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3718-F Alkali Metal Treatment and Storage Facility Closure Plan

U. S. Department of Energy

Date Published
December 1991

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THE 3718-F ALKALI METAL TREATMENT AND STORAGE FACILITY CLOSURE PLAN

FOREWORD

The Hanford Site is operated by the U.S. Department of Energy-Richland Operations Office. The Hanford Site manages and produces mixed waste (containing both radioactive and dangerous components). The radioactive component of mixed waste is interpreted by the U.S. Department of Energy to be regulated under the *Atomic Energy Act of 1954*; the nonradioactive dangerous waste component of mixed waste is interpreted to be regulated under the *Resource Conservation and Recovery Act of 1976* (RCRA) and the Washington State Department of Ecology *Dangerous Waste Regulations*.

The Hanford Site is considered to be a single facility. The single dangerous waste permit identification number issued to the Hanford Site by the U.S. Environmental Protection Agency and the Washington State Department of Ecology is U.S. Environmental Protection Agency/State Identification Number WA7890008967. This identification number encompasses a number of waste management units within the Hanford Facility. All waste management activities carried out under the assigned identification number are considered to be "onsite" as defined in the Washington State Department of Ecology *Dangerous Waste Regulations*, Washington Administrative Code 173-303.

Since 1987, Westinghouse Hanford Company has been a major contractor to the U.S. Department of Energy-Richland Operations Office and has served as co-operator of the 3718-F Alkali Metal Treatment and Storage Facility, the waste management unit addressed in this closure plan.

For purposes of RCRA, Westinghouse Hanford Company is identified as a "co-operator" and signs in that capacity. Any identification of Westinghouse Hanford Company as an "operator" elsewhere in this closure plan is not meant to conflict with Westinghouse Hanford Company's designation as a co-operator but is rather based on Westinghouse Hanford Company's contractual status (i.e., as a management and operations contractor) for the U.S. Department of Energy.

The 3718-F Alkali Metal Treatment and Storage Facility Closure Plan (Revision 1) consists of a Part A Dangerous Waste Permit Application and a RCRA Closure Plan. An explanation of the Part A Revision (Revision 1) submitted with this document is provided at the beginning of the Part A section. The closure plan consists of 9 chapters and 5 appendices.

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LIST OF TERMS

CERCLA	*Comprehensive Environmental Response Compensation and Liability Act of 1980*
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Field Office
DW	dangerous waste
Ecology	Washington State Department of Ecology
EHW	extremely hazardous waste
EII	Environmental Investigations Instructions
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FY	fiscal year
HASP	Health and Safety Plan
HWOP	Hazardous Waste Operating Permit
JSA	Job Safety Analysis
MSDS	Material Safety Data Sheet
QA/QC	quality assurance/quality control
RCRA	*Resource Conservation and Recovery Act of 1976*
RFI/CMS	RCRA facility investigation/corrective measures study
ROD	record-of-decision
TAL	target analyte list
TCLP	toxicity characteristic leaching procedure
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, or disposal
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company

DEFINITIONS OF TERMS

Local Background. Refers to the data set of chemical concentrations from analyses of samples obtained in the local vicinity of a facility. Samples within the facility will be compared to the local background data set to determine the presence or absence of contamination from the facility. For the 3718-F Facility, the samples used to determine the local background concentrations will be obtained within the 300 Area.

Local Background Threshold. Refers to the chemical concentrations that define an upper limit of the local background population. It is not an average local background concentration. However, it is determined statistically (e.g., the tolerance interval approach to the analysis of variance).

Action Levels. Refers to the chemical concentration levels that will prompt an action. Action level values commonly will be local background threshold concentrations, health and environmental based concentrations,

toxicity characteristic leaching procedure (TCLP) regulatory levels, and limit of quantitation (LOQ).

Facility. For purposes of the *Resource Conservation and Recovery Act of 1976*, the Hanford Site is considered to be a single facility consisting of a number of waste management units. The term 'facility' also is commonly used in building nomenclature throughout the Hanford Site (e.g., 3718-F Alkali Metal Treatment Storage Facility).

PART A APPLICATION

The original Part A, Form 3, Revision 0, "Dangerous Waste Permit Application" was submitted to Ecology in November 1985. Revision 1 of the Part A, Form 3, was prepared to provide more extensive facility, process, and dangerous waste descriptions, and to remove dangerous waste code D001. Also, one drawing was revised and one drawing and one photograph were removed. Revision 2 of the Part A, Form 3, was prepared to include Westinghouse Hanford Company as co-operator of the 3718-F Facility. Revision 3 of the Part A, Form 3, was prepared to correct process design capacities, to provide more detailed process and dangerous waste descriptions, and to add dangerous waste codes D001, D002, WT01, and WT02. Also, the site drawing was revised and a new photograph was provided.

The Part A, Form 3, Revision 3, included in this closure plan, consists of seven pages, one figure, and one photograph.

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Please print or type in the unshaded areas only
(ELITE — in areas are spaced for elite type, i.e., 12 characters/inch)

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (mo., day, & yr.)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION (place an "X" below and provide the appropriate date)

☐ 1. EXISTING FACILITY (See instructions for definition of "existing" facility. Complete item below.)

MO 0 9 DAY 1 YR 6 8 — FOR EXISTING FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED (use the boxes to the left)

☐ 2. NEW FACILITY (Complete item below)

MO DAY YR — FOR NEW FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION (place an "X" below and complete Section I above)

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.
1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc.)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET (the volume that would cover one acre to a depth of one foot) OR HECTARE METER
LAND APPLICATION	D82	ACRES OR HECTARES
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE FEET	A
HECTARE METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	T 0 1	25	V		7				
2	T 0 4	100	V		8				
3	S 0 1	2,000	L		9				
4					10				

Continued from the front

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04") FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

T01, T04, S01

The 3718-F Treatment and Storage Facility (3718-F Facility) was used to treat and store alkali metal waste (sodium, lithium, and sodium potassium alloy) from the Fast Flux Test Facility (FFTF) and from various laboratories that used alkali metals for experiments. The alkali metal waste was treated in a burn shed equipped with two burn pans inside a containment catch pan, a fume scrubber, or two chemical reaction tanks. The chemical reaction tanks were used to treat scrap equipment and piping that contain alkali metal waste by dissolving the waste using either water, methanol, isopropyl alcohol, or 2-butoxy ethanol (T01). The treatment of the bulk alkali metal waste consisted of burning the metals in the burn shed to eliminate their ignitability and reactive characteristics. The gaseous emissions produced by the burn process were removed using a fume scrubber. Because of the corrosivity of the waste (e.g., sodium hydroxide) after the burn treament, the waste was neutralized with acid to a pH of between 2.0 to 12.5 (T04). The 3718-F Facility Storage Building was used to store U.S. Department of Transportation-specification 55-gallon (208-liter) drums of alkali metal waste before treatment (S01).

The 3718-F Facility alkali metal waste treatment process was halted in June 1987 and storage of the alkali metal waste was halted in May 1989.

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER — Enter the four digit number from Chapter 173 303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173 303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes

B. ESTIMATED ANNUAL QUANTITY — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column 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 column 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 dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored treated, and/or disposed of at the facility

For non—listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non—listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes If more are needed (1) Enter the first three as described above, (2) Enter "000" in the extreme right box of Item IV D(1); and (3) Enter in the space provided on page 4 the line number and the additional code(s)

2. PROCESS DESCRIPTION If a code is not listed for a process that will be used describe the process in the space provided on the form

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER -- Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows

1. Select one of the Dangerous Waste Numbers and enter it in column A On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat store and/or dispose of the waste
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste In column D(2) on that line enter "Included with above" and make no other entries on that line
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste

EXAMPLE FOR COMPLETING SECTION IV (shown on 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 operation 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 NO.	A. DANGEROUS WASTE NO. (enter one)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1 PROCESS CODES (enter)			2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 1	D 8 0		
X-2	D 0 0 2	400	P	T 0 1	D 8 0		
X-3	D 0 0 1	100	P	T 0 1	D 8 0		
X-4	D 0 0 2			T 0 1	D 8 0		included with above

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER (enter from page 1): WA7890008967

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. (enter codes)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D001	2,000	K	T01 T04 S01	Treatment-Tank-Chemical/ Treatment-Other-Thermal/
2	D002				Storage-Container
3	D003				
4	WT01				
5	WT02				Included With Above
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Continued from the front.

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

C. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The 3718-F Facility was used for the treatment and storage of alkali metal waste. The alkali metal waste was considered characteristic waste due to the ignitability (D001) and reactivity (D003) of the alkali metals and as a toxic state-only waste [WT01 (extremely hazardous waste) and WT02 (dangerous waste)]. The alkali metal waste when treated is considered corrosive (D002) because of the presence of sodium hydroxide. The estimated annual quantity of waste that was treated and stored at the 3718-F Facility was approximately 2000 kilograms (4409 pounds).

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. 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)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager United States Department of Energy DOE Richland Field Office	Edward J. Galda	12/20/91

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

CONTINUE ON PAGE 5

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

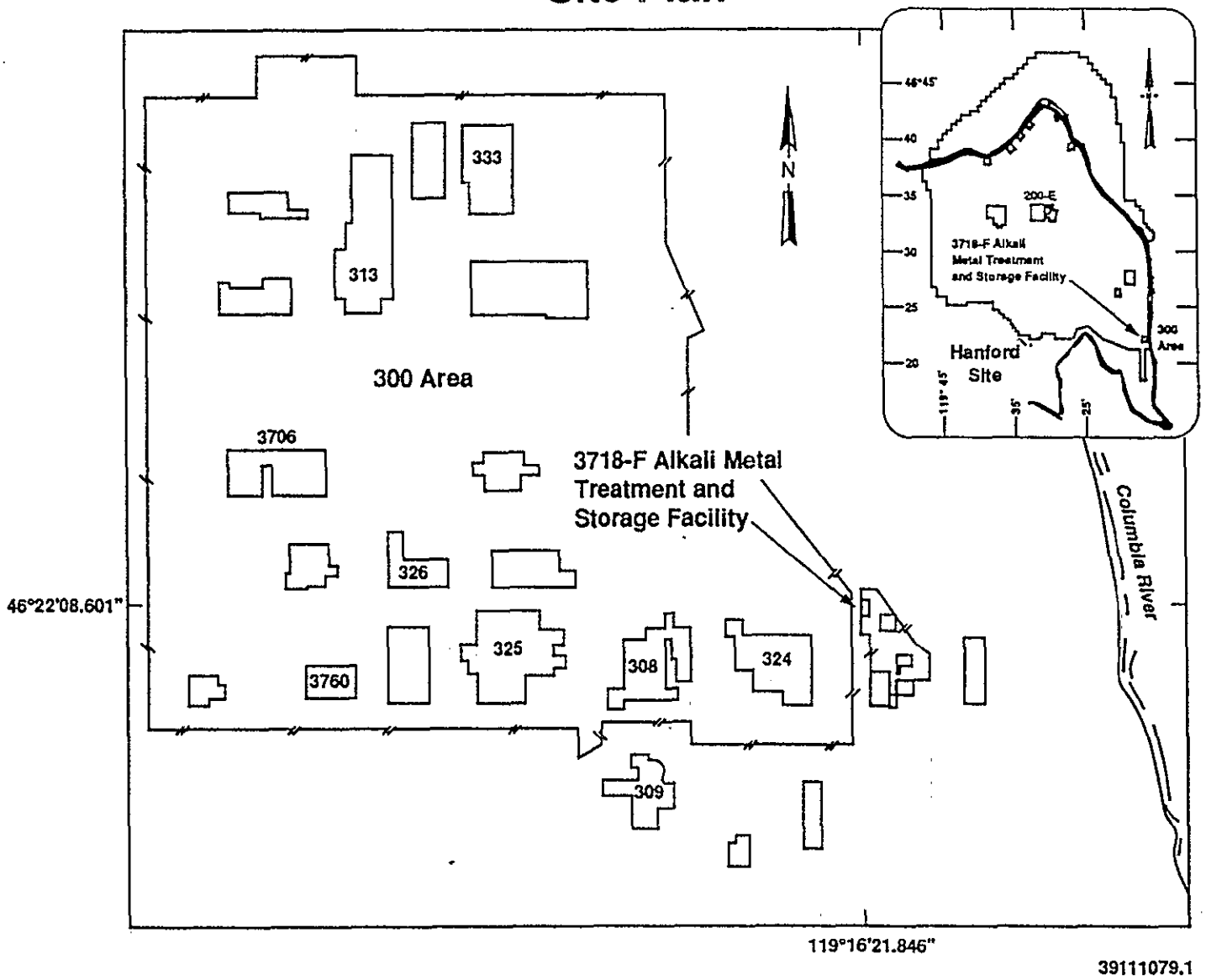
Edward D. Goldberg
Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
DOE Richland Field Office

Date 12/20/91

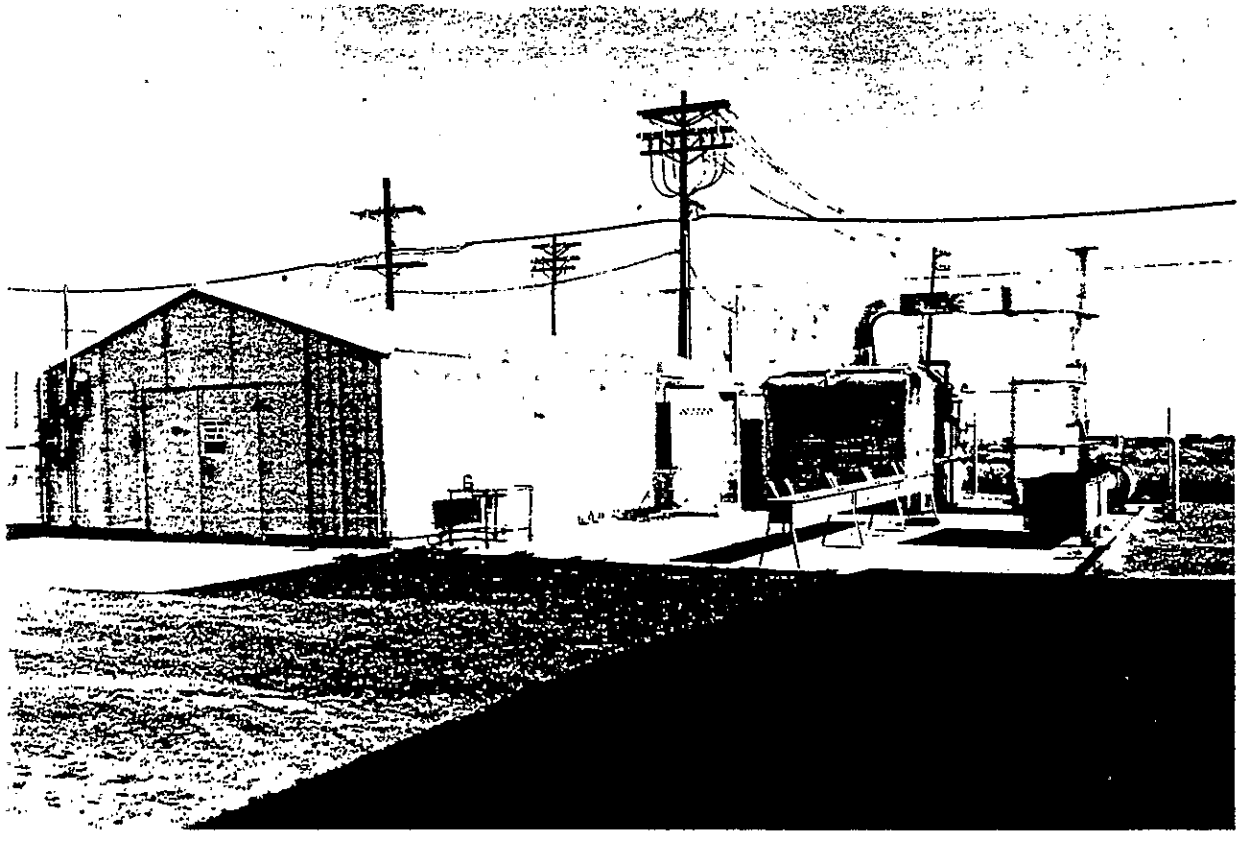
Thomas M. Anderson
Co-operator
Thomas M. Anderson, President
Westinghouse Hanford Company

Date 11/26/91

3817-F Alkali Metal Treatment and Storage Facility Site Plan



3718-F ALKALI METAL TREATMENT AND STORAGE AREA



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1.0 INTRODUCTION

1.1 SUMMARY

The Hanford Site, located northwest of the city of Richland, Washington, houses reactors, chemical-separation systems, and related facilities used for the production of special nuclear materials, as well as for activities associated with nuclear energy development. The 300 Area of the Hanford Site contains reactor fuel manufacturing facilities and several research and development laboratories. The 3718-F Alkali Metal Treatment and Storage Facility (3718-F Facility), located in the 300 Area, was used to store and treat alkali metal wastes. Therefore, it is subject to the regulatory requirements for the storage and treatment of dangerous wastes. Closure will be conducted pursuant to the requirements of the Washington Administrative Code (WAC) 173-303-610 (Ecology 1989) and 40 CFR 270.1. Closure also will satisfy the thermal treatment facility closure requirements of 40 CFR 265.381.

The 3718-F Facility is operated by the U.S. Department of Energy (DOE) Field Office, Richland and managed by the Westinghouse Hanford Company (Westinghouse Hanford). Although the U.S. Government holds legal title to this facility, the DOE, Richland Field Office (DOE-RL), for purposes of *Resource Conservation and Recovery Act of 1976* (RCRA), is considered the legal owner of the facility under existing U.S. Environmental Protection Agency (EPA) interpretive regulations (51 CFR 43, p. 7,722).

This closure plan presents a description of the 3718-F Facility, the history of wastes managed, and the approach that will be followed to close the facility. Only hazardous constituents derived from 3718-F Facility operations will be addressed. Therefore, remedial action with respect to contaminants not associated with the 3718-F Facility will be deferred to the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, (CERCLA) Remedial Investigation/Feasibility Study (RI/FS) process.

The 3718-F Facility is located within the 300-FF-3 (source) and 300-FF-5 (groundwater) operable units as designated in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1990), referred to as the Tri-Party Agreement. These operable units will be addressed through the CERCLA RI/FS process. Characterization work on the 300-FF-3 operable unit is not expected to begin until sometime after fiscal year (FY) 1991.

1.2 THE 3718-F ALKALI METAL TREATMENT AND STORAGE FACILITY CLOSURE PLAN CONTENTS

The 3718-F Facility Closure Plan consists of the following nine chapters:

- Introduction (Chapter 1.0)
- Facility Description (Chapter 2.0)
- Process Information (Chapter 3.0)

- Waste Characteristics (Chapter 4.0)
- Groundwater (Chapter 5.0)
- Closure Performance Standards (Chapter 6.0)
- Closure Activities (Chapter 7.0)
- Postclosure (Chapter 8.0)
- References (Chapter 9.0)

A brief description of each chapter is provided in the following subsections.

1.2.1 Facility Description (Chapter 2.0)

This chapter provides a general description of the 3718-F Facility. A brief description and history of the Hanford Site also are provided.

1.2.2 Process Information (Chapter 3.0)

This chapter covers the detailed operation of the 3718-F Facility. Additional information is given concerning the waste stored at the 3718-F Facility.

1.2.3 Waste Characteristics (Chapter 4.0)

This chapter discusses the estimate of maximum inventory of waste and the waste types stored at the 3718-F Facility.

1.2.4 Groundwater (Chapter 5.0)

This chapter explains that groundwater in the 300 Area will be included in the 300-FF-5 operable unit and investigated under the CERCLA RI/FS process. Therefore, groundwater monitoring is not included.

1.2.5 Closure Performance Standards (Chapter 6.0)

This chapter outlines the closure strategy and the general closure procedure for the 3718-F Facility.

1.2.6 Closure Activities (Chapter 7.0)

This chapter contains a sampling plan and describes how the 3718-F Facility will be cleaned and closed. A closure schedule is provided.

1.2.7 Postclosure (Chapter 8.0)

This chapter outlines provision for postclosure care, if required.

1.2.8 References (Chapter 9.0)

References used throughout this closure plan are listed in Chapter 9.0. All references listed here will be made available for review, upon request, to any regulatory agency or public commentator. References can be obtained by contacting the following:

Administrative Records Specialist
Public Access Room H4-22
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

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2.0 FACILITY DESCRIPTION

2.1 GENERAL HANFORD SITE DESCRIPTION

In early 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location for reactor, chemical separation, and related activities for the production and purification of plutonium. The Hanford Site (Figure 2-1) covers approximately 1,450 km^2 (560 mi^2) of semiarid land, located adjacent to the City of Richland, Washington. The Hanford Site is owned by the U.S. Government and operated by the DOE, which operates the Site with the management support of various prime contractors. Since 1987, the Sitewide management and operations contractor has been Westinghouse Hanford.

2.2 FACILITY DESCRIPTION

The 3718-F Facility is located in the southeast portion of the 300 Controlled-Access Area (Figure 2-2). Figure 2-3 details the layout of the 3718-F Facility. Before 1970, the 3718-F Facility was managed by Pacific Northwest Laboratories as a prime contractor to the DOE-RL.

The 3718-F Facility was designed and constructed in 1968, and redesigned and modified in 1973. Plans of the 3718-F Facility are shown in Figures 2-4 and 2-5.

The 3718-F Facility consists of a single-story storage building [6.1 m by 14.6 m (20 ft by 48 ft)], an adjoining loading pad [3.7 m by 6.1 m (12 ft by 20 ft)], and an adjoining concrete pad [7.6 m by 14.6 m (25 ft by 48 ft)]. A burn shed with accompanying fume scrubber, two reaction tanks for cleaning equipment, and a safety shower are located on the adjoining concrete pad. The adjoining concrete pad is 15.2 cm (6 in.) thick and is bermed along two sides (south and north) and sloped towards a third side (east), along the edge of which runs a 7.6 cm (3-in.) wide-by-7.6-cm- (3-in.-) deep grated trench. The design of the concrete pad is intended to prevent run-off onto the surrounding soils and channel drainage to a floor drain which, in turn, drains to the process sewer system (Figure 2-6).

The gabled ends, roof, and siding of the storage building are corrugated steel. The building has electric lights, electric space heaters, and two window air conditioning units. The building sits on a concrete pad. The northern half of the building is the storage area and the southern half is a work area.

The burn shed is 3.0 m by 3.7 m (10 ft by 12 ft), with an 2.4-m- (8-ft-) wide roll-up door. There are small stirring ports [7.6-cm- (3-in.-) diameter] and windows in the north and west sides. The fume scrubber is a 125-m^3/min (4,300-cfm) counter-flow water spray column.

In the burn process, the waste alkali metals were placed in burn pans with dimensions of 45.7 cm (18 in.) square, and 10.2 cm (4 in.) deep. In turn, these burn pans were placed in a catch pan with dimensions of 101.6 cm (40 in.) by 76.2 cm (30 in.) by 20.3 cm (8 in.).

The smaller of the two reaction tanks contained alcohol solutions, and the larger contained water. The alcohol reaction tank has a 511-L (135-gal) capacity [26.7 cm (10.5 in.) wide, 739.1 cm (291 in.) long, 25.4 cm (10 in.) deep] and the water reaction tank has a 1,628-L (430-gal) capacity [74.9 cm (29.5 in.) wide, 304.8 cm (120 in.) long, 71.1 cm (28 in.) deep]. The alcohol reaction tank has a hinged solid cover while the water reaction tank has a hinged screen cover. Both tanks are constructed of 0.3-cm (1/8-in.) 304-L stainless steel. A third reaction tank, identical to the water reaction tank, was reported in the Part B Permit Application of 1985, but is no longer present at the 3718-F Facility. No documentation of its whereabouts can be found. It is highly likely that it was disposed of in the Central Waste Landfill.

2.3 SECURITY

The following sections describe the 24-hour surveillance system and entry-control measures that provide security and restrict access to the 3718-F Facility.

2.3.1 24-Hour Surveillance System

The entire Hanford Site is a controlled-access facility and is expected to remain so in the foreseeable future. The Hanford Site maintains around-the-clock surveillance for protection of government property, classified information, and special nuclear materials. The Hanford Patrol maintains a continuous presence of armed guards to provide security.

2.3.2 Barrier and Means to Control Entry

Within the Hanford Site are operational areas to which access is restricted. One such operational area, the 300 Area, is the location of the 3718-F Facility. Access to the 300 Area is gained through one of three guard-controlled access points. All personnel entering or leaving the 300 Area must display a DOE-issued security identification badge indicating authorization to enter the area and submit to a search of personal items carried into and out of the area. The 3718-F Facility entrances are padlocked when not in use.

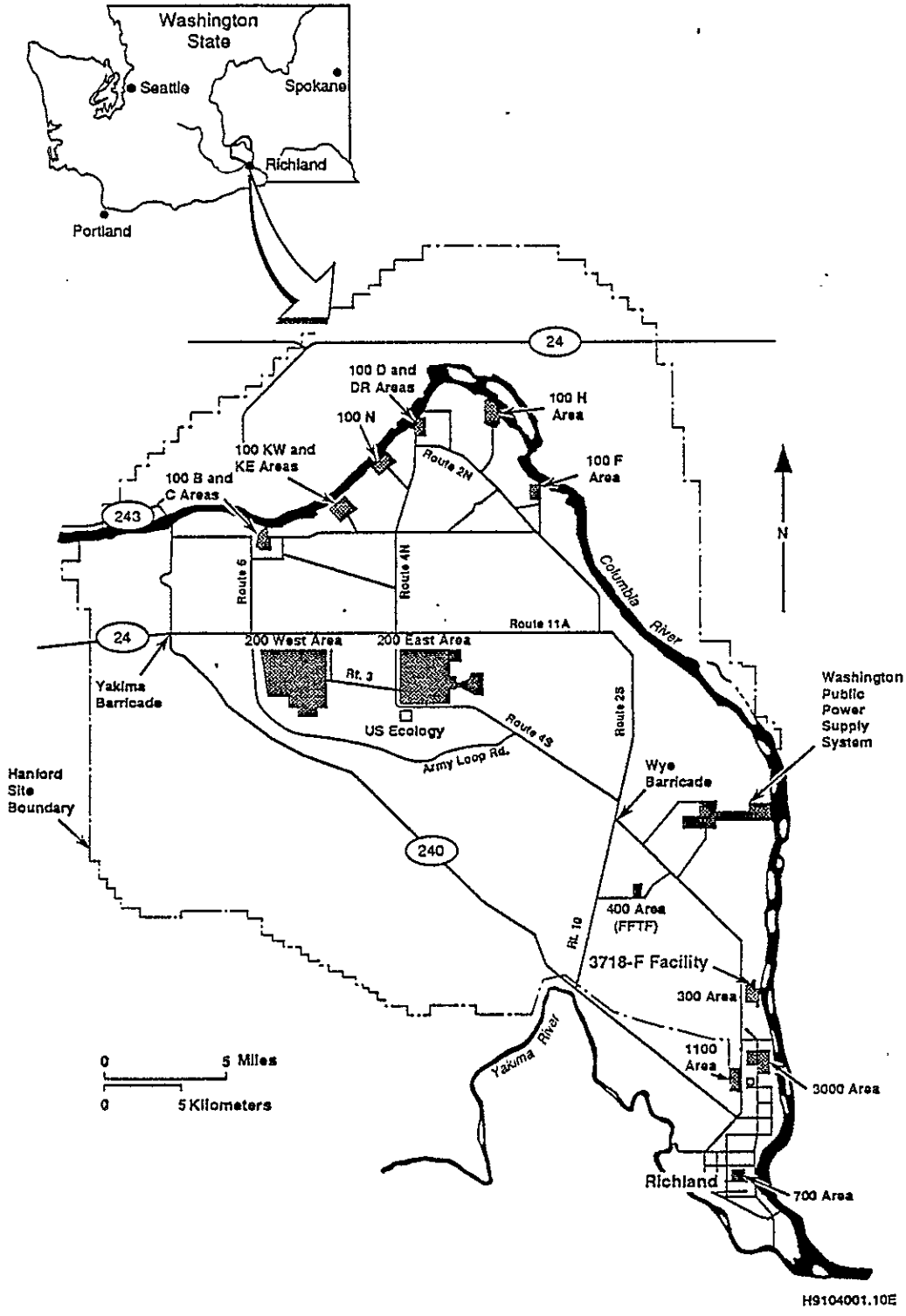

Figure 2-1. Hanford Site and Regional Map.

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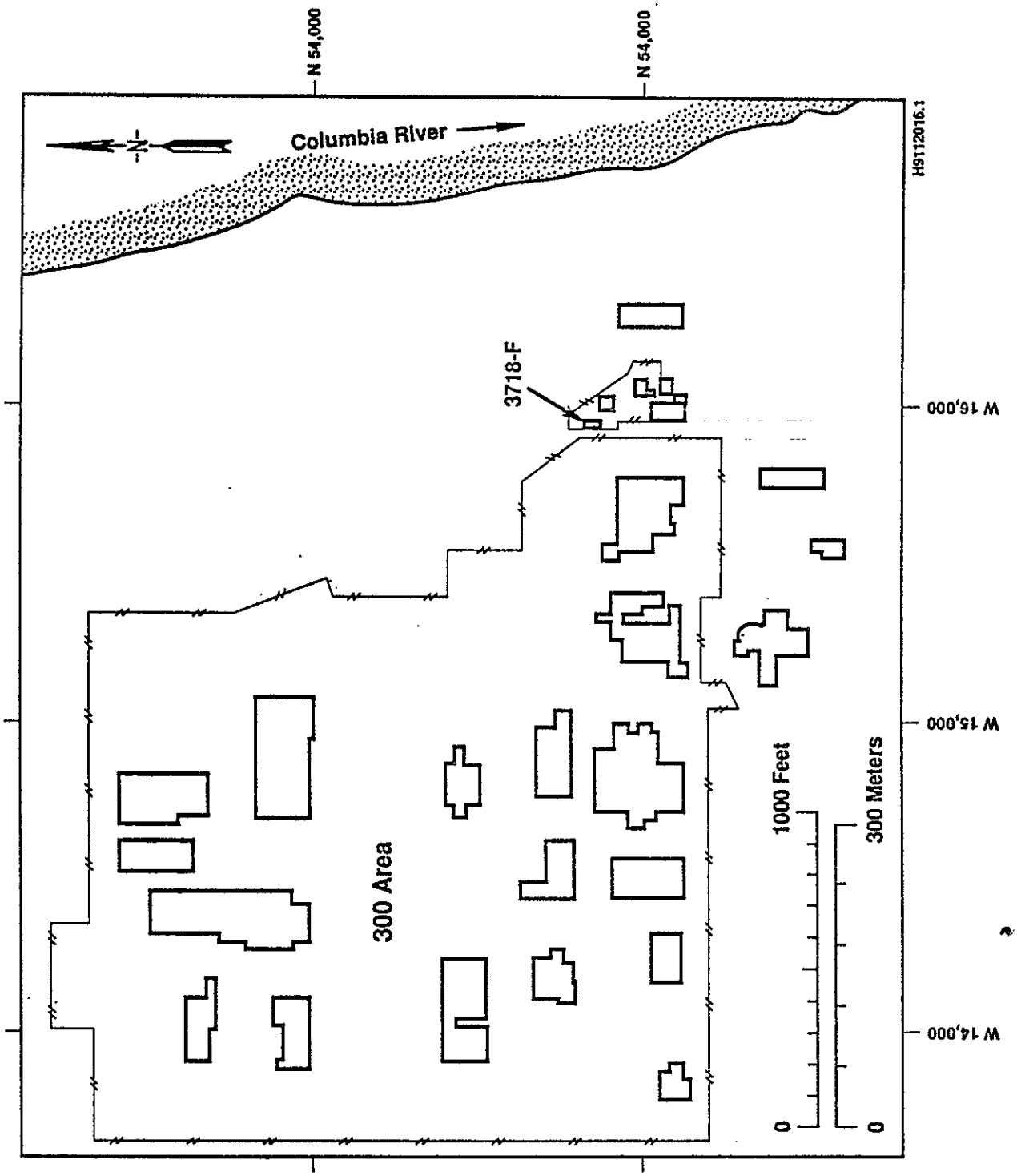

Figure 2-2. The 300 Area at the Hanford Site.

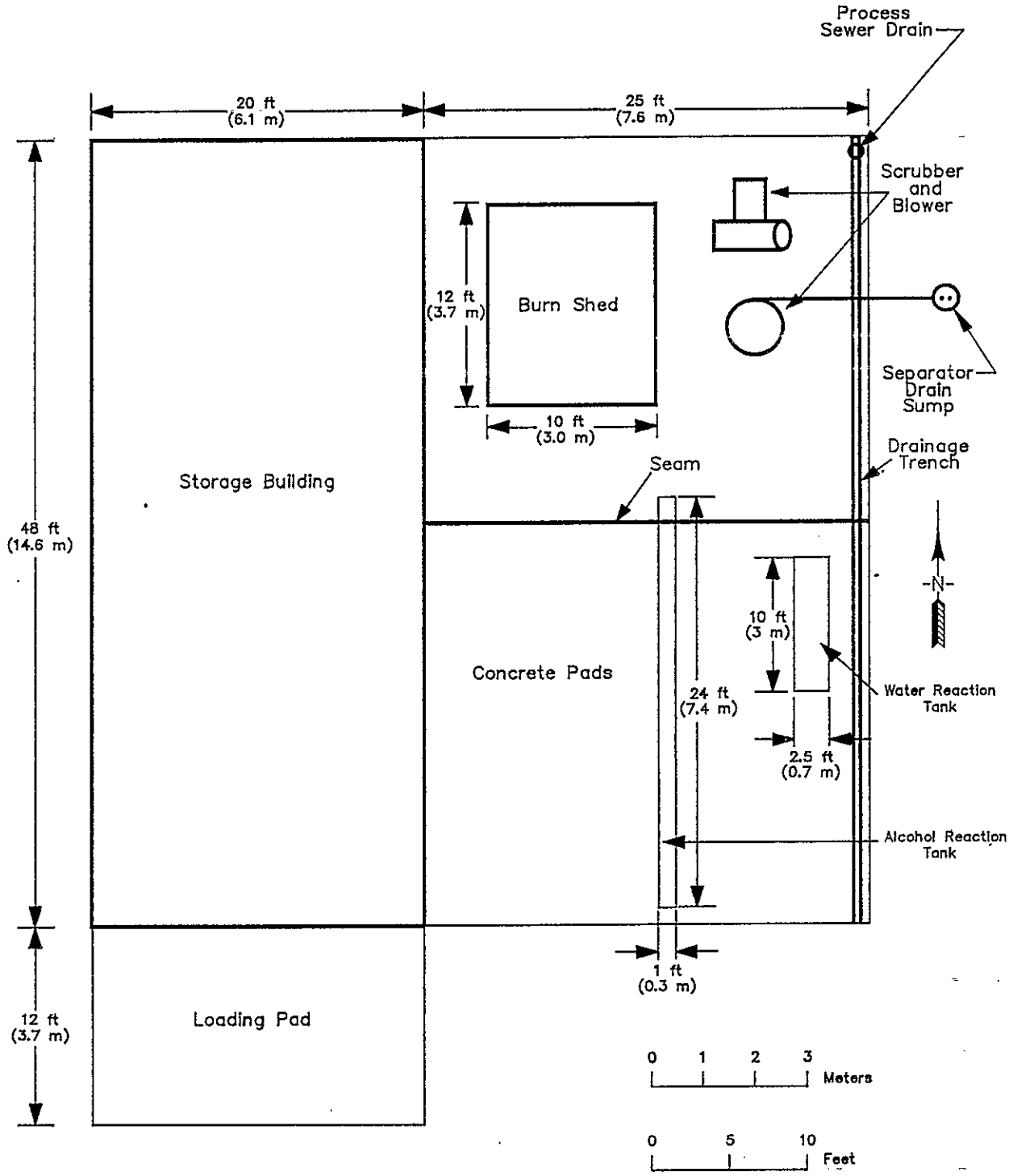

Figure 2-3. The 3718-F Facility Layout.

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Figure 2-4. The 3718-F Facility Site Plan, 1968.

Figure 2-5. The 3718-F Facility Site Plan, 1973.

Figure 2-6. The 300 Area Operating Plan Process Sewer Lines. (sheet 1 of 2)

Figure 2-6. The 300 Area Operating Plan Process Sewer Lines. (sheet 2 of 2)

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3.0 PROCESS INFORMATION

The 3718-F Facility began treatment of alkali metal waste in 1968 and ended in June 1987. Storage activities also began in 1968 and continued until May 1989. Photographs of the 3718-F Facility are shown in Appendix A.

Waste sodium, lithium, and sodium potassium alloy were burned in the burn shed. These metals were placed in small burn pans that sat inside a larger catch pan. Rags were stuffed in and around the metals, then doused with a gasoline/diesel mixture. The rags were ignited with crude torches via the stirring ports. The molten metals were stirred to prevent oxide layers from forming that would extinguish the fire. A water hose was then used to 'fog' the inside of the shed with a water vapor, which completed the oxidation of the metals. The shed was fogged from one stirring port while the metals were stirred from the other port. The burn pans were overflowed into the catch pan to dilute the solution. The solution was allowed to cool, then drained to the process sewer system or, in later years, neutralized to a pH of between 2 and 12.5 before draining to the process sewer system. When available, spent acids from laboratories were used for the neutralization process, otherwise new acid was used. The burn shed and pad were washed down at the completion of the burn process, the wash water going to the process sewer system. Gaseous emissions were removed via the fume scrubber. The scrubber effluent was flushed to the process sewer system. The 3718-F Facility waste streams going into the process sewer system were potentially corrosive and toxic. Burns were only conducted when the prevailing winds were favorable to control the spread of emissions that may have resulted in the event of a scrubber system failure (e.g., power failure).

Equipment contaminated with sodium was cleaned using baths of either water or methanol, isopropyl alcohol, or 2-butoxy ethanol (trade name: Dowanol-EB*). The water bath was used only for small unconfined quantities of sodium because of its violent reaction with water. The alcohols were used for confined quantities of sodium because of their slower, controllable reaction with the metal. Initially, the spent alcohol and water baths both were drained into the process sewer system. Later, after the alcohols were regulated in 1985, the spent alcohol baths were drummed and sent to the 616 Nonradioactive Dangerous Waste Storage Facility for disposal. The spent water baths continued to drain to the process sewer system.

The 3718-F building also stored high purity sodium and sodium potassium alloy for use in laboratories. The metals were dispensed in small quantities from 208-L (55-gal) drums to laboratory sized containers [5.7 L (1½ gal) maximum].

Occasionally, laboratory size quantities of reactive and ignitable compounds also were burned at the 3718-F Facility. These compounds were limited to other alkali metals, calcium, red phosphorous, and magnesium fines.

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*Dowanol-EB is a trademark of Dow Chemical Co.

Wastes generated at the 3718-F Facility include alkali metal oxides, hydroxides, carbonates, and alcohol solutions. However, the metal oxides and hydroxides have since transformed into carbonates from exposure to air.

4.0 WASTE CHARACTERISTICS

4.1 ESTIMATE OF MAXIMUM INVENTORY OF WASTE

The maximum amount of alkali metal waste treated annually was approximately 1,052 kg (2,320 lb) of sodium, 70 kg (155.3 lb) of lithium, and 4.5 kg (10 lb) of sodium potassium alloy (based on operating logs summarized in Table 4-1). The cumulative inventory of alkali metal wastes stored at the 3718-F Facility from 1982 to 1988 was 672 kg (1,482.41 lb), estimated from operating logs summarized in Table 4-2. The maximum inventory of alkali metal wastes stored over any single year was 379.4 kg (836.5 lb). In 1986, 58.5 kg (130 lb) of radioactive sodium was stored at the 3718-F Facility for a period of 16 months. Tables 4-1 and 4-2 summarize the operating records of wastes disposed of and stored at the 3718-F Facility from 1982-1988 (WHCa, b, and c 1991).

4.2 WASTE FORMS TREATED AT THE 3718-F FACILITY

Sodium, lithium, and sodium potassium alloy all have been designated as dangerous wastes because of their ignitable and reactive characteristics. All waste alkali metals handled in the 3718-F Facility were treated by either burning (which produced oxides, hydroxides, and carbonates) or dissolution in water or alcohols (which produced sodium hydroxide solution). Sodium oxides and hydroxides are strong alkalis, but readily absorb carbon dioxide from the atmosphere and transform to sodium carbonate. Sodium carbonate is typically called soda ash and is found naturally. Similarly, lithium and sodium potassium alloy also result in lithium, sodium, and potassium carbonates.

Sodium, lithium, and potassium carbonates are characteristic category D (least toxic) dangerous wastes. The LD_{50} (lethal dose) by oral exposure to rats is 4,090 mg/kg [NIOSH Registry] for sodium carbonate, 525 mg/kg for lithium carbonate, and 1,870 mg/kg for potassium carbonate. Compounds with LD_{50}s of 500 to 5,000 mg/kg are category D dangerous wastes as established by WAC 173-303-101. The material safety data sheets (MSDSs) for sodium carbonate, lithium carbonate, and potassium carbonate have been included in Appendix C.

Before 1985, the spent alcohol solutions from the dissolution process were drained to the process sewer system. Consequently, the concrete pad and surrounding soil have the potential of being contaminated by these alcohol solutions. The sodium was reacted with the alcohols 2-butoxy ethanol, methanol, and isopropyl alcohol to form the intermediate products of sodium 2-butoxy ethylate, sodium methoxide, and sodium isopropylate, respectively. However, these sodium salts produced aqueous sodium hydroxide and the original alcohol when reacted with water during the wash down process.

Methanol, 2-butoxy ethanol, and isopropyl alcohol are all category D dangerous wastes. The LD_{50}s by oral exposure to rats are 5,628 mg/kg, 470 mg/kg, and 5,045 mg/kg, respectively. Methanol and isopropyl alcohol also

are likely to display the characteristic of ignitability in accordance with WAC 173-303-090. The MSDSs for these chemicals are included in Appendix C.

Methanol and isopropyl alcohol are stable. The 2-butoxy ethanol also is stable under normal conditions. However, under vigorous conditions of high acidity and high temperature, 2-butoxy ethanol may degrade to ethyl alcohol, n-butyl alcohol, ethylene glycol, and butane. These vigorous conditions do not exist at the 3718-F Facility and, therefore, these degradation products are not expected to be found.

The calcium, phosphorous, and magnesium treated at the 3718-F Facility would result in carbonates through the same mechanisms as sodium. However, because the quantity of these metals treated is so minute [85 grams (3 oz) of red phosphorous disposed of between 1982 and 1987, no disposals of calcium or magnesium recorded] compared with the quantities of sodium, lithium, and sodium potassium alloy treated, they will not be addressed in the remediation effort. The total volume of benzene and other dissolved hydrocarbons that had been present in the scrubber effluent from the combustion of the gasoline/diesel mixture and were released into the process sewer system also is considered to be negligible. Hydrocarbon combustion residues that may be present on the burn shed walls, piping, and scrubber system are considered to be of negligible volume.

Table 4-1. Wastes Disposed at the 3718-F Facility.

Year	Disposed (kg)				
	Total	Sodium	Lithium	Sodium potassium alloy	Other
1982	1,061.4	1,052.3	9.1	0	0
1983	719.2	700.8	13.6	4.5	0.23
1984	36.3	36.3	0	0	0
1985	2.3	2.3	0	0	0
1986	186.1	153.3	30.9	1.8	0.09
1987	112.2	41.7	70.4	0	0
Total	2,117.5	1,986.7	124	6.3	0.32

Table 4-2. Wastes Stored at the 3718-F Facility.

Year	Stored (kg)					
	Total	Sodium	Lithium	Sodium potassium alloy	Other	Other description
1982	0	0	0	0	0	
1983	122.5	113.4	0	9.1	0	
1984	3.6	3.6	0	0	0	
1985	59.7	44.0	1.4	14.3	0	
1986	75.4	0.7	13.8	1.0	0.9	Calcium
					59.0	Radioactive sodium
1987	379.4	95.7	215.5	68.3	0	
1988	31.8	31.8	0	0	0	
Total	672.4	289.2	230.7	92.7	59.9	

5.0 GROUNDWATER

In accordance with the Tri-Party Agreement (Ecology et al. 1990), groundwater in the 300 Area will be included in the 300-FF-5 operable unit and investigated under the CERCLA RI/FS process. Therefore, groundwater is not included as part of the 3718-F Facility Closure Plan. The RI/FS draft work plan for the 300-FF-5 operable unit was prepared in 1989 (DOE-RL 1989).

The 300-FF-5 operable unit consists of the aquifer beneath the 300-FF-1, 300-FF-2, and 300-FF-3 operable units. The operable unit is defined by "the observed and assumed extent of uranium contamination in the groundwater" (DOE-RL 1989). Ultimately, the operable unit will include all contamination exceeding applicable or relevant and appropriate requirements emanating from the three operable units, and detected in groundwater and sediments below the water table. The Columbia River forms the eastern boundary of the unit.

The Tri-Party Agreement Action Plan (Ecology et al. 1990) indicates that the record of decision for the 300-FF-5 operable unit will be issued in 1994, the remedial design will be performed in 1995, and the remedial action will begin in 1996.

The remedial action objectives for this operable unit will be based on the following general objectives.

- Protecting human health by ensuring that applicable or relevant and appropriate requirements will not be exceeded and health risks, as determined through analysis of all exposure pathways, will be kept at or below acceptable limits.

- Ensuring acceptably low risks to the environment, such as Columbia River biota.

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6.0 CLOSURE STRATEGY AND PERFORMANCE STANDARDS

6.1 CLOSURE STRATEGY

To facilitate closure, the 3718-F Facility will be viewed as consisting of four components; the concrete pads and floors, the burn shed and scrubber system, the reaction tanks, and the associated near-surface soils. These four components will be evaluated separately for closure of the 3718-F Facility. As there are no records of spills or contamination in the storage building, the walls of the storage building are not included in the sampling plan. The boundaries of the closure area will be 5 cm (2 in.) into the concrete pads and floors, the internal surfaces of the walls and ceiling of the burn shed, the internal surfaces of the scrubber system, the internal surfaces of the reaction tanks, 1 m (39.4 in.) down into the soil 2 m (78.7 in.) beyond the perimeter of the concrete pads on the north and east sides, and 1 m (39.4 in.) into the soil where the seam between the concrete pads is. The drain lines to the process sewer system will be addressed under CERCLA.

Three important terms in the following discussion on the 3718-F Facility closure strategy are 'local background', 'local background threshold', and 'action levels.' The definitions for these terms are as follows.

Local background--Refers to the data set of chemical concentrations from analyses of samples obtained in the local vicinity of a facility. Samples within the facility will be compared to the local background data set to determine the presence or absence of contamination from the facility. For the 3718-F Facility, the samples used to determine the local background concentrations will be obtained within the 300 Area.

Local background threshold--Refers to the chemical concentrations that define an upper limit of the local background population. It is not an average local background concentration. However, it is determined statistically (e.g., the tolerance interval approach to the analysis of variance).

Action levels--Refers to the chemical concentration levels that will prompt an action. Action level values commonly will be local background threshold concentrations, health and environment based concentrations, toxicity characteristic leaching procedure (TCLP) regulatory levels, and limit of quantitation (LOQ).

If action levels are exceeded, actions could include such things as additional cleanup, additional evaluation, burn shed and pad removal, and/or deferral of soil remediation to the CERCLA RI/FS process.

Closure of the concrete floors and pads, the burn shed and scrubber system, the reaction tanks, and the associated near-surface soils will be accomplished by verifying that 3718-F Facility derived dangerous waste constituents are below action levels. If 3718-F derived constituents in or on the concrete floors and pads, the burn shed and scrubber system, and the reaction tanks are above the action levels, and if further cleanup is not

effective, these components will be removed and disposed of in a RCRA approved hazardous waste landfill. If 3718-F Facility derived constituents are above action levels in the associated near-surface soils, said soils will be remediated as part of the 300-FF-3 operable unit under the CERCLA RI/FS process. With the exception of imminent hazard, all soil remediation will be deferred to the CERCLA RI/FS process to be cleaned up as part of the 300-FF-3 operable unit.

Because the process sewer system will be addressed under the 300-FF-3 operable unit RI/FS process, it is not included in this closure plan. The process sewer system is considered to begin immediately at the drain inlets (immediately beneath the concrete for the drain at the northeast corner of the concrete pads and at soil surface level for the scrubber effluent drain). A soil sample will be obtained in close proximity to the drain at the northeast corner of the concrete pads to aid in 300-FF-3 operable unit characterization.

6.2 GENERAL CLOSURE PROCEDURES

The general closure procedures are shown in Figure 6-1 and listed as follows.

- Clean the burn shed, scrubber system, reaction tanks, and the concrete floors and pads using one or more of the options described in Section 7.3.

- Collect samples from the burn shed interior, the internal surface areas of the scrubber system, the internal surface areas of the reaction tanks, and the concrete floors and pads. Sample locations and collection methods are delineated in Section 7.4.

- Collect soil samples from adjacent near-surface soils and soils underlying the concrete pads. Collect area background soil samples. Sample locations and collection methods are delineated in Section 7.4.

- Conduct analytical testing of samples in accordance with SW-846 (EPA 1986) and evaluate data results.

- Compare data to the action levels for the closure options.

- If contamination levels are below action levels, the 3718-F Facility will be closed, equipment will be salvaged, and the storage building and concrete floors and pads will be left in place.

- If 3718-F derived constituents in or on the concrete floors and pads, the burn shed and scrubber system, and the reaction tanks are above the action levels, and further cleanup is not effective, these components will be removed and disposed of in a RCRA approved hazardous waste landfill. If 3718-F Facility derived constituents are above action levels in the associated near-surface soils, said soils will be remediated as part of the 300-FF-3 operable unit under the

CERCLA RI/FS process. If 3718-F Facility derived constituents are present in the soils above health and environment based standards, interim action will be taken (e.g., monitoring, soil fixing).

All equipment used in performing closure activities will be decontaminated or disposed of at a RCRA-permitted facility.

Closure activities will be monitored by an independent registered professional engineer who will certify that, in his or her judgment, closure was accomplished in accordance with the specifications of the approved closure plan as described herein. The professional engineer's report will be submitted to the EPA and Ecology along with certification of closure. The report and certification will be sent by registered mail.

The closure activities will be completed in accordance with the schedule contained in this plan (Chapter 7.0) after approval of this plan by Ecology and EPA. Two official copies of this closure plan will be located at the following office:

U.S. Department of Energy, Richland Field Office
Federal Building
825 Jadwin Avenue
P.O. Box 550
Richland, Washington 99352.

The DOE-RL will be responsible for amending this plan, as amendments become necessary, according to the amendment procedure identified in WAC 173-303-610. The plan will be kept at the DOE-RL until closure is complete and certified. Other official copies will be kept by Ecology, EPA, the Administrative Record Center, and by the 3718-F Facility managers office.

6.3 MINIMIZED NEED FOR FURTHER MAINTENANCE

Closure of the 3718-F Facility by removing or cleaning equipment, bases, structures, and other materials contaminated with dangerous wastes or waste residues from the facility will eliminate the need for further maintenance. However, interim actions may be required if soils are left in place for remediation under the CERCLA RI/FS process. These interim actions are described in Section 8.2, Postclosure Care.

6.4 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

As discussed previously, the 3718-F Facility will be closed by cleaning to action levels or by removal and disposal of all contaminated materials in a RCRA-permitted landfill, thereby eliminating all dangerous waste and waste residues to ensure protection of human health and the environment.

6.5 RETURN OF LAND TO THE APPEARANCE AND USE OF SURROUNDING LAND AREAS

Presently, there is no use designated for the 3718-F Facility after closure. However, the current strategy is to leave the storage building and concrete floors and pads in place if concentrations of 3718-F Facility derived constituents are below action levels.

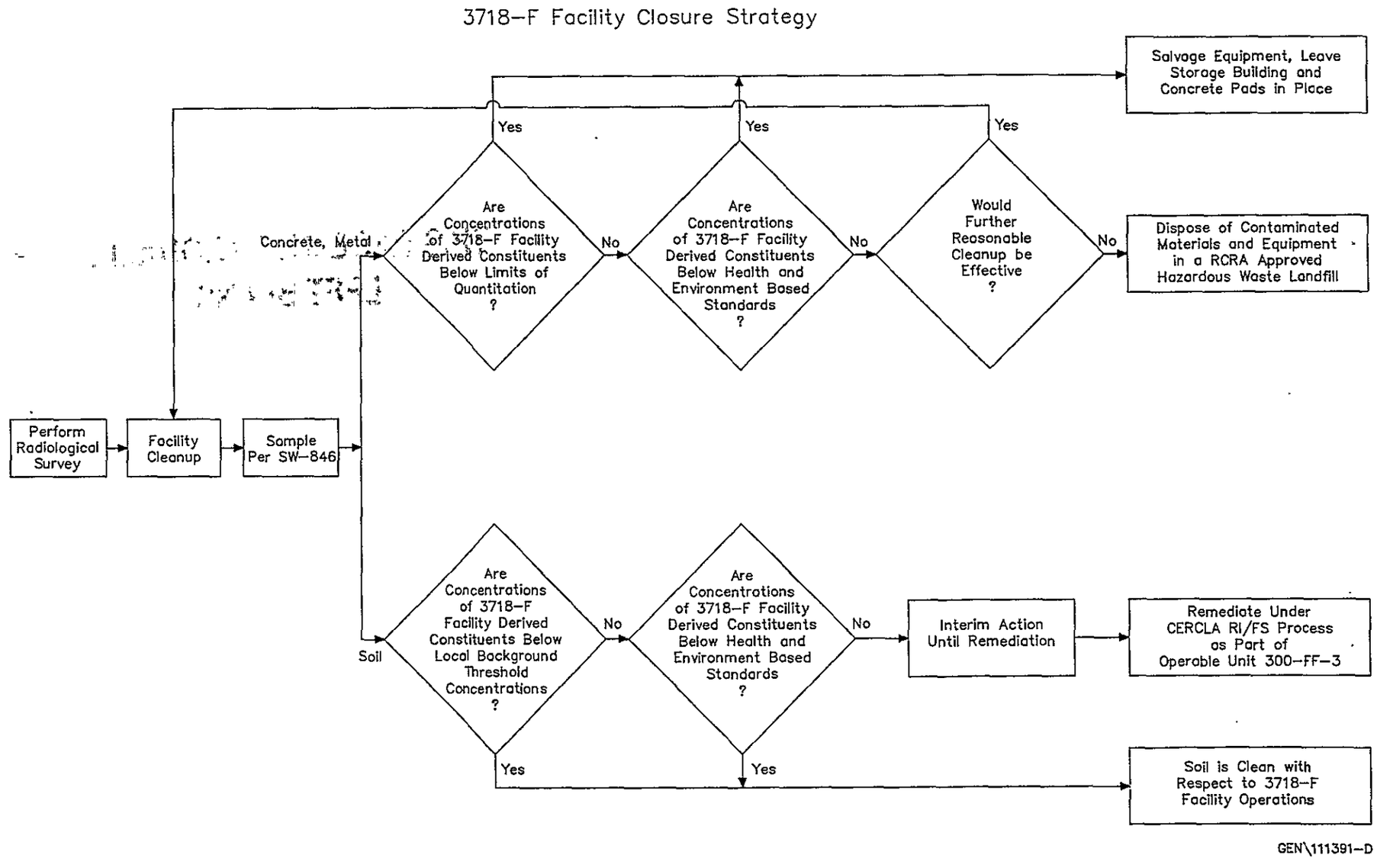

Figure 6-1. The 3718-F Facility Closure Strategy Flowchart.

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7.0 CLOSURE ACTIVITIES

7.1 INTRODUCTION

Chapter 7.0 describes the activities necessary to close the 3718-F Facility. Included is a sampling and analysis plan, and a schedule for completing the closure activities once the closure plan is approved. The overall strategy on which the sampling and analysis plan is based, is described in Chapter 6.0.

7.2 REMOVAL OF DANGEROUS WASTE INVENTORY

There are no longer any dangerous wastes stored at the 3718-F Facility.

7.3 FACILITY CLEANUP

The concrete pads and floors, the burn shed, the scrubber system, and the reaction tanks will be cleaned up before sampling using some combination of the following techniques:

- Damp wipe downs
- Vacuum-assisted mechanical removal
- Sandblasting
- High-pressure steam and suction.

It is anticipated that a majority of the cleanup work can be accomplished with damp wipe downs and vacuuming. Cleanup wastes will be analyzed for the parameters in Table 7-1 then designated according to procedures to determine the appropriate method of disposal.

Although no radioactive materials were treated at the 3718-F Facility, there was an instance when 14 small containers of radioactive materials were temporarily stored (16 months) in the storage building. Consequently, a radiological survey will be performed before decontamination. Should radiological contamination be detected, planned sampling activities will be reviewed and revised as necessary.

7.4 FACILITY SAMPLING

7.4.1 Introduction

The following waste sampling and analysis plan has been prepared to evaluate contamination above action levels, if any, within the burn shed and scrubber system, in the reaction tanks, in the concrete pads and floors, and

in near-surface soils associated with the 3718-F Facility. This plan is based primarily on the history of and the processes associated with the 3718-F Facility (Chapter 3.0).

The 3718-F Facility is RCRA-regulated, but is located within a CERCLA operable unit (300-FF-3). Because it is located within the 300-FF-3 operable unit, any 3718-F Facility derived soil contamination will be remediated as part of the 300-FF-3 operable unit under the CERCLA RI/FS process. Soil characterization under RCRA will extend only to the closure boundary.

7.4.2 Waste Sampling and Analysis Plan

7.4.2.1 Objectives. The objectives of the waste sampling and analysis plan are as follows.

- Obtain local background threshold concentrations for soil.
- Obtain samples from the concrete pads and floors, burn shed, scrubber system, reaction tanks and the underlying and adjacent near surface soils.
- Analyze samples to identify and quantify the specific dangerous waste constituents (if any), as defined by WAC 173-303 (Ecology 1989a), that are present as a result of operations at the 3718-F Facility using the methods outlined in SW-846 (EPA 1986). If any other methods are used they will be referenced and submitted to Ecology
- Evaluate sample analysis data to determine if allowable concentrations or 'action levels' are exceeded.

7.4.2.2 Analytical Parameters. Analytical parameters and methods are selected based on knowledge of the operations and contents of the 3718-F Facility.

In addition, 10 percent of the soil samples will be analyzed for 40 CFR Part 264, Appendix IX constituents to aid in 300-FF-3 operable unit characterization.

7.4.2.3 Sampling Activities. Once the concrete pads and floors, burn shed, scrubber system, and reaction tanks have been cleaned, sampling activities will be conducted at the 3718-F Facility as follows:

1. Collect local soil background samples
2. Collect chip samples from the concrete pads and floors
3. Collect wipe samples from burn shed walls and ceiling, scrubber system, and reaction tanks
4. Collect near-surface soils samples up to a depth of 1 m (39.4 in.)

5. Core the concrete pads and collect soil samples down to a depth of 1 m (39.4 in.) where seams, cracks, or other potential pathways to soil exist in the concrete pads and floors.

7.4.2.4 Sampling Locations. Locations to be sampled at the 3718-F Facility have been divided into four sections: the burn shed, the concrete pads and floors, the reaction tanks, and the associated soil. Each of the four sections has been gridded into 1-m^2 (10.8-ft^2) areas. A minimum of 5 percent of the gridded areas in each section will be selected for random sampling. The use of a random sampling strategy will ensure that data obtained will be representative of the population from which the samples were taken. Tables of the randomly selected sampling locations are included in Appendix B.

Areas of potential contamination have been selected for authoritative sampling. These areas include the scrubber system, drainage trench, soil underlying the concrete pads, and soil immediately adjacent to the concrete pads.

The number and location of each type of sample is presented in Table 7-2.

7.4.2.4.1 Background Samples. The local background soil samples will be taken throughout the 300-FF-3 operable unit at 10 locations to determine the local background threshold concentrations. When the exact locations of these samples have been determined, they will be included in this closure plan. At each local background soil sample location, a sample will be obtained at the surface, and at 1 m (39.4 in.) below the surface. Each sample will be analyzed separately.

Local background soil samples will not be taken in places of obvious contamination from past operations conducted in the 300 Area; however, any general contamination (if present) from past operations, other than those of the 3718-F Facility, will be included.

The local background soil sample analyses results will be used to establish a tolerance interval, and to determine if the chemical concentrations from each sample are from a 'hot spot.' The tolerance interval approach defines a predicted concentration range from local background data within which a large proportion of the monitoring observations should fall with high probability. Any 'hot spots' will fall outside of this range and not be included in the determination of the local background threshold.

7.4.2.4.2 Concrete Floors and Pads. Random chip samples will be taken at gridded locations on the concrete floors and pads (Figure 7-1). Fourteen of the 266 1-m^2 (10.8-ft^2) grids will be sampled. In addition to the random chip samples, one authoritative chip sample will be obtained from the drainage trench (Figure 7-1).

7.4.2.4.3 Burn Shed and Scrubber System. Random wipe samples will be taken at gridded locations on the internal surface areas of the burn shed (Figure 7-2). Three of the 54 burn shed grids will be sampled. The scrubber system will be authoritatively sampled because of its odd shape (Figure 7-3). The interior surface area of the scrubber system is approximately 35 m^2

(378 ft^2). Four locations on this equipment will be authoritatively sampled: (1) the scrubber duct work directly above the burn shed outlet; (2) the inlet to the Kinpactor* venturi; (3) the spray scrubber; and (4) the stack.

7.4.2.4.4 Reaction Tanks. Random wipe samples will be taken at gridded locations on the internal surface areas of the alcohol and water reaction tanks (Figures 7-4 and 7-5). One of the 8 alcohol reaction tank grids will be sampled, and 1 of the 14 water reaction tank grids will be sampled.

7.4.2.4.5 Soils. Random soil samples will be taken from gridded locations in the soils adjacent to the 3718-F Facility (Figure 7-6). Four of the 62 grids will be sampled. In addition to the random samples, six authoritative soil samples will be obtained (Figure 7-6).

The six authoritative soil samples will be obtained as follows: (1) one soil sample at the intersection of the concrete pads seam and the drainage trench; (2) one soil sample immediately adjacent to the concrete pads as close as possible to the piping connection between the sewer line and the drainage trench; (3) one soil sample immediately adjacent to the concrete pads just south of concrete pads seam; and (4) three additional authoritative soil samples in areas where seams, cracks, or other potential pathways to the soil exist on the concrete pads. The exact location of these three additional authoritative samples will be determined at the time of sampling, when the potential pathways can be adequately studied.

At each soil sample location a sample will be obtained at the surface, at a depth of 1/2 m (19.7 in.) and at a depth of 1 m (39.4 in.). Each sample will be analyzed separately.

7.4.2.5 Sampling Procedures, Equipment, Containers, and Preservation.

7.4.2.5.1 Sampling Procedures. Sampling procedures to be used for establishing a baseline concentration and for determining whether wastes have contaminated the building, floor and outside storage pad, and associated soils are described in this subsection. Sampling procedures will be conducted in accordance with environmental investigation instructions (EII) *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7 (WHC 1988) and pertinent EPA guidelines where they exist.

7.4.2.5.1.1 Concrete Samples. Chip samples will be collected by cutting a set of grooves in the surface of the concrete. One groove will be angled toward the other to yield a narrow triangular sample segment between the bottoms of the grooves. Cross grooves, perpendicular to the ends of the sample grooves, will permit the sample to be removed from the surface to yield a prism shaped sample piece with an intact surface layer.

Commercial equipment for cutting grooves is available. The equipment operates dry using pneumatically driven impact bits. The bits are cleaned readily to eliminate cross-contamination between samples. Appropriate

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*Kinpactor is a trademark of the American Air Filter Company.

measures will be taken during operation to control cross-contamination from airborne dust. Measures may include temporary site enclosures and air filtration.

7.4.2.5.1.2 Sheet Metal and Metal Surfaces. Sheet metal and metal surfaces that are part of the burn shed and scrubber will be sampled using wipe samples. Wipe samples will be collected according to specialized sampling techniques (EPA 1987) using Whatman* No. 541 filter paper. The papers will be laboratory-prepared with a toxicity characteristic leaching procedure (TCLP) solvent and will be analyzed for the inorganics listed in Table 7-1.

The TCLP solvent is used as the wipe solvent because it is a reference solvent intended for measuring the concentration of constituents introduced or mobilized into the environment (i.e., onto the wipe). It also is preferable to a more aggressive solvent, such as nitric acid, which may dissolve the metal substrate.

One filter paper will be used to wipe down the wall surface from a 1-m^2 (10.8-ft^2) grid section. The center 100-cm^2 (15.5-in^2) section of the 1-m^2 (10.8-ft^2) area will be sampled. The 100-cm^2 (15.5-in^2) section will be covered with a disposable template and carefully wiped using vertical strokes, starting at the top left corner and progressing to the top right corner (Figure 7-7). The filter paper will be held with clean gloves to prevent contamination. A new pair of gloves will be used for each wipe sample. Care will be taken to wipe the surface only once throughout the sampling effort. After the area is wiped, the filter paper will be folded with the exposed side in, and folded again to form a 90-degree angle in the center of the paper. The filter then will be placed in a glass container and sealed.

7.4.2.5.1.3 Reaction Tank Metal. The reaction tanks will be sampled using wipe samples. Wipe samples will be collected according to specialized sampling techniques (EPA 1987) using Whatman No. 541 filter paper. The filter papers will be laboratory-prepared with a TCLP solvent.

Two filter papers will be used to wipe down the tank surface from each 1-m^2 (10.8-ft^2) grid section. Two 100-cm^2 (15.5-in^2) sections of the 1-m^2 (10.8-ft^2) area will be sampled (Figure 7-8). The upper 100-cm^2 (15.5-in^2) section will be sampled for organics using the TCLP solvent prepared filter paper, and the lower 100-cm^2 (15.5-in^2) section will be sampled for inorganics also using the TCLP solvent prepared filter paper. Each 100-cm^2 (15.5-in^2) section will be covered with a disposable template and carefully wiped using vertical strokes, starting at the top left corner and progressing to the top right corner (Figure 7-7). The filter paper will be held with clean gloves to prevent contamination. A new pair of gloves will be used for each wipe sample. Care will be taken to wipe the surface only once throughout the sampling effort. After each area is wiped, the filter paper will be folded

*Whatman is a trademark of Whatman, Inc.

with the exposed side in, and folded again to form a 90-degree angle in the center of the paper. Each filter will then be placed in a separate glass container and sealed.

7.4.2.5.1.4 Soils. A precleaned shovel or trowel will be used to obtain each soil sample adjacent to the concrete pads. If difficulty is encountered using a shovel or trowel, a precleaned 8.9-cm (3.5-in.) outside-diameter (OD) hand-operated soil auger may be used.

Coring of concrete will be conducted as a means of accessing the underlying soil. A coring device, which employs a 15.2-cm- (6 in.-) OD diamond bit and distilled water as a cutting lubricant, will cut a core from each selected location. No organic-based lubricant will be used.

An industrial size shop vacuum will be used to remove excess water from around the core to minimize surface contamination flowing into the underlying soil. Once the core is removed the underlying soil will be obtained using a small trowel, shovel, or hand auger as necessary. Appropriate measures will be taken to control dust during this operation, including the use of temporary site enclosures and air filtration.

Excess soil that is removed from each hole while sampling will be containerized in a preconditioned 17-H open-headed 208-L (55-gal) container until results of the soil analyses are received. The container will be stored at the 3718-F Facility until designated in accordance with WHC-CM-5-16, *Hazardous Waste Management*, Section 4.0, "Waste Designation (WHC 1989d)".

7.4.2.5.2 Sampling Equipment. The media to be sampled consists of the following:

- Concrete
- Sheet metal and metal surfaces
- Soils.

The following are examples of the types of sampling equipment that may be used during the various phases of the investigation.

Concrete	Soils	Sheet metal and metal surfaces
• Saw for obtaining chip samples	• Auger	• Filter paper
• Concrete coring device	• Spoon	
	• Shovel	
	• Trowel	

Additional equipment and supplies will be procured as required to perform the necessary sampling. Equipment may include, but may not be limited to, the following items:

- Bore or wire brushes
- Stainless-steel mixing bowls
- Sized, heavy-duty plastic bags
- Stainless-steel spatulas, scoops, and spoons
- Adhesive tape
- 100-ft/30-m steel tape, 12-ft/3-m steel tape
- Compass
- Indelible marking pens or pencils
- Hammer/sledgehammer
- Ice chests and ice
- Security tape, flagging
- Gloves of material suitable for anticipated hazards and other personal protective equipment, as needed
- Field radio
- Rags
- Appropriate drawings and maps
- Tags
- Plastic sheeting
- Water containers
- Extra glass and plastic bottles (in case of breakage or contamination)
- Industrial-size shop vacuum
- Teflon* sheets
- Concrete.

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*Teflon is a trademark of E. I. duPont de Nemours and Company, Incorporated.

7.4.2.5.3 Sample Containers and Preservation. Sample containers will be chosen based on their compatibility with the samples, resistance to leaking or breakage, ability to seal tightly, and capacity to hold the required volume for an optimum sample. Containers for collecting and sorting samples will be made of high-density plastic or glass appropriate for the constituents to be analyzed. The containers will have tight, screw-type lids. The glass sample containers will have Teflon cap liners.

All samples will be packaged according to EII 5.11, "Sample Packaging and Shipping" (WHC 1988), placed in an ice chest, and cooled to 4 °C ±2 °C (39.2 °F ±3.6 °F) immediately after collection. Samples will be transported to the analytical laboratory within 48 hours of collection.

7.4.2.5.4 Sampling and Decontamination Wastes. Excess sample material will be containerized in a preconditioned 17-H open-headed 55-gal (208-L) container. Rinse waters from facility cleanup also will be containerized. Disposal of unknown or suspect waste materials will be in accordance with EII 4.2, "Interim Control of Unknown, Suspected Hazardous and Mixed Waste" (WHC 1988).

Waste materials are designated as unknown waste when (1) criteria for suspected hazardous waste is not met, and (2) field readings are suspect.

Waste material will be designated as suspected hazardous waste based upon process knowledge of material that is known to have been discharged to the area under investigation, provided; (1) direct instrumentation reading of organic vapor is in excess of 10 ppm above background levels, or (2) the pH is less than 3 or greater than 12.

In accordance with WAC 173-303-200(2) and EII 4.2, these 55-gal (208-L) containers will be stored in a designated area at the dangerous waste site until each container is full. When the container is full, the contents will be tested for dangerous waste. If the contents are found to be dangerous, arrangements will be made for proper disposal of the materials. The disposal will take place within a 90-day period after a designation is made.

The 3718-F Facility will be responsible for the waste.

7.4.3 Modifications to the Waste Sampling and Analysis Plan

The optimal aspects of sample design are sometimes not achievable because of unanticipated or changing conditions. Factors adversely influencing sampling efforts can include equipment malfunction or breakdown, improper equipment, and overly optimistic evaluation of other physical conditions at sites with no previous history of hazardous waste characterization. When changes to the planned activity are necessary, the changes will be recorded in the field logbook along with circumstances requiring the action. The field logbook will be maintained in accordance with EII 1.5, "Field Log Books"

(WHC 1988). When deviations from an EII are required, procedures outlined in EII 1.4, "Deviation From Environmental Investigation Instructions" (WHC 1988) will be followed.

7.4.4 Sampling Quality Control

7.4.4.1 Field Quality Control. Field Quality Control Samples will include the following.

- Field duplicate samples. Duplicate samples are two separate samples collected from the same sampling point and placed into separate containers. The duplicates will be used as an indication of the repeatability of the analytical data.

- Equipment blanks. An equipment blank is composed of distilled water, which is transported to the site, opened in the field, and poured over or through the sample collection device, collected in a sample container, and returned to the laboratory for analysis. Equipment blanks serve as a check on sampling device cleanliness.

- Trip blanks. Trip blanks will consist of pure deionized, distilled water in a clean sample container and will accompany each batch of containers shipped to the field. Trip blanks will be returned unopened to the laboratory for analysis. Trip blanks will be used to identify any possible contamination originating from container preparation methods, shipment, handling, storage, or site conditions.

- Field blanks. Field blanks for soil and concrete samples consist of pure deionized, distilled water that is transferred to a sample container at the site and preserved with the reagent specified for the analyses of interest. Wipe sample field blanks will consist of filter paper pads that have been laboratory-prepared with the appropriate solution and placed in a sampling container. Field blanks are used to check for possible contamination originating with the reagent or the sampling environment.

The field quality control samples will be established randomly through the sampling activities. Field, trip, and equipment blanks will each total a minimum of 5 percent of the total number of concrete, wipe and soil samples, whereas duplicates will total a minimum of 10 percent of the concrete, wipe and soil samples. If samples of each type are not completed in one day, QC samples will be collected each day. Additional field quality control samples will be established as warranted based on sampling events and circumstances.

7.4.4.2 Field Logbook. The personnel conducting sampling will maintain an official logbook during the effort, as outlined in EII 1.5, "Field Logbooks" (WHC 1988). All information pertinent to the sampling will be recorded in the logbook.

7.4.4.3 Sample Containers. Sample containers are purchased precleaned from the factory and maintained under strict chain of custody to preserve the integrity of the samples from collection through disposal.

7.4.4.4 Sample Labels. Labels will be securely attached to each sample to prevent misidentification. They may be adhesive labels or tags and will be affixed to the proper sample containers before or at the time of collection. All information will be completed at the time of collection. Indelible pencil or ink must be used. Each label will contain at least the following information:

- Site contractor
- Collector's name
- Date and time collected
- Sample number.

7.4.4.5 Sample Seals. Sample seals will be used to prevent and/or detect tampering with samples between the time of collection and the beginning of analysis. Seals will be applied to the sample containers before they leave custody of the sampling team. The seals will be attached so the seal must be broken to open the container.

7.4.4.6 Chain-of-Custody Records. To ensure the integrity of the samples from collection through analysis to final disposition, the procedures outlined in EII 5.1, "Chain-of-Custody" (WHC 1988) will be followed.

7.4.4.7 Sample Analysis Request. The sample-analysis request form is designed to accompany the samples to the laboratory and to designate the analyses to be performed on each sample. The form will be used and filled out in accordance with EII 5.1, "Chain-of-Custody," and 5.2, "Soil and Sediment Sampling" (WHC 1988).

7.4.4.8 Sample Disposition. At the certified completion of all analyses, the samples will be returned to the Westinghouse Hanford Office of Sample Management. In no case shall the samples be retained longer than 3 years unless specifically designated by the cognizant engineer.

7.4.4.9 Equipment Decontamination. Extreme care is necessary in field sampling to ensure that there is no cross-contamination of samples by sampling equipment. To prevent this source of contamination, freshly cleaned or disposable sampling tools will be used. When equipment must be reused in the field, it will be cleaned as thoroughly as practical in accordance with EII 5.4, "Field Decontamination of Drilling, Well Development and Sampling Equipment" (WHC 1991). Whenever possible, equipment will be cleaned in the laboratory according to procedures specified in EII 5.5, "1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment" (WHC 1991).

7.4.5 Analytical Procedures

Analyses of all constituents will be performed by the laboratory in accordance with EPA requirements in SW-846 (EPA 1986). The EPA-specified detection limits are goals; the actual detection limits will be presented in the analytical certification reports.

7.4.6 Laboratory Quality Control

The contractor laboratory will ensure the integrity and validity of test results through implementation of an internal quality control (QC) program. The program will meet the QC criteria of SW-846 (EPA 1986).

The QC procedures for hazardous chemical analyses will include [as appropriate to each analysis and as specified in Section 1.2 of SW-846 (EPA 1986)] evaluation of blanks, random matrix spikes (for 10 percent of the samples), internal standards, surrogates, and standard calibration curves. Spikes will be added in amounts comparable to the amount of analyte present in the sample. The QC procedures specific to individual methods will be detailed in the laboratory's documented analytical procedures and will be included with each batch of samples analyzed. See Appendix E for the QAPP.

7.4.7 Site Safety

7.4.7.1 Health and Safety. A Hazardous Waste Operating Permit (HWOP) or a Job Safety Analysis (JSA) is required for all hazardous waste sampling sites. The HWOP or JSA is intended to specify information pertinent to field assignments and to be a guide in unusual situations or emergencies. A site-specific version of the general RCRA/CERCLA investigation health and safety manual will be developed by Westinghouse Hanford to be used for sampling at the 3718-F Facility. This plan will be completed and added to the closure plan just before initiation of sampling activities. The site-specific HWOP or JSA will be prepared in accordance with EII 2.1, "Preparation of Hazardous Waste Operations Permits" (WHC 1990).

7.4.7.2 Personnel Training. All personnel at Westinghouse Hanford involved with the closure activities at the 3718-F Facility will receive a minimum level of hazardous waste training. Personnel are generally placed into the following categories.

- Managers and supervisors are responsible for supervising, coordinating, and directing the closure activities and personnel.

- Nuclear Process Operators and Decommissioning and Decontamination workers are responsible for sampling, packaging, and handling of dangerous waste, nonradioactive, and radioactive material.

- Health Physics Technicians are responsible for surveying for radiological contamination.

- Site safety officers are responsible for surveying for hazardous waste contamination.

- Crafts personnel are responsible for specialized work. The various crafts include carpenters, electricians, ironworkers/riggers, heavy equipment operators, crane operators, millwrights, pipefitters, and painters.

The personnel mentioned previously shall receive a minimum of 40 hours of hazardous waste workers training offsite, and a minimum of 3 days actual field experience under the direct supervision of a trained, experienced supervisor in accordance with 29 CFR 1910.120(e). In addition, field supervisors are required to have at least eight additional hours of specialized training. Other personnel entering the 3718-F Facility during closure must have a minimum of 24 hours of hazardous waste workers training offsite, and a minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor. Additional 3718-F Facility specific training also may be required for personnel involved with the closure activities.

Table 7-3 contains a matrix that delineates the training courses that constitute the 40 hours of hazardous waste workers training. Appendix D contains a brief description of these training courses, including descriptions of the target audience, instructional technique, evaluation method, length of course, and frequency of retraining.

7.4.8 Evaluation of Data

After receiving the analytical results, the data will be judged for reliability; reviewed and summarized to eliminate constituents whose results are all below detection limits (making the data more manageable); and statistically evaluated according to procedures outlined in EII 1.11, "Technical Data Management" (WHC 1988). Data from the 3718-F Facility sampling will be evaluated and summarized as follows:

- Evaluate the quality control of the sample handling and sample analyses to assess the reliability of the data (EII 1.11).

- Prepare summary statistics for constituents and examine the analytical data according to guidance provided in *Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, Interim Final Guidance* (EPA 1989c).

- Test the significance of the location effects on analytical results using the analysis of variance procedure.

- Have qualified personnel evaluate and interpret data.

- Compare the sample results to the action levels.

7.4.8.1 Assessment of Data Reliability. Data reliability will be assessed by evaluating the sample handling and analysis quality control. Sample handling

quality control will be evaluated by reviewing field documentation and results of quality assurance samples to establish that sampling error was minimized. The review will be conducted to verify that decontaminated equipment was used, that cross-contamination was minimized, that samples were preserved properly, and that the chain of custody of the samples was not broken.

Analytical data received from any sampling performed at the 3718-F Facility will be scrutinized against the quality control report provided by the contractor laboratory to assess the reliability of the results. Both organic and inorganic chemical analytical results will be checked, as summarized below.

- Inorganic chemical analysis laboratory assessment
  - -Holding times are acceptable
  - -Contractor's detection limits are below those required by EPA
  - -Laboratory blanks and replicates are within established QC limits
  - -Sample spike recoveries are within QC limits

- Organic chemical analysis laboratory assessment
  - -Holding times are acceptable
  - -Instrument detection limits, blank recoveries, surrogate recoveries, and spike recoveries are within EPA-established QC limits.

7.4.8.2 Statistical Treatment of Data. All data collected will be analyzed and tabulated using the methods described in SW-846 (EPA 1986). Other guidance documents and statistical references may be used where applicable [e.g., Barth and Mason 1984 and *Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, Interim Final Guidance* (EPA 1989c)]. Data for individual constituents will be summarized and will include the following information:

- Number of less than (LT) detection-limit values
- Total number of values
- Mean values
- Standard deviation
- Coefficient of variation
- Method detection limit values
- Quantitation limit values
- Representative method precision
- Minimum value
- Maximum value.

The data will be interpreted by qualified scientists and statisticians. The technical basis for establishing the local background threshold concentrations, the methods by which significant deviation from local background will be determined, and the appropriate sample sizes (i.e., numbers) are being developed for the Hanford Site by Westinghouse Hanford and the DOE-RL. Once developed they will be related to Ecology.

7.4.9 Reporting

After completion of the sampling effort, field logbooks will be reviewed by the Westinghouse Hanford Technical Lead and verification documents will be provided for actual sample locations, number of samples, and specific methods used for collection, if different from those provided in the waste sampling and analysis plan. Data received from the laboratory will be reviewed, analyzed, and summarized statistically. The results will provide further closure evaluations.

7.5 DISPOSAL OF BURN SHED, EQUIPMENT, CONCRETE PADS, AND SOIL

A 'decommissioning work plan' is a generic term for the implementation procedure used to provide specific field direction to workers actually performing the decontamination and demolition. The actual decommissioning work plan will be of sufficient detail to enable field implementation of the items addressed in these sections and will reference procedures to be used. The decommissioning work plan will be included as an appendix in the closure plan. This will take place just before the work begins.

The analytical results of the concrete chip samples and wipe samples will be evaluated to determine the appropriate closure option for the concrete pads and floors, the burn shed and scrubber, and the reaction tanks, as follows.

- If the material is designated as a dangerous waste, it will be removed, transported and disposed of offsite at a permitted treatment, storage and/or disposal facility.

- If the material is not designated as a dangerous waste, it will be left in place, salvaged or disposed of in a commercial landfill.

If soil sample analyses show soil contamination from 3718-F Facility constituents, the soil will be remediated as part of the 300-FF-3 operable unit under the CERCLA RI/FS process. However, if soil contamination is above health based standards interim action will be taken.

7.6 OTHER ACTIVITIES REQUIRED FOR CLOSURE

An interim cover may be placed over the building location if the building and outside storage pads are removed and if Table 7-1 contaminants are left in place, pending remediation of the 300-FF-3 operable unit. The cover material will be dependent on the results of the soil samples but could consist of

packed clay, asphalt, concrete, a synthetic liner, fixative spray, or a combination of these materials. Reclamation may be justified to control dust, erosion, surface water run-off and promote postclosure usage. Site restoration may include backfilling disturbed soil areas with noncontaminated native soil, compaction, and grading (Section 8.2, Postclosure Care).

Depending on the surface area, method, material, and location of areas to be decontaminated, a temporary containment structure may be necessary to control the spread of hazardous contaminants. This temporary containment structure will provide a negative air pressure (via high-efficiency particulate air filter-equipped exhauster), airlock entry and exits, and other attributes similar to an asbestos work enclosure described by EPA in *Asbestos Waste Management Guidance* (EPA 1985).

All equipment used during closure activities will be decontaminated or disposed of according to the following:

- EII 4.2, "Interim Control of Unknown, Suspected Hazardous and Mixed Waste" (WHC 1988)
- EII 5.4, "Field Decontamination of Drilling, Well Development and Sampling Equipment" (WHC 1991)
- EII 5.5, "1706-KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment" (WHC 1991).

7.7 SCHEDULE OF CLOSURE

Closure of the 3718-F Facility will begin upon notification by Ecology of plan approval. Closure will proceed according to the schedule presented in Figure 7-9.

7.8 AMENDMENT OF PLAN

The closure plan for the 3718-F Facility will be amended whenever changes in operating plans or unit design affect the closure plan, whenever there is a change in the expected year of closure, or if, when conducting closure activities, unexpected events require a modification of the closure plan. The closure plan will be modified in accordance with WAC 173-303-610(3). This plan may be amended any time before certification of final closure of the 3718-F Facility.

If an amendment to the approved closure plan is required, DOE-RL will submit a written request to Ecology to authorize a change to the approved plan. The written request will include a copy of the closure plan amendment for approval.

7.9 CERTIFICATION OF CLOSURE AND SURVEY PLAT

Within 60 days of closure of the 3718-F Facility, DOE-RL will submit to Ecology a certification of closure. The certification will be signed by both DOE-RL and an independent professional engineer registered in the state of Washington, stating the unit has been closed in accordance with the approved closure plan. The certification will be submitted by registered mail. Documentation supporting the independent professional engineer's certification will be retained and furnished to Ecology upon request. The DOE-RL will self-certify with the following statement (or a similar statement):

> "We, the undersigned, hereby certify that all 3718-F Alkali Metal Treatment and Storage Facility closure activities were performed in accordance with the specifications in the approved closure plan."

The DOE-RL and the independent professional engineer registered in the state of Washington will certify with a document similar to Figure 7-10.

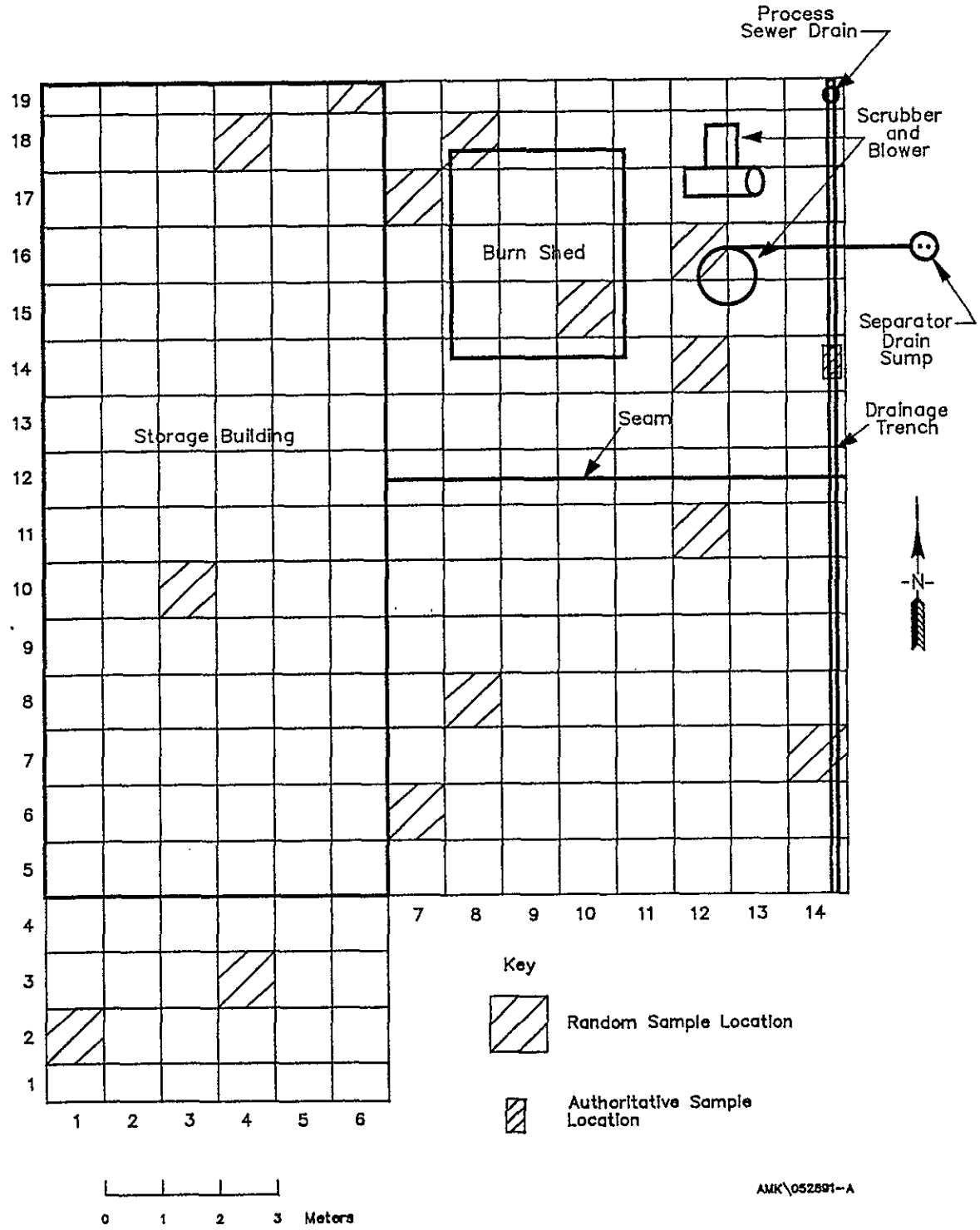


Figure 7-1. The 3718-F Facility, Concrete Pads and Floors Chip Sampling Locations.

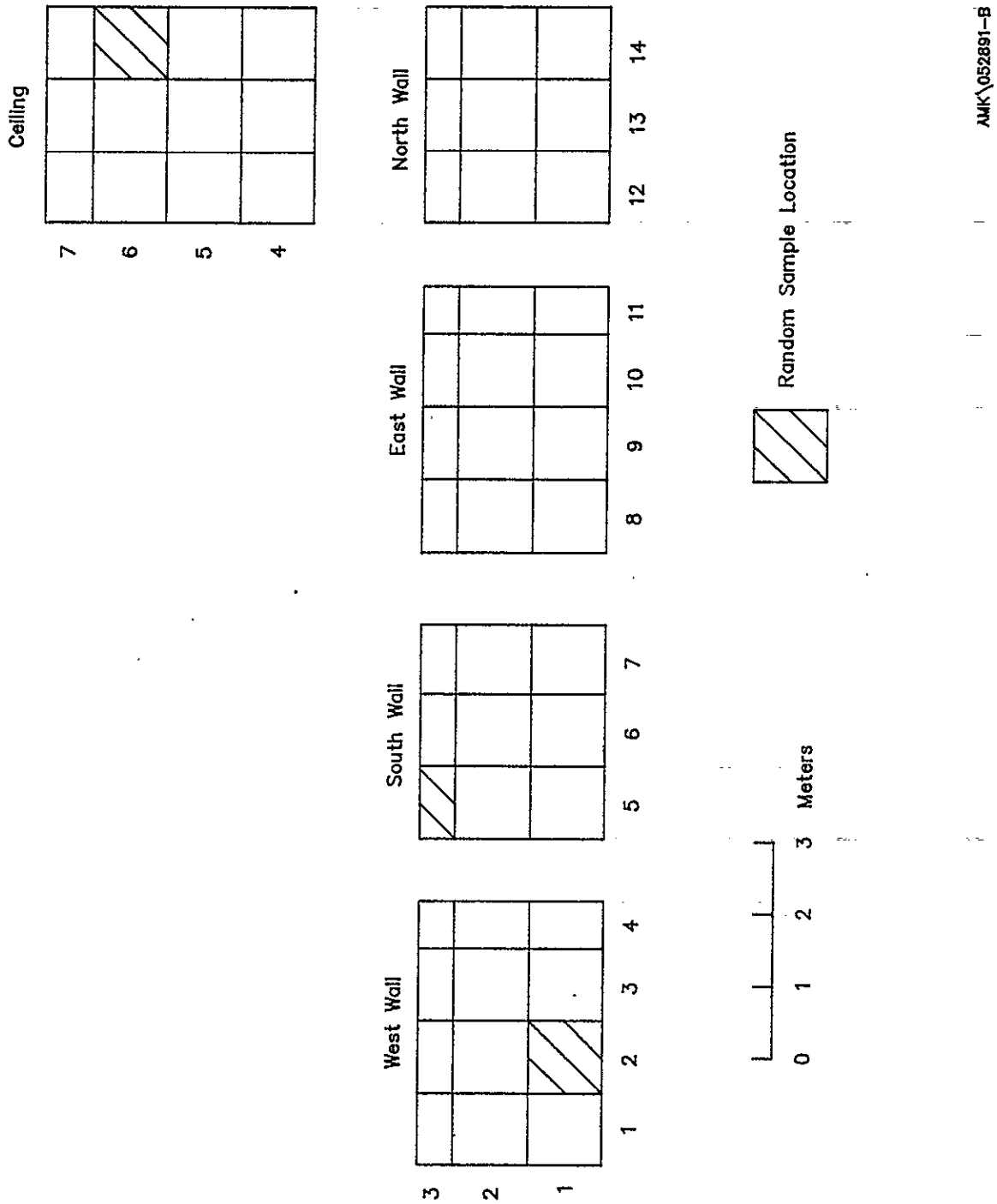


Figure 7-2. The 3718-F Facility, Burn Shed Wipe Sampling Locations.

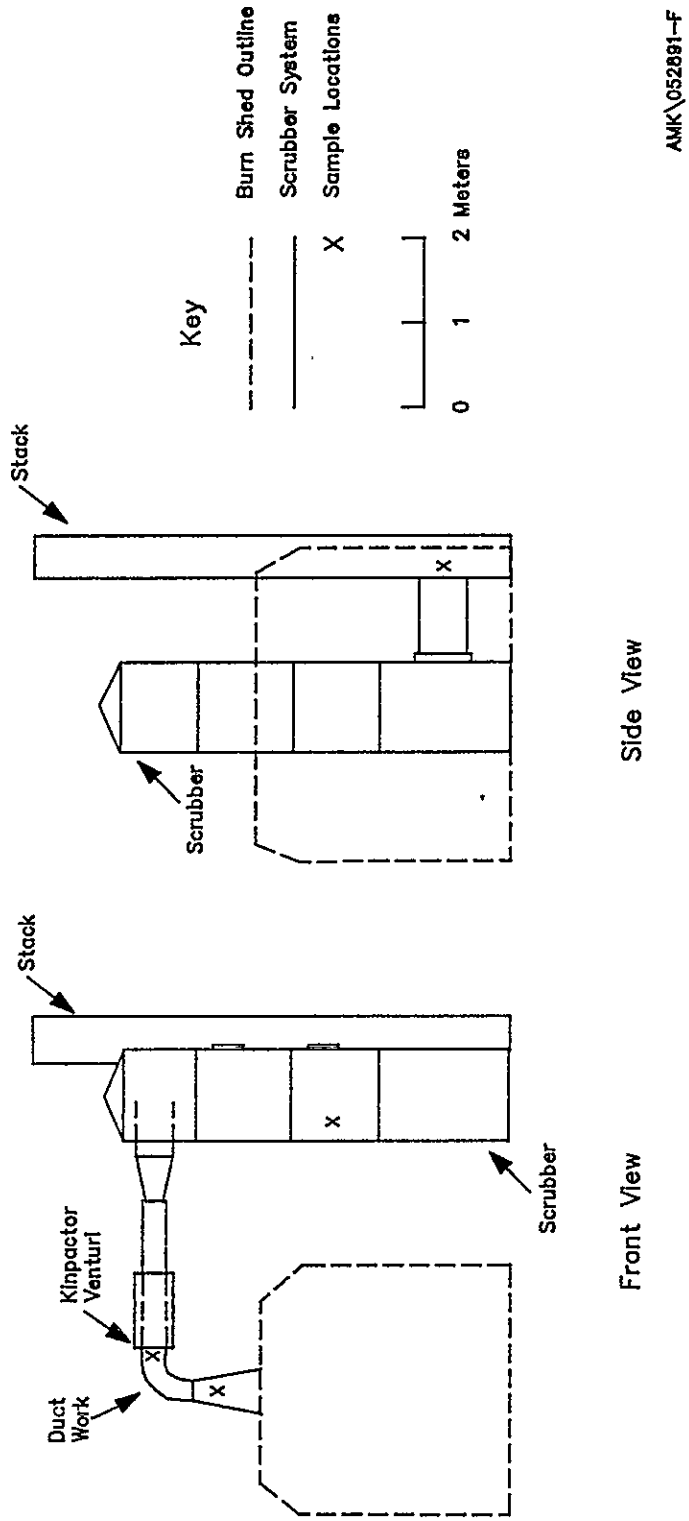
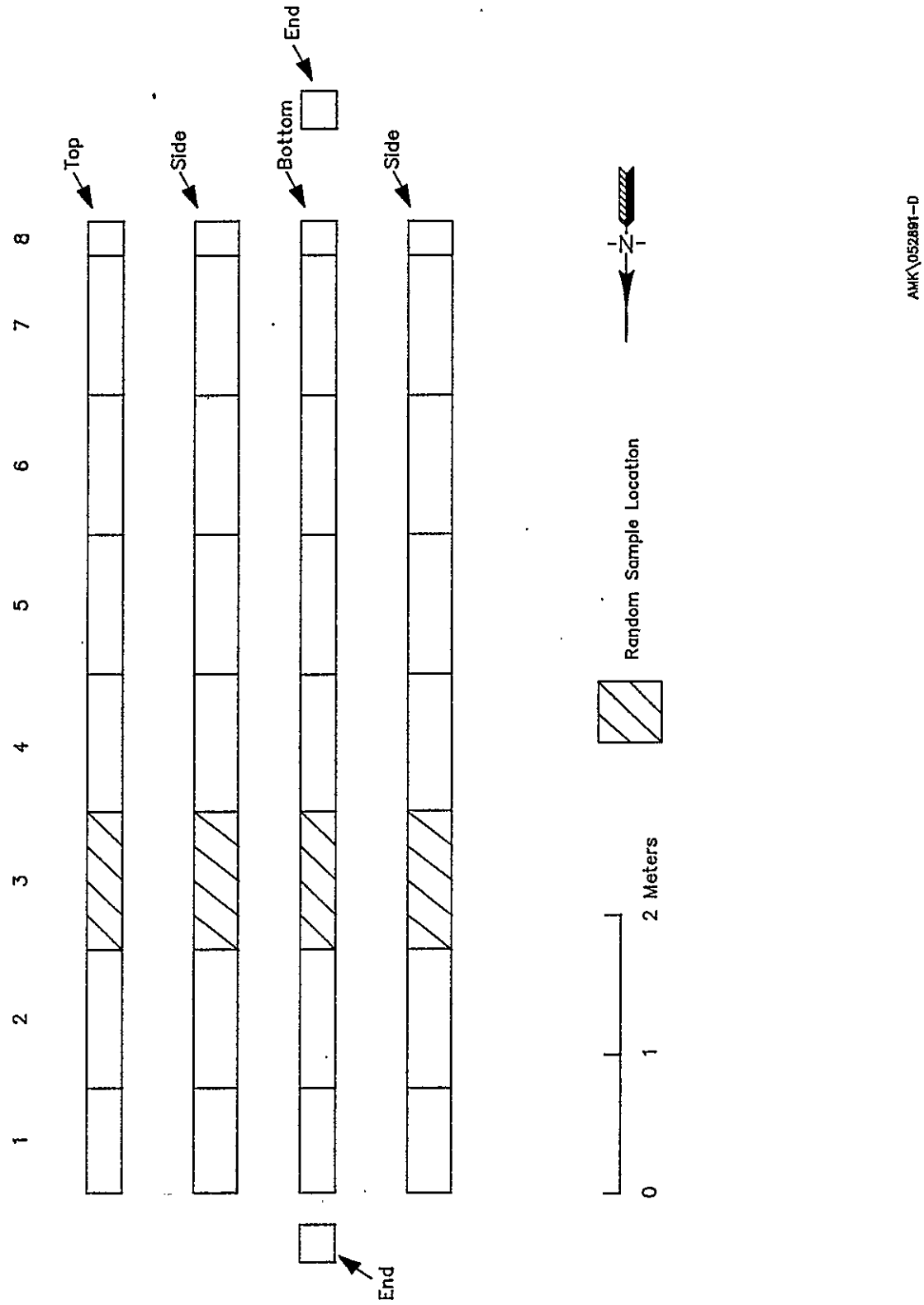


Figure 7-3. The 3718-F Facility, Scrubber System Sampling Locations.



1 Figure 7-4. The 3718-F Facility, Alcohol Reaction Tank Sampling Locations.

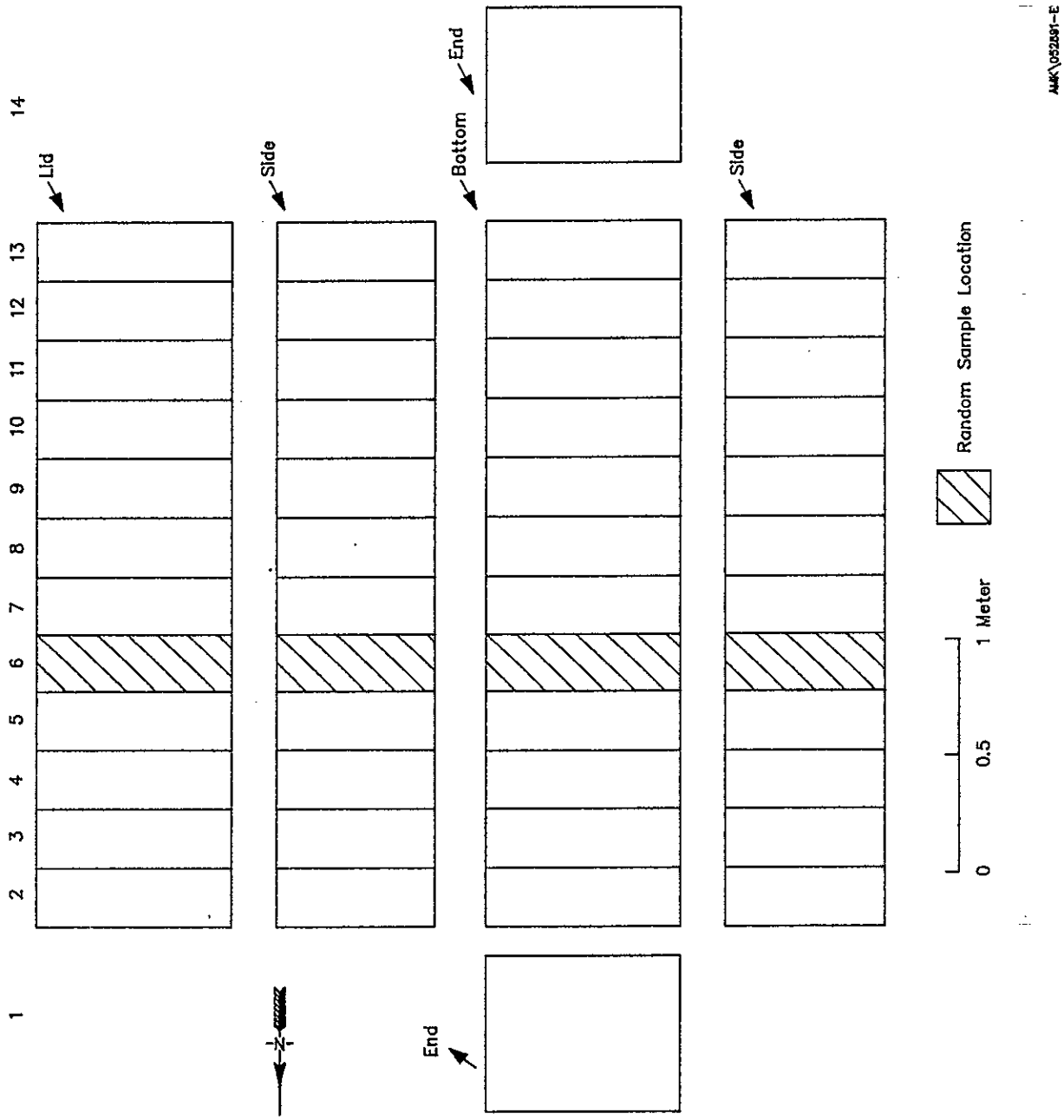


Figure 7-5. The 3718-F Facility, Water Reaction Tank Sampling Locations.

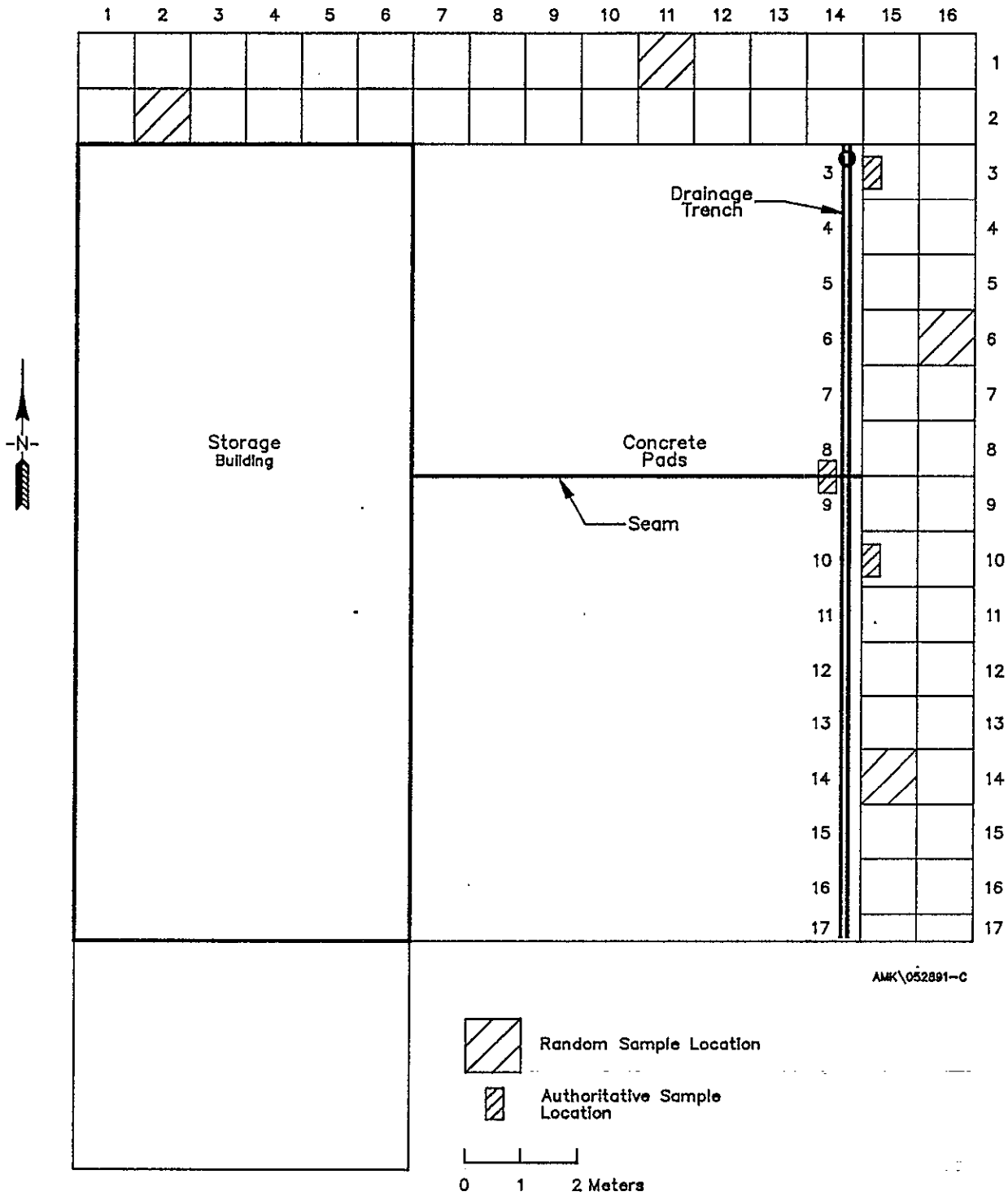


Figure 7-6. The 3718-F Facility, Soil Sampling Locations.

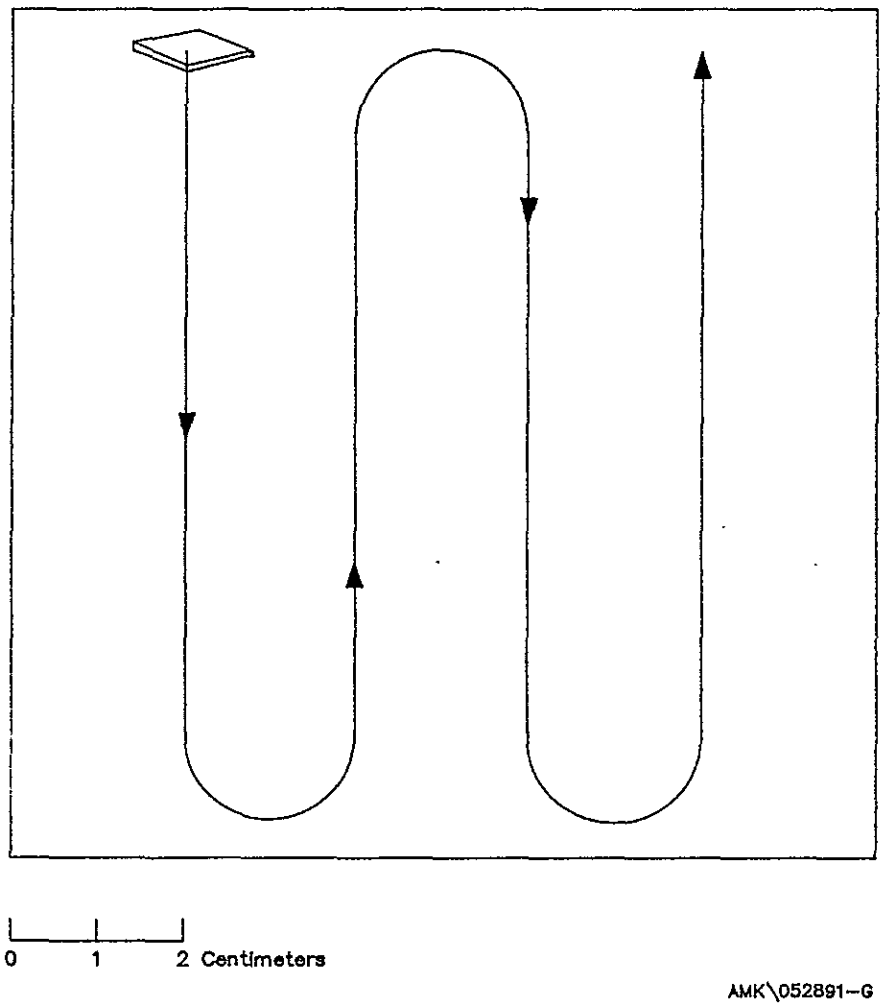


Figure 7-7. The 3718-F Facility Wipe Sampling Plan.

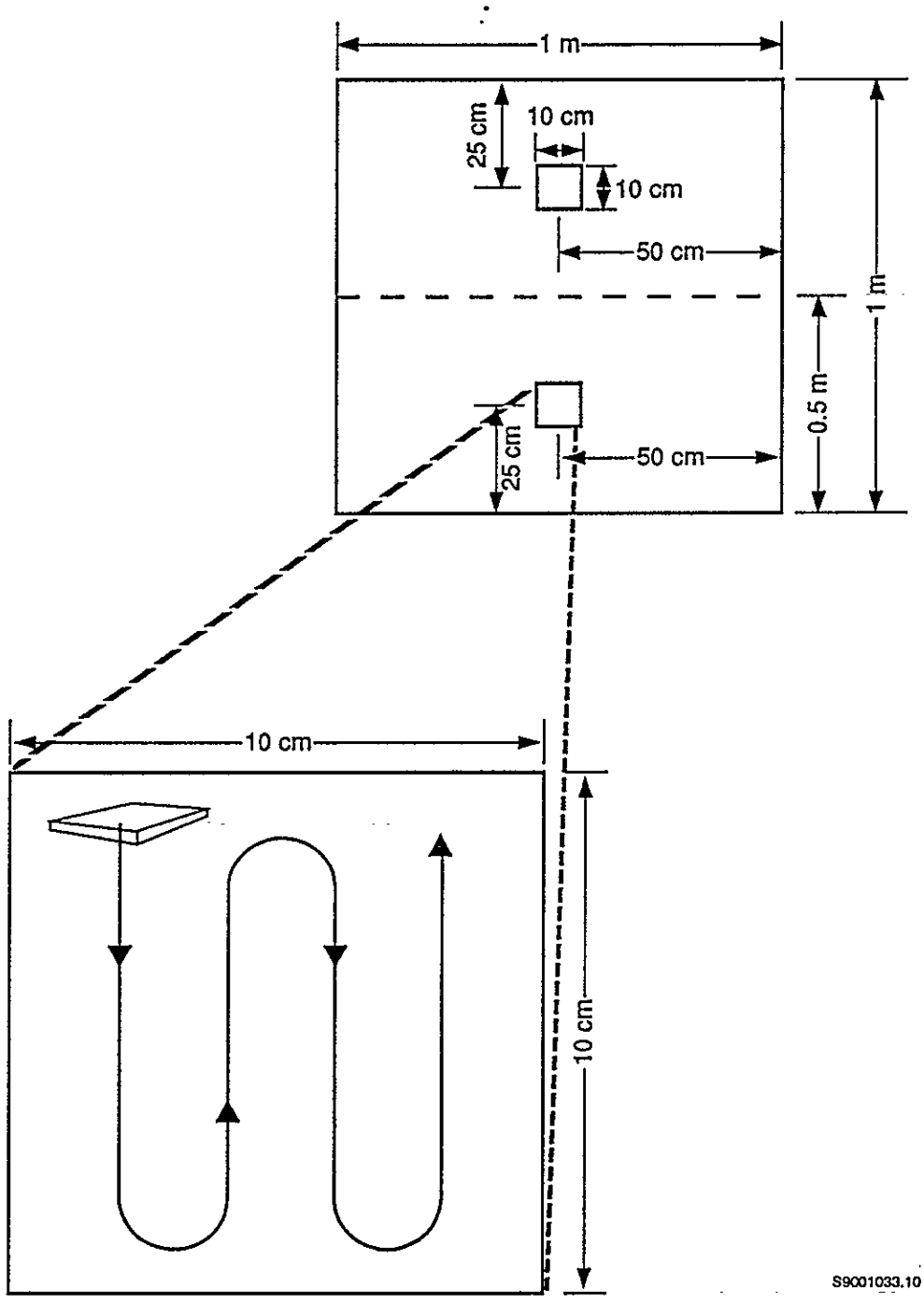


Figure 7-8. Reaction Tank Wipe Sampling Plan.

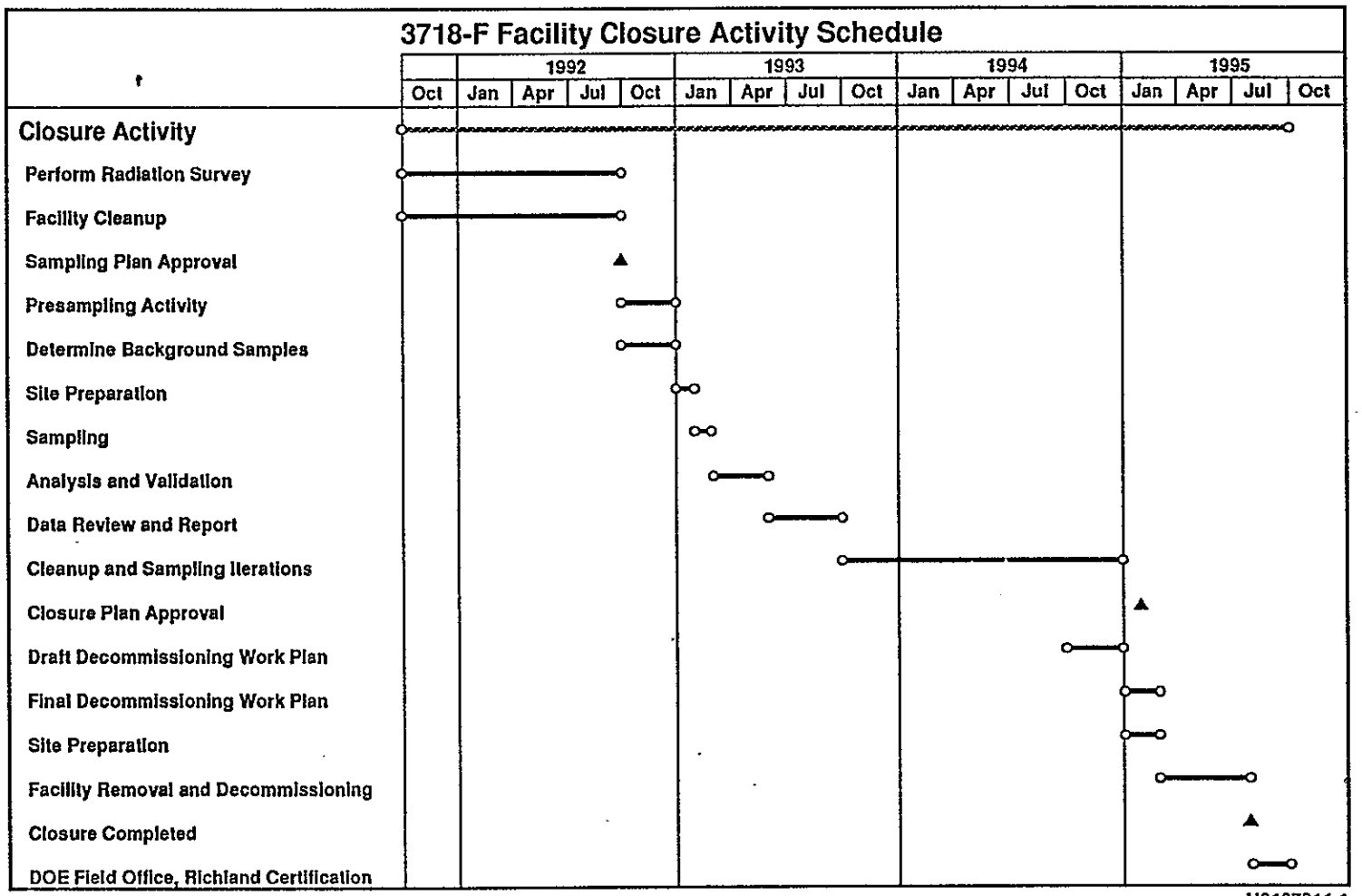


Figure 7-9. The 3718-F Facility Closure Schedule.

CLOSURE CERTIFICATION FOR

_____

Hanford Site Facility
Department of Energy-Richland Operations

We, the undersigned, hereby certify that all _____ _____ closure activities were performed in accordance with the specifications in the approved closure plan.

_____
Owner/Operator Signature DOE-RL Representative Date
(Typed Name)

_____P.E.#_____
Signature Independent Registered Professional Engineer Date
(Typed name and Washington State Professional Engineer license number).

Figure 7-10. Closure Certification for the 3718-F Facility.

Table 7-1. Potential Compliance Constituents, Analytical Methods and Action Levels for the 3718-F Facility.

Constituent	Analytical Procedure			Action Level			
	Soil	Concrete	Sheet metal and metal surfaces wipe samples	Soil	Concrete	Sheet metal	Metal surfaces (reaction tanks)
Lithium	SW-846, 7430	SW-846, 6010[a]	SW-846, 3050, 6010	BG/HBS	LOQ/HBS	LOQ/HBS	LOQ/HBS
Potassium	SW-846, 7610	SW-846, 6010[a]	SW-846, 3050, 6010	BG/HBS	LOQ/HBS	LOQ/HBS	LOQ/HBS
Sodium	SW-846, 7770	SW-846, 6010[a]	SW-846, 3050, 6010	BG/HBS	LOQ/HBS	LOQ/HBS	LOQ/HBS
Methanol	SW-846, 8240	SW-846, 8240[b]	SW-846, 3810, 8240	BG/HBS	LOQ/HBS	---	LOQ/HBS
Isopropyl alcohol	SW-846, 8240	SW-846, 8240[b]	SW-846, 3810, 8240	BG/HBS	LOQ/HBS	---	LOQ/HBS
2-Butoxy ethanol	SW-846, 8240	SW-846, 8240[b]	SW-846, 3810, 8240	BG/HBS	LOQ/HBS	---	LOQ/HBS
pH	SW-846, 9045	Not required	Not required	BG/HBS	---	---	---
Calcium carbonate	ASTM D 4373-84	Not required	Not required	BG/HBS	---	---	---
Alkalinity	Calculated[c]	Not required	Not required	BG/HBS	---	---	---

[a]Extraction by toxicity characteristic leaching procedure solution.

[b]Extraction by thermal desorption method.

[c]Alkalinity will be determined using the following equation:

$$\text{Alkalinity} \equiv [HCO_3^-] + 2[HCO_3^{2-}] + [OH^-] - [H^+] \quad \text{(Sposito, 1989)}$$

where, $[HCO_3^-]$ is determined from the calcium carbonate content,

$[HCO_3^{2-}]$ is calculated using $K_2 = \dfrac{[HCO_3^-]}{[H^+][CO_3^{2-}]}$

where K_2 is the equilibrium constant,

$[OH^-]$ is determined using the pH,

$[H^+]$ is determined using the pH.

BG = Local background threshold concentrations
LOQ = Limit of quantitation
HBS = Health and environment based standards.

Table 7-2. Sampling Summary of the 3718-F Facility.

Location	Number of samples
Background soil samples	20
Concrete pads and floors	14
Burn shed walls and ceiling	3
Scrubber system	4
Alcohol reaction tank	1
Water reaction tank	1
Adjacent soils	18
Underlying soils	12

Table 7-3. Company-General Training Matrix.

Course Title	Type	Target Audience			
		MS	NO	HPT	CR
Generator Hazards Safety Training	I	X	X	X	X
Hazardous Waste Worker Safety Training	I	X	X	X	X
Hazardous Waste Worker Safety Training Refresher	C	X	X	X	X
Hazardous Materials/Waste Job Specific Training	I	X	X	X	X
Radiation Safety Training	C	X	X	X	X
On-the-Job Training/Waste Site Field Experience	C	X	X	X	X
Fire Extinguisher Safety Orientation	C	X	X	X	X
Cardiopulmonary Resuscitation (CPR)	C	X	X	X	X
Scott SKA Pak[b]-MSA PAPR[c]	C	X	X	X	X
Self-Contained Breathing Apparatus (SCBA) Training (optional)	C	X	X	X	X
Noise Control (optional)	C	X	X	X	X
Hazardous Waste Site Supervisor/Manager Safety Management Training	I	X			

C = Continuing Course.
CR = Crafts.
HPT = Health Physics Technicians.
I = Introductory Course.
MS = Managers and Supervisors.
NO = Nuclear Operators and Decommissioning and Decontamination Workers.

[b]Trademark of Scott Aviation, Lancaster, New York.

[c]Trademark of Mine Safety Appliance Company, Pittsburgh, Pennsylvania.

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8.0 POSTCLOSURE

8.1 NOTICE IN DEED BOOK

This closure plan proposes clean closure of the 3718-F Facility. However, if clean closure cannot be obtained, the following action will be taken in accordance with WAC 173-303-610 (1)(b). Within 60 days of the certification of closure, DOE-RL will sign, notarize, and file for recording the notice indicated below. The notice will be sent to the Auditor of Benton County, P.O. Box 470, Prosser, Washington, with instructions to record this notice in the deed book.

TO WHOM IT MAY CONCERN

The United States Department of Energy Field Office, Richland an operations office of the United States Department of Energy, which is a department of the United States government, the undersigned, whose local address is the Federal Building, 825 Jadwin Avenue, Richland, Washington, hereby gives the following notice as required by 40 CFR 265.120 and WAC 173-303-610(10) (whichever is applicable):

(a) The United States of America is, and since April 1943, has been in possession in fee simple of the following described lands: (legal description of 3718-F Alkali Metal Treatment and Storage Facility Site).

(b) The United States Department of Energy Field Office, Richland by operation of the 3718-F Alkali Metal Treatment and Storage Facility, has disposed of hazardous and/or dangerous waste under the terms of regulations promulgated by the United States Environmental Protection Agency and Washington Department of Ecology (whichever is applicable) at the above described land.

(c) The future use of the above described land is restricted under terms of 40 CFR 264.117(c) and WAC 173-303-610(7)(d) (whichever is applicable).

(d) Any and all future purchasers of this land should inform themselves of the requirements of the regulations and ascertain the amount and nature of wastes disposed on the above described property.

(e) The United States Department of Energy Field Office, Richland has filed a survey plat with the Benton County Planning Department and with the United States Environmental Protection Agency, Region 10, and the Washington Department of Ecology (whichever are applicable) showing the location and dimensions of the 3718-F Alkali Metal Treatment and Storage Facility Site and a record of the type, location, and quantity of waste treated.

8.2 POSTCLOSURE CARE

Postclosure care generally is required when a waste management facility cannot attain a clean closure. At the 3718-F Facility, underlying soils and groundwater may have been contaminated by waste generated during operations in the 300 Area. Under the Tri-Party Agreement (Ecology et al. 1990), source contamination and groundwater will be investigated and remediated through the operable units under the CERCLA RI/FS process.

With the exception of an imminent health threat, all soil remediation will take place under the CERCLA RI/FS process. If the soil within the 3718-F Facility boundary is found to be contaminated (chemical concentrations above local background threshold concentrations) from operations conducted (chemicals used or waste stored) at the 3718-F Facility, the facility will not be considered closed until the remediation under CERCLA is complete. During the time between closure of the building, floor, and pads and any soil remediation under CERCLA, steps will be taken to isolate any contamination.

Temporary covers will be installed, if necessary, to prevent migration of any contamination. The temporary covers would be less permeable than the surrounding soil and may be composed of constituents such as asphalt, clay, or a fixative spray. The existing facility floor and pads may be used as covers if they were found to be uncontaminated or were decontaminated. The exact nature of any covers would be determined at the time the need was identified, and this information would be added to the closure plan. In addition, access to the areas of contamination would be controlled if necessary to protect personnel or prevent the migration of contamination.

During the period between closure of the building and soil remediation under CERCLA, the facility area would be inspected, at a minimum, once a week. This inspection would be combined with facility inspection presently conducted. The inspections would determine the need for maintenance of any temporary covers or other physical barriers. Any required maintenance would be performed by trained personnel from the Hanford Site.

Any data obtained from sampling and analyses during RCRA closure activities will be part of the record and included in the closure plan. This data will be taken into account and used during the CERCLA evaluation of the 300-FF-3 operable unit, as well as data collected specifically for the CERCLA evaluation.

9.0 REFERENCES

ASTM, 1991, *Annual Book of ASTM Standards*, Section 4, Construction, Volume 04.08, American Society for Testing and Materials, Philadelphia, Pennsylvania.

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EPA, 1988, *Identification and Listing of Hazardous Waste*, Title 40, Code of Federal Regulations, Part 261, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1990, *Interim Status Standards for Owners and Operators of Hazardous Waste, Treatment, Storage, and Disposal Facilities*, Title 40, Code of Federal Regulations, Part 265, as amended, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989a, *Integrated Risk Information System (IRIS)*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989b, *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual*, Part A, Chapter 6, Exposure Assessment, U.S. Environmental Protection Agency, Washington, D.C.

Keith, L. H., W. Crummett, J. Deegan, R. A. Libby, J. K. Taylor, G. Wentler, 1983, "Principles of Environmental Analysis" *Analytical Chemistry*, Vol. 55.

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WHC, 1989b, *Environmental Compliance Manual*, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989c, *Industrial Safety Manual*, WHC-CM-4-3, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989d, *Hazardous Waste Management*, WHC-CM-5-16, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991a, *3718-F Building Alkali Disposal Records*, WHC-N-553, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991b, *3718-F Building Disposal Operations Logbook*, WHC-N-555, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991c, *3718-F Inventory Safety and Operations Log*, WHC-N-554, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

PHOTOGRAPHS

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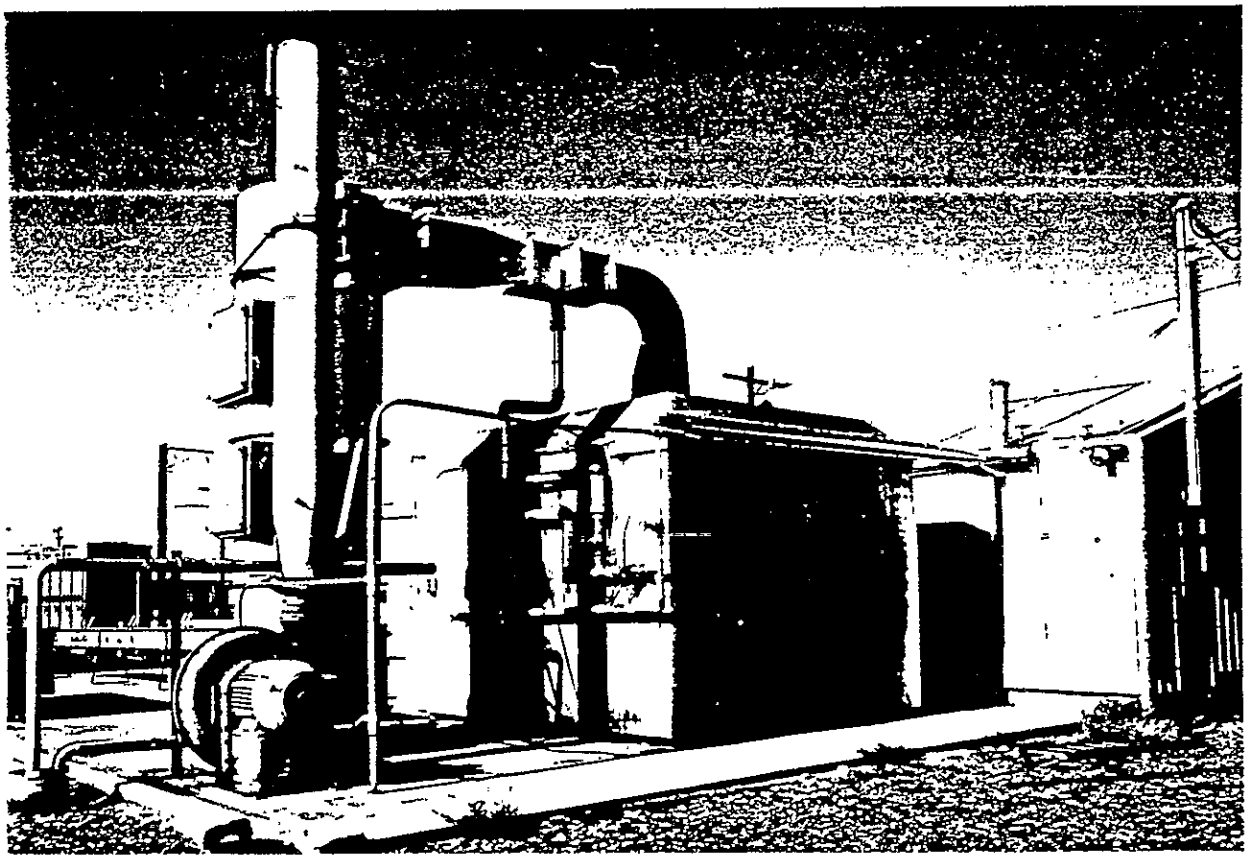
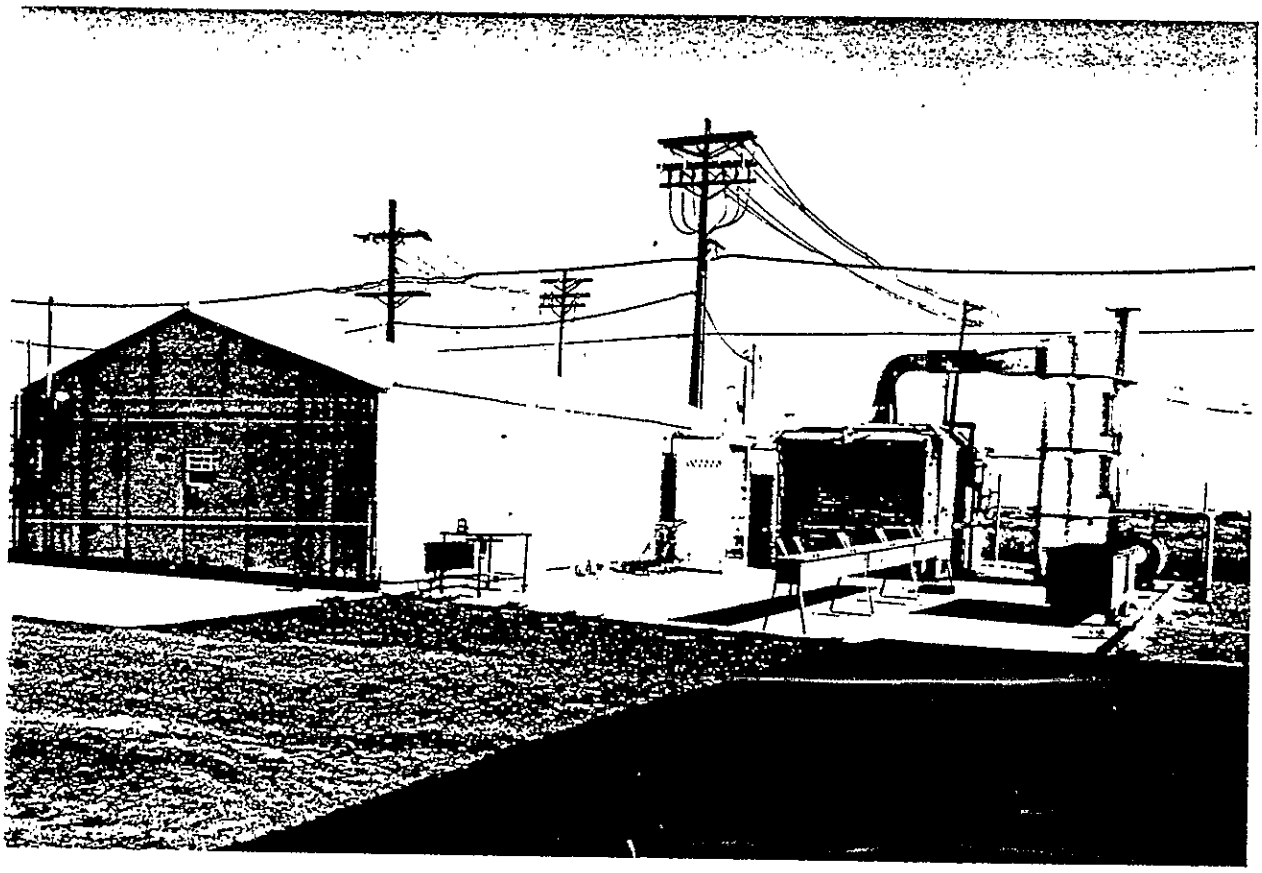


1 The 3718-F Treatment and Storage Facility.



1 The 3718-F Building Burn Shed and Reaction Tanks.

APPENDIX B

RANDOM SAMPLING LOCATIONS

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Table B-1. The 3718-F Facility Concrete Pads and Floors Random Sampling Locations. (Figure 7-1)

X Coordinate	Y Coordinate
4	18
3	10
7	6
12	14
8	8
7	17
14	7
12	11
6	19
10	15
12	16
1	2
8	18
4	3

Table B-2. The 3718-F Facility Burn Shed Random Sampling Locations. (Figure 7-2)

X Coordinate	Y Coordinate
2	1
5	3
14	7

Table B-3. The 3718-F Facility Alcohol Reaction Tank Random Sample Location. (Figure 7-4)

1 m^2 grid location
3

Table B-4. The 3718-F Facility Water Reaction Tank Random Sample Location. (Figure 7-5)

1 m^2 Grid Location
6

Table B-5. The 3718-F Facility Soil Random Sampling Locations. (Figure 7-6)

X Coordinate	Y Coordinate
3	2
16	5
11	1
15	14

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APPENDIX C

MATERIAL SAFETY DATA SHEETS

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MATERIAL SAFETY DATA SHEET OHS03540

OCCUPATIONAL HEALTH SERVICES, INC.
450 SEVENTH AVENUE, SUITE 2407
NEW YORK, NEW YORK 10123
(800) 445-MSDS (212) 967-1100

EMERGENCY CONTACT:
JOHN S. BRANSFORD, JR. (615) 292-1180

SUBSTANCE IDENTIFICATION

CAS-NUMBER 111-76-2
RTEC-NUMBER KJ8575000

SUBSTANCE: BUTYL CELLOSOLVE

TRADE NAMES/SYNONYMS:
ETHANOL, 2-BUTOXY-: BUTYL OXITOL: ETHYLENE GLYCOL MONOBUTYL ETHER: 2-BUTOXYETHANOL: BETA-BUTOXYETHANOL: BUTYL GLYCOL: ETHYLENE GLYCOL BUTYL ETHER: ETHYLENE GLYCOL N-BUTYL ETHER: DOWANOL EB: GLYCOL BUTYL ETHER: GLYCOL MONOBUTYL ETHER: MONOBUTYL GLYCOL ETHER: GAFCOL EB: BUTYL MONOETHER GLYCOL: ETHYLENE GLYCOL MONO-N-BUTYL ETHER: EKTASOLVE EB: UN 2369: E-179: 13073: C6H1402: OHS03540

CHEMICAL FAMILY:
ETHER, ALIPHATIC

MOLECULAR FORMULA: C4-H9-O-C-H2-C-H2-O-H MOLECULAR WEIGHT: 118.18

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

COMPONENTS AND CONTAMINANTS

COMPONENT: BUTYL CELLOSOLVE PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:
BUTYL CELLOSOLVE (ETHYLENE GLYCOL MONOBUTYL ETHER):
50 PPM (240 MG/M3) OSHA TWA (SKIN)
25 PPM (120 MG/M3) ACGIH TWA (SKIN)

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS LIQUID WITH A MILD, ETHEREAL ODOR.

BOILING POINT: 340 F (171 C) MELTING POINT: -94 F (-70 C)

SPECIFIC GRAVITY: 0.9015 EVAPORATION RATE: (BUTYL ACETATE=1) 0.06

SOLUBILITY IN WATER: SOLUBLE VAPOR DENSITY: 4.1

VAPOR PRESSURE: 0.76 MMHG @ 20 C

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OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN ALCOHOL, ETHER, MOST ORGANIC SOLVENTS,
MINERAL OIL

OTHER PHYSICAL DATA
VISCOSITY: 3.5 CS AT 25 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
MODERATE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

FLASH POINT: 143 F (62 C) (CC) UPPER EXPLOSION LIMIT: 12.7 % @ 275 F

LOWER EXPLOSION LIMIT: 1.1% @ 200 F AUTOIGNITION TEMP.: 460 F (238 C)

FLAMMIBILITY CLASS (OSHA): IIIA

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR ALCOHOL FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

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

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK ENDS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES, ELSE WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 26).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE FLOODING AMOUNTS OF WATER AS A FOG, SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS, KEEP UPWIND.

ALCOHOL FOAM (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIAL, EIGHTH EDITION).

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:
COMBUSTIBLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND 172.402:

NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: NONE
EXCEPTIONS: 49CFR173.118A

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TOXICITY

BUTYL CELLOSOLVE (ETHYLENE GLYCOL MONOBUTYL ETHER):
500 MG OPEN SKIN-RABBIT MILD IRRITATION; 18 MG EYE-RABBIT IRRITATION; 100 MG/24 HOURS EYE-RABBIT MODERATE IRRITATION; 100 PPM INHALATION-HUMAN TCLO; 195 PPM/8 HOURS INHALATION-HUMAN TCLO; 700 PPM/7 HOURS INHALATION-MOUSE LC50; 220 MG/KG SKIN-RABBIT LD50; 230 MG/KG SKIN-GUINEA PIG LD50; 470 MG/KG ORAL-RAT LD50; 1230 MG/KG ORAL-MOUSE LD50; 300 MG/KG ORAL-RABBIT LD50; 1200 MG/KG ORAL-GUINEA PIG LD50; 220 MG/KG INTRAPERITONEAL-RAT LD50; 536 MG/KG INTRAPERITONEAL-MOUSE LD50; 220 MG/KG INTRAPERITONEAL-RABBIT LD50; 500 MG/KG SUBCUTANEOUS-MOUSE LDLO; 340 MG/KG INTRAVENOUS-RAT LD50; 1130 MG/KG INTRAVENOUS-MOUSE LD50; 280 MG/KG INTRAVENOUS-RABBIT LD50; REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGEN STATUS: NONE.
BUTYL CELLOSOLVE IS TOXIC, A SKIN, EYE, AND MUCOUS MEMBRANE IRRITANT, CENTRAL NERVOUS SYSTEM DEPRESSANT, HEMOLYTIC AGENT AND NEPHROTOXIN. POISONING MAY ALSO AFFECT THE LIVER.

HEALTH EFFECTS AND FIRST AID

INHALATION:
BUTYL CELLOSOLVE (ETHYLENE GLYCOL MONOBUTYL ETHER):
IRRITANT/NARCOTIC/HEMOLYTIC AGENT/NEPHROTOXIN/TOXIC.
700 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- INHALATION OF VAPORS MAY CAUSE IRRITATION OF THE UPPER RESPIRATORY TRACT AND DYSPNEA. SOME CELLOSOLVES MAY CAUSE NAUSEA, VOMITING, DIARRHEA, ANEMIA, POSSIBLE ABDOMINAL AND LUMBAR PAIN, AND SYMPTOMS OF CENTRAL NERVOUS SYSTEM DEPRESSION INCLUDING HEADACHE, DIZZINESS, DROWSINESS, WEAKNESS, SLURRED SPEECH, RECRUDESCENT STUTTERING, STAGGERING GAIT, TREMORS, BLURRED VISION, AND PERSONALITY CHANGES RESEMBLING SCHIZOPHRENIA OR NARCOLEPSY. SEVERE EXPOSURES MAY RESULT IN ANOREXIA, WEIGHT LOSS, APATHY, VISCERAL CONGESTION, HEMORRHAGING OF THE LUNGS, AND LIVER AND KIDNEY DAMAGE. KIDNEY EFFECTS MAY INCLUDE TRANSIENT POLYURIA, ALBUMINURIA, HEMATURIA, HEMOGLOBINURIA, OLIGURIA PROGRESSING TO ANURIA, AND ACUTE RENAL FAILURE. EFFECTS ON THE BLOOD MAY INCLUDE ERYTHROPENIA, RETICULOCYTOSIS, LEUKOCYTOSIS, GRANULOCYTOSIS, AND INCREASED ERYTHROCYTE FRAGILITY WHICH MAY RESULT IN HEMOLYSIS. NARCOSIS, PULMONARY EDEMA, AND BONE MARROW DEPRESSION HAVE ALSO BEEN REPORTED. INHALATION OF 700 PPM/7 HOURS RESULTED IN DEATH IN MICE DUE TO LUNG AND KIDNEY INJURY.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO VAPOR CONCENTRATIONS WOULD BE EXPECTED TO CAUSE IRRITATION OF THE RESPIRATORY TRACT, NARCOSIS, AND LIVER AND KIDNEY DAMAGE IN HUMANS. IN ANIMALS, REPEATED EXPOSURES TO 100-400 PPM MAY CAUSE VISCERAL EFFECTS AND MILD HEMOLYTIC ANEMIA; OVEREXPOSURE TO VAPORS MAY RESULT IN FATIGUE AND LETHARGY, HEADACHE, NAUSEA, ANOREXIA, AND TREMOR; AND OVEREXPOSURE TO HIGH CONCENTRATIONS MAY RESULT IN LIVER AND KIDNEY INJURY, HEMOGLOBINURIA, GREATLY INCREASED ERYTHROCYTE FRAGILITY, PULMONARY HEMORRHAGE, AND DEATH FROM RENAL FAILURE. EFFECTS ON THE FEMALE REPRODUCTIVE SYSTEM, FERTILITY, AND SPECIFIC DEVELOPMENTAL ABNORMALITIES HAVE BEEN REPORTED FROM EXPOSURE OF PREGNANT

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RATS AND RABBITS TO BUTYL CELLOSOLVE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
BUTYL CELLOSOLVE (ETHYLENE GLYCOL MONOBUTYL ETHER):
IRRITANT/NARCOTIC/HEMOLYTIC AGENT/NEPHROTOXIN/TOXIC.
ACUTE EXPOSURE- DIRECT CONTACT WITH THE LIQUID MAY CAUSE IRRITATION WITH REDNESS. BUTYL CELLOSOLVE MAY BE RAPIDLY ABSORBED THROUGH INTACT SKIN TO CAUSE NAUSEA, VOMITING, DIARRHEA, ANEMIA, ABDOMINAL AND LUMBAR PAIN, AND SYMPTOMS OF CENTRAL NERVOUS SYSTEM DEPRESSION INCLUDING HEADACHE, DROWSINESS, DIZZINESS, WEAKNESS, SLURRED SPEECH, RECRUDESCENT STUTTERING, STAGGERING GAIT, TREMORS, AND BLURRED VISION. PERSONALITY CHANGES RESEMBLING SCHIZOPHRENIA OR NARCOLEPSY MAY ALSO OCCUR. SEVERE EXPOSURES MAY RESULT IN ANOREXIA, WEIGHT LOSS, APATHY, VISCERAL CONGESTION, HEMORRHAGING OF THE LUNGS, AND LIVER AND KIDNEY DAMAGE. KIDNEY EFFECTS MAY INCLUDE TRANSIENT POLYURIA, ALBUMINURIA, HEMATURIA, HEMOGLOGINURIA, OLIGURIA PROGRESSING TO ANURIA, AND ACUTE RENAL FAILURE. EFFECTS ON THE BLOOD MAY INCLUDE ERYTHROPENIA, RETICULOCYTOSIS, LEUKOCYTOSIS, GRANULOCYTOSIS, AND INCREASED ERYTHROCYTE FRAGILITY WHICH MAY RESULT IN HEMOLYSIS. NARCOSIS, PULMONARY EDEMA, AND BONE MARROW DEPRESSION HAVE ALSO BEEN REPORTED.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DEFATTING OF THE SKIN, DERMATITIS, AND SYMPTOMS AS IN ACUTE EXPOSURE.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
BUTYL CELLOSOLVE (ETHYLENE GLYCOL MONOBUTYL ETHER):
IRRITANT.
ACUTE EXPOSURE- EXPOSURE TO VAPOR CONCENTRATIONS OF >100 PPM MAY CAUSE IRRITATION WITH MILD PAIN, REDNESS, AND LACRIMATION. DIRECT CONTACT WITH THE LIQUID CAUSED IRRITATION WITH REDDENING AND SWELLING OF THE CONJUNCTIVA, PAIN, AND SLIGHT TRANSITORY CORNEAL CLOUDING IN RABBITS. THE DEGREE OF INJURY WAS GRADED 4 ON A SCALE OF 1-10 AFTER 24 HOURS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
BUTYL CELLOSOLVE (ETHYLENE GLYCOL MONOBUTYL ETHER):
NARCOTIC/HEMOLYTIC AGENT/NEPHROTOXIC/TOXIC.
ACUTE EXPOSURE- INGESTION MAY CAUSE SOUR TASTE, TONGUE NUMBNESS, NAUSEA, VOMITING, DIARRHEA, ABDOMINAL AND LUMBAR PAIN, AND EFFECTS ON THE CENTRAL NERVOUS SYSTEM INCLUDING HEADACHE, DROWSINESS, DIZZINESS, WEAKNESS, SLURRED SPEECH, RECRUDESCENT STUTTERING, STAGGERING GAIT, TREMORS, BLURRED VISION, AND PERSONALITY CHANGES RESEMBLING SCHIZOPHRENIA OR NARCOLEPSY. SEVERE EXPOSURES MAY RESULT IN ANOREXIA, WEIGHT LOSS, APATHY, VISCERAL CONGESTION, HEMORRHAGING OF THE LUNGS, AND LIVER AND KIDNEY DAMAGE. KIDNEY EFFECTS MAY INCLUDE TRANSIENT POLYURIA, ALBUMINURIA, HEMATURIA, HEMOGLOBINURIA, OLIGURIA PROGRESSING TO ANURIA, AND ACUTE RENAL EFFECTS ON THE BLOOD MAY INCLUDE ERYTHROPENIA, RETICULOCYTOSIS,

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LEUKOCYTOSIS, GRANULOCYTOSIS, AND INCREASED ERYTHROCYTE FRAGILITY WHICH MAY RESULT IN HEMOLYSIS. NARCOSIS, PULMONARY EDEMA, AND BONE MARROW DEPRESSION HAVE ALSO BEEN REPORTED. INGESTION OF 470 MG/KG WAS LETHAL TO RATS. DEATHS IN ANIMALS RESULTING FROM SINGLE EXPOSURES ARE GENERALLY DUE TO NARCOSIS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED INGESTION MAY CAUSE GROWTH DEPRESSION, INCREASED LIVER AND KIDNEY DAMAGE, AND EFFECTS AS IN ACUTE EXPOSURE. DELAYED DEATHS IN ANIMALS ARE GENERALLY A RESULT OF LUNG CONGESTION AND/OR RENAL FAILURE. EFFECTS ON FERTILITY HAVE BEEN REPORTED FROM EXPOSURE OF PREGNANT MICE TO BUTYL CELLOSOLVE.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. MAINTAIN BLOOD PRESSURE AND AIRWAY. GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.) ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
BUTYL CELLOSOLVE (ETHYLENE GLYCOL MONOBUTYL ETHER):
CAUSTICS (STRONG): DECOMPOSITION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

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

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE.

STORAGE

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

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CONDITIONS TO AVOID

MAY BE IGNITED BY HEAT, SPARKS OR FLAMES. CONTAINER MAY EXPLODE IN HEAT OF FIRE. VAPOR EXPLOSION HAZARD INDOORS, OUTDOORS OR IN SEWERS. RUN-OFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILLS AND LEAKS

OCCUPATIONAL-SPILL:
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT SECTION

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

RESPIRATOR:
THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS; OR DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

BUTYL CELLOSOLVE:

250 PPM- ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

625 PPM- ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

700 PPM- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S).
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

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

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

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

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

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 12/05/84 REVISION DATE: 07/07/88

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MATERIAL SAFETY DATA SHEET OHS12090

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR 1-212-789-3535

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

MSDS # 1279

SUBSTANCE IDENTIFICATION

CAS-NUMBER 67-63-0
RTEC-NUMBER NT8050000

SUBSTANCE: ISOPROPYL ALCOHOL

TRADE NAMES/SYNONYMS:
ISOPROPANOL: ETHYL CARBINOL: DIMETHYLCARBINOL: 2-PROPANOL: ISOHOL: SEC-PROPYL ALCOHOL: PROPYL ALCOHOL: XEROX FILM REMOVER (UNION CARBIDE): CTL R-53 REDUCER (CHEMICAL TECHNOLOGY LABS., INC.): TEXPADS (THE TEXWIPE COMPANY): CORONA WIRE CLEANER (CANON BUSINESS MACHINES): DISK DRIVE HEAD CLEANING KIT (DIGITAL EQUIPMENT CORPORATION): LENS CLENS #3 (GENERAL PRODUCTION SERVICES INC.): REDUCER (SHERWIN-WILLIAMS): ISOPROPYL ALC SEMI GO 4X1GPOLY (ASHLAND CHEMICAL COMPANY): ADPRO-MULTISURF (MALLINCKRODT): 108 THINNER (KESTER SOLDER COMPANY): STCC 4904205: UN 1219: C3H8O: OHS12090

CHEMICAL FAMILY:
ALCOHOL, ALIPHATIC

MOLECULAR FORMULA: C-H3-C-H-(O-H)-C-H3 MOLECULAR WEIGHT: 60.10

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=3 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ISOPROPYL ALCOHOL (ISOPROPANOL) CAS# 67-63-0
PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:
ISOPROPYL ALCOHOL (ISOPROPANOL; 2-PROPANOL):
400 PPM (980 MG/M3) OSHA TWA; 500 PPM (1225 MG/M3) OSHA STEL
400 PPM (980 MG/M3) ACGIH TWA; 500 PPM (1225 MG/M3) ACGIH STEL
400 PPM NIOSH RECOMMENDED 10 HOUR TWA;
800 PPM NIOSH RECOMMENDED 15 MINUTE CEILING

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS LIQUID WITH AN ODOR OF ALCOHOL.

BOILING POINT: 180 F (82 C) MELTING POINT: -129 F (-89 C)

SPECIFIC GRAVITY: 0.7855 EVAPORATION RATE: (BUTYL ACETATE=1)

2.88

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VOLATILITY: 100%

SOLUBILITY IN WATER: SOLUBLE

VAPOR DENSITY: 2.1

VAPOR PRESSURE: 40 MMHG @ 24 C

ODOR-THRESHOLD: 40-45 PPM

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN ALCOHOL, ETHER, CHLOROFORM, ACETONE, BENZENE; INSOLUBLE IN SALT SOLUTIONS.

OTHER PHYSICAL DATA
VISCOSITY: 2.1 CPS @ 25 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: 53 F (12 C) (CC)

UPPER EXPLOSION LIMIT: 12.7% @ 93 C

LOWER EXPLOSION LIMIT: 2.0%

AUTOIGNITION TEMP.: 750 F (399 C)

FLAMMABILITY CLASS (OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR ALCOHOL-RESISTANT FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL-RESISTANT FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

ALCOHOL FOAM
(NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1984).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 26).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG, SOLID STREAMS MAY NOT BE EFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS, KEEP UPWIND.

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WATER MAY BE INEFFECTIVE (NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1984)

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.125
EXCEPTIONS: 49 CFR 173.118

TOXICITY

ISOPROPYL ALCOHOL (ISOPROPANOL; 2-PROPANOL):
IRRITATION DATA: 500 MG SKIN-RABBIT MILD; 16 MG EYE-RABBIT; 10 MG EYE-RABBIT MODERATE; 100 MG/24 HOURS EYE-RABBIT MODERATE.
TOXICITY DATA: 12,800 PPM/3 HOURS INHALATION-MOUSE LCLO; 16,000 PPM/4 HOURS INHALATION-RAT LCLO; 12,800 MG/KG SKIN-RABBIT LD50; 5272 MG/KG ORAL-MAN LDLO; 14,432 MG/KG ORAL-MAN TDLO; 3570 MG/KG ORAL-HUMAN LDLO; 223 MG/KG ORAL-HUMAN TDLO; 5045 MG/KG ORAL-RAT LD50; 3600 MG/KG ORAL-MOUSE LD50; 6410 MG/KG ORAL-RABBIT LD50; 4797 MG/KG ORAL-DOG LD50; 6000 MG/KG SUBCUTANEOUS-MOUSE LDLO; 6 MG/KG SUBCUTANEOUS-MAMMAL LDLO; 1088 MG/KG INTRAVENOUS-RAT LD50; 1509 MG/KG INTRAVENOUS-MOUSE LD50; 1184 MG/KG INTRAVENOUS-RABBIT LD50; 1963 MG/KG INTRAVENOUS-CAT LDLO; 5120 MG/KG INTRAVENOUS-DOG LDLO; 2735 MG/KG INTRAPERITONEAL-RAT LD50; 4477 MG/KG INTRAPERITONEAL-MOUSE LD50; 667 MG/KG INTRAPERITONEAL-RABBIT LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL INADEQUATE EVIDENCE (IARC GROUP-3). STRONG ACID MANUFACTURING PROCESS: KNOWN HUMAN CARCINOGEN (NTP); HUMAN SUFFICIENT EVIDENCE (IARC GROUP-1). WORKERS INVOLVED IN THE MANUFACTURE OF ISOPROPYL ALCOHOL BY THE STRONG-ACID PROCESS, INVOLVING THE FORMATION OF ISOPROPYL OILS, SHOWED AN INCREASE IN PARANASAL AND LARYNGEAL CANCERS.
LOCAL EFFECTS: IRRITANT- INHALATION, EYE.
ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INGESTION, DERMAL ABSORPTION.
TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING SKIN DISORDERS; IMPAIRED LIVER, RENAL AND/OR PULMONARY FUNCTION.
ADDITIONAL INFORMATION: POTENTIATES THE EFFECT OF CARBON TETRACHLORIDE AND OTHER HEPATOTOXIC CHLORINATED ALIPHATIC HYDROCARBONS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
ISOPROPYL ALCOHOL (ISOPROPANOL; 2-PROPANOL):
IRRITANT/NARCOTIC. 12,000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

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ACUTE EXPOSURE- HUMAN SUBJECTS EXPOSED TO 400 PPM FOR 3-5 MINUTES HAD MILD IRRITATION OF THE NOSE AND THROAT. AT 800 PPM THE IRRITATION WAS NOT SEVERE BUT UNCOMFORTABLE. HIGHER CONCENTRATIONS MAY CAUSE EFFECTS AS DETAILED IN ACUTE INGESTION. THE LENGTH OF TIME REQUIRED TO PRODUCE DEEP NARCOSIS IN ANIMALS WAS INVERSELY PROPORTIONAL TO THE CONCENTRATION: THE ONSET OF DEEP NARCOSIS RANGED FROM 460 MINUTES AT 3250 PPM TO 100 MINUTES AT 24,500 PPM.

CHRONIC EXPOSURE- MICE SUBJECTED TO 10900 PPM ISOPROPYL ALCOHOL IN AIR FOR ABOUT 4 HOURS/DAY UNTIL THEY HAD ACCUMULATED 123 HOURS OF EXPOSURE WERE NARCOTIZED BUT SURVIVED. REVERSIBLE FATTY CHANGES WERE OBSERVED IN THE LIVER. MALE MICE EXPOSED TO EITHER 1000 OR 5000 PPM OF ISOPROPYL ALCOHOL VAPOR FOR 6 HOURS A DAY FOR 9 EXPOSURES EXHIBITED HYALINE DROPLET NEPHROPATHY. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS. THERE HAS BEEN AN INCREASED INCIDENCE OF CANCER OF THE PARANASAL SINUSES, AND POSSIBLY OF THE LARYNX, IN THE MANUFACTURE OF ISOPROPYL ALCOHOL BY THE STRONG ACID PROCESS, INVOLVING THE FORMATION OF ISOPROPYL OILS. IT IS NOT CLEAR WHICH SUBSTANCES ARE RESPONSIBLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
ISOPROPYL ALCOHOL (ISOPROPANOL; 2-PROPANOL):
NARCOTIC.

ACUTE EXPOSURE- CONTACT WITH THE SKIN MAY CAUSE SLIGHT IRRITATION. CONTACT DERMATITIS HAS BEEN REPORTED IN A FEW SENSITIVE INDIVIDUALS. SUBSTANCE MAY BE DERMALLY ABSORBED RESULTING IN SYSTEMIC TOXICITY AS DETAILED IN ACUTE INGESTION. TOXIC EFFECTS MAY BECOME MORE MARKED IF ABSORPTION AND INHALATION OCCUR CONCURRENTLY.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS DUE TO THE DEFATTING ACTION ON THE SKIN. REPEATED AND PROLONGED EXPOSURE TO THE SKIN OF RABBITS CAUSED SLIGHT ERYTHEMA, DRYING, AND SUPERFICIAL DESQUAMATION.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
ISOPROPYL ALCOHOL (ISOPROPANOL; 2-PROPANOL):
IRRITANT.

ACUTE EXPOSURE- 400-800 PPM MAY CAUSE IRRITATION. IN RABBIT EYES, A DROP CAUSED MILD TRANSITORY INJURY AND A 50% AQUEOUS SOLUTION AFTER 3 MINUTES CAUSED MODERATE IRRITATION. CONTACT WITH A 70% SOLUTION CAUSED CONJUNCTIVITIS, IRITIS, AND CORNEAL OPACITY.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO VAPORS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
ISOPROPYL ALCOHOL (ISOPROPANOL; 2-PROPANOL):
NARCOTIC.

ACUTE EXPOSURE- INGESTION MAY CAUSE ABDOMINAL PAIN, HEMATEMESIS, NAUSEA, VOMITING, AND HEMORRHAGE. CENTRAL NERVOUS SYSTEM DEPRESSION MAY OCCUR WITH

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HEADACHE, DIZZINESS, FLUSHING, INCOORDINATION, STUPOR, CONFUSION, HYPOTENSION, AREFLEXIA, AND REFRACTORY NARCOSIS. OLIGURIA FOLLOWED BY DIURESIS AND COMA MAY ALSO OCCUR. OTHER SYMPTOMS MAY INCLUDE HYPOGLYCEMIA, TENDERNESS AND EDEMA OF MUSCLES, AND ARRHYTHMIAS. VOMITING WITH ASPIRATION MAY CAUSE ASPIRATION PNEUMONIA. DEPRESSED RESPIRATION AND DEATH DUE TO RESPIRATORY PARALYSIS MAY OCCUR IN A FEW HOURS AFTER EXPOSURE. SEVERE AND PROLONGED SHOCK MAY LEAD TO SERIOUS OR FATAL RENAL DAMAGE AFTER SEVERAL DAYS. PATHOLOGIC FINDINGS HAVE INCLUDED EXTENSIVE HEMORRHAGIC TRACHEOBRONCHITIS, BRONCHOPNEUMONIA AND HEMORRHAGIC PULMONARY EDEMA.

CHRONIC EXPOSURE- NO ADVERSE EFFECTS RESULTED IN HUMANS FOLLOWING DAILY INGESTION OF 2.6 AND 6.4 MG/KG FOR 6 WEEKS. RATS THAT INGESTED 0.5 TO 10.0% ISOPROPYL ALCOHOL IN DRINKING WATER FOR 27 WEEKS SHOWED DECREASED BODY WEIGHT. PROLONGED ORAL ADMINISTRATION IN RABBITS PRODUCED ANESTHESIA AND DEATH. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- IN RESPIRATORY DEPRESSION, GIVE OXYGEN BY ARTIFICIAL RESPIRATION. GIVE ACTIVATED CHARCOAL. GASTRIC LAVAGE WITH PROTECTED AIRWAY IS USEFUL EVEN IF DELAYED. DO NOT ATTEMPT EMESIS IF RESPIRATION IS DEPRESSED. MAINTAIN BLOOD PRESSURE. TREATMENT SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.) GET MEDICAL ATTENTION.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:
ISOPROPYL ALCOHOL (ISOPROPANOL; 2-PROPANOL):
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES. MAY SLOWLY PEROXIDISE ON EXPOSURE TO AIR UNDER NORMAL STORAGE CONDITIONS. AN EXPLOSION HAZARD MAY EXIST IF THE SUBSTANCE IS DISTILLED OR ALLOWED TO EVAPORATE TO DRYNESS.

INCOMPATIBILITIES:
ISOPROPYL ALCOHOL (ISOPROPANOL; 2-PROPANOL):
ALUMINUM: DISSOLUTION IS EXOTHERMIC.
BARIUM PERCHLORATE: FORMATION OF EXPLOSIVE COMPOUND.
2-BUTANONE (METHYL ETHYL KETONE): ACCELERATES THE PEROXIDATION OF THE ALCOHOL.
CHROMIUM TRIOXIDE (GRANULAR): IGNITION.
COATINGS: MAY BE ATTACKED.
DIOXYGENYL TETRAFLUOROBORATE: IGNITION AT AMBIENT TEMPERATURES.
HYDROGEN + PALLADIUM (PARTICLES): IGNITION ON EXPOSURE TO AIR.
HYDROGEN PEROXIDE: FORMATION OF EXPLOSIVE COMPOUND.
KETONES: MARKEDLY INCREASES THE POSSIBILITY OF PEROXIDATION.
NITROFORM (TRINITROMETHANE): DISSOLVES LIBERATING HEAT AND POSSIBLY EXPLODING.
OLEUM: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
OXYGEN (GAS): AUTOXIDATION, ON EXPOSURE TO LIGHT, RESULTS IN FORMATION OF KETONES AND POTENTIALLY EXPLOSIVE HYDROGEN PEROXIDE.
PHOSGENE: IN THE PRESENCE OF IRON SALTS, MAY EXPLODE.
PLASTICS: MAY BE ATTACKED.
POTASSIUM TERT-BUTOXIDE: IGNITION.
RUBBER: MAY BE ATTACKED.
SODIUM DICHROMATE + SULFURIC ACID: EXOTHERMIC REACTION WITH POSSIBLE

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INCANDESCENCE.
SEE ALSO ALCOHOLS.

ALCOHOLS:
ACETALDEHYDE: VIOLENT CONDENSATION REACTION.
BARIUM PERCHLORATE: FORMATION OF HIGHLY EXPLOSIVE PERCHLORIC ESTER ON REFLUXING.
CHLORINE: FORMATION OF HIGHLY EXPLOSIVE ALKYL HYPOCHLORITES.
DIETHYL ALUMINUM BROMIDE: SPONTANEOUS IGNITION.
ETHYLENE OXIDE: POSSIBLE EXPLOSION.
HEXAMETHYLENE DIISOCYANATE: POSSIBLE EXPLOSION IN ABSENCE OF SOLVENT.
HYDROGEN PEROXIDE + SULFURIC ACID: POSSIBLE EXPLOSION.
HYPOCHLOROUS ACID: FORMATION OF HIGHLY EXPLOSIVE ALKYL HYPOCHLORITES.
ISOCYANATES: POSSIBLE EXPLOSION IN ABSENCE OF SOLVENT.
LITHIUM ALUMINUM HYDRIDE: VIGOROUS REACTION.
NITROGEN TETROXIDE: POSSIBLE EXPLOSION.
PERCHLORIC ACID (HOT): DANGEROUS INTERACTION.
PERMONOSULFURIC ACID: POSSIBLE EXPLOSION ON CONTACT WITH PRIMARY OR SECONDARY ALCOHOLS.
TRI-ISO-BUTYL ALUMINUM: VIOLENT REACTION.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

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

STORAGE-DISPOSAL

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

STORAGE

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

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AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE AND POISONOUS; DO NOT ALLOW UNNECESSARY PERSONNEL IN AREA. DO NOT OVERHEAT CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE AND TRAVEL A CONSIDERABLE DISTANCE IN HEAT OF FIRE.

SPILLS AND LEAKS

OCCUPATIONAL-SPILL:
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:
THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ISOPROPYL ALCOHOL:

1000 PPM- ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S).

10,000 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

12,000 PPM- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

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

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN

MSDS # 1279

PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

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

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

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 02/26/85 REVISION DATE: 10/09/90

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MSDS #1484.

MATERIAL SAFETY DATA SHEET OHS21080

OCCUPATIONAL HEALTH SERVICES, INC.
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EMERGENCY CONTACT:
JOHN S. BRANSFORD, JR. (615) 292-1180

SUBSTANCE IDENTIFICATION

CAS-NUMBER 497-19-8
RTEC-NUMBER VZ4050000

SUBSTANCE: SODIUM CARBONATE

TRADE NAMES/SYNONYMS:
CARBONIC ACID, DISODIUM SALT: BISODIUM CARBONATE: CALCINED SODA: CARBONIC ACID SODIUM SALT: CARBONIC ACID SODIUM SALT (1:2): DISODIUM CARBONATE: NA-X: SODA: SODA ASH: S-261: S-262: S-263: S-264: S-281: S-495: S-636: OHS21080

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: C-03.2NA MOLECULAR WEIGHT: 105.99

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=0 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=0 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: SODIUM CARBONATE PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS TO WHITE, HYGROSCOPIC CRYSTALLINE POWDER, SMALL CRYSTALS, OR GRANULES WITH AN ALKALINE TASTE.

BOILING POINT: DECOMPOSES MELTING POINT: 1564 F (851 C)

SPECIFIC GRAVITY: 2.536 SOLUBILITY IN WATER: 7.1% @ 0 C

PH: 11.5 @ 1% AQ SOLN

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN GLYCEROL; INSOLUBLE IN ALCOHOL, ACETONE

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

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FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

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

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

TOXICITY

SODIUM CARBONATE:
ANHYDROUS: 500 MG/24 HOURS SKIN-RABBIT MILD IRRITATION; 100 MG/24 HOURS EYE-RABBIT MODERATE IRRITATION; 100 MG RINSED EYE-RABBIT MILD IRRITATION; 4090 MG/KG ORAL-RAT LD50; 2300 MG/M3/2 HOURS INHALATION-RAT LC50; 1200 MG/M3/2 HOURS INHALATION-MOUSE LC50; 2210 MG/KG SUBCUTANEOUS-MOUSE LD50; 117 MG/KG INTRAPERITONEAL-MOUSE LD50; 800 MG/M3/2 HOURS INHALATION-GUINEA PIG LC50; REPRODUCTIVE EFFECTS DATA (RTECS).
MONOHYDRATE: NO DATA AVAILABLE.
DECAHYDRATE: NO DATA AVAILABLE.
CARCINOGEN STATUS: NONE.
SODIUM CARBONATE IS TOXIC AND A SEVERE EYE, SKIN, AND MUCOUS MEMBRANE IRRITANT.

HEALTH EFFECTS AND FIRST AID

INHALATION:
SODIUM CARBONATE:
IRRITANT/TOXIC.
ACUTE EXPOSURE- DUSTS OR VAPORS MAY CAUSE MUCOUS MEMBRANE IRRITATION WITH COUGHING, SHORTNESS OF BREATH, AND GASTROINTESTINAL CHANGES. EXPOSURE TO 1200 MG/M3/2 HOURS WAS THE LETHAL CONCENTRATION IN MICE TESTED.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE PERFORATION OF THE NASAL SEPTUM. EXPOSURE TO A CONCENTRATION OF 10 TO 20 MG/M3 OF A 2% AQUEOUS SOLUTION OF SODIUM CARBONATE FOR 4 HOURS/DAY, 5 DAYS/WEEK, FOR 3 AND A HALF MONTHS CAUSED NO PRONOUNCED EFFECTS IN MALE MICE. HOWEVER, AT HIGHER CONCENTRATIONS, A DECREASE IN WEIGHT GAIN WAS RECORDED. HISTOLOGICAL EXAMINATIONS SHOWED THICKENING OF THE INTRA-ALVEOLAR WALLS, HYPEREMIA, LYMPHOID INFILTRATION, AND DESQUAMATION OF THE LUNGS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
SODIUM CARBONATE:
IRRITANT.

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ACUTE EXPOSURE- CONTACT MAY CAUSE IRRITATION AND REDNESS. CONCENTRATED SOLUTIONS MAY CAUSE ERYTHEMA, BLISTERING AND SKIN NECROSIS. 500 MG APPLIED TO RABBIT SKIN FOR 24 HOURS PRODUCED MILD IRRITATION. A SINGLE APPLICATION OF A 50% WEIGHT BY VOLUME AQUEOUS SOLUTION OF SODIUM CARBONATE TO INTACT SKIN OF RABBITS, GUINEA PIGS, AND HUMANS SHOWED NO ERYTHEMA, EDEMA, OR CORROSION. HOWEVER, WHEN APPLIED TO ABRADED SKIN, MODERATE ERYTHEMA AND EDEMA RESULTED IN RABBITS AND HUMANS, WITH NEGLIGIBLE EFFECTS IN GUINEA PIGS. IN ONE-THIRD OF THE HUMAN VOLUNTEERS, TISSUE DESTRUCTION WAS SEEN AT THE ABRADED SITES.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS AND POSSIBLE "SODA ULCERS" OF THE HANDS AND WRISTS. SENSITIVITY REACTIONS MAY OCCUR FROM REPEATED EXPOSURES.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
SODIUM CARBONATE:
IRRITANT.

ACUTE EXPOSURE- CONTACT WITH DUSTS MAY CAUSE SEVERE IRRITATION WITH REDNESS, PAIN, AND BLURRED VISION. APPLICATION OF 100 MG TO RABBIT EYES AND THEN RINSED CAUSED ONLY MILD IRRITATION. IN SOLUTION, SODIUM CARBONATE IS SUFFICIENTLY ALKALINE TO DAMAGE THE CORNEAL EPITHELIUM, BUT IF PROMPTLY WASHED FROM THE EYES WITH WATER IT IS UNLIKELY TO CAUSE PERMANENT DAMAGE TO THE CORNEAL STROMA. AN APPLICATION OF SEVERAL DROPS OF A 10% SOLUTION (PH 10.7) TO A RABBIT'S EYE FOLLOWED BY IRRIGATION WITH WATER FOR 30 SECONDS CAUSED NO DETECTABLE INJURY. CONCENTRATED SOLUTIONS MAY CAUSE NECROSIS OF THE EYE.

CHRONIC EXPOSURE- DEPENDING UPON CONCENTRATION AND DURATION, SYMPTOMS MAY BE THOSE AS FOR ACUTE EXPOSURE.

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

INGESTION:
SODIUM CARBONATE:
CORROSIVE.

ACUTE EXPOSURE- INGESTION MAY CAUSE CORROSION OF THE GASTRIC MUCOSA WITH SORE THROAT AND PAIN. IT MAY CAUSE GASTROINTESTINAL DISTURBANCES SUCH AS NAUSEA, VOMITING, ABDOMINAL PAIN, AND DIARRHEA. DEATH IS GENERALLY DUE TO CIRCULATORY COLLAPSE. THE ESTIMATED LETHAL HUMAN DOSE IS APPROXIMATELY 30 GRAMS.

CHRONIC EXPOSURE- SODIUM CARBONATE IS USED AS A GENERAL PURPOSE FOOD ADDITIVE. NO ADVERSE EFFECTS HAVE BEEN REPORTED FROM EXPOSURE TO SMALL AMOUNTS.

FIRST AID- DILUTE THE ALKALI BY GIVING WATER OR MILK IMMEDIATELY AND ALLOW VOMITING TO OCCUR. AVOID GASTRIC LAVAGE OR EMETICS. ESOPHAGOSCOPY IS THE ONLY WAY TO EXCLUDE THE POSSIBLITY OF CORROSION IN THE UPPER GASTROINTESTINAL TRACT; IF CORROSION IS SUSPECTED, ESOPHAGOSCOPY SHOULD USUALLY BE PERFORMED WITHIN 24 HOURS. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). MAINTAIN AIRWAY AND TREAT SHOCK. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

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NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:
REACTS WITH WATER WITH THE EVOLUTION OF HEAT.

INCOMPATIBILITIES:
SODIUM CARBONATE:
- ACIDS (STRONG): MAY REACT VIOLENTLY.
- ALUMINUM (HOT): EXPLOSIVE REACTION.
- AMMONIA + SILVER NITRATE: EXPLOSIVE REACTION UPON HEATING.
- AN AROMATIC AMINE + A CHLORONITRO COMPOUND: EXOTHERMIC REACTION.
- 2,4-DINITROTOLUENE: INCREASES EXPLOSIVENESS.
- FLUORINE: VIOLENT IGNITION.
- LITHIUM (BURNING): RELEASES REACTIVE SODIUM.
- PHOSPHORUS PENTOXIDE: HIGHLY EXOTHERMIC REACTION.
- SODIUM SULFIDE (HOT): EXPLOSIVE REACTION ON CONTACT WITH WATER.
- SULFURIC ACID: VIOLENT ERUPTION.
- 2,4,6-TRINITROTOLUENE: REDUCED EXPLOSION TEMPERATURE.
- ZINC: CORROSIVE.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC SODIUM OXIDE AND TOXIC OXIDES OF CARBON.

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

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

NONE REPORTED.

SPILLS AND LEAKS

MSDS # 1484

OCCUPATIONAL-SPILL:
SWEEP UP AND PLACE IN SUITABLE (FIBERBOARD) CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON THE CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON THE DATA FOUND IN THE PHYSICAL DATA, HEALTH EFFECTS AND TOXICITY SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION:

DUST AND MIST RESPIRATOR WITH A FULL FACEPIECE.

AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND HIGH-EFFICIENCY PARTICULATE FILTER.

TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

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

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

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

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT

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CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

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

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 12/19/84 REVISION DATE: 03/22/89

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MATERIAL SAFETY DATA SHEET OHS12880

MSDS # 1614

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 554-13-2
RTEC-NUMBER OJ5800000

SUBSTANCE: LITHIUM CARBONATE

TRADE NAMES/SYNONYMS:
CARBONIC ACID, DILITHIUM SALT: DILITHIUM CARBONATE: CARBONIC ACID, LITHIUM SALT: LITHIUM CARBONATE (LI2CO3): CARBOLITH: ESKALITH: HYPNOREX: LITHONATE: LITHOTABS: PLENUR: L-119: CLI203: OHS12880

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: LI2-C-03 MOLECULAR WEIGHT: 73.89

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: LITHIUM CARBONATE PERCENT: 100

EXPOSURE LIMIT:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: WHITE CRYSTALLINE POWDER.

BOILING POINT: 2390 F (1310 C)
(DECOMPOSES)

MELTING POINT: 1333 F (723 C)

SPECIFIC GRAVITY: 2.11

SOLUBILITY IN WATER: 1.54% @ 0 C

PH: 11.2 @ 1% SOLUTION

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
INSOLUBLE IN ALCOHOL, ACETONE, AMMONIA.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

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'IREFIGHTING MEDIA:
:XTINGUISH USING AGENT SUITABLE FOR TYPE OF SURROUNDING FIRE.

FIREFIGHTING:
'O ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING
VAPORS OR DUSTS; KEEP UPWIND.

TOXICITY

LITHIUM CARBONATE:
'111 MG/KG ORAL-HUMAN TDLO; 54 MG/KG ORAL-MAN TDLO; 8 MG/KG ORAL-MAN TDLO;
'080 MG/KG/13 WEEKS INTERMITTENT ORAL-MAN TDLO; 120 MG/KG/10 DAYS INTERMITTENT
,RAL-WOMAN TDLO; 525 MG/KG ORAL-RAT LD50; 531 MG/KG ORAL-MOUSE LD50;
556 MG/KG/32 DAYS UNREPORTED-WOMAN TDLO; 500 MG/KG ORAL-DOG LD50; 156 MG/KG
INTRAPERITONEAL-RAT LD50; 241 MG/KG INTRAVENOUS-RAT LD50; 434 MG/KG
SUBCUTANEOUS-RAT LD50; 236 MG/KG INTRAPERITONEAL-MOUSE LD50; 497 MG/KG
'NTRAVENOUS-MOUSE LD50; 413 MG/KG SUBCUTANEOUS-MOUSE LD50; MUTAGENIC DATA
RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
LITHIUM CARBONATE IS AN EYE IRRITANT AND MAY IRRITATE THE SKIN AND
MUCOUS MEMBRANES. POISONING MAY AFFECT THE NERVOUS SYSTEM, KIDNEYS AND
THYROID. PERSONS AT INCREASED RISK FROM EXPOSURE MAY INCLUDE INDIVIDUALS
WITH SIGNIFICANT CARDIOVASCULAR OR RENAL DISEASE; SODIUM AND WATER
IMBALANCE; AND PREEXISTING HYPOTHYROIDISM. TASKS REQUIRING ALERTNESS
MAY BE IMPAIRED.

HEALTH EFFECTS AND FIRST AID

INHALATION:
LITHIUM CARBONATE:
ACUTE EXPOSURE- INHALATION MAY CAUSE COUGHING, SORE THROAT AND IRRITATION.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

'IRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING
HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST.
TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
LITHIUM CARBONATE:
ACUTE EXPOSURE- APPLICATION OF 0.5 GRAMS TO RABBIT SKIN UNDER OCCLUSIVE
WRAP FOR 4 HOURS PRODUCED MINIMAL IRRITATION. A GRADE OF 0.3 ON
A SCALE OF 0 TO 8 WAS REPORTED FOLLOWING A 30 MINUTE INTERVAL AFTER
THE SKIN WAS RINSED. ONE RABBIT IN THE STUDY HAD SLIGHT ERYTHEMA
ON DAYS 1-4 FOLLOWING THE EXPOSURE.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

'IRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED
AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO
EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL
ATTENTION IMMEDIATELY.

YE CONTACT:

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LITHIUM CARBONATE:
IRRITANT.
ACUTE EXPOSURE- INSTILLATION OF 0.10 GRAMS INTO RABBIT EYES PRODUCED MODERATE IRRITATION. SLIGHT TO MILD CORNEAL OPACITIES, IRITIS, SLIGHT TO MODERATE CONJUNCTIVITIS, HEMORRHAGES AND WHITE AREAS ON THE CONJUNCTIVA WERE NOTED. A GRADE OF 41 ON A SCALE OF 0-110 WAS REPORTED AFTER 24 HOURS. NO EFFECTS WERE NOTED BY DAY 7 OF THE STUDY. WASHING THE EYES WITH TAP WATER SHORTLY AFTER EXPOSURE DECREASED BOTH THE SEVERITY AND DURATION OF EFFECTS WITH RECOVERY OCCURRING IN 4 DAYS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
LITHIUM CARBONATE:
ACUTE EXPOSURE- INGESTION OF A LARGE DOSE MAY CAUSE SEVERE GASTROENTERITIS AND EFFECTS ON THE CENTRAL NERVOUS SYSTEM, RENAL FUNCTION AND FLUID AND ELECTROLYTE BALANCE. SYMPTOMS, POSSIBLY DELAYED, MAY INCLUDE NAUSEA, VOMITING, THIRST, ANOREXIA, DIARRHEA, BLURRED VISION, DROWSINESS, WEAKNESS, TREMOR, STAGGERING, BRADYCARDIA AND COMA. MORE UNUSUAL REACTIONS MAY INCLUDE DELIRIUM WITH EEG CHANGES, ACTION MYOCLONUS, RHABDOMYOLYSIS, ECG CHANGES, GLYCOSURIA, AND ALLERGIC ERYTHEMA. A PAINFUL DISCOLORATION OF THE FINGERS AND TOES AND COLDNESS OF THE EXTREMITIES WITHIN 1 DAY OF THERAPEUTIC USE HAS BEEN REPORTED. IN SEVERE CASES, DEATH MAY OCCUR DUE TO RENAL FAILURE OR CARDIAC OR PULMONARY COMPLICATIONS. SOME SURVIVORS MAY HAVE LONG-LASTING OR PERMANENT SEQUELAE, MOSTLY OF CEREBELLAR NATURE BUT, SOMETIMES WITH PERIPHERAL NEUROPATHY OR PARKINSONISM.
CHRONIC EXPOSURE- REPEATED OR PROLONGED INGESTION MAY CAUSE SYMPTOMS AS DETAILED IN ACUTE INGESTION. IN ADDITION, A METALLIC TASTE, DRY MOUTH, EXCESSIVE THIRST, ABDOMINAL PAIN AND INCONTINENCE OF URINE AND FECES MAY OCCUR. NERVOUS SYSTEM EFFECTS MAY INCLUDE A DAZED FEELING, CONFUSION, GIDDINESS, MENTAL LAPSES, DYSPRAXIA, DROWSINESS, VERTIGO, HEADACHE, APATHY, RESTLESSNESS, ANXIETY, SOME SUPPRESSION OF THE REM PHASES OF SLEEP, POSITIVE ROMBERG SIGN, BLACKOUT SPELLS, STUPOR, TINNITUS, AND UNCONSCIOUSNESS. NEUROLOGIC ASYMMETRY, PSYCHOMOTOR RETARDATION, SLURRED SPEECH, NYSTAGMUS AND EPILEPTIFORM SEIZURES MAY OCCUR. PSEUDOTUMOR CEREBRI (INCREASED INTRACRANIAL PRESSURE AND PAPILLEDEMA) HAS BEEN REPORTED AND MAY POSSIBLY RESULT IN ENLARGEMENT OF THE BLIND SPOT, CONSTRICTION OF VISUAL FIELDS AND EVENTUAL BLINDNESS DUE TO OPTIC ATROPHY. PHOTOPHOBIA HAS BEEN REPORTED. MUSCULAR EFFECTS MAY INCLUDE TREMORS, ATAXIA, MUSCULAR AND REFLEX HYPERIRRITABILITY WITH FASCICULATIONS, TWITCHING AND SPASTIC OR CHOREO-ATHETOTIC MOVEMENTS, COGWHEEL RIGIDITY, PARKINSONISM AND DYSTONIA. TWO CASES INVOLVING SEVERE GENERALIZED SENSORIMOTOR PERIPHERAL NEUROPATHY HAVE BEEN REPORTED. CARDIAC ARRHYTHMIAS, HYPOTENSION, PERIPHERAL CIRCULATORY COLLAPSE, AND INTERSTITIAL MYOCARDITIS ARE POSSIBLE. LEUKOCYTOSIS IS FAIRLY COMMON. ENDOCRINE EFFECTS MAY INCLUDE DISTURBED IODINE METABOLISM, STIMULATION OF ANTITHYROIDAL AUTO-ANTIBODIES, HYPOTHYROIDISM WITH MYXEDEMA, OR RARELY HYPERTHYROIDISM. OSTEOPOROSIS, AN INCREASE IN SERUM TOTAL CALCIUM, IONIZED CALCIUM AND PARATHYROID HORMONE AND INDEPENDENTLY FUNCTIONING PARATHYROID ADENOMAS HAVE BEEN REPORTED. TRANSITORY NEPHROTIC SYNDROME AND ACQUIRED NEPHROGENIC DIABETES INSIPIDUS MAY OCCUR. TRANSIENT HYPERGLYCEMIA, LOWERED URINARY CONCENTRATING ABILITY LEADING TO HYPERNATREMIA AND HYPEROSMOLALITY, SODIUM DEPLETION, POLYURIA,

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GLYCOSURIA, OLIGURIA, ANURIA, AND AZOTEMIA ARE POSSIBLE. MORPHOLOGIC CHANGES WITH GLOMERULAR AND INTERSTITIAL FIBROSIS AND NEPHRON ATROPHY HAVE BEEN REPORTED. HOWEVER, A CAUSAL RELATIONSHIP HAS NOT BEEN ESTABLISHED. DERMATOLOGIC EFFECTS MAY INCLUDE CUTANEOUS HYPERALGESIA OR ANESTHESIA, XEROSIS CUTIS, CHRONIC FOLLICULITIS, GENERALIZED PRURITUS WITH OR WITHOUT RASH, DEVELOPMENT OR EXACERBATION OF ACNE OR PSORIASIS, CUTANEOUS ULCERS AND ALOPECIA. HYPER- OR HYPOTHERMIA, WEIGHT GAIN, EDEMA OF THE ANKLES AND WRISTS, AND SEXUAL DYSFUNCTION HAVE BEEN REPORTED. DEATH MAY OCCUR DUE TO RENAL FAILURE, BRAIN DAMAGE OR PULMONARY COMPLICATIONS. LITHIUM READILY CROSSES THE PLACENTAL BARRIER AND IS EXCRETED IN BREAST MILK. THE USE OF LITHIUM IN PREGNANCY HAS BEEN ASSOCIATED WITH NEONATAL GOITER, CARDIAC ANOMALIES, ESPECIALLY EBSTEIN'S, CENTRAL NERVOUS SYSTEM DEPRESSION AND HYPOTONIA. MARKED FUNCTIONAL AND STRUCTURAL CHANGES IN THE KIDNEYS OF NEWBORN RATS EXPOSED TO LITHIUM VIA THEIR MOTHER'S MILK HAVE BEEN REPORTED. ADVERSE EFFECTS ON NIDATION IN RATS AND EMBRYO VIABILITY IN MICE HAVE BEEN ATTRIBUTED TO LITHIUM, AS HAVE TERATOGENICITY IN SUBMAMMALIAN SPECIES AND CLEFT PALATES IN MICE. HOWEVER, OTHER STUDIES IN RATS, RABBITS AND MONKEYS HAVE SHOWN NO EVIDENCE OF LITHIUM-INDUCED DEVELOPMENTAL DEFECTS. LEUKEMIA HAS BEEN REPORTED DURING LITHIUM TREATMENT. HOWEVER, AN EPIDEMIOLOGIC STUDY INVOLVING A POPULATION OF 173,000 PERSONS YEILDED NEGATIVE RESULTS.

IRST AID- IF VICTIM IS CONSCIOUS AND PRODUCTIVE VOMITING HAS NOT ALREADY OCCURRED, REMOVE POISON BY IPECAC EMESIS OR GASTRIC LAVAGE. (GOSSELIN, SMITH AND HODGE, CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS, 5TH EDITION) MAINTAIN AIRWAY, RESPIRATION AND BLOOD PRESSURE. GET MEDICAL ATTENTION. ADMINISTRATION OF GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

NTIDOTE:
O SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

EACTIVITY:
TABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

NCOMPATIBILITIES:
ITHIUM CARBONATE:
ACIDS (DILUTE): DECOMPOSES.
ACIDS (STRONG): MAY REACT VIOLENTLY.
FLUORINE: DECOMPOSES WITH INCANDESCENCE.
METALS: MAY BE CORROSIVE IN THE PRESCENCE OF MOISTURE.

ECOMPOSITION:
HERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

OLYMERIZATION:
AZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL EMPERATURES AND PRESSURES.

STORAGE-DISPOSAL

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

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

PREVENT DISPERSION OF DUST IN AIR.

SPILLS AND LEAKS

OCCUPATIONAL-SPILL:
FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

DUST AND MIST RESPIRATOR.

AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER.

POWERED AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

TYPE 'C' SUPPLIED-AIR RESPIRATOR OPERATED IN THE PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE OR CONTINUOUS-FLOW MODE.

SELF-CONTAINED BREATHING APPARATUS.

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

MSDS # 1614.

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

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

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

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS UBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 10/23/84 REVISION DATE: 06/27/89

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MATERIAL SAFETY DATA SHEET OHS19290 MSDS # 2875

OCCUPATIONAL HEALTH SERVICES, INC.
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NEW YORK, NEW YORK 10123
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EMERGENCY CONTACT:
JOHN S. BRANSFORD, JR. (615) 292-1180

SUBSTANCE IDENTIFICATION

CAS-NUMBER 584-08-7
RTEC-NUMBER TS7750000

SUBSTANCE: POTASSIUM CARBONATE

TRADE NAMES/SYNONYMS:
CARBONIC ACID, DIPOTASSIUM SALT: SALT OF TARTAR: POTASH: PEARL ASH:
DIPOTASSIUM CARBONATE: OHS19290

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: C-03.2K MOLECULAR WEIGHT: 138.21

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=0 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=0 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: POTASSIUM CARBONATE PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS, HYGROSCOPIC, MONOCLINIC CRYSTALS, GRANULES OR POWDER WITH A STRONG ALKALINE TASTE.

BOILING POINT: DECOMPOSES MELTING POINT: 1636 F (891 C)

SPECIFIC GRAVITY: 2.428 SOLUBILITY IN WATER: 112% @ 20 C

PH: 11.6

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
INSOLUBLE IN ALCOHOL, ACETONE, ETHYL ALCOHOL

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

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FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. DO NOT SCATTER SPILLED MATERIAL WITH MORE WATER THAN NEEDED FOR FIRE CONTROL. DIKE FIRE CONTROL WATER FOR LATER DISPOSAL

USE AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING HAZARDOUS VAPORS, KEEP UPWIND.

TOXICITY

POTASSIUM CARBONATE:
TOXICITY DATA:
ANHYDROUS: 1870 MG/KG ORAL-RAT LD50; 100 MG/KG ORAL-WILD BIRD LD50.
SESQUIHYDRATE: NO DATA AVAILABLE.
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYES.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION.
TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
POTASSIUM CARBONATE:
IRRITANT.
ACUTE EXPOSURE- INHALATION OF DUSTS MAY CAUSE MUCOUS MEMBRANE EFFECTS INCLUDING COUGH, PAINFUL THROAT AND NASAL IRRITATION. SUPERFICIAL DESTRUCTION OF THE MUCOUS MEMBRANES MAY OCCUR.
CHRONIC EXPOSURE- PROLONGED INHALATION OF ALKALINE MATERIALS MAY PRODUCE LESIONS OF THE NASAL SEPTUM.

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

SKIN CONTACT:
POTASSIUM CARBONATE:
IRRITANT.
ACUTE EXPOSURE- DIRECT CONTACT MAY PRODUCE STRONG IRRITATION AND SUPERFICIAL DESTRUCTION OF THE SKIN. DEPENDING UPON THE DURATION OF CONTACT; BURNS MAY OCCUR.
CHRONIC EXPOSURE- PROLONGED CONTACT WITH CARBONATE SOLUTIONS MAY CAUSE ECZEMA, DERMATITIS AND ULCERATION. CONTACT WITH BAGGED CARBONATES MAY CAUSE CHERRY-SIZED NECROTIC PORTIONS OF THE SKIN. SUBSEQUENT DEEP

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ULCERATED PITTING OF THE SKIN IS SOMETIMES OBSERVED.

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

EYE CONTACT:
POTASSIUM CARBONATE:
IRRITANT.
ACUTE EXPOSURE- CONTACT WITH DUSTS MAY CAUSE IRRITATION. EXPERIMENTAL IRRIGATION OF THE SURFACE OF THE EYES OF RABBITS WITH A 10% SOLUTION AT PH 11.6 FOR 30 SECONDS CAUSED PAIN AND VERY SLIGHT TRANSIENT OPTICAL IRREGULARITY OF THE EPITHELIUM. HOWEVER, 1 TO 2 HOURS LATER THE CORNEAS AND CONJUNCTIVA APPEARED NORMAL UPON EXAMINATION. CONCENTRATED ALKALIES MAY CAUSE CONJUNCTIVAL EDEMA AND CORNEAL DESTRUCTION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE CONJUNCTIVITIS.

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

INGESTION:
POTASSIUM CARBONATE:
ACUTE EXPOSURE- THE ESTIMATED FATAL DOSE FOR POTASSIUM CARBONATE IS 20 GRAMS. INGESTION OF A STRONG ALKALI MAY CAUSE SEVERE PAIN, VOMITING, DIARRHEA, AND COLLAPSE. THE VOMITUS MAY CONTAIN BLOOD AND DESQUAMATED MUCOSAL LINING. IF DEATH DOES NOT OCCUR IN THE FIRST 24 HOURS, THE PATIENT MAY IMPROVE FOR 2-4 DAYS AND THEN HAVE A SUDDEN ONSET OF SEVERE ABDOMINAL PAIN, BOARDLIKE ABDOMINAL RIGIDITY, AND RAPID FALL OF BLOOD PRESSURE INDICATING DELAYED GASTRIC OR ESOPHAGEAL PERFORATION. EVEN THOUGH THE PATIENT RECOVERS FROM THE IMMEDIATE DAMAGE, ESOPHAGEAL STRICTURE CAN OCCUR WEEKS, MONTHS, OR EVEN YEARS LATER TO MAKE SWALLOWING DIFFICULT. APPROXIMATELY 25% OF THOSE WHO INGEST STRONG ALKALI DIE FROM THE IMMEDIATE EFFECTS. DAMAGE TO THE ESOPHAGUS AND STOMACH AFTER INGESTION MAY PROGRESS FOR 2-3 WEEKS. DEATH FROM PERITONITIS MAY OCCUR AS LATE AS 1 MONTH AFTER INGESTION. APPROXIMATELY 95% OF THOSE WHO INGEST STRONG ALKALI AND RECOVER FROM THE IMMEDIATE EFFECTS HAVE PERSISTENT ESOPHAGEAL STRICTURE.
CHRONIC EXPOSURE- IN A STUDY FOR THE FOOD AND DRUG ADMINISTRATION, POTASSIUM CARBONATE WAS FOUND TO BE NONTERATOGENIC IN MICE WHEN THEY WERE GIVEN DAILY ORAL INTUBATIONS OF UP TO 290 MG/KG ON DAYS 6-15 OF GESTATION.

FIRST AID- DILUTE THE ALKALI BY GIVING WATER OR MILK IMMEDIATELY AND ALLOW VOMITING TO OCCUR. AVOID GASTRIC LAVAGE OR EMETICS. ESOPHAGOSCOPY IS THE ONLY WAY TO EXCLUDE THE POSSIBLITY OF CORROSION IN THE UPPER GASTROINTESTINAL TRACT; IF CORROSION IS SUSPECTED, ESOPHAGOSCOPY SHOULD USUALLY BE PERFORMED WITHIN 24 HOURS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). MAINTAIN AIRWAY AND TREAT SHOCK. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

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REACTIVITY SECTION

REACTIVITY:
REACTS WITH WATER WITH THE EVOLUTION OF HEAT.

INCOMPATIBILITIES:
POTASSIUM CARBONATE:
ACIDS: EXOTHERMIC REACTION.
CARBON: POSSIBLE EXPLOSION ON HEATING.
CHLORINE TRIFLUORIDE: VIOLENT REACTION WITH IGNITION.
MAGNESIUM: FORMATION OF EXPLOSIVE COMPOUND ON HEATING.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

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

STORAGE-DISPOSAL

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

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

NONE REPORTED.

SPILLS AND LEAKS

OCCUPATIONAL-SPILL:
NO SPECIAL PRECAUTIONS INDICATED.

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN

MSDS #2875

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

DUST AND MIST RESPIRATOR WITH A FULL FACEPIECE.

AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND HIGH-EFFICIENCY PARTICULATE FILTER.

TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

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

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

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

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

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

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

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 12/08/86 REVISION DATE: 12/20/89

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MATERIAL SAFETY DATA SHEET OHS14280

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1-800-445-MSDS (1-800-445-6737) OR 1-212-789-3535

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

MSDS # 1329

SUBSTANCE IDENTIFICATION

CAS-NUMBER 67-56-1
RTEC-NUMBER PC1400000

SUBSTANCE: METHYL ALCOHOL

TRADE NAMES/SYNONYMS:
METHANOL: WOOD ALCOHOL: METHYL HYDROXIDE: CARBINOL: MONOHYDROXYMETHANE: WOOD SPIRIT: WOOD NAPHTHA: METHYLOL: COLONIAL SPIRIT: COLUMBIAN SPIRIT: PYROXYLIC SPIRIT: BOOSTER FUEL (HENES PRODUCT CORP.): METHANOL (ELECTROKLEIN) (ROK): METHANOL, SPECTRO QUALITY (MCB MANF. CHEMIST): COULOMATIC (R) CONDITIONER SOLUTION: STANDARD WATER IN METHANOL: STCC 4904230: RCRA U154: UN 1230: CH4O: OHS14280

CHEMICAL FAMILY:
HYDROXYL, ALIPHATIC

MOLECULAR FORMULA: C-H3-O-H MOLECULAR WEIGHT: 32.04

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: METHYL ALCOHOL (METHANOL) CAS# 67-56-1 PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:
METHYL ALCOHOL (METHANOL):
200 PPM (260 MG/M3) OSHA TWA (SKIN); 250 PPM (325 MG/M3) OSHA STEL
200 PPM (260 MG/M3) ACGIH TWA (SKIN); 250 PPM (310 MG/M3) ACGIH STEL
200 PPM NIOSH RECOMMENDED 10 HOUR TWA;
800 PPM NIOSH RECOMMENDED 15 MINUTE CEILING

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH A CHARACTERISTIC ALCOHOLIC ODOR.

BOILING POINT: 149 F (65 C) MELTING POINT: -137 F (-94 C)

SPECIFIC GRAVITY: 0.7914 EVAPORATION RATE: (BUTYL ACETATE=1) 4.6

VISCOSITY: 0.59 CPS @ 20 C

SOLUBILITY IN WATER: VERY SOLUBLE

VAPOR DENSITY: 1.11

VAPOR PRESSURE: 97.25 MMHG @ 20 C

ODOR-THRESHOLD: 100 PPM

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OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN ETHER, BENZENE, ALCOHOL, ACETONE,
CHLOROFORM, ETHANOL, KETONES AND MOST OTHER ORGANIC SOLVENTS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT, FLAME, OR OXIDIZERS.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: 52 F (11 C) (CC)

UPPER EXPLOSION LIMIT: 36.0%

LOWER EXPLOSION LIMIT: 6.0%

AUTOIGNITION TEMP.: 725 F (385 C)

FLAMMABILITY CLASS (OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR ALCOHOL-RESISTANT FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL-RESISTANT FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. DIKE FIRE-CONTROL WATER FOR LATER DISPOSAL; DO NOT SCATTER THE MATERIAL. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 28).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG, SOLID STREAMS MAY NOT BE EFFECTIVE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING TOXIC VAPORS, KEEP UPWIND.

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.119
EXCEPTIONS: 49 CFR 173.118

MSDS # 1329

TOXICITY

METHYL ALCOHOL (METHANOL):
IRRITATION DATA: 20 MG/24 HOURS SKIN-RABBIT MODERATE; 40 MG EYE-RABBIT MODERATE; 100 MG/24 HOURS EYE-RABBIT MODERATE.
TOXICITY DATA: 86,000 MG/M3 INHALATION-HUMAN TCLO; 300 PPM INHALATION-HUMAN TCLO; 64,000 PPM/4 HOURS INHALATION-RAT LC50; 1000 PPM INHALATION-MONKEY LCLO; 50 GM/M3/2 HOURS INHALATION-MOUSE LCLO; 44,000 MG/M3/6 HOURS INHALATION-CAT LCLO; 15,800 MG/KG SKIN-RABBIT LD50; 393 MG/KG SKIN-MONKEY LDLO; 428 MG/KG ORAL-HUMAN LDLO; 143 MG/KG ORAL-HUMAN LDLO; 6422 MG/KG ORAL-MAN LDLO; 3429 MG/KG ORAL-MAN TDLO; 4 GM/KG ORAL-WOMAN TDLO; 7 GM/KG ORAL-MONKEY LD50; 5628 MG/KG ORAL-RAT LD50; 7300 MG/KG ORAL-MOUSE LD50; 14,200 MG/KG ORAL-RABBIT LD50; 7500 MG/KG ORAL-DOG LDLO; 9800 MG/KG SUBCUTANEOUS-MOUSE LD50; 2131 MG/KG INTRAVENOUS-RAT LD50; 4710 MG/KG INTRAVENOUS-MOUSE LD50; 8907 MG/KG INTRAVENOUS-RABBIT LD50; 7529 MG/KG INTRAPERITONEAL-RAT LD50; 10,765 MG/KG INTRAPERITONEAL-MOUSE LD50; 1826 MG/KG INTRAPERITONEAL-RABBIT LD50; 868 MG/KG UNREPORTED-MAN LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT- SKIN, EYE.
ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INHALATION, DERMAL ABSORPTION, INGESTION.
TARGET EFFECTS: NEUROTOXIN; CENTRAL NERVOUS SYSTEM DEPRESSANT.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH KIDNEY, EYE OR SKIN DISORDERS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
METHYL ALCOHOL (METHANOL):
NARCOTIC/NEUROTOXIN. 25,000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- MAY CAUSE IRRITATION OF THE MUCOUS MEMBRANES, COUGHING, OPPRESSION IN THE CHEST, TRACHEITIS, BRONCHITIS, TINNITUS, UNSTEADY GAIT, TWITCHING, COLIC, CONSTIPATION, NYSTAGMUS, AND BLEPHAROSPASM. SYMPTOMS FROM OCCUPATIONAL EXPOSURE INCLUDE PARESTHESIAS, NUMBNESS AND SHOOTING PAINS IN THE HANDS AND FOREARMS. METABOLIC ACIDOSIS, AND EFFECTS ON THE EYES AND CENTRAL NERVOUS SYSTEM MAY OCCUR AS DETAILED IN ACUTE INGESTION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE EFFECTS AS IN ACUTE INGESTION. REPEATED EXPOSURE TO 200-375 PPM CAUSED RECURRENT HEADACHES IN WORKERS. EXPOSURE FOR 4 YEARS TO 1200-8000 PPM RESULTED IN MARKED DIMINUTION OF VISION AND ENLARGEMENT OF THE LIVER IN A WORKMAN. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

MSDS # 1329

METHYL ALCOHOL (METHANOL):
IRRITANT/NARCOTIC/NEUROTOXIN.
ACUTE EXPOSURE- CONTACT WITH LIQUID MAY CAUSE IRRITATION. SKIN ABSORPTION MAY OCCUR AND CAUSE METABOLIC ACIDOSIS AND EFFECTS ON THE EYES AND CENTRAL NERVOUS SYSTEM AS DETAILED IN ACUTE INGESTION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH THE LIQUID MAY CAUSE DEFATTING OF THE SKIN RESULTING IN ERYTHEMA, SCALING, AND ECZEMATOID DERMATITIS. CHRONIC ABSORPTION MAY RESULT METABOLIC ACIDOSIS AND EFFECTS AS DETAILED IN ACUTE INGESTION.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
METHYL ALCOHOL (METHANOL):
IRRITANT.
ACUTE EXPOSURE- VAPORS MAY CAUSE IRRITATION. HIGH CONCENTRATIONS HAVE BEEN REPORTED TO CAUSE VIOLENT INFLAMMATION OF THE CONJUNCTIVA AND EPITHELIAL DEFECTS ON THE CORNEA. MILD IRRITATION MAY OCCUR WITH DILUTE SOLUTIONS; THE UNDILUTED LIQUID HAS PRODUCED MODERATE CORNEAL OPACITY AND CONJUNCTIVAL REDNESS IN RABBITS. APPLICATION OF A DROP OF METHANOL IN RABBIT EYES CAUSED A MILD REVERSIBLE REACTION, GRADED 3 ON A SCALE OF 1-10 AFTER 24 HOURS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
METHYL ALCOHOL (METHANOL):
NARCOTIC/NEUROTOXIN.
ACUTE EXPOSURE- MAY CAUSE MILD AND TRANSIENT INEBRIATION AND SUBSEQUENT DROWSINESS FOLLOWED BY AN ASYMPTOMATIC PERIOD LASTING 8-48 HOURS. FOLLOWING THE DELAY, COUGHING, DYSPNEA, HEADACHE, DULLNESS, WEAKNESS, VERTIGO OR DIZZINESS, NAUSEA, VOMITING, OCCASIONAL DIARRHEA, ANOREXIA, VIOLENT PAIN IN THE BACK, ABDOMEN, AND EXTREMITIES, RESTLESSNESS, APATHY OR DELIUIUM, AND RARELY, EXCITEMENT AND MANIA MAY OCCUR. RAPID, SHALLOW RESPIRATION DUE TO METABOLIC ACIDOSIS, COLD AND CLAMMY SKIN, HYPOTENSION, CYANOSIS, OPISTHOTONOS, CONVULSIONS, MILD TACHYCARDIA, CARDIAC DEPRESSION, PERIPHERAL NEURITIS, CEREBRAL AND PULMONARY EDEMA, UNCONSCIOUSNESS, AND COMA ARE POSSIBLE. EFFECTS ON THE EYE MAY INCLUDE OPTIC NEURITIS, BLURRED OR DIMMED VISION, DILATED, UNRESPONSIVE PUPILS, PTOSIS, EYE PAIN, CONCENTRIC CONSTRICTION OF VISUAL FIELDS, DIPLOPIA, CHANGE IN COLOR PERCEPTION, PHOTOPHOBIA, AND OPTIC NERVE ATROPHY. PARTIAL BLINDNESS OR POSSIBLY DELAYED TRANSIENT OR PERMANENT BLINDNESS MAY OCCUR. BILATERAL SENSORINEURAL DEAFNESS HAS BEEN REPORTED IN A SINGLE CASE. LIVER, KIDNEY, HEART, STOMACH, INTESTINAL AND PANCREATIC DAMAGE MAY ALSO OCCUR. DEATH MAY BE DUE TO RESPIRATORY FAILURE OR RARELY FROM CIRCULATORY COLLAPSE. AS LITTLE AS 15 ML HAS CAUSED BLINDNESS; THE USUAL FATAL DOSE IS 60-240 ML. PROLONGED ASTHENIA AND IRREVERSIBLE EFFECTS ON THE NERVOUS SYSTEM INCLUDING DIFFICULTY IN SPEECH, MOTOR DYSFUNCTION WITH RIGIDITY, SPASTICITY, AND HYPOKINESIS HAVE BEEN REPORTED.
CHRONIC EXPOSURE- REPEATED INGESTION MAY CAUSE VISUAL IMPAIRMENT AND BLINDNESS AND OTHER SYSTEMIC EFFECTS AS DETAILED IN ACUTE INGESTION. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

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FIRST AID- IF INGESTION OF METHANOL IS DISCOVERED WITHIN 2 HOURS, GIVE SYRUP OF IPECAC. LAVAGE THOROUGHLY WITH 2-4 L OF TAP WATER WITH SODIUM BICARBONATE (20 G/L) ADDED. GET MEDICAL ATTENTION IMMEDIATELY. LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL (DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

ANTIDOTE:
THE FOLLOWING ANTIDOTE(S) HAVE BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

METHANOL POISONING:
GIVE ETHANOL, 50% (100 PROOF), 1.5 ML/KG ORALLY INITIALLY, DILUTED TO NOT MORE THAN 5% SOLUTION, FOLLOWED BY 0.5-1.0 ML/KG EVERY 2 HOURS ORALLY OR INTRAVENOUSLY FOR 4 DAYS IN ORDER TO REDUCE METABOLISM OF METHANOL AND TO ALLOW TIME FOR ITS EXCRETION. BLOOD ETHANOL LEVEL SHOULD BE IN THE RANGE OF 1-1.5 MG/ML (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ORAL OR INTRAVENOUS ADMINISTRATION OF 4-METHYLPYRAZOLE INHIBITS ALCOHOL DEHYDROGENASE AND HAS BEEN USED EFFECTIVELY AS AN ANTIDOTE FOR METHANOL OR ETHYLENE GLYCOL POISONING (ELLENHORN AND BARCELOUX, MEDICAL TOXICOLOGY).

REACTIVITY SECTION

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
METHYL ALCOHOL (METHANOL):
- ACETYL BROMIDE: VIOLENT REACTION WITH FORMATION OF HYDROGEN BROMIDE.
- ALKYLALUMINUM SOLUTIONS: VIOLENT REACTION.
- ALUMINUM: CORRODES.
- BARIUM PERCHLORATE: DISTILLATION YIELDS HIGHLY EXPLOSIVE ALKYL PERCHLORATE.
- BERYLLIUM HYDRIDE: VIOLENT REACTION, EVEN AT -196 C.
- BROMINE: VIGOROUSLY EXOTHERMIC REACTION.
- CALCIUM CARBIDE: VIOLENT REACTION.
- CHLORINE: POSSIBLE IGNITION AND EXPLOSION HAZARD.
- CHLOROFORM AND SODIUM HYDROXIDE: EXPLOSIVE REACTION.
- CHROMIUM TRIOXIDE (CHROMIC ANHYDRIDE): POSSIBLE IGNITION.
- CYANURIC CHLORIDE: VIOLENT REACTION.
- DICHLOROMETHANE: POSSIBLE IGNITION AND EXPLOSION.
- DIETHYL ZINC: POSSIBLE IGNITION AND EXPLOSION.
- HYDROGEN PEROXIDE + WATER: EXPLOSION HAZARD.
- IODINE + ETHANOL + MERCURIC OXIDE: EXPLOSION HAZARD.
- LEAD: CORRODES.
- LEAD PERCHLORATE: EXPLOSION HAZARD.
- MAGNESIUM: VIOLENT REACTION.
- MAGNESIUM (POWDERED): MIXTURES ARE CAPABLE OF DETONATION.
- METALS: INCOMPATIBLE.
- NICKEL: POSSIBLE IGNITION IN THE PRESENCE OF NICKEL CATALYST.
- NITRIC ACID (CONCENTRATED): MIXTURES OF GREATER THAN 25% ACID MAY DECOMPOSE VIOLENTLY.
- OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
- PERCHLORIC ACID: EXPLOSION HAZARD.
- PHOSPHOROUS TRIOXIDE: POSSIBLE VIOLENT REACTION AND IGNITION.
- PLASTICS, RUBBER, COATINGS: MAY BE ATTACKED.

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POTASSIUM: POSSIBLE DANGEROUS REACTION.
POTASSIUM HYDROXIDE + CHLOROFORM: EXOTHERMIC REACTION.
POTASSIUM TERT-BUTOXIDE: FIRE AND EXPLOSION HAZARD.
SODIUM + CHLOROFORM: POSSIBLE EXPLOSION.
SODIUM HYPOCHLORITE: EXPLOSION HAZARD.
SODIUM METHOXIDE + CHLOROFORM: VIOLENT REACTION.
SULFURIC ACID: FIRE AND EXPLOSION HAZARD.
ZINC: EXPLOSION HAZARD.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

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

STORAGE-DISPOSAL

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

STORAGE

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER U154.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES OR OTHER IGNITION SOURCES. VAPORS MAY BE EXPLOSIVE. MATERIAL IS POISONOUS; AVOID INHALATION OF VAPORS OR CONTACT WITH SKIN. DO NOT ALLOW MATERIAL TO CONTAMINATE WATER SOURCES.

SPILLS AND LEAKS

SOIL-RELEASE:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

AIR-RELEASE:

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APPLY WATER SPRAY TO KNOCK DOWN VAPORS.

WATER-SPILL:
ALLOW SPILLED MATERIAL TO AERATE.

LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

OCCUPATIONAL-SPILL:
SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:
THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

METHYL ALCOHOL (METHANOL):

2000 PPM- ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

5000 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

10,000 PPM- ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

25,000 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS. MSDS # 132

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

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

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

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

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

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 09/25/84 REVISION DATE: 10/09/90

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MSDS # 2687

ATTN: SAFETY DIRECTOR
BATTELLE NORTHWEST
PACIFIC NORTHWEST LABS
ACCOUNTS PAYABLE
P O BOX 999
RICHLAND WA 99352

DATE: 03/24/98
CUST # 130508 P.O. # V8423AR8

MATERIAL SAFETY DATA SHEET

PAGE:

IDENTIFICATION

PRODUCT # 16499-2 NAME: SODIUM METHOXIDE, ANHYDROUS POWDER
CAS # 124-41-4

TOXICITY HAZARDS

RTECS # PC3570000
METHANOL, SODIUM SALT
REVIEWS, STANDARDS, AND REGULATIONS
EPA TSCA CHEMICAL INVENTORY, 1986

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATI

HEALTH HAZARD DATA

ACUTE EFFECTS
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
MATERIAL 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.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.
FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.

PHYSICAL DATA

MELTING POINT: >300 C
VAPOR DENSITY: 1.1
VAPOR PRESSURE: 50.0 MM @ 20 C
96.0 MM @ 25 C

FIRE AND EXPLOSION HAZARD DATA

LOWER EXPLOSION LEVEL: 7.3%
UPPER EXPLOSION LEVEL: 36%

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MSDS #2687

M A T E R I A L S A F E T Y D A T A S H E E T PAGE:

CATALOG # 16499-2 NAME: SODIUM METHOXIDE, ANHYDROUS POWDER

EXTINGUISHING MEDIA
DRY CHEMICAL POWDER.
DO NOT USE WATER.
SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
FLAMMABLE SOLID.
UNUSUAL FIRE AND EXPLOSION HAZARDS
THIS MATERIAL, LIKE MOST MATERIALS IN POWDER FORM, IS CAPABLE OF CREATING A DUST EXPLOSION.
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

---------- REACTIVITY DATA ----------

INCOMPATIBILITIES
CHLORINATED SOLVENTS
MAY DECOMPOSE ON EXPOSURE TO MOIST AIR OR WATER.
REACTS VIOLENTLY WITH:
ACIDS
WATER
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE

---------- SPILL OR LEAK PROCEDURES ----------

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
EVACUATE AREA.
SHUT OFF ALL SOURCES OF IGNITION.
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
WEAR DISPOSABLE COVERALLS AND DISCARD THEM AFTER USE.
COVER WITH DRY-LIME, SAND, OR SODA ASH. PLACE IN COVERED CONTAINERS USING NON-SPARKING TOOLS AND TRANSPORT OUTDOORS.
AVOID RAISING DUST.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
WASTE DISPOSAL METHOD
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 & LOCAL LAWS.

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---

CHEMICAL SAFETY GOGGLES.
LONG RUBBER OR NEOPRENE GAUNTLET GLOVES.
NIOSH/MSHA-APPROVED RESPIRATOR.
SAFETY SHOWER AND EYE BATH.
USE ONLY IN A CHEMICAL FUME HOOD.
USE NONSPARKING TOOLS.
DO NOT BREATHE DUST.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.
CORROSIVE.
KEEP TIGHTLY CLOSED.
KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.
MOISTURE-SENSITIVE.
STORE IN A COOL DRY PLACE.

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M A T E R I A L S A F E T Y D A T A S H E E T PAGE:

CATALOG # 16499-2 NAME: SODIUM METHOXIDE, ANHYDROUS POWDER

---------- ADDITIONAL PRECAUTIONS AND COMMENTS ---------

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APPENDIX D

PERSONNEL TRAINING

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D.1 COMPANY - GENERAL RULES

Title: Generator Hazards Safety Training

Description: Provides the dangerous material/waste worker with the fundamentals for safe use and disposal of dangerous materials.

Target Audience: Dangerous material and waste workers

Technique: Classroom

Evaluation: Written test

Length: 4 hours

Frequency: 24 months

Title: Hazardous Waste Worker Safety Training

Description: Provides the dangerous waste worker with the fundamentals of safety when working with dangerous waste.

Note: This course fulfills training requirements of 29 CFR 1910.120 requiring dangerous waste training of workers at all treatment, storage, and/or disposal facilities regulated under RCRA.

Target Audience: Dangerous material and waste workers

Technique: Classroom and on-the-job training

Evaluation: Written test

Length: 24 hours

Frequency: Not applicable

Title:	Hazardous Waste Worker Safety Training Refresher
Description:	Provides the dangerous waste worker with a refresher in the fundamentals of safety when working with dangerous waste.
Note:	This course fulfills training requirements of 29 CFR 1910.120 requiring dangerous waste training of workers at all treatment, storage, and/or disposal facilities regulated under RCRA.
Target Audience:	Dangerous material and waste workers
Technique:	Classroom
Evaluation:	Written test
Length:	8 hours
Frequency:	12 months

Title:	Hazardous Material/Waste job-Specific Training
Description:	Provides job-specific dangerous material/waste information. Two checklists may be obtained from safety training to help the supervisor/manager through this session with each employee.
Note:	Not a classroom presentation--supervisor conducts this exercise with each employee using the checklists.
Target Audience:	Employees who complete generator hazards safety training
Technique:	On-the-job training
Evaluation:	On-the-job training checklist
Length:	Average - 2 hours
Frequency:	12 months

Title:	Scott SKA PAK[a] MSA PAPR[b]
Description:	This class is designed to instruct employees in the proper use of the Scott "SKA-PAK" for entry, exit or work in conditions immediately dangerous to life and health and to instruct employees to recognize and handle emergencies. This class also includes instructions in the use of MSA PAPR.
Target Audience:	General, Safety, QA, OPS/OPRS, Management, Maintenance
Engineering Technique:	Classroom
Evaluation:	Practical exam
Length:	Approximately 2 hours
Frequency:	12 months

Title:	Self-Contained Breathing Apparatus (SCBA) Annual Qualification
Description:	Provides instructions in the proper use of a pressure-demand respirator in which breathing air is supplied from a cylinder carried on the user's back. The SCBA are typically used for emergency response situations in an atmosphere that is immediately dangerous to life or health.
Target Audience:	General, Safety, OPS/OPRS, Maintenance
Technique:	Taught in a classroom using a slide projector and overhead
Evaluation:	Written and practical test
Length:	Approximately 4 hours
Frequency:	12 months

[a]Trademark of Scott Aviation, Lancaster, New York.

[b]Trademark of Mine Safety Appliance Company, Pittsburgh, Pennsylvania.

Title:	Radiation Safety Training
Description:	A practical dress/undress demonstration is also required. Instructs radiation workers in the fundamentals of radiation protection and the proper procedures for monitoring exposures (ALARA). Training includes knowledge of the acute and chronic effects of exposure to radiation risks associated with occupational radiation exposure, mode of exposure, protective measures, instrumentation, monitoring programs, contamination control, personnel decontamination, warning signs and alarms, and responsibilities of employees and managers.
Target Audience:	Radiation workers as defined in WHC-CM-4-10
Technique:	Taught in a classroom using a white board, appropriate audio/visual equipment
Evaluation:	Written exam and practical dress/undress
Length:	Approximately 7 hours
Frequency:	24 months (Retraining under Course Number 020003)

Title:	On-The-Job Training
Description:	On-the-job training session under the supervision of an experienced person before full responsibilities may be assumed. In addition, all personnel on the hazardous waste site are required to have reviewed this Waste Sampling and Analysis Plan.
Target Audience:	Nuclear Operators and Operations Management
Technique:	Classroom and on-the-job training
Evaluation:	Practical exercise and on-the-job training checklist
Length:	40 hours
Frequency:	12 months

Title:	Cardiopulmonary Resuscitation (CPR)
Description:	Provide cardiopulmonary Resuscitation training to American Heart Association standards
Target Audience:	Hazardous Waste Worker
Technique:	Classroom and active participation
Length:	4 hours
Frequency:	24 months (recertification)

Title:	Noise Control (Noise-Hearing Conservation)
Description:	Provide employees with information conducive to hearing conservation. Supervisors and employees responsibility, exposure limits, hearing conservation requirements, protection devices, diagnosis of noise, induced hearing loss.
Target Audience:	All employees exposed to an 8 hour time weighted average sound level of 85 dBA or greater.
Technique:	Classroom
Length:	Approximately 1 hour
Frequency:	12 months

Title:	Fire Extinguisher Safety Orientation
Description:	Provides a description of the types of fire extinguishers and fire classes, proper extinguisher for proper fire class and demonstrates proper use of fire extinguishers.
Target Audience:	All personnel
Technique:	Classroom
Evaluation:	None
Length:	0.5 hours
Frequency:	12 months

Title:	Hazardous Waste Site Supervisor/Manager Safety Management Training
Description:	This program provides an additional eight hours of training for supervisors and managers covering hazardous waste programs.
Target Audience:	Personnel who manage or have safety overview responsibilities of dangerous material and waste operations
Technique:	Classroom
Evaluation:	None
Length:	8 hours
Frequency:	Not applicable

APPENDIX E

QUALITY ASSURANCE PROJECT PLAN FOR FACILITY AND SOIL SAMPLING AT THE 3718-F ALKALI METAL TREATMENT AND STORAGE FACILITY

GLOSSARY . . . . . E-iii

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GLOSSARY

Accuracy: For the purposes of closure activities, accuracy may be interpreted as the measure of the bias in a system. Sampling accuracy is normally assessed through the evaluation of matrix spiked samples and reference samples.

Audit: For the purposes of closure activities, audits are considered to be systematic checks to verify the quality of operation of one or more elements of the total measurement system. In this sense, audits may be of two types: (1) performance audits, in which quantitative data are independently obtained for comparison with data routinely obtained in a measurement system, or (2) system audits, involving a qualitative onsite evaluation of laboratories or other organizational elements of the measurement system for compliance with established quality assurance program and procedure requirements. For closure activities at the Hanford Site, performance audit requirements are fulfilled by periodic submittal of blind samples to the primary laboratory, or the analysis of split samples by an independent laboratory. System audit requirements are implemented through the use of standard surveillance procedures.

Blind Sample: A blind sample refers to any type of sample routed to the primary laboratory, for purposes of auditing performance, relative to a particular sample matrix and analytical method. Blind samples are not specifically identified as such to the laboratory; they may be made from traceable standards, or may consist of sample material spiked with a known concentration of a known compound. See the glossary entry for audit.

Comparability: For the purposes of closure activities, comparability is an expression of the relative confidence with which one data set may be compared with another.

Completeness: For the purposes of closure activities, completeness may be interpreted as a qualitative parameter expressing the percentage of measurements judged to be valid.

Deviation: For the purpose of closure activities, deviation refers to a planned departure from established criteria that may be required as a result of unforeseen field situations or that may be required to correct ambiguities in procedures that may arise in practical applications.

Equipment Blanks: Equipment blanks consist of pure deionized, distilled water washed through decontaminated sampling equipment and placed in containers identical to those used for actual field samples; they are used to verify the adequacy of sampling equipment decontamination procedures, and are collected once each day.

Field Blanks: Field blanks consist of pure deionized, distilled water, transferred to a sample container at the site and preserved with the reagent specified for the analytes of interest; they are used to check for possible contamination originating with the reagent or the sampling environment, and are normally collected once each day.

Wipe sample field blanks will consist of filter paper pads that have been laboratory-prepared with the appropriate solution and placed in a sampling container. The blanks will be analyzed to determine if contaminants were introduced by the pads or preparation solution.

Field Duplicate Sample: Field duplicate samples are samples retrieved from the same sampling location using the same equipment and sampling technique, placed in separate identically prepared and preserved containers, and analyzed independently. Field duplicate samples are generally used to verify the repeatability or reproducability of analytical data, and are normally analyzed with each analytical batch or 10% of the total collected samples, whichever is greater.

Wipe duplicate samples will consist of one confirmatory wipe sample taken from each of the gridded areas as an indication of the thoroughness of the wiping technique. The sample will be taken by wiping the previously wiped area a second time.

Matrix Spiked Samples: Matrix spiked samples are a type of laboratory quality control sample; they are prepared by splitting a sample received from the field into two homogenous aliquots (i.e., replicate samples), and adding a known quantity of a representative analyte of interest to one aliquot in order to calculate percentage of recovery.

Nonconformance: A nonconformance is a deficiency in characteristic, documentation, or procedure that renders the quality of material, equipment, services, or activities unacceptable or indeterminate. When the deficiency is of a minor nature, does not effect a permanent or significant change in quality if it is not corrected, and can be brought into conformance with immediate corrective action, it shall not be categorized as a nonconformance. However, if the nature of the condition is such that it cannot be immediately and satisfactorily corrected, it shall be documented in compliance with approved procedures and brought to the attention of management for disposition and appropriate corrective action.

Precision: Precision is a measure of the repeatability or reproducability of specific measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is normally expressed in terms of standard deviation, but may be also expressed as the coefficient of variation (i.e., relative standard deviation) and range (i.e., maximum value minus minimum value). Precision is assessed by means of duplicate/replicate sample analysis.

Quality Assurance: For the purposes of closure activities, quality assurance (QA) refers to the total integrated quality planning, quality control, quality assessment, and corrective action activities that collectively ensure that the data from monitoring and analysis meets all end user requirements and/or the intended end use of the data.

Quality Assurance Project Plan: The Quality Assurance Project Plan (QAPP) is an orderly assembly of management policies, project objectives, methods, and procedures that defines how data of known quality will be produced for a particular project or investigation.

Quality Control: For the purposes of closure activities, quality control (QC) refers to the routine application of procedures and defined methods to the performance of sampling, measurement, and analytical processes.

Reference Samples: Reference samples are a type of laboratory quality control sample prepared from an independent, traceable standard at a concentration other than that used for analytical equipment calibration, but within the calibration range. Such reference samples are required for every analytical batch or every 20 samples, whichever is greater.

Replicate Sample: Replicate samples are two aliquots removed from the same sample container in the laboratory and analyzed independently.

Representativeness: For the purposes of closure activities, representativeness may be interpreted as the degree to which data accurately and precisely represent a characteristic of a population parameter, variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter which is most concerned with the proper design of a sampling program.

Split Sample: A split sample is produced through homogenizing a field sample and separating the sample material into two equal aliquots. Field split samples are usually routed to separate laboratories for independent analysis, generally for purposes of auditing the performance of the primary laboratory relative to a particular sample matrix and analytical method. See the glossary entry for audit. In the laboratory, samples are generally split to create matrix spiked samples; see the glossary entry above.

Trip Blanks: Trip blanks are a type of field quality control sample, consisting of pure deionized, distilled water in a clean, sealed sample container, accompanying each batch of containers shipped to the sampling site and returned unopened to the laboratory. Trip blanks are used to identify any possible contamination originating from container preparation methods, shipment, handling, storage, or site conditions.

Validation: For the purposes of closure activities, validation refers to a systematic process of reviewing a body of data against a set of criteria to provide assurance that the data are acceptable for their intended use. Validation methods may include review of verification activities, editing, screening, cross-checking, or technical review.

Verification: For the purposes of closure activities, verification refers to the process of determining whether procedures, processes, data, or documentation conform to specified requirements. Verification activities may include inspections, audits, surveillances, or technical review.

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1.0 PROJECT DESCRIPTION

1.1 PROJECT OBJECTIVE

The primary purpose of the waste sampling and analysis activities at the 3718-F Alkali Metal Treatment and Storage Facility (3718-F Facility) is to evaluate contamination above action levels, if any, in the concrete floors and pads, the burn shed and scrubber system, the reaction tanks, and in the near-surface soils associated with the 3718-F Facility.

1.2 BACKGROUND INFORMATION

The location of the 3718-F Facility and general background information are provided in the 3718-F Facility closure plan.

1.3 QUALITY ASSURANCE PROJECT PLAN APPLICABILITY AND RELATIONSHIP TO THE WESTINGHOUSE HANFORD COMPANY QUALITY ASSURANCE PROGRAM

This Quality Assurance Project Plan (QAPP) applies specifically to the field sampling activities and laboratory analyses performed as part of the closure activities for the 3718-F Facility at the Hanford Site. It is designed to be implemented in conjunction with the specific requirements of the 3718-F Facility closure plan. The QAPP is prepared in compliance with the *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan* (WHC 1990). This plan describes the means selected to implement the overall quality assurance (QA) program requirements defined by the *Westinghouse Hanford Company Quality Assurance Manual* [(WHC-CM-4-2) (WHC 1989a)], as applicable to environmental investigations, while accommodating the specific requirements for project plan format and content agreed upon in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1990). The program plan contains a matrix of procedural resources [from WHC-CM-4-2 and from the *Westinghouse Hanford Environmental Investigations and Site Characterization Manual* (WHC-CM-7-7) (WHC 1989b)] that have been drawn upon to support this QAPP. This QAPP is subject to mandatory review and revision before use on subsequent phases of the investigation. Distribution and revision control of this plan shall be in compliance with procedures QR 6.0, "Document Control," and QI 6.1, "Quality Assurance Document Control," all from WHC-CM-4-2 (WHC 1989a). All plans and procedures referenced in the QAPP are available for regulatory review on request by the direction of the Technical Lead.

1.4 SAMPLING ACTIVITIES

Field sampling activities will include concrete core sampling, concrete chip sampling, wipe sampling of the sheet metal and metal surfaces, and soil sampling. A complete description of all activities is provided in Chapter 7.0 of the 3718-F Facility closure plan.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 PROJECT MANAGEMENT RESPONSIBILITIES

The Regulatory Assessment, Permitting and NEPA Function of Westinghouse Hanford Company (Westinghouse Hanford) has primary responsibilities for conducting the sampling and analysis for the 3718-F Facility closure activities. An organizational chart is included as Figure E-1. Responsibilities of key test personnel and organizations are described as follows:

- **Closure Plan Lead (Regulatory Permitting/National Environmental Protection Act Group).** The Closure Plan Lead is responsible for overall project organization and interface with the regulatory agencies and the U.S. Department of Energy (DOE).

- **Technical Lead.** The Technical Lead will be responsible for overall direction of sampling and testing activities; responsibilities include the planning and authorization of all work and management of any subcontracted activities, as well as overall technical schedule, and budgetary performance.

- **Quality Assurance Officer.** The QA Officer is responsible for coordination and/or oversight of performance to the QAPP requirements by means of internal auditing and surveillance techniques. The Quality Assurance Officer retains the necessary organizational independence and authority to identify conditions adverse to quality and to inform the Technical Lead of needed corrective action.

- **Health and Safety Officer (Environmental Division/Environmental Field Services).** The Health and Safety Officer is responsible for determining potential health and safety hazards from radioactive, volatile, and/or toxic compounds during sample handling and sampling decontamination activities and has the responsibility and authority to halt field activities caused by unacceptable health and safety hazards.

- **Field Team Leader.** The field team leader is responsible for onsite direction of sampling technicians in compliance with the requirements of the closure plan, this QAPP, and all implementing environmental investigation instructions (EII).

- **Office of Sample Management.** The Westinghouse Hanford Office of Sampling Management (OSM) is responsible for coordinating sample shipments between the field team and the analytical laboratory, resolution of any chain-of-custody issues, and for validation of all analytical data as discussed in Chapter 8.0 of the QAPP.

2.2 ANALYTICAL LABORATORIES

Soil samples shall be routed to an approved Westinghouse Hanford, participant contractor, or subcontractor laboratory, which shall be responsible for performing the analyses identified in this plan in compliance with work order or contractual requirements and Westinghouse Hanford-approved procedures, Section 4.1.2. At the Technical Lead's option, services of alternate qualified laboratories may be procured for the performance of split sample analyses for performance audit purposes. If such an option is selected, the QA plan and applicable analytical procedures from the alternate laboratory also shall be approved by Westinghouse Hanford before their use in compliance with Section 4.1.2 requirements. All analytical laboratory work shall be subject to the surveillance controls invoked by QI 7.3, "Source Surveillance and Inspection" (WHC 1989a).

2.3 OTHER SUPPORT CONTRACTORS

Procurement of other support contractors may be assigned project responsibilities at the direction of the Technical Lead. Such services shall be in compliance with standard Westinghouse Hanford procurement procedure requirements as discussed in Sections 4.1.2. All work shall be performed in compliance with Westinghouse Hanford-approved QA plans and/or procedures, subject to controls of QI 7.3, "Source Surveillance and Inspection" (WHC 1989a).

3.0 OBJECTIVES FOR MEASUREMENTS

This investigation assesses the potential contamination in the concrete pads and floors, on the burn shed walls and ceiling, on the internal surfaces of the scrubber system, on the internal surfaces of the reaction tanks, and in the associated near-surface soils. Analytical parameters for sample analysis are defined within Chapter 7.0 of the 3718-F Facility closure plan, and are contained within the master list of analytical parameters provided by Table E-1.

As noted in Section 4.6 of *Data Quality Objectives for Remedial Response Activities: Volume I, Development Process* (EPA 1987), universal goals for precision, accuracy, representativeness, completeness, and comparability cannot be practically established at the outset of an investigation. However, data are available from previously negotiated analytical contracts for Hanford Site investigations, the Data Quality Objectives guidance document (EPA 1987), and from typical capabilities currently expected for laboratories involved in environmental analyses, that may be used as minimum guidelines for the selection of analytical methods appropriate for this investigation. Table E-1 provides preliminary target values for detection limits, precision, and accuracy that are intended for use in initial procurement negotiations with the analytical laboratory that will routinely perform chemical analyses for this investigation. After an individual laboratory statement of work is negotiated, and procedures are developed and approved as noted in Section 4.1,

Table E-1 and this section shall be revised to reference approved detection limit, precision, and accuracy criteria as project requirements.

Goals for data representativeness are addressed qualitatively by the specification of sampling locations within Chapter 7.0 of the 3718-F Facility Closure Plan. Objectives for completeness for this investigation shall require that contractually or procedurally established requirements for precision and accuracy be met for at least 90 percent of the total number of requested determinations. Failure to meet this criterion shall be documented in data summary reports as described in Section 8.1, and shall be considered in the validation process discussed in Section 8.2. Corrective action measures shall be initiated by the Technical Lead, as appropriate, as noted in Chapter 13.0 of the QAPP. Approved analytical procedures shall require the use of the reporting techniques and units consistent with the U.S. Environmental Protection Agency (EPA) reference methods listed in Table E-1 to facilitate the comparability of data sets in terms of precision and accuracy.

4.0 SAMPLING PROCEDURES

4.1 PROCEDURE APPROVALS AND CONTROL

4.1.1 Westinghouse Hanford Procedures

The Westinghouse Hanford procedures that will be used to support the closure plan have been selected from the Quality Assurance Program Index included in the *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan* (WHC 1990). Selected procedures include EIIs from the *Environmental Investigations and Site Characterization Manual* (WHC 1989b), and Quality Requirements (QR) and Quality Instructions (QI), from the *Westinghouse Hanford Quality Assurance Manual* (WHC 1989a). Procedure approval, revision, and distribution control requirements applicable to EIIs are addressed in EII 1.2, "Preparation and Revision of Environmental Investigations Instructions" (WHC 1989b); requirements applicable to QIs and QRs are addressed in QR 5.0, "Instructions, Procedures, and Drawings"; QI 5.1, "Preparation of Quality Assurance Documents"; QR 6.0, "Document Control"; and QI 6.1, "Quality Assurance Document Control" (WHC 1989a). Other procedures applicable to the preparation, review, approval, and revision of OSM and other Hanford Site analytical laboratory procedures shall be as defined in the various procedures and manuals identified in *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan* (WHC 1990) under criteria 5.00 and 6.00. All procedures are available for regulatory review. Procedures not currently included in the EII manual (wipe and concrete coring procedures) will be prepared before initiation of sampling.

4.1.2 Participant Contractor/Subcontractor Procedures

As noted in Section 2.1, participant contractor and/or subcontractor services may be procured at the direction of the Technical Lead. All such procurement shall be subject to the applicable requirements of QR 4.0, "Procurement Document Control"; QI 4.1, "Procurement Document Control"; QI 4.2, "External Services Control"; QR 7.0, "Control of Purchased Items and Services"; QI 7.1, "Procurement Planning and Control"; and/or QI 7.2, "Supplier Evaluation" (WHC 1989a). Whenever such services require procedural controls, requirements for use of Westinghouse Hanford procedures, or for submittal of contractor procedures for Westinghouse Hanford review and approval before use, shall be included in the procurement document or work order, as applicable. In addition to the submittal of analytical procedures, analytical laboratories shall be required to submit the current version of their internal QA program plans. All analytical laboratory plans and procedures shall be reviewed and approved before use by qualified personnel from the OSM, Westinghouse Hanford analytical laboratories organizations, or other qualified personnel, as directed by the Technical Lead. All participant contractor or subcontractor procedures, plans, and/or manuals shall be retained as project quality records in compliance with EII 1.6, "Records Management" (WHC 1989b); QR 17.0, "Quality Assurance Records"; and QI 17.1, "Quality Assurance Records Control" (WHC 1989a). All such documents are available for regulatory review on request.

4.2 SAMPLING AND INVESTIGATIVE PROCEDURES

Soil sampling activities shall be performed in compliance with EII 5.2, "Soil and Sediment Sampling" (WHC 1989b). Soil samples shall routinely be routed to offsite analytical laboratories for chemical analyses. Additional EIIs that have been selected to support the test activity are identified in Table E-2. Presently, EIIs have not been developed for concrete core or chip sampling, or for wipe sampling. Sample identification requirements and container type, preparation, and preservation requirements shall be as specified in EII 5.2. All sampling equipment decontamination shall be in accordance with EII 5.4, "Field Decontamination of Drilling, Well Development and Sampling Equipment" (WHC 1989b) and EII 5.5, "1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment" (WHC 1989b).

4.3 PROCEDURE ADDITIONS AND CHANGES

Additional EIIs or EII updates that may be required, as a consequence of the 3718-F Facility Closure Plan requirements, shall be developed in compliance with EII 1.2, "Preparation and Revision of Environmental Investigations Instructions" (WHC 1989b). Should deviations from established EIIs be required to accommodate unforseen field situations, they may be authorized by the Field Team Leader in accordance with the requirements of EII 1.4, "Deviation from Environmental Investigation Instructions" (WHC 1989b). Documentation, review, and disposition of instruction change authorization forms are defined within EII 1.4. Other types of document change requests shall be completed as required by the Westinghouse Hanford procedures governing their preparation and revision.

5.0 SAMPLE CUSTODY

All samples obtained during the implementation of the sampling and analysis plan shall be controlled as required by EII 5.1 "Chain of Custody," (WHC 1989b) from the point of origin to the analytical laboratory. Laboratory chain-of-custody procedures shall be reviewed and approved as required by Westinghouse Hanford procurement control procedures as noted in Section 4.1, and shall ensure the maintenance of sample integrity and identification throughout the analytical process. At the direction of the Technical Lead, requirements for return of residual sample materials after completion of analysis shall be defined in accordance with those procedures defined in the procurement documentation to subcontractor or participant contractor laboratories. Chain-of-custody forms shall be initiated for returned residual samples as required by the approved procedures applicable within the participating laboratory. Results of analyses shall be traceable to original samples through the unique code or identifier specified in Section 4.0. All results of analyses shall be controlled as permanent project quality records as required by QR 17.0, "Quality Assurance Records" (WHC 1989a) and EII 1.6, "Records Management" (WHC 1989b).

6.0 CALIBRATION PROCEDURES

Calibration of all Westinghouse Hanford measuring and test equipment, whether in existing inventory or newly purchased, shall be controlled as required by QR 12.0, "Control of Measuring and Test Equipment"; QI 12.1, "Acquisition and Calibration of Portable Measuring and Test Equipment" (WHC 1989a); QI 12.2, "Measuring and Test Equipment Calibration by User" (WHC 1989a); and/or EII 3.2, "Health and Safety Monitoring Instruments" (WHC 1989b). Routine operational checks for Westinghouse Hanford field equipment shall be as defined within applicable EIIs or procedures; similar information shall be provided in Westinghouse Hanford-approved participant contractor or subcontractor procedures.

Calibration of Westinghouse Hanford, participant contractor, or subcontractor laboratory analytical equipment shall be as defined by applicable standard analytical methods, subject to Westinghouse Hanford review and approval.

7.0 ANALYTICAL PROCEDURES

Analytical methods or procedures based on the reference methods identified in Table E-1, shall be selected or developed and approved before use in compliance with appropriate Westinghouse Hanford procedure and/or procurement control requirements, as noted in Section 4.1.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 DATA REDUCTION AND DATA PACKAGE PREPARATION

All analytical laboratories shall be responsible for preparing a report summarizing the results of analysis and for preparing a detailed data package that includes all information necessary to perform data validation to the extent indicated by the minimum requirements of Section 8.2. Data summary report format and data package content shall be defined in procurement documentation subject to Westinghouse Hanford review and approval as noted in Section 4.1. At a minimum, laboratory data packages shall include the following.

- Sample receipt and tracking documentation, including identification of the organization and individuals performing the analysis, the names and signatures of the responsible analysts, sample holding time requirements, references to applicable chain-of-custody procedures, and the dates of sample receipt, extraction, and analysis.

- Instrument calibration documentation, including equipment type and model, with continuing calibration data for the time period in which the analysis was performed.

- Quality control data, as appropriate for the methods used, including matrix spike/matrix spike duplicate data, recovery percentages, precision data, laboratory blank data, and identification of any nonconformances that may have affected the laboratory's measurement system during the time period in which the analysis was performed.

- The analytical results or data deliverables, including reduced data, reduction formulas or algorithms, and identification of data outliers or deficiencies.

Other supporting information, such as initial calibration data, reconstructed ion chromatographs, spectrograms, traffic reports, and raw data, need not be included in the submittal of individual data packages unless specifically requested by the Technical Lead or the OSM. However, all sample data shall be retained by the analytical laboratory and made available for systems or program audit purposes upon request by Westinghouse Hanford, DOE Field Office, Richland, or regulatory agency representatives (Chapter 10.0). Such data shall be retained by the analytical laboratory through the duration

of their contractual statement of work, at which point it shall be turned over to Westinghouse Hanford for archiving.

The completed data package shall be reviewed and approved by the analytical laboratory's QA Manager before submittal to OSM for validation as discussed in Section 8.2. The requirements of this section shall be included in procurement documentation or work orders, as appropriate, in compliance with the standard Westinghouse Hanford procurement control procedures referenced in Section 4.1.

8.2 VALIDATION

Validation of the completed data package shall be performed by qualified Westinghouse Hanford OSM personnel. Validation requirements will be defined within approved OSM data validation procedures, but at a minimum will include the requirements as defined within this section.

For organic analyses, validation reports shall be prepared documenting checks of applicable requirements chosen from those recommended in *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses* (EPA 1988a), listed as follows.

- Sample holding times
- Gas chromatograph/mass spectrometer tuning
- Initial and continuing calibrations
- Sample blanks
- Surrogate recovery
- Matrix spike/matrix spike duplicate
- Field duplicates
- Internal standards performance
- Target compound list compound identification
- Compound quantitation and reported detection limits
- Tentatively identified compounds
- System performance
- Overall assessment of data for a case.

For inorganic analyses, validation reports shall be prepared documenting checks of applicable requirements chosen from those recommended in *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (EPA 1988b), listed as follows.

- Sample holding times
- Initial and continuing calibrations
- Sample blanks
- Interference check samples
- Laboratory control samples
- Matrix spike
- Duplicates samples
- Atomic absorption quality control
- Inductively coupled plasma serial dilution
- Overall assessment of data for a case.

The applicable requirements for organic and inorganic validation reports will be determined when the laboratory Statement of Work is prepared.

8.3 FINAL REVIEW AND RECORDS MANAGEMENT CONSIDERATIONS

All validation reports and supporting analytical data packages shall be subjected to a final technical review by qualified reviewers at the direction of the Westinghouse Hanford Technical Lead, before submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments shall be retained as permanent project quality records in compliance with EII 1.6, "Records Management" (WHC 1989b) and QA 17.0, "Quality Assurance Records" (WHC 1989a), and shall be incorporated into the Hanford Environmental Information System (HEIS).

9.0 INTERNAL QUALITY CONTROL

All analytical samples shall be subject to in-process quality control measures in both the field and laboratory. Unless superseded by specific directions provided in Chapter 7.0 of the closure plan, the following minimum field quality control requirements apply. These requirements are adapted from *Test Methods for Evaluating Solid Wastes*, SW-846 (EPA 1986), as modified by

the proposed rule changes included in the *Federal Register*, Vol. 54, No. 13 (EPA 1989). Definitions of the sample type can be found in the glossary.

- Field duplicate samples. Field duplicate samples are generally used to verify the repeatability or reproducability of analytical data. For each shift of sampling activity under an individual sampling subtask, a minimum of 10 percent of the total collected samples shall be duplicated.

- Wipe sample conformation samples will consist of one confirmatory wipe sample taken from each of the gridded areas as an indicator of the thoroughness of the wiping technique. The sample will be taken by wiping the previously wiped area a second time.

- Split samples. At the Technical Lead's direction, field or field duplicate samples may be split in the field and sent to an alternative laboratory as a performance audit of the primary laboratory. Frequency shall be as directed by the Technical Lead.

- Blind samples. At the Technical Lead's direction, blind reference samples may be introduced into any sampling round as a performance and audit of the primary laboratory. Blind sample type and frequency shall be as directed by the Technical Lead.

- Field blanks. Field blanks are used to check for possible contamination originating with the reagent or the sampling environment, and are normally collected once each day.

  Soil and concrete sample field blanks will consist of pure deionized, distilled water that is transferred to a sample container at the site and preserved with the reagent specified for the analyses of interest.

  Wipe sample field blanks will consist of filter paper pads that have been laboratory-prepared with the appropriate solution and placed in a sampling container. The blanks will be analyzed to determine if contaminants were introduced by the pads or preparation solution.

- Equipment blanks. Equipment blanks are used to verify the adequacy of sampling equipment decontamination procedures, and are collected once each day.

- Trip blanks. Trip blanks shall be returned unopened to the laboratory, and are prepared as a check on possible contamination originating from container preparation methods, shipment, handling, storage, or site conditions. In compliance with standard Westinghouse Hanford procurement procedures, requirements for trip blank preparation shall be included in procurement documents of work orders to the sample container supplier and/or preparer. Trip blanks shall be collected daily.

The internal QC checks performed by analytical laboratories laboratory analyses shall meet the following minimum requirements:

- Matrix spiked and matrix spiked duplicate samples. Matrix spiked and matrix spiked duplicate samples require the addition of a known quantity of a representative analyte of interest to the sample as a measure of recovery percentage. The spike should be made in a replicate of one of the field duplicate samples. Spike compound selection, quantities, and concentrations shall be described in the laboratory's analytical procedures. One sample shall be spiked per analytical batch, or once every 20 samples whichever is greater.

- Quality control reference samples. A QC reference sample shall be prepared from an independent standard at a concentration other than that used for calibration, but within the calibration range. Reference samples are required as an independent check on analytical technique and methodology, and shall be run with every analytical batch, or every 20 samples, whichever is greater.

Other requirements specific to laboratory analytical equipment calibration are included in Chapter 6.0 of the QAPP. The minimum requirements of this section shall be invoked in procurement documents or work orders, compliant with standard Westinghouse Hanford procedures as noted in Section 4.1.

10.0 PERFORMANCE AND SYSTEM AUDITS

Performance, system, and program audits are scheduled to begin early in the execution of this closure plan and continue through completion. Collectively, the audits address quality affecting activities that include, but are not limited to, measurement system accuracy, intramural and extramural analytical laboratory services, field activities, and data collection, processing, validation and management.

Performance audits of the accuracy of laboratory analyses are implemented in accordance with Standard Operating Procedure EII 1.12 "Laboratory Analysis Performance Audits" (to be prepared). System audit requirements are implemented in accordance with Standard Operating Procedure QI 10.4, "Surveillance" (WHC 1989a). Surveillances will be performed regularly throughout the course of the closure plan activities. Additional performance and system 'surveillances' may be scheduled as a consequence of corrective action requirements, or may be performed upon request. All quality affecting activities are subject to surveillance.

All aspects of closure plan activities will also be evaluated as part of routine environmental restoration program wide QA audits under the Standard Operating Procedure requirements of WHC-CM-4-2 (WHC 1989a). Program audits shall be conducted in accordance with QR 18.0, "Audits," QI 18.1 "Audit Programming and Scheduling," and QI 18.2, "Planning, Performing, Reporting,

and Follow-up of Quality Audits" by auditors qualified in accordance with QI 2.5, "Qualification of Quality Assurance Personnel" (WHC 1989a).

11.0 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and laboratory that directly affects the quality of the analytical data shall be subject to preventive maintenance measures that ensure minimization of measurement system downtime. Field equipment maintenance instructions shall be as defined by the approved procedures governing their use. Laboratories shall be responsible for performing or managing the maintenance of their analytical equipment; maintenance requirements, spare parts lists, and instructions shall be included in individual methods or in laboratory QA plans, subject to Westinghouse Hanford review and approval. When samples are analyzed using EPA reference methods, the requirements for preventive maintenance of laboratory analytical equipment as defined by the reference method shall apply.

12.0 DATA ASSESSMENT PROCEDURES

Test data from this investigation will be assessed as required by Chapter 7.0 of the 3718-F Facility closure plan. Analytical data shall first be compiled and summarized by the laboratory and validated in compliance with approved OSM procedures meeting all minimum requirements of Chapter 8.0 of this QAPP.

13.0 CORRECTIVE ACTION

Corrective action requests required as a result of surveillance reports, nonconformance reports, or audit activity shall be documented and dispositioned as required by QR 16.0, "Corrective Action"; QI 16.1, "Trending/Trend Analysis"; and QI 16.2, Corrective Action Reporting," (WHC 1989a). Primary responsibilities for corrective action resolution are assigned to the Technical Lead and the QA Coordinator. Other measurement systems, procedures, or plan corrections that may be required because routine review processes shall be resolved as required by governing procedures or shall be referred to the Technical Lead for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project QA records upon completion or closure.

14.0 QUALITY ASSURANCE REPORTS

As previously stated in Chapters 10.0 and 13.0 of the QAPP, project activities shall be regularly assessed by auditing and surveillance processes. Surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project quality records upon completion or closure of the activity.

15.0 REFERENCES

Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 USC 9601 et seq.

Ecology, EPA, and DOE, 1990, *Hanford Federal Facility Agreement and Consent Order*, Vol. 1 and 2, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Richland, Washington.

EPA, 1986, *Test Methods for Evaluating Solid Wastes*, SW-846, Third edition, U.S. Environmental Protection Agency/Office of Solid Waste and Emergency Response, Washington, Washington, D.C.

EPA, 1987, *Data Quality Objectives for Remedial Response Activities: Volume I, Development Process*, EPA/540/6-87/003, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988a, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, Hazardous Site Evaluation Division, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, Hazardous Site Evaluation Division, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989, "Hazardous Waste Management System; Testing and Monitoring Activities (Proposed Rule)"; in *Federal Register*, Vol. 54, No. 13, pp 3212-3228.

Resource Conservation and Recovery Act of 1976, as amended, 42 USC 6901 et seq.

WHC, 1989a, *Westinghouse Hanford Company Quality Assurance Manual*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989b, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990, *Environmental Engineering, Technology and Permitting Function Quality Assurance Program Plan*, WHC-EP-0383, Westinghouse Hanford Company, Richland, Washington.

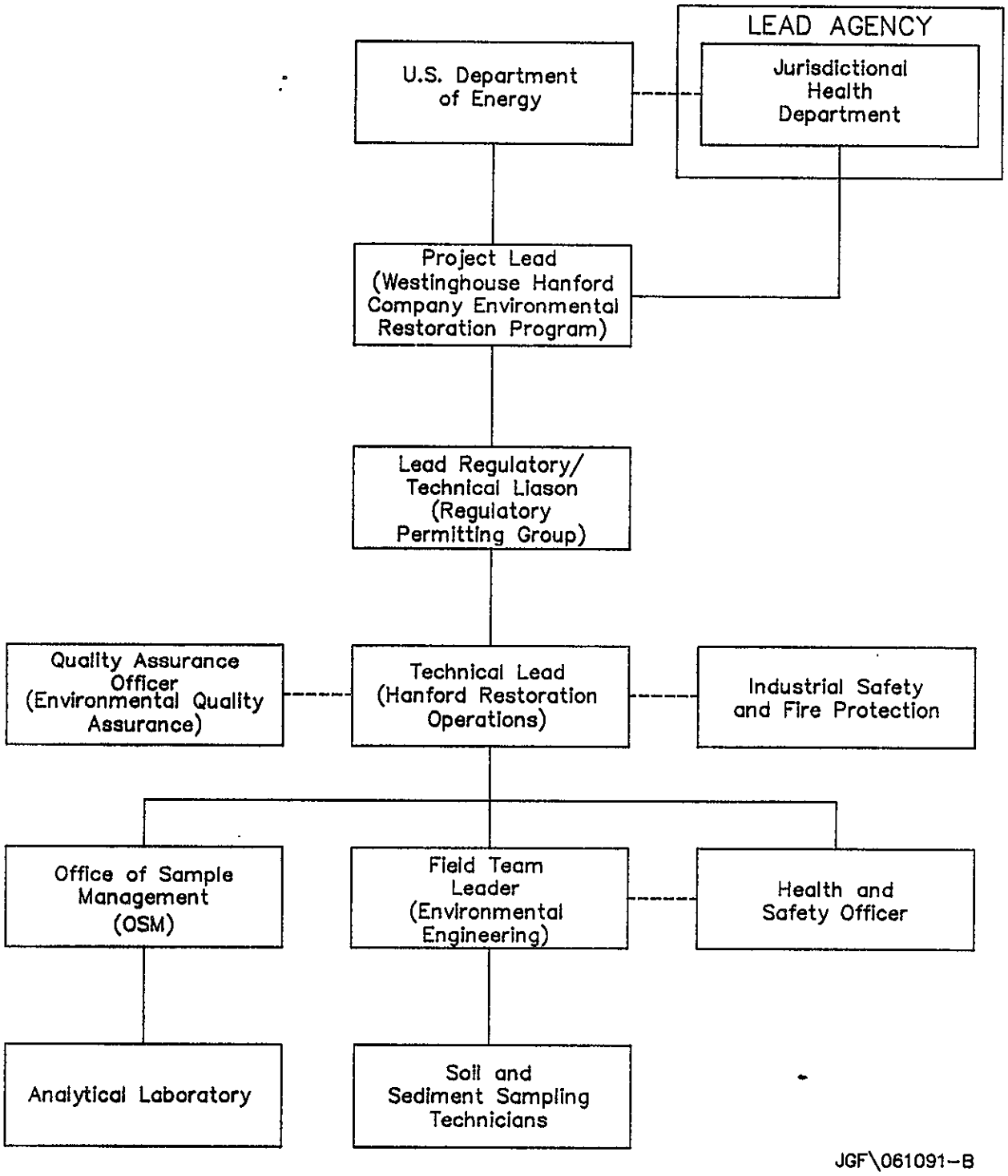

Figure E-1. Project Organization, Sampling at the 3718-F Alkali Metal Treatment and Storage Facility.

Table E-1. Analytes of Interest and Analytical Methods for the 3718-F Facility Sampling[b,d].

Analytical category	Analyte of interest	Standard reference method	Minimum detection limit[c]	Precision[c]	Accuracy[c]
Inorganics	Lithium	3050,6010[a]	0.005 mg/kg	±25% RPD	±25%
	potassium	3050,6010[a]	e	±25% RPD	±25%
	sodium	3050,6010[a]	0.03 mg/kg	±25% RPD	±25%
Volatile organics	2-Butoxy ethanol	3810,8240[a]	25 g/kg	±25% RPD	±25%
	isopropyl alcohol	3810,8240[a]	25 g/kg	±25% RPD	±25%
	methanol	3810,8240[a]	25 g/kg	±25% RPD	±25%
Other	pH	9045[a]	N/A	±25% RPD	±25%
	Calcium carbonate	D4373-84[f]	N/A	N/A	N/A
	Alkalinity	Calculated	N/A	N/A	N/A

[a]Methods specified are from Test Methods for Evaluating Solid Waste (SW-846) (EPA 1986).

[b]Analytical methods shall be in compliance with approved Westinghouse Hanford or Westinghouse Hanford-approved participant contractor or subcontractor procedures. All procedures shall be reviewed and approved in compliance with requirements specified in the Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan for Comprehensive Environmental Response, Compensation, and Liability Act of 1980 remedial investigation and feasibility study activities.

[c]Minimum requirements for method detection levels, precision, and accuracy will be method-specific, and shall be negotiated and established in the procedure review and approval process. Target values are indicated where appropriate; precision is expressed in terms of relative percent different (RPD) and accuracy as percentage recovery.

[d]Analyses shall be performed by an approved participant contractor or subcontractor laboratory.

[e]The detection limit is highly dependent on the operating conditions and plasma position.

[f]Method specified is from Annual Book of ASTM Standards (ASTM 1991).

Table E-2. Investigative Procedures for the 3718-F Facility Sampling.

Procedure	Title*	Wipe sampling	Chip sampling	Soil sampling	Concrete/ asphalt sampling
EII 1.2	Preparation and Revision of Environmental Investigations Instructions	X	X	X	X
EII 1.4	Deviation from Environmental Investigations Instructions	X	X	X	X
EII 1.5	Field Logbooks	X	X	X	X
EII 1.6	Records Management	X	X	X	X
EII 1.7	Indoctrination, Training and Qualification	X	X	X	X
EII 2.1	Preparation of Hazardous Waste Operations Permits	X	X	X	X
EII 3.2	Health and Safety Monitoring Instruments	X	X	X	X
EII 5.1	Chain of Custody	X	X	X	X
EII 5.2	Soil and Sediment Sampling			X	
EII 5.4	Field Decontamination of Drilling, Well Development and Sampling Equipment		X	X	X
EII 5.5	1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment		X	X	X
EII 5.11	Sample Packaging and Shipping	X	X	X	X
TBD	Concrete/Asphalt Core Sampling				X
TBD	Wipe Sampling	X			
TBD	Chip Sampling		X		

*Procedures are Westinghouse Hanford Environmental Investigations Instructions (EII) selected from the latest approved version of WHC-CM-7-7, Environmental Investigations and Site Characterization Manual (WHC 1989b).

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980.
M&TE = Measure and test equipment.
RCRA = Resource Conservation and Recovery Act of 1976.
TBD = To be determined.

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LEGEND

MANHOLES

CLEANOUTS

CATCH BASINS

PROCESS SEWER

RETENTION PROCESS SEWER

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CLASSIFICATION

NONE

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RICHLAND OPERATIONS OFFICE

Hanford Engineering Development Laboratory

Westinghouse Hanford Company

300 AREA OPERATING PLAN PROCESS SEWER LINES

BLDG. NO. 300-G

INDEX NO. 0304

DWG. NO. H-3-23706

SHT. NO. 1

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REFERENCE DRAWINGS

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3/8/73	HEDL			WMSON 3-8-73	UPDATED NORTH OF 324.	1

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CHECKED 11/20/72
DRAWN J.C. WILLIAMSON 11-20-72
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CLASSIFICATION NONE

U. S. ATOMIC ENERGY COMMISSION
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Westinghouse Hanford Company

300 AREA
OPERATING PLAN
PROCESS SEWER
LINES

BLDG. NO. 300 GEN — INDEX NO. 0304
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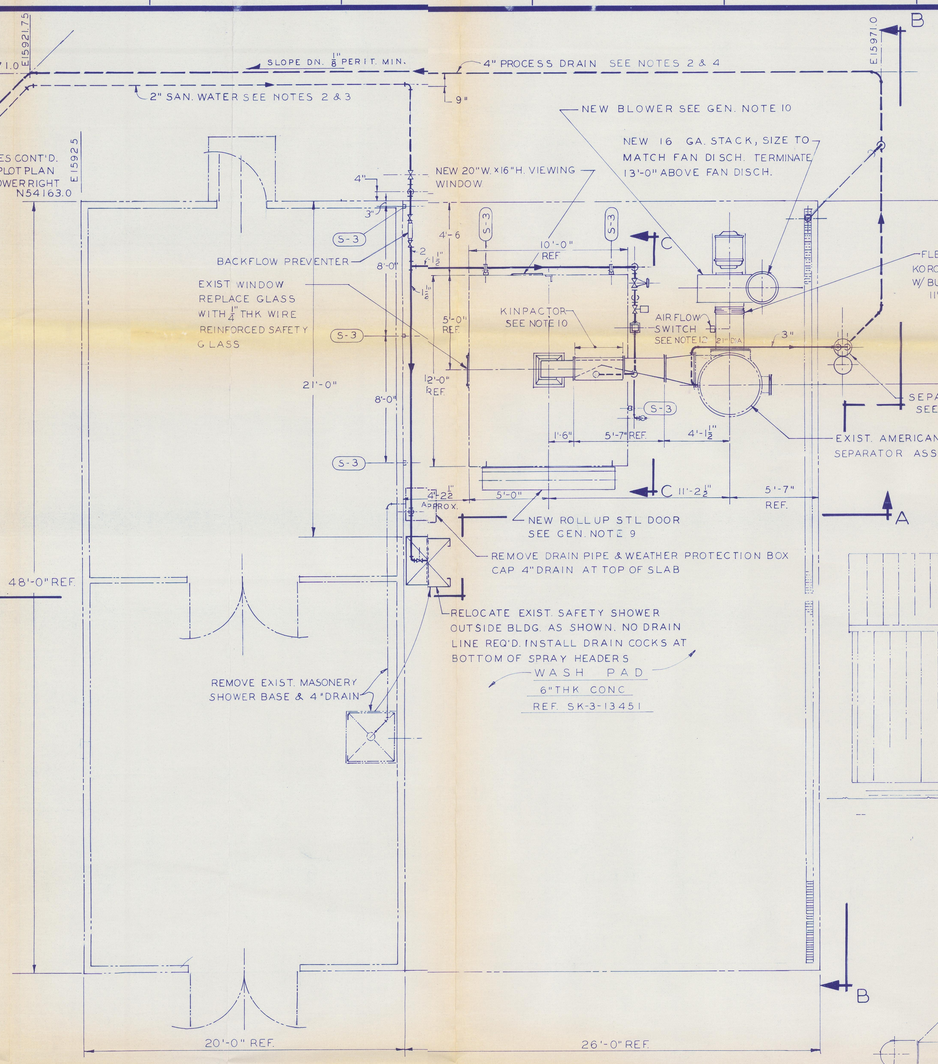
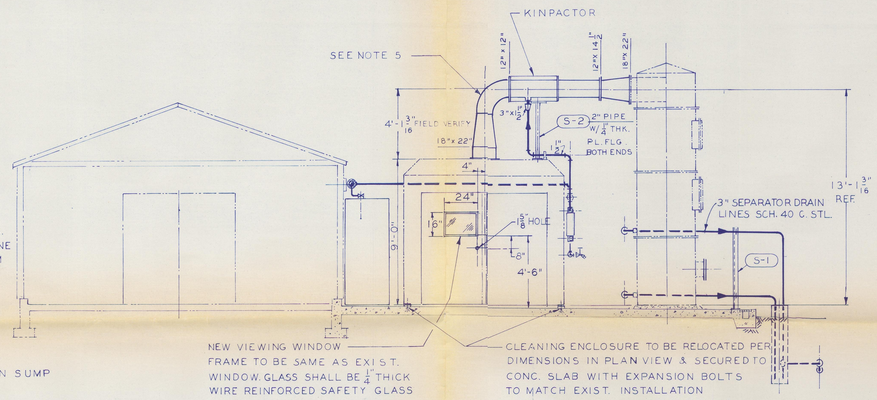


PLAN - SODIUM EQUIP. CLEANING FACILITY, BLDG. 3718-F



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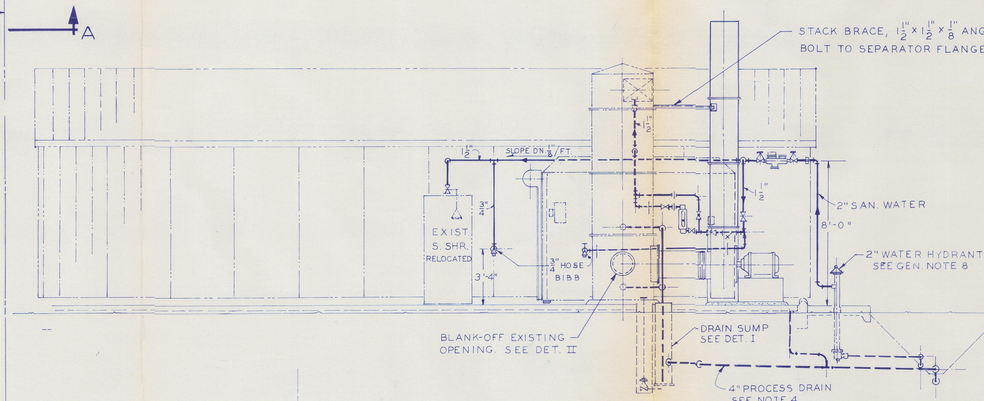

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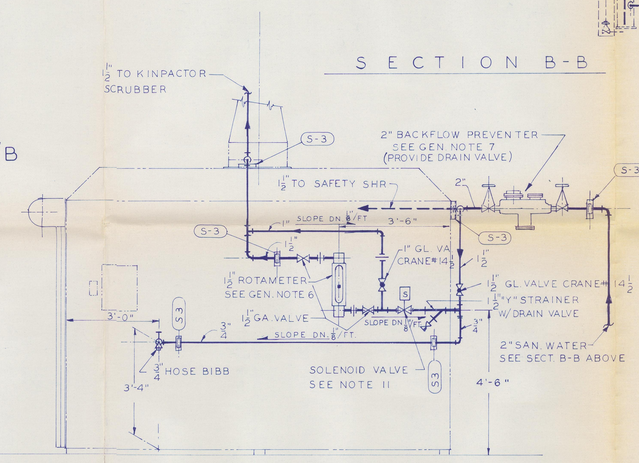

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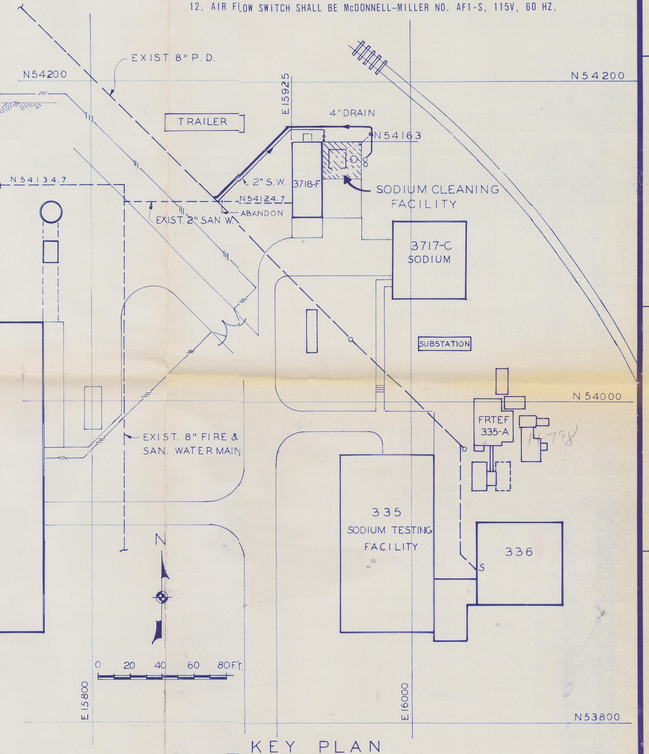
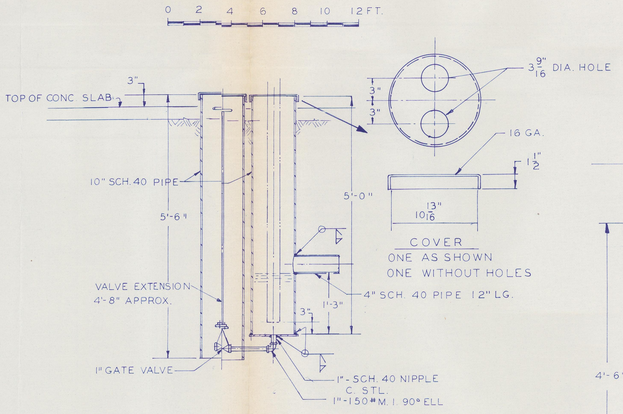


KEY PLAN

GENERAL NOTES

1. MATERIAL AND EQUIPMENT SHALL BE AS SPECIFIED OR APPROVED EQUAL.
2. PIPING SHALL BE FABRICATED, TESTED, AND INSTALLED IN ACCORDANCE WITH ANSI B31.1, CODE FOR PRESSURE PIPING, WHAN M-12, MANUAL FOR NON-ALKALI METAL PRESSURE SYSTEMS, AND THE FOLLOWING GENERAL NOTES.
3. SANITARY WATER PIPING MATERIALS, EQUIPMENT, TESTING, DISINFECTING, AND CLEANING SHALL BE IN ACCORDANCE WITH HANFORD GUIDE DG-100-M, GUIDE FOR PROCESS AND SERVICE PIPING, SERVICE TYPE H-19A.
4. UNDERGROUND DRAIN PIPING MATERIALS, INSTALLATION, TESTING, AND CLEANING SHALL BE IN ACCORDANCE WITH HANFORD GUIDE DG-100-M, GUIDE FOR SERVICE PIPING, SERVICE TYPE H-21.
5. EXHAUST DUCTWORK, EXCLUSIVE OF THE SCRUBBER ASSEMBLY, SHALL BE 16 GAGE BLACK STEEL, PAINTED INTERNALLY AND EXTERNALLY WITH RUST INHIBITING PRIMER, TYGON AV-500 AND TWO COATS OF SODIUM HYDROXIDE RESISTANT PAINT, TYGON RO-221.
6. WATER FLOW METER SHALL BE BROOKS ROTAMETER COMPANY, MODEL 1110, SIZE 12, HAVING A MAXIMUM CAPACITY OF 60 GPM OF CLEAN WATER AT STANDARD CONDITIONS.
7. WATER BACK-FLOW PREVENTER SHALL BE HERSEY NO. 1 DOUBLE CHECK VALVE ASSEMBLY, 2-INCH SIZE.
8. WATER HYDRANT SHALL BE JAMES B. CLOW & SONS NO. 71 TYPE A COMPRESSION FIRE HYDRANT WITH THREADED IRON PIPE INLET AND OUTLET CONNECTIONS. DEPTH OF BURIAL TO BE 3'- 0".
9. ROLLUP DOOR SHALL BE CRAWFORD DOOR COMPANY, NO. 513-1-501, FACE OF WALL TYPE INSTALLATION. WITH CHAIN OPERATOR. WALL OPENING SIZE: 8'- 0" WIDE BY 7'- 0" HIGH.
10. SCRUBBER ASSEMBLY AND FAN SHALL BE AMERICAN AIR FILTER CO KINPACTOR, SIZE 1.
11. SOLENOID VALVE SHALL BE ASCO NO. 8211C22, 1-1/2" PIPE SIZE, 125V, 60 HZ, WATERTIGHT SOLENOID ENCLOSURE.
12. AIR FLOW SWITCH SHALL BE McDONNELL-MILLER NO. AF1-S, 115V, 60 HZ.



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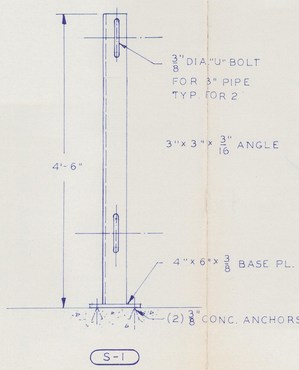

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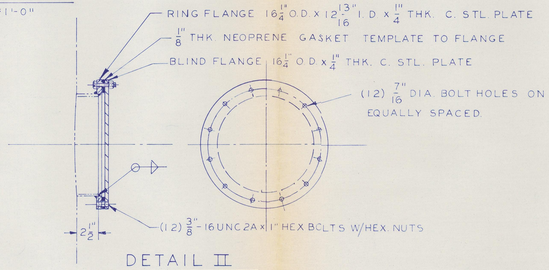

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U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATIONS OFFICE
Hanford Engineering Development Laboratory
Westinghouse Hanford Company

MECHANICAL
SODIUM CLEANING FACILITY
MODIFICATIONS

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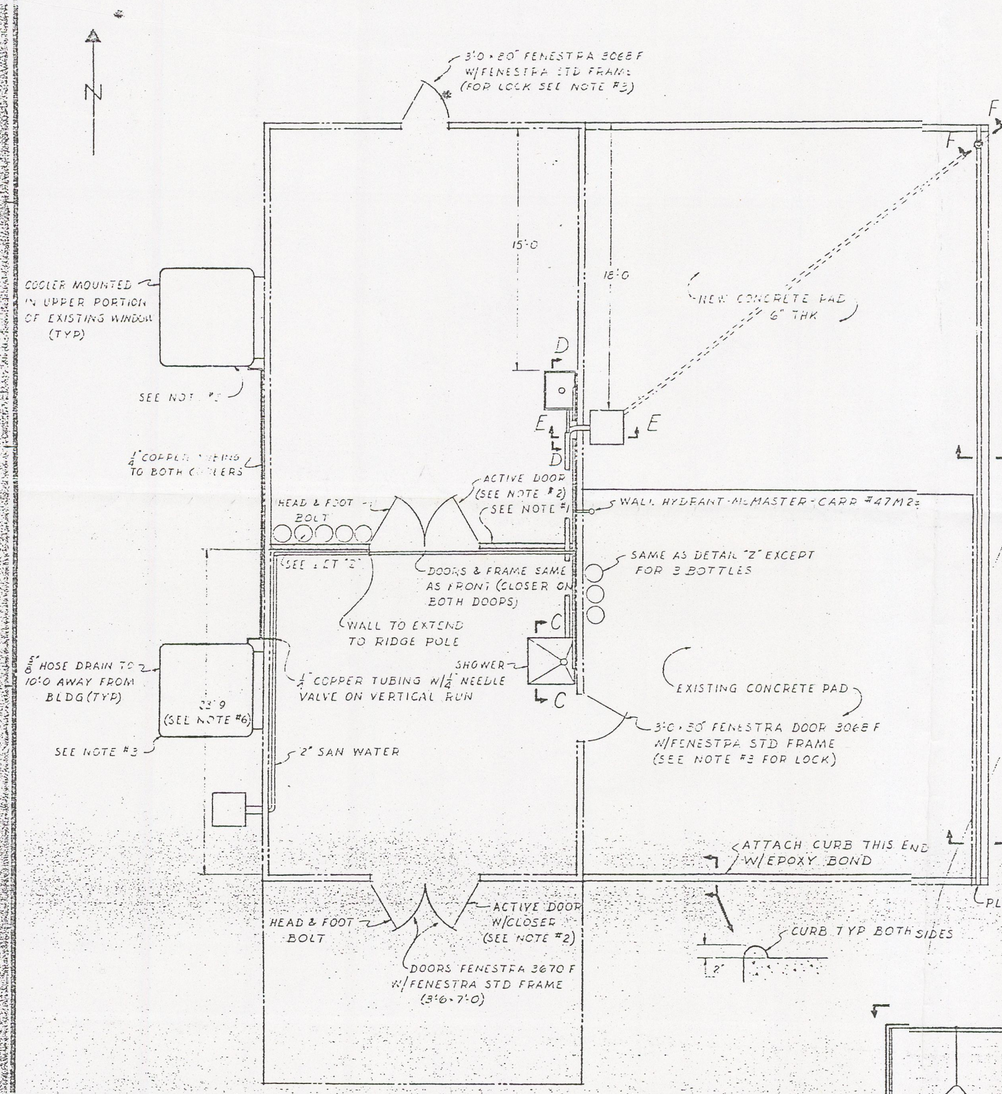

PLAN

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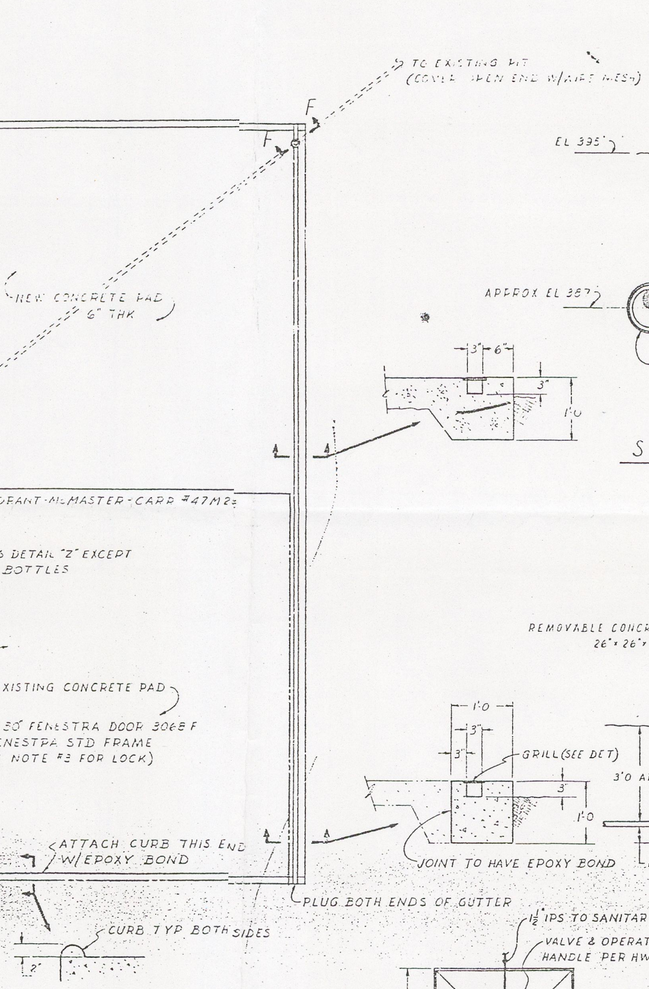

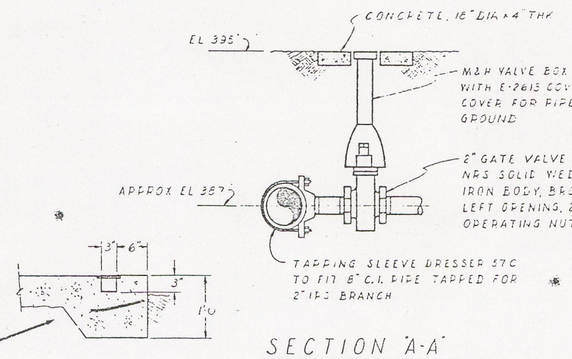

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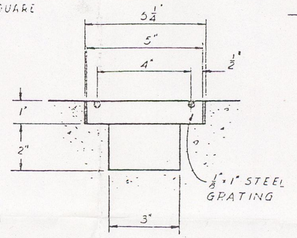

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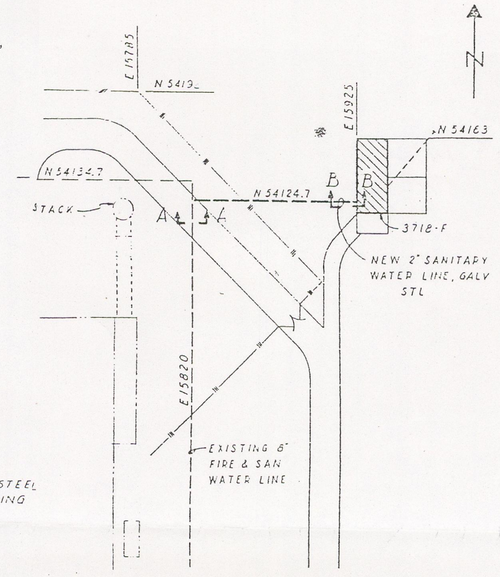

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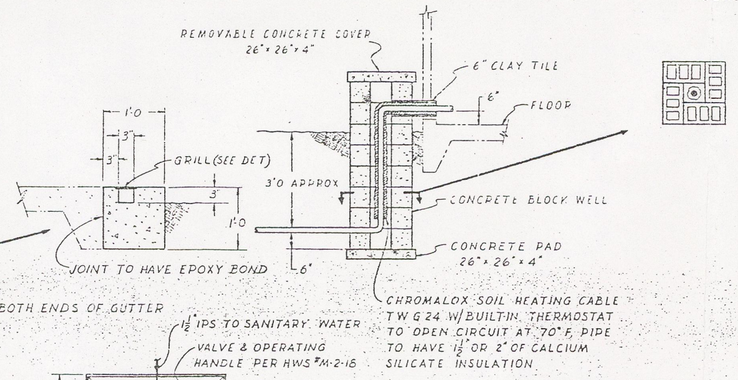

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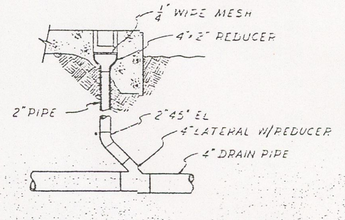

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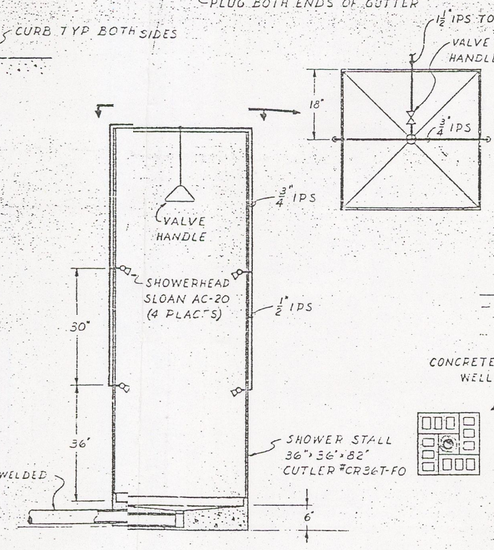

SECTION "C-C"

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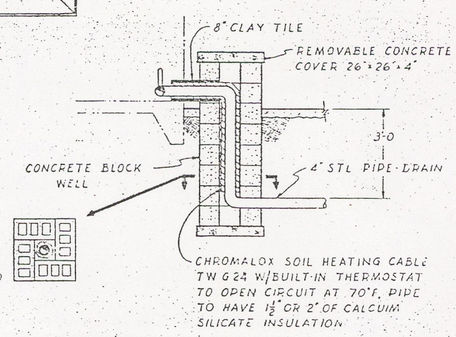
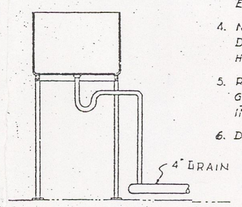


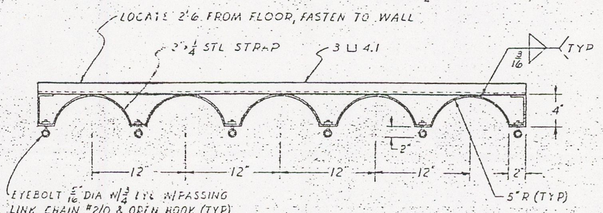
SECTION "E-E"

SCALE: NONE



SECTION "D-D"

SCALE: NONE



ETAIL "Z"

SCALE: NONE

GENERAL NOTES

1. NEW PARTITION TO BE METAL STUDS ON 16" CENTERS W/5/8" GYPSUM BOARD BOTH SIDES.
2. DOOR LOCKS TO BE FENESTRA 9400 SERIES WITHOUT CYLINDER TO FIT CORBIN 253 1/2 CYLINDER.
3. EVAPORATIVE COOLER 3000 CFM, SIDE OUTLET SQUIRREL CAGE BLOWER, 1/4 HP, 115 VOLTS, SINGLE PH MOTOR WITH WATER RECIRCULATING PUMP & WATER LEVEL CONTROL ESSICK #B-3000 OR EQ
4. NEW SANITARY WATER PIPE AND FITTINGS SHALL BE DISINFECTED IN ACCORDANCE WITH HANFORD STANDARDS HW-45666-S, AND PRESSURE TESTED TO 200 PSI.
5. REPLACE EXISTING WALL AND CEILING WITH 5/8" THICK GYPSUM BOARD. REPLACE OR REPAIR ANY DAMAGED INSULATION.
6. DIMENSION IS APPROX, PARTITION ℄ TO BE ON COL ℄

CAUTION
NOT COMPLETE WITHOUT
CURRENT STATUS OF OUTSTANDING
ECNS FROM DATA BASE

DWG. NO.	REV NO.	DRAWING TITLE OR INDEX NO.

REFERENCE DRAWINGS

NEXT USED ON

NO.	BY-DATE	FOR	BY-DATE	FOR	REV BY DATE	DESCRIPTION	REV NO.
M1						WAS H.N.W. DWG	1
MICRO F'W'D	APPD FOR COMPORM WITH DESIGN CRIT		APPD				

REVISIONS

COMMENT PRT ISSUE NO. | DATE | CHECK PRT ISSUE NO. 1st | DATE | LAST REV 1

DRAWING STATUS

APPD. FOR COMPORMANCE WITH DESIGN CRITERIA BY [signature] FOR [signature] DATE 4/14/65
APPD [signature] DATE 4/14/65
DRWN P. F. COFFMAN
OPTG APPD
CHECKED
DRAWN WEBB 4-30-65
SCALE AS SHOWN
CLASSIFICATION [signature] DATE 5-10-71
CLASSIFICATION NONE

U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATIONS OFFICE
HANFORD ENGINEERING DEVELOPMENT LABORATORY
Operated by WADCO

CLEANING & WELDING FACILITY

BLDG. NO. 3718 F | INDEX NO. 0800
DWG. NO. SK-3-13451 | SHEET NO. 1 | SHEETS 2