL at 25 °C (77 °F)
Water solubility	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Vapours may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - > 5,580 mg/kg

LC50 Inhalation - rat - 4 h - 12,500 - 28,800 mg/m3

LD50 Dermal - rabbit - 12,196 mg/kg

Skin corrosion/irritation
Skin - rabbit - Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Severe eye irritation - 24 h

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Toluene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Damage to fetus possible
Suspected human reproductive toxicant

Reproductive toxicity - rat - Inhalation
Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Experiments have shown reproductive toxicity effects in male and female laboratory animals.

Developmental Toxicity - rat - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Specific target organ toxicity - single exposure (GHS)
May cause damage to organs.

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation. Vapours may cause drowsiness and dizziness.
Ingestion	Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
Lung irritation, chest pain, pulmonary edema, Inhalation studies on toluene have demonstrated the development of inflammatory and ulcerous lesions of the penis, prepuce, and scrotum in animals.

Additional Information
RTECS: XS5250000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 74.00 - 340.00 mg/l - 96 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 7.63 mg/l - 96 h
	NOEC - Pimephales promelas (fathead minnow) - 5.44 mg/l - 7 d
	LOEC - Pimephales promelas (fathead minnow) - 8.04 mg/l - 7 d
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 8.00 mg/l - 24 h
	Immobilization EC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h
Toxicity to algae	EC50 - Chlorella vulgaris (Fresh water algae) - 245.00 mg/l - 24 h
	EC50 - Pseudokirchneriella subcapitata (green algae) - 10.00 mg/l - 24 h

Persistence and degradability

Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d Bioconcentration factor (BCF): 94

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1294 Class: 3 Packing group: II
Proper shipping name: Toluene
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1294 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: TOLUENE
Marine pollutant: No

IATA
UN-Number: 1294 Class: 3 Packing group: II
Proper shipping name: Toluene

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Irritant, Teratogen, Reproductive hazard

DSL Status
All components of this product are on the Canadian DSL list.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

	CAS-No.	Revision Date
Toluene	108-88-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Toluene	108-88-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date

Toluene	108-88-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Toluene	108-88-3	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	CAS-No.	Revision Date
Toluene	108-88-3	2007-09-28

16. OTHER INFORMATION

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TETRACHLOROETHYLENE

1. Product Identification

Synonyms: ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon bichloride; carbon dichloride
CAS No.: 127-18-4
Molecular Weight: 165.83
Chemical Formula: Cl2C:CCl2
Product Codes:
J.T. Baker: 9218, 9360, 9453, 9465, 9469
Mallinckrodt: 1933, 8058

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Tetrachloroethylene	127-18-4	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.
Ingestion:
Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhea, headache, and dizziness.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
May cause liver, kidney or central nervous system damage after repeated or prolonged exposures. Suspected cancer risk from animal studies.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. The use of alcoholic beverages enhances the toxic effects.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapor generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapors are heavier than air and collect in low-lying areas.
Explosion:
Not considered to be an explosion hazard. Containers may explode when involved in a fire.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. 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.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (ceiling),
300 ppm/5min/3-hour (max)

-ACGIH Threshold Limit Value (TLV):
25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.
Odor:
Ethereal odor.
Solubility:
0.015 g in 100 g of water.
Specific Gravity:
1.62 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
121C (250F)
Melting Point:
-19C (-2F)
Vapor Density (Air=1):
5.7
Vapor Pressure (mm Hg):
18 @ 25C (77F)
Evaporation Rate (BuAc=1):
0.33 (trichloroethylene = 1)

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.
Conditions to Avoid:
Moisture, light, heat and incompatibles.

---

11. Toxicological Information

Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 4100 ppm/6H; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Tetrachloroethylene (127-18-4)	No	Yes	2A

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this

material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:

The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 4L

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Tetrachloroethylene (127-18-4)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Tetrachloroethylene (127-18-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Tetrachloroethylene (127-18-4)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Tetrachloroethylene (127-18-4)	100	U210	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
********** **********

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THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS BMQXG

HEWLETT PACKARD -- TONER (PRE-MIXED), 17278A
MATERIAL SAFETY DATA SHEET
SN: 685000N024529
Manufacturer's CAGE: 98220
Part No. Indicator: A
Part Number/Trade Name: TONER (PRE-MIXED), 17278A

General Information

Company's Name: HEWLETT PACKARD CO
Company's Street: 16399 W BERNARDO DR
Company's City: SAN DIEGO
Company's State: CA
Company's Country: US
Company's Zip Code: 92127-1899
Company's Emerg Ph #: 619-487-4100
Company's Info Ph #: 619-487-4100
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 29JUN89
Safety Data Review Date: 13FEB92
MSDS Serial Number: BMQXG
Hazard Characteristic Code: N/

Ingredients/Identity Information

Proprietary: NO
Ingredient: ISOPAR-G; (SOLVENT, ISOPAR-G (MFR CAS NO 64742-48-9))
Ingredient Sequence Number: 01
Percent: >97
NIOSH (RTECS) Number: 1000360IP
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: 300 PPM (MFR)

Proprietary: NO
Ingredient: DYESTUFF; (POLYMER & DYE STUFF)
Ingredient Sequence Number: 02
Percent: <3
NIOSH (RTECS) Number: 1001201DS
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: BLACK LIQUID; FAINT PETROLEUM HYDROCARBON ODOR.
Boiling Point: 311F,155C
Melting Point: <0F,<-18C
Vapor Pressure (MM Hg/70 F): <10 @ 25C
Vapor Density (Air=1): 5.0
Specific Gravity: <0F, <-18C
Evaporation Rate And Ref: 0.30 (BUTYL ACETATE = 1)
Solubility In Water: <0.1%

Fire and Explosion Hazard Data

Flash Point: 100F,38C
Flash Point Method: TCC
Lower Explosive Limit: 0.8%
Upper Explosive Limit: 7%
Extinguishing Media: DRY CHEMICAL, CO*2, FOAM AND MIST. WATER MAY BE INEFT, BUT SHOULD BE USED TO KEEP FIRE-EXPSD CNTNRS COOL.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP (FP N). WATER NOT REC AS EXTING MEDIA AS IT SPREADS HYDROCARBON FIRES. MINIMIZE BRTHG GASES, VAPS & FUMES.
Unusual Fire And Expl Hazrds: NONE, HOWEVER, IT IS FLAMMABLE WHEN EXPOSED TO A DIRECT FLAME OR EXCESSIVE TEMPERATURES.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NOT APPLICABLE.
Materials To Avoid: STRONG OXIDANTS (LIQUID CHLORINE, CONC O*2, CHROMIC ACID).
Hazardous Decomp Products: NONE, HOWEVER, MOST PRODUCTS OF COMBUSTION ARE TOXIC.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: (ACUTE & CHRONIC) BRIEF PERIODS OF HIGH EXPOSURE CAN CAUSE DIZZINESS, IRRITATION OF MUCOUS MEMBRANES, AND DROWSINESS. CHRONIC EXPOSURE TO CONCENTRATIONS BELOW 300 PPM ARE NOT CURRENTLY BELIEVED TO PRODUCE LONG TERM ADVERSE EFFECTS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: EXCESSIVE EXPOSURE CAN CAUSE HEADACHE, NAUSEA, AND EYE IRRITATION. SEVERE EXPOSURE CAN CAUSE MILD DEPRESSION AND/ OR RESPIRATORY IRRITATION AND DIFFICULTY IN BREATHING. SKIN CONTACT CAN CAUSE DRYING AND CHAPPING. EYE CONTACT CAN CAUSE IRRITATION OF CONJUNCTIVA.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: INGEST: GET MD IMMEDIATELY. DO NOT INDUCE VOMITING AS IT MAY ASPIRATE IN LUNGS AND CAUSE PNEUMONIA-LIKE DISORDERS. WASH THOROUGHLY WITH SOAP AND WATER. INHAL: REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE O*2/ARTIFICIAL RESPIRATION) (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EXTINGUISH IGNITION SOURCES, PROVIDE VENTILATION, SOAK UP WITH INERT ABSORBENT AND PLACE IN A FLAMMABLE WASTE CONTAINER. IN CERTAIN SITUATIONS, SPILL REPORTS MAY NEED TO BE SUBMITTED TO LOCAL AUTHORITIES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: CONSULT FEDERAL, STATE AND LOCAL AUTHORITIES FOR APPROVED WASTE DISPOSAL METHOD. HAZARD CLASSIFICATION: FLAMMABLE LIQUID. ID NUMBER: UN#1993.
Precautions-Handling/Storing: KEEP CONTAINER CLOSED, AVOID HANDLING NEAR HEAT, STRONG LIGHTS, SPARKS, OPEN FLAMES, AND STRONG OXIDANT.
Other Precautions: AVOID BREATHING VAPORS AND PROLONGED OR REPEATED SKIN CONTACT.

Control Measures

Respiratory Protection: NONE WHEN USED IN WELL-VENTILATED AREAS ACCORDING TO DIRECTIONS. NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: MECHANICAL (GENERAL): GENERAL OFFICE VENTILATION.
Protective Gloves: NEOPRENE OR NITRILE GLOVES.
Eye Protection: CHEM WORK GOGG/FULL LENGTH FSHLD (FP N).
Other Protective Equipment: NO SPECIFIC REQUIREMENT WHEN USED ACCORDING TO DIRECTIONS.
Work Hygienic Practices: AVOID BREATHING VAPORS, AND AVOID PROLONGED OR REPEATED SKIN CONTACT.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Trans Data Review Date: 92128
DOT PSN Code: GJL
DOT Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.

http://haz1.siri.org:80/msds/h/q351/q125182

DOT Class: 3
DOT ID Number: UN1993
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HIA
IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S.
IMO Regulations Page Number: 3345
IMO UN Number: 1993
IMO UN Class: 3.3
IATA PSN Code: MCA
IATA UN ID Number: 1993
IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MCA
AFI Prop. Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
AFI Class: 3
AFI ID Number: UN1993
AFI Pack Group: III
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

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Disposal Data

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Label Data

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Label Required: YES
Technical Review Date: 12FEB92
Label Date: 12FEB92
Label Status: G
Common Name: TONER (PRE-MIXED), 17278A
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: FLAMMABLE. KEEP AWAY FROM HEAT, SPARKS, OPEN FLAME. ACUTE: EYE CONTACT CAN CAUSE IRRITATION OF CONJUNCTIVA. SKIN CONTACT CAN CAUSE DRYING AND CHAPPING. EXCESSIVE EXPOSURE CAN CAUSE HEADACHE, NAUSEA, RESPIRATORY IRRITATION, DIZZINESS, DROWSINESS. CHRONIC: NONE SPECIFIED BY MANUFACTURER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: HEWLETT PACKARD CO
Label Street: 16399 W BERNARDO DR
Label City: SAN DIEGO
Label State: CA
Label Zip Code: 92127-1899
Label Country: US
Label Emergency Number: 619-487-4100

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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 sent updates to dan@siri.org.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Trichloroethylene
Product ID: 0085
SYNONYMS: Trichloroethene; Trichlorethylene; Trichlor; C_2HCl_3
ISSUE DATE: 06/01/2007
EDITION NO.: 22

PPG Industries, Inc.
One PPG Place, Pittsburgh, PA 15272, USA
24-hour Emergency Telephone Number: 1-412-434-4515
For Product Information (8am-5pm Eastern time):
1-800-243-6774 (C/A)

PREPARER: Product Safety, Chemicals

2. COMPOSITION/INFORMATION ON INGREDIENTS

Material/CAS Number	Percent
Trichloroethylene (Stabilized) 79-01-6	>99

Note: Tested Mixture

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

WARNING! May cause irritation to eyes and skin. Vapor harmful. Harmful if swallowed. Possible cancer hazard based on tests with laboratory animals -- overexposure may create cancer risk. *Do not ship lightly stabilized grades in aluminum trailers.*

Precautions: Avoid contact with eyes. Avoid prolonged or repeated contact with the skin. Use only with adequate ventilation. Do not breathe vapors. High vapor concentrations can cause dizziness, unconsciousness, central nervous system depression or death. Long-term overexposure may cause liver/kidney injury. Do not use in poorly ventilated or confined spaces without proper respiratory protection. Ventilation must be sufficient to limit employee exposure to this product below permissible exposure limits. Eye irritation, dizziness and/or drunkenness are signs of overexposure. Do not swallow. Wash thoroughly every day after work. Do not eat, drink or smoke in work area.

4. FIRST AID MEASURES

INHALATION: Move person to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult. If breathing is difficult, give oxygen. Call a physician.

EYE/SKIN CONTACT: In case of contact, immediately flush eyes and skin with plenty of water (soap and water for skin) for at least 15 minutes, while removing contaminated clothing and shoes. Get medical attention if irritation persists. Thoroughly clean contaminated clothing and shoes before reuse or discard.

INGESTION: If swallowed, give at least 3-4 glasses of water, but do not induce vomiting. Do not give anything by mouth to an unconscious or convulsing person. Get medical attention.

NOTES TO PHYSICIAN:
Only administer adrenaline after careful consideration following overexposure. Increased sensitivity of the heart to adrenaline may be caused by overexposure to this product.

5. FIRE-FIGHTING MEASURES

FLASH POINT: None (by DOT test method).

FLAMMABLE LIMITS IN AIR - LOWER (%): 7.8%

FLAMMABLE LIMITS IN AIR - UPPER (%): 52%

EXTINGUISHING MEDIA: Carbon dioxide. Dry chemical. Water.

SPECIAL FIREFIGHTING PROCEDURES: Emits toxic fumes under fire conditions. When this product is involved in fires, it can decompose to toxic, corrosive hydrogen chloride and possible traces of phosgene. Fire-fighters must wear NIOSH approved pressure demand, self-contained breathing apparatus and full protective clothing when fighting chemical fires. Vapor concentration in a confined or poorly ventilated area can be ignited upon contact with a high energy spark, flame, or high intensity source of heat. This can occur at concentrations ranging between the lower and upper limits (by volume) listed above.

6. ACCIDENTAL RELEASE MEASURES

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:
Immediately evacuate the area. Provide maximum ventilation. Unprotected personnel should move upwind of spill. Only personnel equipped with proper respiratory and eye/skin protection should be permitted in the area. Dike area to contain spill. Take precautions as necessary to prevent contamination of ground and surface waters. Recover spilled material on adsorbents, such as sawdust or vermiculite, and sweep into closed containers for disposal. After all visible traces, including ignitable vapors, have been removed, thoroughly wet vacuum the area. Do not flush to sewer. If area of spill is porous, remove as much earth and gravel, etc. as necessary and place in closed containers for disposal.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORAGE:
Vapors are heavier than air and will collect in low areas. Keep container closed when not in use. Store only in closed, properly labeled containers. This material or its vapors when in contact with flames, hot glowing surfaces or electric arcs can decompose to form hydrogen chloride gas and possible traces of phosgene. Avoid contamination of water supplies. Handling, storage and use procedures must be carefully monitored to avoid spills or leaks. Any spill or leak has the potential to cause underground water contamination which may, if sufficiently severe, render a drinking water source unfit for human consumption. Contamination that does occur cannot be easily corrected. A chlorinated solvent used as a flashpoint suppressant must be added in sufficient quantity or the resultant mixture may have a flashpoint lower than the flammable component. Do not use cutting or welding torches on drums that contained this product unless properly purged and cleaned. Do not ship lightly stabilized grades in aluminum trailers. The only exception is Type 145 vapor degreasing grade. Liquid oxygen or other strong oxidants may form explosive mixtures with this product.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits:
8-hour Time Weighted Average (TWA); 15-minute Short-Term Exposure Limit (STEL)

OSHA: 50 ppm TWA. 200 ppm STEL. (1989 Vacated PEL's)

ACGIH: 10 ppm TWA. 25 ppm STEL.

ONTARIO: 50 ppm TWAEV , 100 ppm STEV (Short Term Exposure Value) .

PPG Internal Permissible Exposure Limit (IPEL): 5 ppm TWA. 25 ppm STEL.

RESPIRATORY PROTECTION: Airborne concentrations should be maintained below the exposure limits. When respiratory protection is required for certain operations (<10x exposure limit), use an air purifying respirator. The effectiveness of an air purifying respirator is limited. Use only for a single short-term exposure. Use self-contained breathing apparatus (SCBA) or full facepiece airline respirator with auxiliary SCBA operated in the pressure demand mode for emergencies and for all work performed in storage vessels, poorly ventilated rooms, and other confined areas. Overexposure to vapors may be prevented by ensuring proper ventilation controls, vapor exhaust or fresh air entry. A NIOSH-approved air purifying respirator with the appropriate chemical cartridges or a positive-pressure air-supplied respirator may also reduce exposure. Read the respirator manufacturer's instructions and literature carefully to determine the type of airborne contaminants against which the respirator is effective, its limitations, and how it is to be properly fitted and used.

VENTILATION: Use local exhaust or general room/dilution ventilation sufficient to maintain employee exposure below permissible exposure limits.

EYE AND FACE PROTECTION: Splashproof goggles.

PROTECTIVE GLOVES: Viton®. Silver Shield®. Polyvinyl alcohol (degrades in water).

OTHER PROTECTIVE EQUIPMENT: Boots, aprons, or chemical suits should be used when necessary to prevent skin contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point:	86-88 C
Vapor Density (Air=1):	4.54
Specific Gravity (Water=1):	1.465 @ 20/20°C
pH:	6.7 to 7.5
FREEZING/MELTING POINT:	-86.4 C
SOLUBILITY (wt.% in water):	0.11
Bulk Density (kg/M3):	12.2 lbs/gal @ 20°C
VOLUME % VOLATILE:	100
VAPOR PRESSURE:	57.8 mm Hg @ 20 C
Evaporation Rate:	0.28 (ethyl ether=1)
HEAT OF SOLUTION:	NA
Physical State:	Liquid.
Odor:	Ether-like
COLOR:	Clear/Colorless

10. STABILITY AND REACTIVITY

Stability: Stable.

HAZARDOUS POLYMERIZATION: Will not occur.

INCOMPATIBILITY (CONDITIONS/MATERIALS TO AVOID):
Open flames, hot glowing surfaces or electric arcs. Avoid contamination with caustic soda, caustic potash or oxidizing materials. Shock sensitive compounds may be formed.

HAZARDOUS THERMAL DECOMPOSITION/COMBUSTION PRODUCTS:
Hydrogen chloride gas. Possible traces of phosgene.

11. TOXICOLOGICAL INFORMATION

ACUTE INHALATION LC50:	(mouse) 8450 ppm (4 hours). Slight to very low toxicity.
ACUTE DERMAL LD50:	(rabbit) >2000 mg/kg. Slight to very low toxicity.
SKIN IRRITATION:	Mildly irritating.
EYE IRRITATION:	Moderately irritating.
ACUTE ORAL LD50:	(rat) 5650 mg/kg. Slight to very low toxicity.

CARCINOGENICITY STATUS: Trichloroethylene is listed by NTP as a suspect carcinogen, and by IARC as a Group 2A carcinogen. Trichloroethylene is listed by ACGIH as A2, a suspected human carcinogen.

MEDICAL CONDITIONS AGGRAVATED: Prolonged exposure above the OSHA permissible exposure limit may complicate existing liver and kidney diseases.

EFFECTS OF OVEREXPOSURE:

ACUTE:

Inhalation: This product is primarily a central nervous system depressant. Inhalation can cause irritation of the respiratory tract, dizziness, nausea, headache, loss of coordination and equilibrium, unconsciousness and even death in confined or poorly ventilated areas. Fatalities following severe acute exposure to various chlorinated solvents have been attributed to ventricular fibrillation.

Eye/Skin: Liquid splashed in the eye can result in discomfort, pain and irritation. Prolonged or repeated contact with liquid on the skin can cause irritation and dermatitis. The problem may be accentuated by liquid becoming trapped against the skin by contaminated clothing and shoes. Skin absorption is not expected to be of toxicological significance under normal industrial use.

Ingestion: Swallowing of this material may result in irritation of the mouth and GI tract along with other effects as listed above for inhalation. Vomiting and subsequent aspiration into the lungs may lead to chemical pneumonia and pulmonary edema which is a potentially fatal condition.

CHRONIC: Prolonged exposure above the OSHA permissible exposure limits may result in liver and kidney damage. Prudent handling practices should be followed to minimize human exposure.

CARCINOGENICITY: Chronic exposure to Trichloroethylene primarily produced renal toxicity and tumors in rats and liver and lung tumors in mice, with some reports of tumors at other sites.

MUTAGENESIS: When activated with microsomal enzymes, trichloroethylene has been shown to be weakly positive in certain microbial mutagen test systems.

EPIDEMIOLOGY: Extensive epidemiologic cohort studies of Trichloroethylene-exposed workers do not indicate significant increases in cancer incidence, but case–control studies suggest that prolonged exposure to high concentrations of Trichloroethylene can increase the incidence of renal cancer.

REPRODUCTIVE/DEVELOPMENTAL: Trichloroethylene was not embryotoxic or teratogenic in rats or mice inhaling the compound. In a teratology-reproduction study conducted by NTP, rats and mice fed microencapsulated trichloroethylene at doses as high as 300 mg/kg/day (rats) and 750 mg/kg/day (mice) showed little effect.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:
Extreme toxicity.

LC_{50}: 52 ppm (96 hr, Sheepshead Minnow)
LC_{50}: 14 ppm (96 hr, Mysid Shrimp)
EC_{50}: 95 ppm (96 hr, Marine Alga)

ENVIRONMENTAL FATE:
No data at this time.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD:
Contaminated sand, sawdust, vermiculite, soil or porous surface must be disposed of in a permitted hazardous waste management facility. Recovered liquids may be reprocessed or incinerated or must be treated in a permitted hazardous waste management facility. Waste material must be disposed of in accordance with federal, state, provincial, and local environmental control regulations. Empty containers should be recycled or disposed of through an approved waste management facility.

14. TRANSPORT INFORMATION

Proper Shipping Name: Trichloroethylene
Hazard Class: 6.1 (Toxic)
UN Number: UN1710
Packing Group: III
USA-RQ, Hazardous Substance and Quantity: 100 lbs./45.4 kg.
Marine Pollutant: None

15. REGULATORY INFORMATION

USA TSCA: All components of this product are listed on the TSCA Inventory.
EU EINECS: All components in this product are listed on EINECS.
CANADA DOMESTIC SUBSTANCES LIST (DSL): This product and/or all of its components are listed on the Canadian DSL.
AUSTRALIA AICS: All components of this product are listed on AICS.
KOREA ECL: All components in this product are listed on the Korean Existing Chemicals Inventory (KECI).
JAPAN MITI (ENCS): All components in this product are listed on the Japanese Existing and New Chemical Substances (ENCS) chemical inventory.
PHILIPPINES PICCS: All of the components in this product are listed on the Philippines Inventory of Chemicals and Chemical Substances (PICCS).
CHINA IECSC: All components of this product are listed on the Inventory of Existing Chemical Substances in China (IECSC) or otherwise exempt.

SARA TITLE III:
SARA (311, 312) Hazard Class:
Acute Health Hazard. Chronic Health Hazard.
SARA (313) Chemicals:
This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirement of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.
Trichloroethylene//79-01-6
SARA Extremely Hazardous Substance:
Not listed.

CERCLA Hazardous Substance:
The following materials are listed as CERCLA Hazardous Substances in Table 302.4 of 40 CFR Part 302: Trichloroethylene (79-01-6) RQ = 100 lbs./45.4 kg.

CALIFORNIA PROPOSITION 65: This product is a chemical known to the State of California to cause cancer.

NJ RIGHT-TO-KNOW LIST: Also contains butylene oxide (CAS No. 106-88-7).

CANADA REGULATIONS (WHMIS): Class D1B - Toxic Materials. Sensitization to product: None known. Odor threshold: Approx. 80 ppm. Product use: degreasing solvent.

16. OTHER INFORMATION

The following has been revised since the last issue of this MSDS:
Date. Edition. Section 8 has been updated. Section 11 has been updated. Section 16 has been updated.

Previous revision date: 7/28/2006
Previous edition number: 021

NA = Not Available

MATERIAL SAFETY DATA SHEET

550304

(APPROVED BY THE U.S. DEPARTMENT OF LABOR AS - "essentially similar" to form OSHA-20 (former LSB-OSS-4))

FOR HAZARDOUS PRODUCTS USED IN PLACES OF EMPLOYMENT

Section 1 NAME AND PRODUCT 4-4345, 4-4347, 4-4349 Universal Blanket Wash

MANUFACTURER'S NAME
A.B.DICK COMPANY

EMERGENCY PHONE NO.: 24 HOUR
(b) 312 - 647 - 8800

STREET ADDRESS
(a) 5700 WEST TOUHY AVENUE

For latest data, consult manufacturer.

DATE THIS FORM WRITTEN
(d) July 2, 1985

CITY, STATE, ZIP CODE
(c) CHICAGO, ILLINOIS 60648

SIGNATURE
(e) Kenneth W. Pinter Kenneth W. Pinter

CHEMICAL NAME, TRADE NAME, AND SYNONYMS
(g)

HAZARD CLASSIFICATION FOR DEPARTMENT OF TRANSPORTATION (DOT)

Flammable Liquid ☐ Combustible Liquid ☒ Corrosive Material ☐ _____ ☐

DOT Shipping Name Not regulated. UN#

Section 2 HAZARDOUS INGREDIENTS	CAS Reg. No.	% Wt.	TLV (units)
1. Aliphatic Hydrocarbon (Z-1) (Mixed $C_{9's}$ & $C_{10's}$)	64742-88-7	100	500 ppm

Section 3 PHYSICAL DATA pH FREEZING POINT (°F)

3. BOILING POINT (°F.)	305-335	6. SPECIFIC GRAVITY (H_2O = 1)	0.774
VAPOR PRESSURE (mmHg at 20°C)	8mm @ 38°C.	7. % VOLATILE BY VOLUME	100
4. VAPOR DENSITY (air=1)	4.73	8. COLOR AND ODOR	Clear - sweet naptha
5. SOLUBILITY IN WATER	Insoluble	9. PHYSICAL STATE	Liquid

Section 4 FIRE AND EXPLOSION HAZARD DATA

10. FLASH POINT (AND METHOD USED)
102 °F T.O.C., (C.C.), C.O.C.

11. FLAMMABLE LIMITS (STP)
L.F.L. 1.1 U.F.L. 6.1

12. EXTINGUISHING MEDIA:
☐ WATER FOG ☒ FOAM ☐ ALCOHOL FOAM ☒ CO_2 ☐ DRY CHEMICAL
☒ OTHER Any media for class B fires.

13. SPECIAL FIRE FIGHTING PROTECTIVE EQUIPMENT
None

14. UNUSUAL FIRE AND EXPLOSION HAZARDS
None

Section 5 REACTIVITY DATA

15. STABILITY			16. CONDITIONS TO AVOID
	NORMAL CONDITIONS	OK	DO NOT use near open flame or other ignition source.
	FIRE CONDITIONS	OK	DO NOT smoke while using.

17. INCOMPATIBILITY (Materials to avoid)
☐ WATER ☐ ACID ☐ BASE ☐ CORROSIVE ☒ OXIDIZING MATERIAL
☐ OTHER

18. HAZARDOUS DECOMPOSITION PRODUCTS
None

19. HAZARDOUS POLYMERIZATION			20. CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

(FRONT)

Section 6 HEALTH HAZARD DATA

21. ORAL INGESTION

Liquid is harmful and/or fatal if swallowed.

22. EYE CONTACT

Flush with water; consult a physician.

23. SKIN CONTACT

Will defat tissue. Avoid prolonged contact.

24. SKIN ABSORPTION

See #23.

25. INHALATION (TLV OR SUGGESTED CONTROL FIGURE)

Vapors are intoxicating and narcotic; may irritate mucous membranes of the lungs.

26. EFFECTS OF OVEREXPOSURE

Headache, dizziness, drowsiness, irritation of eyes and nose.

27. FIRST AID PROCEDURES

If overcome by vapors, remove victim from contaminated area. Keep victim warm and quiet.
If breathing has stopped, give artificial respiration. Call physician immediately.

If swallowed, DO NOT induce vomiting.

Section 7 SPILL OR LEAK PROCEDURES

28. STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Material is volatile and care should be exercised to prevent fire.
Spilled material may be pumped into another container or absorbed and removed from area.
Keep sparks or ignition source out of area. Avoid inhalation of vapors.

29. DISPOSAL METHOD

Incineration or according to local, state, federal regulations for combustible material.

Section 8 SPECIAL PROTECTION INFORMATION

30. VENTILATION

LOCAL EXHAUST: Use in well ventilated area.	SPECIAL: Vapors are heavier than air.
MECHANICAL (General): Exhaust at floor level.	OTHER:

31. RESPIRATORY PROTECTION (Specify Type)

None

32. PROTECTIVE CLOTHING

None

33. EYE PROTECTION

- [x] NOT NORMALLY NECESSARY
- [ ] SAFETY GLASSES WITHOUT SIDE SHIELDS
- [ ] CHEMICAL WORKERS GOGGLES
- [ ] GAS TIGHT GOGGLES OR EQUIVALENT
- [ ] SAFETY GLASSES WITH SIDE SHIELDS
- [ ] OTHER

34. OTHER PROTECTIVE EQUIPMENT

None

Section 9 SPECIAL PRECAUTIONS OR OTHER COMMENTS

35. PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep container closed. DO NOT store or use near ignition sources.
Keep in a cool place.

36. OTHER PRECAUTIONS

Ground containers when transferring liquid. Use non-sparking tools.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: XYLENE

Manufacturer Information:

Sunoco, Inc. (R&M)
1735 Market Street LL

Philadelphia, Pennsylvania, 19103-7583

Product Use:

Solvent

Emergency Phone Numbers:

Chemtrec	(800) 424-9300
Sunoco Inc.	(800) 964-8861

Information:

Product Safety Information	(888) 567-3066

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	Amount (Vol%)
M-XYLENE	108-38-3	0 - 46
P-XYLENE	106-42-3	0 - 20
ETHYL BENZENE	100-41-4	0 - 19
O-XYLENE	95-47-6	0 - 15
TOLUENE	108-88-3	0 - 0.5
BENZENE	71-43-2	0 - 0.01

EXPOSURE GUIDELINES (SEE SECTION 15 FOR ADDITIONAL EXPOSURE LIMITS)

	CAS No.	Governing Body	Exposure Limits		
Limit for the product	1330-20-7	ACGIH	STEL	150	ppm
Limit for the product	1330-20-7	ACGIH	TWA	100	ppm
Limit for the product	1330-20-7	OSHA	TWA	100	ppm
BENZENE	71-43-2	ACGIH	STEL	2.5	ppm
BENZENE	71-43-2	OSHA	STEL	5	ppm
BENZENE	71-43-2	ACGIH	TWA	0.5	ppm
BENZENE	71-43-2	OSHA	TWA	1	ppm
ETHYL BENZENE	100-41-4	ACGIH	STEL	125	ppm
ETHYL BENZENE	100-41-4	ACGIH	TWA	100	ppm
ETHYL BENZENE	100-41-4	OSHA	TWA	100	ppm
M-XYLENE	108-38-3	ACGIH	STEL	150	ppm
M-XYLENE	108-38-3	ACGIH	TWA	100	ppm
M-XYLENE	108-38-3	OSHA	TWA	100	ppm
O-XYLENE	95-47-6	ACGIH	STEL	150	ppm

O-XYLENE	95-47-6	ACGIH	TWA	100	ppm
O-XYLENE	95-47-6	OSHA	TWA	100	ppm
P-XYLENE	106-42-3	ACGIH	STEL	150	ppm
P-XYLENE	106-42-3	ACGIH	TWA	100	ppm
P-XYLENE	106-42-3	OSHA	TWA	100	ppm
TOLUENE	108-88-3	NIOSH	STEL	150	ppm
TOLUENE	108-88-3	ACGIH	TWA	20	ppm
TOLUENE	108-88-3	OSHA	TWA	200	ppm

3. HAZARDS IDENTIFICATION

- **EMERGENCY OVERVIEW**
  Danger! Flammable liquid and vapor. Harmful if inhaled. Overexposure may cause nervous system effects. May cause serious disturbances of heart rhythm. May cause skin irritation. Causes eye irritation. Causes respiratory tract irritation. Harmful or fatal if swallowed. Pulmonary aspiration hazard. While ingesting or vomiting, may enter lungs and produce damage.

  Hazards Ratings:
  Key: 0 = least, 1 = slight, 2 = moderate, 3 = high, 4 = extreme

	Health	Fire	Reactivity	PPI
NFPA	2	3	0	
HMIS	2	3	0	X

- **POTENTIAL HEALTH EFFECTS**
  - **PRE-EXISTING MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE**
    The following diseases or disorders may be aggravated by exposure to this product: skin, eye, liver, kidney, nervous system, respiratory system, lung (asthma-like conditions).
  - **INHALATION**
    High concentrations may lead to central nervous system effects (drowsiness, dizziness, nausea, headaches, paralysis and loss of consciousness and even death). Repeated overexposure has caused a hearing loss in laboratory animals. Repeated overexposure has produced toxic effects in developing and young laboratory animals. Solvent "huffing/sniffing" (abuse) or intentional prolonged overexposure to high levels of vapors can produce abnormal behavior, convulsions, hallucinations, delerium, nervous system damage, serious disturbances of heart rhythm and sudden death. Prolonged or repeated exposure may cause liver and kidney damage. See Section 15 for additional information.

    LC50 (mg/l): no data
    LC50 (mg/m3): no data
    LC50 (ppm): 26800

  - **SKIN**
    May be absorbed through the skin in harmful amounts. Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis (rash). Prolonged or repeated skin contact may cause irritation.

    Draize Skin Score: no data Out of 8.0
    LD50 (mg/kg): 2000

  - **EYES**
    Causes eye irritation.
  - **INGESTION**
    Moderately toxic. Irritating to mouth, throat, and stomach. May produce central nervous system effects, which includes dizziness, loss of balance and coordination, unconsciousness, coma and even death. Harmful or fatal if swallowed. Pulmonary aspiration hazard. While ingesting or vomiting, may enter lungs and produce damage. See Section 15 for additional information.

    LD50 (g/kg): 4.3

4. FIRST AID MEASURES

- **INHALATION**
  Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen and continue to monitor. Get immediate medical attention.
- **SKIN**
  Wash with soap and water for 20 minutes. Get medical attention if irritation develops or persists. Wash clothing before reuse. Injection injuries may not appear serious at first but within a few hours, without proper treatment, the area will become swollen, discolored and extremely painful. See Section 15 for additional information.
- **EYES**
  Flush eye with water for 20 minutes. Get medical attention.
- **INGESTION**
  Do not induce vomiting! Do not give liquids! Get medical attention immediately.

5. FIRE FIGHTING MEASURES

- **EXTINGUISHING MEDIA**
  Water spray; Regular foam; Dry chemical; Carbon dioxide;
- **FIRE FIGHTING INSTRUCTIONS**
  Use water spray to cool fire exposed tanks and containers. Wear structural fire fighting gear.
- **FLAMMABLE PROPERTIES**
  STATIC ACCUMULATOR. This liquid may form an ignitable vapor-air mixture in closed tanks or containers.

	Typical	Minimum	Maximum	Text Result	Units	Method
Flash Point				79 TAG C.C.	F	N/A
Autoignition Temperature	870				F	N/A
Lower Explosion Limit	1.1				%	N/A
Upper Explosion Limit	6.6				%	N/A

6. ACCIDENTAL RELEASE MEASURES

Prevent ignition, stop leak and ventilate the area. Contain spilled liquid with sand or earth. DO NOT use combustible materials such as sawdust. Vapor can be controlled using a water fog. Water streams should not be directed to the liquid as this will cause the liquid to boil and generate more vapor. Keep personnel upwind from leak. Use appropriate personal protective equipment as stated in Section 8 of this MSDS. Advise the Environmental Protection Agency (EPA) and appropriate state agencies, if required. Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container. Vacuum or sweep up material and place in a disposal container.

7. HANDLING AND STORAGE

- **HANDLING**
  Use only in a well-ventilated area. STATIC ACCUMULATOR. This liquid may form an ignitable vapor-air mixture in closed tanks or containers. This liquid may accumulate static electricity even when transferred into properly grounded containers. Bonding and grounding may be insufficient to remove static electricity. Static electricity accumulation may be significantly increased by the presence of small quantities of water.Always bond receiving container to the fill pipe before and during loading, following NFPA-77 and/or API RP 2003 requirements. Automatic gauging devices and other floats in vessels or tanks which contain static accumulating liquids should be electrically bonded to the shell. Bonding and grounding alone may be inadequate to eliminate fire and explosion hazards associated with electrostatic charges. In addition to bonding and grounding, efforts to mitigate the hazards of an electrostatic discharge may include, but are not limited to, ventilation, inerting and/or reduction of transfer velocities. Always keep the nozzle in contact with the container throughout the loading process. Do not fill any portable containers in or on a vehicle. Special precautions, such as reduced loading rates and increased monitoring, must be observed during "switch loading" operations (i.e. loading this material in tanks or shipping compartments that previously contained middle distillates or similar products). Non-equilibrium conditions may increase the risks associated with static electricity such as tank and container filling, tank cleaning, sampling, gauging, loading, filtering, mixing, agitation, etc.

Dissipation of electrostatic charges may be improved with the use of conductivity additives when used with other mitigating efforts, including bonding and grounding. Avoid breathing (dust, vapor, mist, gas). Avoid prolonged or repeated contact with skin. Avoid contact with eyes. Wash thoroughly after handling. Never siphon by mouth.

- **STORAGE**
  Keep away from heat, sparks, and flame. Store in a cool dry place. NFPA class IC storage. Flash point is greater than 73 degrees F and less than 100 degrees F. Consult NFPA and / or OSHA codes for additional information.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Consult With a Health and Safety Professional for Specific Selections

- **ENGINEERING CONTROLS**
  Use with adequate ventilation. Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. Use explosion-proof ventilation equipment.
- **PERSONAL PROTECTION**
  - **EYE PROTECTION**
    Splash proof chemical goggles are recommended to protect against the splash of product.
  - **GLOVES or HAND PROTECTION**
    The glove(s) listed below may provide protection against permeation. Gloves of other chemically resistant materials may not provide adequate protection. Protective gloves are recommended to protect against contact with product. Polyvinyl alcohol; Viton; Safety 4H; Teflon;
  - **RESPIRATORY PROTECTION**
    Concentration in air determines the level of respiratory protection needed. Use only NIOSH certified respiratory equipment. Half-mask air purifying respirator with organic vapor cartridges is acceptable for exposures to ten (10) times the exposure limit. Full-face air purifying respirator with organic vapor cartridges is acceptable for exposures to fifty (50) times the exposure limit. Exposure should not exceed the cartridge limit of 1000 ppm. Protection by air purifying respirators is limited. Use a positive pressure-demand full-face supplied air respirator or SCBA for exposures greater than fifty (50) times the exposure limit. If exposure is above the IDLH (Immediately Dangerous to Life and Health) or there is the possibility of an uncontrolled release, or exposure levels are unknown, then use a positive pressure-demand full-face supplied air respirator with escape bottle or SCBA. Wear a NIOSH-approved (or equivalent) full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.
  - **OTHER**
    Where splashing is possible, full chemically resistant protective clothing and boots are required. The following materials are acceptable for use as protective clothing: Polyvinyl alcohol (PVA); Viton; Teflon; Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Remove contaminated clothing and wash before reuse. For non-fire emergencies, positive pressure SCBA and structural firefighter's protective clothing will provide only limited protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Property	Typical	Units	Text Result	Reference
Appearance		N/A	COLORLESS LIQUID.	
Boiling Point		F	278 TO 290	
Bulk Density		lb/gal	no data	
Liquid Conductivity	0.1	pS/m		
Melting Point		F	MINUS 53	
Molecular Weight		g/mole	no data	
Octanol/Water Coefficient		N/A	no data	
pH		N/A	no data	
Specific Gravity	0.87	N/A		

Solubility In Water		wt %	NIL	
Odor		N/A	SWEET, PLEASANT.	
Odor Threshold		ppm	no data	
Vapor Pressure	9	mmHg		@ 25 C
Viscosity (F)		SUS	no data	
Viscosity (C)		CsT	no data	
% Volatile	100	wt %		

10. STABILITY AND REACTIVITY

- **STABILITY**
  Stable
- **CONDITIONS TO AVOID**
  Avoid static discharge
- **INCOMPATIBILITY**
  Strong oxidizers
- **HAZARDOUS DECOMPOSITION PRODUCTS**
  Combustion may produce carbon monoxide, carbon dioxide and other asphyxiants.
- **HAZARDOUS POLYMERIZATION**
  Will not polymerize.

11. ECOLOGICAL INFORMATION

No data available

12. DISPOSAL CONSIDERATIONS

Follow federal, state and local regulations. This material is a RCRA hazardous waste. Do not flush material to drain or storm sewer. Contract to authorized disposal service.

13. TRANSPORT INFORMATION

Governing Body	Mode	Proper Shipping Name
DOT	Ground	Xylene
IATA	Air	Xylene
IMDG	Marine	Xylene

Governing Body	Mode	Hazard Class	UN/NA No.	Label
DOT	Ground	3 (Flammable liquid)	1307	
IATA	Air	Class 3	1307	
IMDG	Marine	Class 3	1307	

14. REGULATORY INFORMATION

This product contains the following EPCRA section 313 chemicals subject to the reporting requirements of the Emergency Planning and Community Right-To-Know Act of 1986 (40 CFR 372): (Maximum Wt %) M-Xylene - CAS Number 108-38-3, 46%; P-Xylene- CAS Number 106-42-3, 20%; Ethyl Benzene- CAS Number 100-41-4, 19%; O-Xylene- CAS Number 95-47-6, 15%. This information must be included in all MSDSs that are copied and distributed for this material.

Regulatory List	Component	CAS No.
ACGIH - Occupational Exposure Limits - Carcinogens	XYLENE	1330-20-7
ACGIH - Occupational Exposure Limits - TWAs	XYLENE	1330-20-7
ACGIH - Short Term Exposure Limits	XYLENE	1330-20-7

CAA (Clean Air Act) - HON Rule - Organic HAPs	XYLENE	1330-20-7
CAA (Clean Air Act) - HON Rule - SOCMI Chemicals	XYLENE	1330-20-7
CAA (Clean Air Act) - VOCs in SOCMI	XYLENE	1330-20-7
CAA - 1990 Hazardous Air Pollutants	XYLENE	1330-20-7
CERCLA/SARA - Haz Substances and their RQs	XYLENE	1330-20-7
CERCLA/SARA - Section 313 - Emission Reporting	XYLENE	1330-20-7
CWA (Clean Water Act) - Hazardous Substances	XYLENE	1330-20-7
IARC - Group 3 (not classifiable)	XYLENE	1330-20-7
Inventory - Australia (AICS)	XYLENE	1330-20-7
Inventory - Canada - Domestic Substances List	XYLENE	1330-20-7
Inventory - China	XYLENE	1330-20-7
Inventory - European EINECS Inventory	XYLENE	1330-20-7
Inventory - Japan - (ENCS)	XYLENE	1330-20-7
Inventory - Korea - Existing and Evaluated	XYLENE	1330-20-7
Inventory - New Zealand	XYLENE	1330-20-7
Inventory - Philippines Inventory (PICCS)	XYLENE	1330-20-7
Inventory - TSCA - Sect. 8(b) Inventory	XYLENE	1330-20-7
Massachusetts - Right To Know List	XYLENE	1330-20-7
New Jersey - Department of Health RTK List	XYLENE	1330-20-7
New Jersey - Env Hazardous Substances List	XYLENE	1330-20-7
New Jersey - Special Hazardous Substances	XYLENE	1330-20-7
OSHA - Final PELs - Time Weighted Averages	XYLENE	1330-20-7
Pennsylvania - RTK (Right to Know) List	XYLENE	1330-20-7
Pennsylvania - RTK - Environmental Hazard List	XYLENE	1330-20-7
U.S. - DOT - Hazardous Substances and RQs (App A)	XYLENE	1330-20-7
ACGIH - Occupational Exposure Limits - Carcinogens	BENZENE	71-43-2
ACGIH - Occupational Exposure Limits - Carcinogens	ETHYL BENZENE	100-41-4
ACGIH - Occupational Exposure Limits - Carcinogens	M-XYLENE	108-38-3
ACGIH - Occupational Exposure Limits - Carcinogens	O-XYLENE	95-47-6
ACGIH - Occupational Exposure Limits - Carcinogens	P-XYLENE	106-42-3
ACGIH - Occupational Exposure Limits - Carcinogens	TOLUENE	108-88-3
ACGIH - Occupational Exposure Limits - TWAs	BENZENE	71-43-2
ACGIH - Occupational Exposure Limits - TWAs	ETHYL BENZENE	100-41-4
ACGIH - Occupational Exposure Limits - TWAs	M-XYLENE	108-38-3
ACGIH - Occupational Exposure Limits - TWAs	O-XYLENE	95-47-6
ACGIH - Occupational Exposure Limits - TWAs	P-XYLENE	106-42-3
ACGIH - Occupational Exposure Limits - TWAs	TOLUENE	108-88-3
ACGIH - Short Term Exposure Limits	BENZENE	71-43-2
ACGIH - Short Term Exposure Limits	ETHYL BENZENE	100-41-4
ACGIH - Short Term Exposure Limits	M-XYLENE	108-38-3
ACGIH - Short Term Exposure Limits	O-XYLENE	95-47-6
ACGIH - Short Term Exposure Limits	P-XYLENE	106-42-3
ACGIH - Skin Absorption Designation	BENZENE	71-43-2
ACGIH - Skin Absorption Designation	TOLUENE	108-88-3
CAA (Clean Air Act) - High Risk Haz Air Pollutants	BENZENE	71-43-2
CAA (Clean Air Act) - HON Rule - Organic HAPs	BENZENE	71-43-2
CAA (Clean Air Act) - HON Rule - Organic HAPs	ETHYL BENZENE	100-41-4
CAA (Clean Air Act) - HON Rule - Organic HAPs	M-XYLENE	108-38-3
CAA (Clean Air Act) - HON Rule - Organic HAPs	O-XYLENE	95-47-6
CAA (Clean Air Act) - HON Rule - Organic HAPs	P-XYLENE	106-42-3
CAA (Clean Air Act) - HON Rule - Organic HAPs	TOLUENE	108-88-3
CAA (Clean Air Act) - HON Rule - SOCMI Chemicals	BENZENE	71-43-2
CAA (Clean Air Act) - HON Rule - SOCMI Chemicals	ETHYL BENZENE	100-41-4
CAA (Clean Air Act) - HON Rule - SOCMI Chemicals	M-XYLENE	108-38-3
CAA (Clean Air Act) - HON Rule - SOCMI Chemicals	O-XYLENE	95-47-6
CAA (Clean Air Act) - HON Rule - SOCMI Chemicals	P-XYLENE	106-42-3
CAA (Clean Air Act) - HON Rule - SOCMI Chemicals	TOLUENE	108-88-3
CAA (Clean Air Act) - VOCs in SOCMI	BENZENE	71-43-2
CAA (Clean Air Act) - VOCs in SOCMI	ETHYL BENZENE	100-41-4
CAA (Clean Air Act) - VOCs in SOCMI	O-XYLENE	95-47-6
CAA (Clean Air Act) - VOCs in SOCMI	P-XYLENE	106-42-3

CAA (Clean Air Act) - VOCs in SOCMI	TOLUENE	108-88-3
CAA - 1990 Hazardous Air Pollutants	BENZENE	71-43-2
CAA - 1990 Hazardous Air Pollutants	ETHYL BENZENE	100-41-4
CAA - 1990 Hazardous Air Pollutants	M-XYLENE	108-38-3
CAA - 1990 Hazardous Air Pollutants	O-XYLENE	95-47-6
CAA - 1990 Hazardous Air Pollutants	P-XYLENE	106-42-3
CAA - 1990 Hazardous Air Pollutants	TOLUENE	108-88-3
California - Prop. 65 - Developmental Toxicity	BENZENE	71-43-2
California - Prop. 65 - Developmental Toxicity	TOLUENE	108-88-3
California - Prop. 65 - Reproductive - Male	BENZENE	71-43-2
California - Proposition 65 - Carcinogens List	BENZENE	71-43-2
California - Proposition 65 - Carcinogens List	ETHYL BENZENE	100-41-4
Canada - CEPA - Sch. I - List of Toxic Substances	BENZENE	71-43-2
Canada - WHMIS - Ingredient Disclosure	BENZENE	71-43-2
Canada - WHMIS - Ingredient Disclosure	ETHYL BENZENE	100-41-4
Canada - WHMIS - Ingredient Disclosure	M-XYLENE	108-38-3
Canada - WHMIS - Ingredient Disclosure	O-XYLENE	95-47-6
Canada - WHMIS - Ingredient Disclosure	P-XYLENE	106-42-3
Canada - WHMIS - Ingredient Disclosure	TOLUENE	108-88-3
CERCLA/SARA - Haz Substances and their RQs	BENZENE	71-43-2
CERCLA/SARA - Haz Substances and their RQs	ETHYL BENZENE	100-41-4
CERCLA/SARA - Haz Substances and their RQs	M-XYLENE	108-38-3
CERCLA/SARA - Haz Substances and their RQs	O-XYLENE	95-47-6
CERCLA/SARA - Haz Substances and their RQs	P-XYLENE	106-42-3
CERCLA/SARA - Haz Substances and their RQs	TOLUENE	108-88-3
CERCLA/SARA - Section 313 - Emission Reporting	BENZENE	71-43-2
CERCLA/SARA - Section 313 - Emission Reporting	ETHYL BENZENE	100-41-4
CERCLA/SARA - Section 313 - Emission Reporting	M-XYLENE	108-38-3
CERCLA/SARA - Section 313 - Emission Reporting	O-XYLENE	95-47-6
CERCLA/SARA - Section 313 - Emission Reporting	P-XYLENE	106-42-3
CERCLA/SARA - Section 313 - Emission Reporting	TOLUENE	108-88-3
CWA (Clean Water Act) - Hazardous Substances	BENZENE	71-43-2
CWA (Clean Water Act) - Hazardous Substances	ETHYL BENZENE	100-41-4
CWA (Clean Water Act) - Hazardous Substances	M-XYLENE	108-38-3
CWA (Clean Water Act) - Hazardous Substances	O-XYLENE	95-47-6
CWA (Clean Water Act) - Hazardous Substances	P-XYLENE	106-42-3
CWA (Clean Water Act) - Hazardous Substances	TOLUENE	108-88-3
CWA (Clean Water Act) - Priority Pollutants	BENZENE	71-43-2
CWA (Clean Water Act) - Priority Pollutants	ETHYL BENZENE	100-41-4
CWA (Clean Water Act) - Priority Pollutants	TOLUENE	108-88-3
CWA (Clean Water Act) - Toxic Pollutants	BENZENE	71-43-2
CWA (Clean Water Act) - Toxic Pollutants	ETHYL BENZENE	100-41-4
CWA (Clean Water Act) - Toxic Pollutants	TOLUENE	108-88-3
DEA - List II Essential Chemicals	TOLUENE	108-88-3
IARC - Group 1 (carcinogenic to humans)	BENZENE	71-43-2
IARC - Group 2B (Possibly carcinogenic to humans)	ETHYL BENZENE	100-41-4
IARC - Group 3 (not classifiable)	M-XYLENE	108-38-3
IARC - Group 3 (not classifiable)	O-XYLENE	95-47-6
IARC - Group 3 (not classifiable)	P-XYLENE	106-42-3
IARC - Group 3 (not classifiable)	TOLUENE	108-88-3
Inventory - Australia (AICS)	BENZENE	71-43-2
Inventory - Australia (AICS)	ETHYL BENZENE	100-41-4
Inventory - Australia (AICS)	M-XYLENE	108-38-3
Inventory - Australia (AICS)	O-XYLENE	95-47-6
Inventory - Australia (AICS)	P-XYLENE	106-42-3
Inventory - Australia (AICS)	TOLUENE	108-88-3
Inventory - Canada - Domestic Substances List	BENZENE	71-43-2
Inventory - Canada - Domestic Substances List	ETHYL BENZENE	100-41-4
Inventory - Canada - Domestic Substances List	M-XYLENE	108-38-3
Inventory - Canada - Domestic Substances List	O-XYLENE	95-47-6
Inventory - Canada - Domestic Substances List	P-XYLENE	106-42-3

Inventory - Canada - Domestic Substances List	TOLUENE	108-88-3
Inventory - China	BENZENE	71-43-2
Inventory - China	ETHYL BENZENE	100-41-4
Inventory - China	M-XYLENE	108-38-3
Inventory - China	O-XYLENE	95-47-6
Inventory - China	P-XYLENE	106-42-3
Inventory - China	TOLUENE	108-88-3
Inventory - China	BENZENE	71-43-2
Inventory - European EINECS Inventory	ETHYL BENZENE	100-41-4
Inventory - European EINECS Inventory	M-XYLENE	108-38-3
Inventory - European EINECS Inventory	O-XYLENE	95-47-6
Inventory - European EINECS Inventory	P-XYLENE	106-42-3
Inventory - European EINECS Inventory	TOLUENE	108-88-3
Inventory - European EINECS Inventory	BENZENE	71-43-2
Inventory - Japan - (ENCS)	ETHYL BENZENE	100-41-4
Inventory - Japan - (ENCS)	M-XYLENE	108-38-3
Inventory - Japan - (ENCS)	O-XYLENE	95-47-6
Inventory - Japan - (ENCS)	P-XYLENE	106-42-3
Inventory - Japan - (ENCS)	TOLUENE	108-88-3
Inventory - Japan - (ENCS)	BENZENE	71-43-2
Inventory - Korea - Existing and Evaluated	ETHYL BENZENE	100-41-4
Inventory - Korea - Existing and Evaluated	M-XYLENE	108-38-3
Inventory - Korea - Existing and Evaluated	O-XYLENE	95-47-6
Inventory - Korea - Existing and Evaluated	P-XYLENE	106-42-3
Inventory - Korea - Existing and Evaluated	TOLUENE	108-88-3
Inventory - Korea - Existing and Evaluated	BENZENE	71-43-2
Inventory - New Zealand	ETHYL BENZENE	100-41-4
Inventory - New Zealand	M-XYLENE	108-38-3
Inventory - New Zealand	O-XYLENE	95-47-6
Inventory - New Zealand	P-XYLENE	106-42-3
Inventory - New Zealand	TOLUENE	108-88-3
Inventory - New Zealand	BENZENE	71-43-2
Inventory - Philippines Inventory (PICCS)	ETHYL BENZENE	100-41-4
Inventory - Philippines Inventory (PICCS)	M-XYLENE	108-38-3
Inventory - Philippines Inventory (PICCS)	O-XYLENE	95-47-6
Inventory - Philippines Inventory (PICCS)	P-XYLENE	106-42-3
Inventory - Philippines Inventory (PICCS)	TOLUENE	108-88-3
Inventory - Philippines Inventory (PICCS)	BENZENE	71-43-2
Inventory - TSCA - Sect. 8(b) Inventory	ETHYL BENZENE	100-41-4
Inventory - TSCA - Sect. 8(b) Inventory	M-XYLENE	108-38-3
Inventory - TSCA - Sect. 8(b) Inventory	O-XYLENE	95-47-6
Inventory - TSCA - Sect. 8(b) Inventory	P-XYLENE	106-42-3
Inventory - TSCA - Sect. 8(b) Inventory	TOLUENE	108-88-3
Inventory - TSCA - Sect. 8(b) Inventory	BENZENE	71-43-2
Massachusetts - Right To Know List	ETHYL BENZENE	100-41-4
Massachusetts - Right To Know List	M-XYLENE	108-38-3
Massachusetts - Right To Know List	O-XYLENE	95-47-6
Massachusetts - Right To Know List	P-XYLENE	106-42-3
Massachusetts - Right To Know List	TOLUENE	108-88-3
Massachusetts - Right To Know List	BENZENE	71-43-2
New Jersey - Department of Health RTK List	ETHYL BENZENE	100-41-4
New Jersey - Department of Health RTK List	M-XYLENE	108-38-3
New Jersey - Department of Health RTK List	O-XYLENE	95-47-6
New Jersey - Department of Health RTK List	P-XYLENE	106-42-3
New Jersey - Department of Health RTK List	TOLUENE	108-88-3
New Jersey - Department of Health RTK List	BENZENE	71-43-2
New Jersey - Env Hazardous Substances List	ETHYL BENZENE	100-41-4
New Jersey - Env Hazardous Substances List	M-XYLENE	108-38-3
New Jersey - Env Hazardous Substances List	O-XYLENE	95-47-6
New Jersey - Env Hazardous Substances List	P-XYLENE	106-42-3
New Jersey - Env Hazardous Substances List	TOLUENE	108-88-3
New Jersey - Env Hazardous Substances List		

New Jersey - Special Hazardous Substances	BENZENE	71-43-2
New Jersey - Special Hazardous Substances	ETHYL BENZENE	100-41-4
New Jersey - Special Hazardous Substances	M-XYLENE	108-38-3
New Jersey - Special Hazardous Substances	O-XYLENE	95-47-6
New Jersey - Special Hazardous Substances	P-XYLENE	106-42-3
New Jersey - Special Hazardous Substances	TOLUENE	108-88-3
NTP - Report on Carcinogens - Known Carcinogens	BENZENE	71-43-2
OSHA - Final PELs - Ceiling Limits	BENZENE	71-43-2
OSHA - Final PELs - Ceiling Limits	TOLUENE	108-88-3
OSHA - Final PELs - Short Term Exposure Limits	BENZENE	71-43-2
OSHA - Final PELs - Time Weighted Averages	BENZENE	71-43-2
OSHA - Final PELs - Time Weighted Averages	ETHYL BENZENE	100-41-4
OSHA - Final PELs - Time Weighted Averages	TOLUENE	108-88-3
OSHA - Hazard Communication Carcinogens	BENZENE	71-43-2
OSHA - Specifically Regulated Carcinogens	BENZENE	71-43-2
Pennsylvania - RTK (Right to Know) List	BENZENE	71-43-2
Pennsylvania - RTK (Right to Know) List	ETHYL BENZENE	100-41-4
Pennsylvania - RTK (Right to Know) List	M-XYLENE	108-38-3
Pennsylvania - RTK (Right to Know) List	O-XYLENE	95-47-6
Pennsylvania - RTK (Right to Know) List	P-XYLENE	106-42-3
Pennsylvania - RTK (Right to Know) List	TOLUENE	108-88-3
Pennsylvania - RTK - Environmental Hazard List	BENZENE	71-43-2
Pennsylvania - RTK - Environmental Hazard List	ETHYL BENZENE	100-41-4
Pennsylvania - RTK - Environmental Hazard List	M-XYLENE	108-38-3
Pennsylvania - RTK - Environmental Hazard List	O-XYLENE	95-47-6
Pennsylvania - RTK - Environmental Hazard List	P-XYLENE	106-42-3
Pennsylvania - RTK - Environmental Hazard List	TOLUENE	108-88-3
Pennsylvania - RTK - Special Hazardous Substances	BENZENE	71-43-2
TSCA - Sect. 12(b) - Export Notification	P-XYLENE	106-42-3
TSCA - Section 4 - Chemical Test Rules	P-XYLENE	106-42-3
U.S. - DOT - Hazardous Substances and RQs (App A)	BENZENE	71-43-2
U.S. - DOT - Hazardous Substances and RQs (App A)	ETHYL BENZENE	100-41-4
U.S. - DOT - Hazardous Substances and RQs (App A)	M-XYLENE	108-38-3
U.S. - DOT - Hazardous Substances and RQs (App A)	O-XYLENE	95-47-6
U.S. - DOT - Hazardous Substances and RQs (App A)	P-XYLENE	106-42-3
U.S. - DOT - Hazardous Substances and RQs (App A)	TOLUENE	108-88-3

Title III Classifications Sections 311,312:

- Acute: YES
- Chronic: YES
- Fire: YES
- Reactivity: NO
- Sudden Release of Pressure: NO

15. OTHER INFORMATION

COMPONENT TOXICITY: Ethylbenzene, a component of this product, has been designated by the International Agency for Research on Cancer as "possibly carcinogenic to humans", based on increased tumor incidence in laboratory animals. Overexposure may lead to nervous system effects, including drowsiness, dizziness, nausea, headaches, paralysis, loss of consciousness and even death. Repeated overexposure has caused a hearing loss in laboratory animals. NOTE TO PHYSICIAN: Catecholamines and similar adrenergic drugs are generally contraindicated because of potential for increased sensitivity of the heart from hydrocarbon overexposure and subsequent ventricular fibrillation. EKG monitoring may be indicated and bronchodilators should be selected with care. Following injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss. Follow all MSDS/label precautions even after container is emptied because it may retain product residue.