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DOE/RL-92-53
Revision 1
UC-630

218-E-8 Borrow Pit Demolition Site Closure Plan

Date Published
October 1994

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

Approved for Public Release

START

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218-E-8 BORROW PIT DEMOLITION SITE CLOSURE PLAN

FOREWORD

The Hanford Site is owned by the U.S. Government and operated by the U.S. Department of Energy, Richland Operations Office. Dangerous waste and mixed waste (containing both radioactive and dangerous components) are produced and managed on the Hanford Facility. The dangerous waste is regulated in accordance with the *Resource Conservation and Recovery Act of 1976* and the *State of Washington Hazardous Waste Management Act of 1976* (as administered through the Washington State Department of Ecology *Dangerous Waste Regulations*, Washington Administrative Code 173-303). 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 component of mixed waste is interpreted to be regulated under the *Resource Conservation and Recovery Act* and Washington Administrative Code 173-303.

For purposes of the *Resource Conservation and Recovery Act* and the Washington State Department of Ecology *Dangerous Waste Regulations*, the Hanford Facility is considered to be a single facility. The single dangerous waste permit identification number issued to the Hanford Facility 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 over 60 treatment, storage, and/or disposal units within the Hanford Site, hereinafter referred to as the Hanford Facility when cited in the context of the *Resource Conservation and Recovery Act* and the Washington State Department of Ecology *Dangerous Waste Regulations*.

For the purposes of the *Resource Conservation and Recovery Act*, Westinghouse Hanford Company is identified as 'co-operator.' 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 rather is based on Westinghouse Hanford Company's contractual status (i.e., as a management and operations contractor) for the U.S. Department of Energy, Richland Operations Office.

The *218-E-8 Borrow Pit Demolition Site Closure Plan* consists of a Hanford Facility Dangerous Waste Part A Permit Application, Form 3, Revision 4, and a closure plan. An explanation of the Part A Form 3, submitted with this closure plan is provided at the beginning of the Part A Section. The closure plan consists of nine chapters and five appendices.

This *218-E-8 Borrow Pit Demolition Site Closure Plan* submittal contains information current as of August 28, 1994.

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GLOSSARY

218-E-8 Demolition Site	218-E-8 Borrow Pit Demolition Site
ASTM	American Society for Testing and Materials
C.A.S.	Chemical Abstract System
CERCLA	*Comprehensive Environmental Response Compensation and Liability Act of 1980*
CFR	*Code of Federal Regulations*
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQO	data quality objective
Ecology	Washington State Department of Ecology
EII	Environmental Investigations Instruction
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
HEAST	Health Effects Assessment Summary Tables
HEIS	Hanford Environmental Information System
IRIS	Integrated Risk Information System
MTCA	*Model Toxics Control Act*
Part A	Part A permit application
QAPjP	quality assurance project plan
QI	quality instruction
QR	quality requirement
RCRA	*Resource Conservation and Recovery Act of 1976*
RfD	Reference dose
SAP	Sampling and Analysis Plan
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal
WAC	*Washington Administrative Code*
WHC-CAS	Westinghouse Hanford Company Commercial Analytical Services

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PART A

The Part A permit application, Form 1, included in this closure plan was submitted to the Washington State Department of Ecology in May 1988. The Part A, Form 1, consists of three pages.

The original Part A, Form 3, Revision 0, was submitted to Washington State Department of Ecology in November 1985. Revision 1 of the Part A, Form 3, was prepared to provide more extensive unit, 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 218-E-8 Borrow Pit Demolition Site. 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. Revision 4 of the Part A, Form 3, was prepared to remove dangerous waste codes D002, D035, U159, and WC01 per the revised WAC 173-303 and to add dangerous waste codes U160 and WC02. Also, new photographs were provided.

Revision 4 of the Part A, Form 3, was prepared to remove Dangerous waste codes D002, D035, U159, and WC01 per the revised WAC 173-303 and to add dangerous waste codes U160 and WC02. Also, new photographs were provided.

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PART A

The Hanford Facility Dangerous Waste Part A Permit Application, Form 3, Revision 4 for the 218-E-8 Borrow Pit Demolition Site is being certified and will be submitted at a later date.

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FORM 1

State of Washington Department of Ecology

WASHINGTON STATE

DANGEROUS WASTE PERMIT GENERAL INFORMATION

(Read "Form 1 Instructions" before starting)

I. EPA/STATE I.D. NUMBER: WA7 0 9 0 0 0 8 9 6 7

II. NAME OF FACILITY
U.S. DEPARTMENT OF ENERGY-HANFORD SITE

III. FACILITY CONTACT

A. NAME & TITLE (Last, First, & Title)	B. PHONE (area code & no.)
LAWRENCE, MICHAEL J., MANAGER	509 376 7395

IV. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX	B. CITY OR TOWN	C. STATE	D. ZIP CODE
P.O. BOX 550	RICHLAND	WA	99352

V. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER	B. COUNTY NAME	C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
HANFORD SITE	NTON	RICHLAND	WA	99352	005

VI. SIC CODES (4-digit, in order of priority)

A. FIRST	B. SECOND	C. THIRD	D. FOURTH
9711 NATIONAL SECURITY	8922 NUCLEAR NONCOMMERCIAL DEVELOPMENT AND EDUCATION	9611 ADMINISTRATION AND GENERAL ECONOMICS PROGRAM	4911 STEAM-ELECTRIC GENERATION

VII. OPERATOR INFORMATION

A. NAME (DOE-RL)
DEPARTMENT OF ENERGY-RICHLAND OPERATIONS
WESTINGHOUSE HANFORD COMPANY (WHC)

B. Is the name listed in Item VII-A also the owner? ☒ YES ☐ NO **

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)
F = FEDERAL, S = STATE, P = PRIVATE, M = PUBLIC (other than federal or state), O = OTHER (specify)
F

D. PHONE (area code & no.): 509 376 7395

E. STREET OR P.O. BOX: PO BOX 550/PO BOX 1970

509 376 7803

F. CITY OR TOWN	G. STATE	H. ZIP CODE
RICHLAND	WA	99352

VIII. INDIAN LAND
Is this facility located on Indian lands? ☐ YES ☒ NO

**DOE-RL: OWNER/CO-OPERATOR; WHC: CO-OPERATOR FOR CERTAIN UNITS ON THE HANFORD SITE.

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020-01

020-1 (7/7)

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IX. MAP

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

X. NATURE OF BUSINESS *(provide a brief description)*

- NATIONAL DEFENSE NUCLEAR MATERIAL PRODUCTION
- ENERGY RESEARCH AND TECHNOLOGY DEVELOPMENT
- DEFENSE NUCLEAR WASTE MANAGEMENT
- BYPRODUCT STEAM, SOLD FOR ELECTRIC POWER GENERATION

AND SIC 15: BUILDING CONSTRUCTION - GENERAL CONTRACTORS AND OPERATIVE BUILDERS

XI. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the 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.

A. NAME & OFFICIAL TITLE (Type or print)	B. SIGNATURE	C. DATE SIGNED
SEE ATTACHMENT		

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WA7890008967

FORM 1

DANGEROUS WASTE PERMIT GENERAL INFORMATION

XI. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments, 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.

Michael J. Lawrence — 5-19-88

Michael J. Lawrence
Manager, Richland Operations
United States Department of Energy

Date

W. M. Jacobi — 5/13/88

William M. Jacobi
President
Westinghouse Hanford Company
Co-operator

Date

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Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

FORM

DANGEROUS WASTE PERMIT APPLICATION

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

F ICIAL 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.)*

FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

MO.	DAY	YR.
0 8		8 4

☐ 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 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
e:		
AINER (barrel, drum, etc)	S01	GALLONS OR LITERS
	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

UNIT OF MEASURE	UNIT OF MEASURE CODE
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H

UNIT OF MEASURE	UNIT OF MEASURE CODE
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. 2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G	
X-2	T 0 3	20	E	
1	T 0 4	150	U	
3				
4				

LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	B. 2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY
5				
6				
7				
8				
9				
10				

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III. PROCESSES (continued)

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

The 218-E-8 Borrow Pit is located in the 200 East Area of the Hanford Facility. (The 218-E-8 Demolition Site occupied only a small portion, an area 6 meters (20 feet) by 6 meters (20 feet), of the larger 218-E-8 Borrow Pit. The 218-E-8 Demolition Site was used to detonate explosive discarded chemical products used on the Hanford Site. The process design capacity for treatment at the 218-E-8 Demolition Site was 150 gallons (568 liters) per day.

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 in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing 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 code)	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))
X	0 5 4	900	P	T 0 3 D 8 0	
X	0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2			T 0 3 D 8 0	included with above

 CONTINUE ON PAGE 3

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

I.D. NUMBER *(entered from page 1)*: 7 8 9 0 0 0 8 9 6 7

DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	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	1,000	K	T04	Treatment-Other (Demolition)
2	D003				
3	U108				
4	U160				
5	WC02				
6	WT01				
7	WT02				Included with above.
8					
9					
10					
11					
12					
13					
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17					
18					
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26					

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IV. DESCRIPTION OF DANGEROUS WASTES (continued)

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

.... 218-E-8 Demolition Site was used for treatment of shock-sensitive or potentially explosive chemical waste. The waste exhibited the dangerous waste characteristics of ignitability (D001) and reactivity (D003). Some compounds were known to be discarded chemical products (U108 or U160). Depending on the nature of the waste treated, the waste might have the state-only designations for toxic extremely hazardous (WT01) or dangerous waste (WT02) and carcinogenic dangerous waste (WC02). The estimated annual quantity of waste of 1,000 kilograms (2,205 pounds) represents the total amount of dangerous waste that is believed to have been treated at the 218-E-8 Demolition Site.

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 U.S. Department of Energy Richland Operations Office	John D. Wagoner	11/4/94

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		

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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.

John D. Wagoner — 11/4/94

Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

Date

A. LaMar Trego — 9/20/94

Co-operator
A. LaMar Trego, President
Westinghouse Hanford Company

Date

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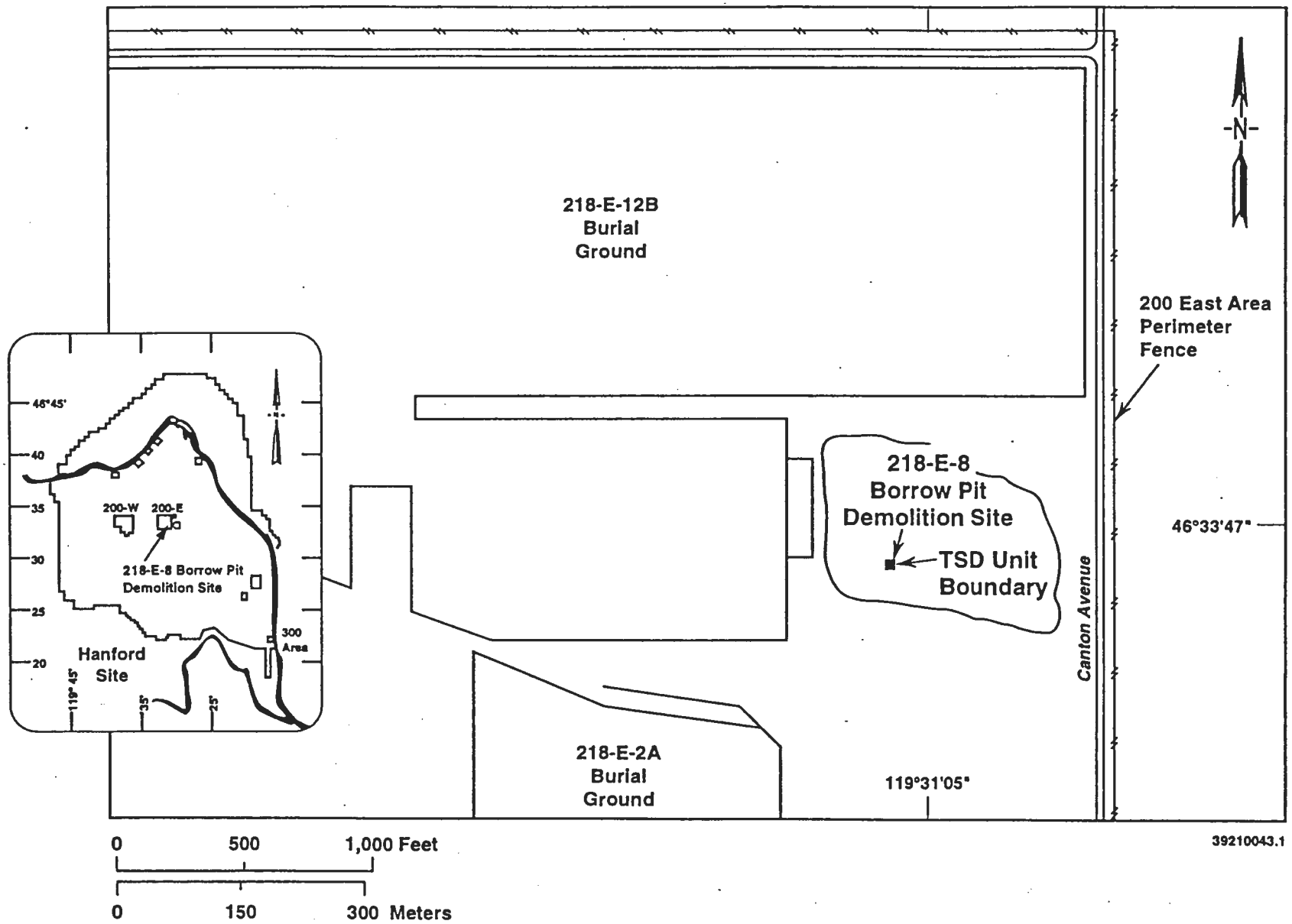
218-E-8 Borrow Pit Demolition Site
Site Plan



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218-E-8 BORROW PIT DEMOLITION SITE

46°33'47"
119°31'05"

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1.0 INTRODUCTION

This chapter provides background information for the 218-E-8 Borrow Pit Demolition Site (218-E-8 Demolition Site) and provides an overview of the contents of the 218-E-8 Demolition Site closure plan.

1.1 BACKGROUND

The 218-E-8 Demolition Site was the site of a single demolition event in November of 1984. This demolition event was a form of thermal treatment for discarded explosive chemical products. Because the 218-E-8 Demolition Site will no longer be used for this thermal activity, the site will be closed. Closure will be conducted pursuant to the requirements of the Washington State Department of Ecology (Ecology) "Dangerous Waste Regulations," *Washington Administrative Code* (WAC) 173-303-610 and 40 *Code of Federal Regulations* (CFR) 270.1.

This closure plan presents a description of the 218-E-8 Demolition Site, the history of the waste treated, and the approach that will be followed to close the 218-E-8 Demolition Site. Because there were no radioactively contaminated chemicals involved in the demolitions at the 218-E-8 Borrow Pit site, the information on radionuclides is provided for 'information only'. Remediation of any radioactive contamination is not within the scope of this closure plan. Only dangerous constituents derived from 218-E-8 Demolition Site operations will be addressed in this closure plan in accordance with WAC 173-303-610(2)(b)(i).

The 218-E-8 Demolition Site is located within the 200-PO-6 operable unit as designated in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1994). The soil and groundwater of this operable unit will be addressed through the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) process. Therefore, any required remedial action, with respect to contaminants not associated with the 218-E-8 Demolition Site, will be deferred to the CERCLA remedial investigation/feasibility study process. Characterization work on the 200-PO-6 operable unit is not expected to begin until sometime after fiscal year 1999.

1.2 CLOSURE PLAN OBJECTIVE

The objective of this closure plan is to describe and support clean closure of the 218-E-8 Borrow Pit Demolition Site. Clean closure as used in this context means that no dangerous waste or dangerous waste contaminated soil will remain onsite that pose a threat to human health and the environment. To meet the criteria for clean closure of the 218-E-8 Borrow Pit Demolition Site, soil sampling and analytical results must verify that the levels of discarded explosive chemical products derived from 218-E-8 Demolition Site operations are below action levels. Action levels are defined as levels above the Hanford Site soil background levels identified in *Hanford*

Site Background: Part 1, Soil Background for Nonradioactive Analytes (DOE-RL 1993) and *Model Toxics Control Act* (MTCA) (WAC 173-340) Method B levels. If analysis determines that levels of the discarded explosive chemical products derived from 218-E-8 Demolition Site operations are above both these guidelines, a phase two investigation will be developed.

1.3 218-E-8 BORROW PIT DEMOLITION SITE CLOSURE PLAN CONTENTS

The 218-E-8 Demolition Site 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 Monitoring (Chapter 5.0)
- Closure Strategy and Performance Standards (Chapter 6.0)
- Closure Activities (Chapter 7.0)
- Postclosure Plan (Chapter 8.0)
- References (Chapter 9.0).

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

1.3.1 Facility Description (Chapter 2.0)

This chapter provides a brief description of the Hanford Site, Hanford Facility, and the location and description of the 218-E-8 Demolition Site. Information on Hanford Site security also is provided.

1.3.2 Process Information (Chapter 3.0)

This chapter describes how the discarded explosive chemical products were processed and explains the overall waste treatment system at the 218-E-8 Demolition Site.

1.3.3 Waste Characteristics (Chapter 4.0)

This chapter discusses the waste inventory and the characteristics of the waste that was treated at the 218-E-8 Demolition Site.

1.3.4 Groundwater Monitoring (Chapter 5.0)

This chapter discusses the probability that groundwater contamination has not occurred and that groundwater monitoring is not needed.

1.3.5 Closure Strategy and Performance Standards (Chapter 6.0)

This chapter discusses the closure strategy, performance standards for protection of health and the environment, and provides an overview of closure activities.

1.3.6 Closure Activities (Chapter 7.0)

This chapter describes the closure activities.

1.3.7 Postclosure Plan (Chapter 8.0)

This chapter outlines provisions for postclosure care if required.

1.3.8 References (Chapter 9.0)

References used throughout this closure plan are listed in this chapter. All references listed here, which are not available from other sources, will be made available for review, upon request, to any regulatory agency or public commentor. References can be obtained by contacting the following:

Administrative Records Specialist
Public Access Room H6-08
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

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2.0 FACILITY DESCRIPTION

This chapter briefly describes the Hanford Site, the Hanford Facility, and the location of the 218-E-8 Demolition Site, and provides information on Hanford Site security.

2.1 GENERAL HANFORD SITE DESCRIPTION

The Hanford Site covers approximately 560 square miles (1,450 square kilometers) of semiarid land that is owned by the U.S. Government and operated by the U.S. Department of Energy, Richland Operations Office (DOE-RL). The Hanford Site is located northwest of the city of Richland, Washington (Figure 2-1). The city of Richland adjoins the southeasternmost portion of the Hanford Site boundary and is the nearest population center. 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 special nuclear materials and other nuclear activities. The mission of the Hanford Site is now focused on waste management and environmental remediation and restoration.

Activities on the Hanford Site are centralized in numerically designated areas. The reactors are located along the Columbia River in the 100 Areas. The reactor fuel reprocessing units are in the 200 Areas, which are on a plateau approximately 7 miles (11 kilometers) from the Columbia River. The 300 Area, located adjacent to and north of Richland, contains the reactor fuel research and development laboratories. The 400 Area, 5 miles (8 kilometers) northwest of the 300 Area, contains the Fast Flux Test Facility, which was used for testing liquid metal reactor systems. The 600 Area covers all locations not specifically given an area designation. Adjacent to and north of Richland, the 1100 Area contains offices associated with administration, maintenance, transportation, and materials procurement and distribution. The 3000 Area, between the 1100 Area and 300 Area, contains engineering offices and administrative offices. Administrative offices also are located in the 700 Area, which is in downtown Richland.

2.2 FACILITY DESCRIPTION AND GENERAL PROVISIONS

The Hanford Facility is a single *Resource Conservation and Recovery Act* (RCRA) facility identified by the U.S. Environmental Protection Agency (EPA)/State Identification Number WA7890008967 that consists of over 60 treatment, storage, and/or disposal (TSD) units conducting dangerous waste management activities. These TSD units are included in the *Hanford Facility Dangerous Waste Part A Permit Application* (DOE-RL 1988b). The Hanford Facility consists of all contiguous land, and structures, other appurtenances, and improvements on the land, used for recycling, reusing, reclaiming, transferring, storing, testing, or disposing of dangerous waste, which, for the purposes of the RCRA, are owned by the U.S. Government and operated by the DOE-RL.

2.3 DESCRIPTION OF 218-E-8 BORROW PIT DEMOLITION SITE

The 218-E-8 Demolition Site is located in the northeast portion of the 200 East controlled-access area (Figure 2-2). Figure 2-3 details the layout of the 218-E-8 Demolition Site. Photographs of the 218-E-8 Demolition Site are included in Appendix 2A.

The 218-E-8 Demolition Site is situated in a multi-use borrow pit area. The entire borrow pit area is approximately 600 feet (180 meters) by 900 feet (270 meters) in size with a gravelly, nondescript landscape. The floor of the borrow pit was graded sometime before the demolition activities conducted in 1984. Portions of the borrow pit have been used for a variety of other activities, including asbestos disposal, burning of tumbleweeds, and storage of hazardous waste. The 218-E-8 Demolition Site occupied only a small portion [an area 20 feet (6 meters) by 20 feet (6 meters)] of the large borrow pit and is located away from the other activities. None of these activities are known to have contaminated or otherwise affected the 218-E-8 Demolition Site.

In November 1984, a demolition event consisting of a single explosion occurred at the 218-E-8 Demolition Site. This event consisted of discarded explosive chemicals/products placed in a shallow depression, 6 inches (15 centimeters) to 12 inches (30 centimeters) deep dug expressly for the demolition activity. The depression is no longer evident. However, the depression was still evident at the time of demarcation in 1988, when the site was staked and roped off with a chain fence. The TSD unit is approximately 20-foot (6-meter) by 20-foot (6-meter) square. Surveyed monuments have been placed around the 218-E-8 Demolition Site.

2.4 SECURITY INFORMATION

The entire Hanford Site is a controlled-access area. The Hanford Site maintains around-the-clock surveillance for the protection of government property, classified information, and special nuclear materials. The Hanford Patrol maintains a continuous presence of protected force personnel to provide additional security.

Manned barricades are maintained around the clock at checkpoints on vehicular access roads leading to the 200 Areas. All personnel accessing these areas must have a U.S. Department of Energy-issued security identification badge indicating the appropriate authorization. Personnel also might be subject to a search of items carried into or out of these areas.

The 218-E-8 Demolition Site is isolated from other portions of the area (at a minimum) by a chain fence with warning sings along the chain. The signs, stating "DANGER--UNAUTHORIZED PERSONNEL KEEP OUT," are in English, visible from all angles of approach, and are legible from a distance of at least 25 feet (7.6 meters). In addition to these signs, the fences around the 200 Areas are posted with signs warning against unauthorized entry. The signs are visible from all angles of approach.

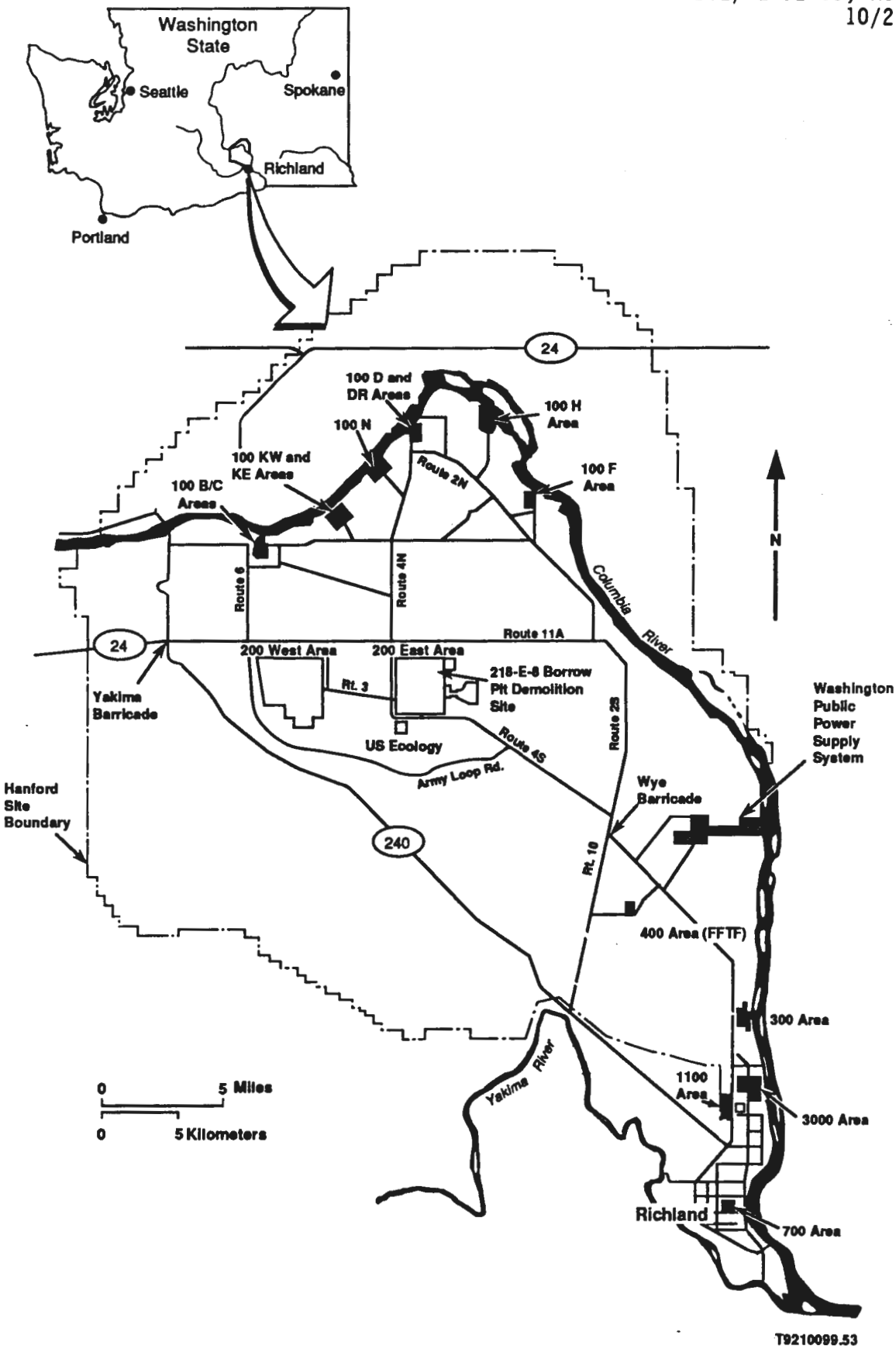

Figure 2-1. Hanford Site.

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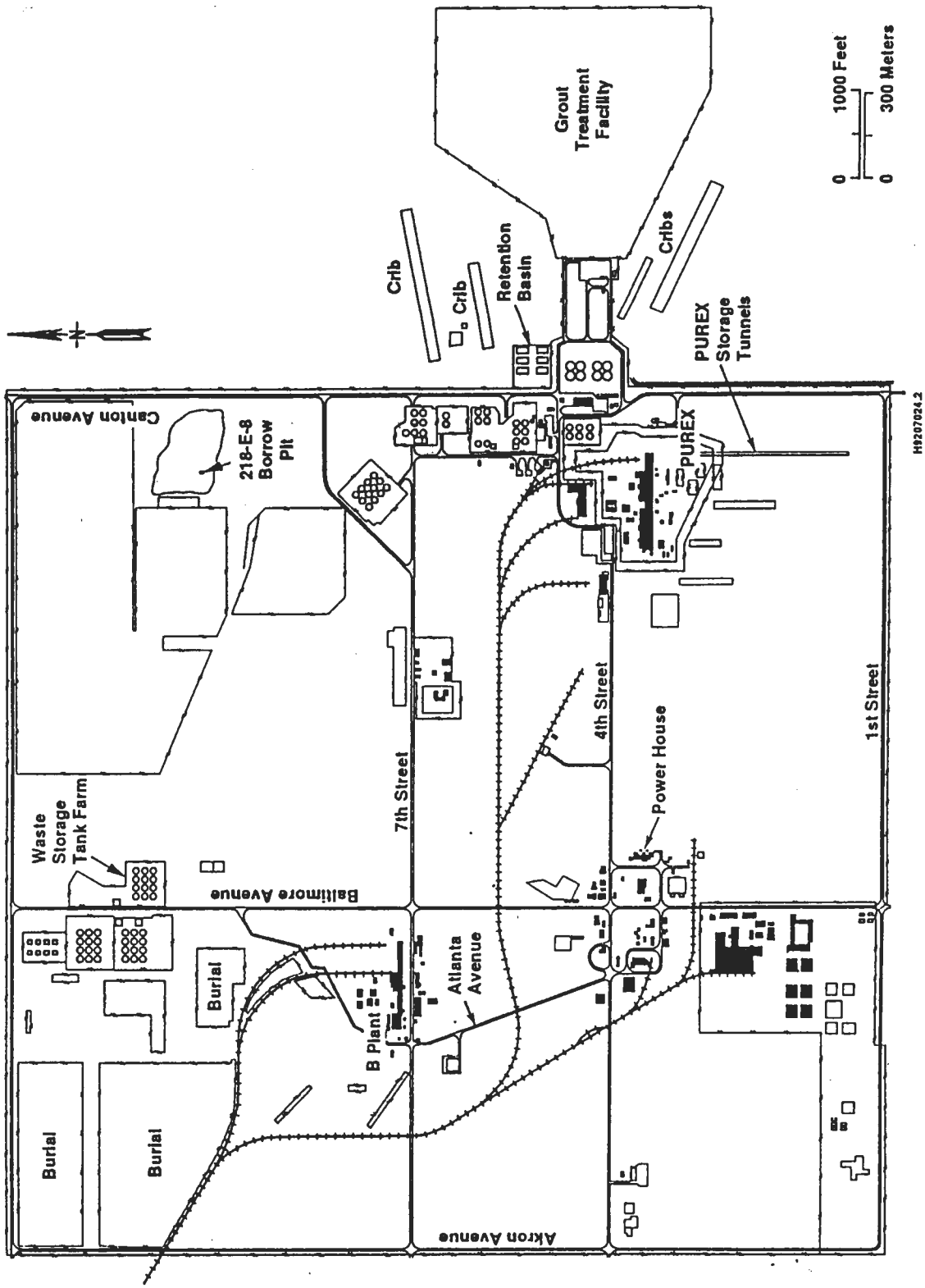

Figure 2-2. 200 East Area.

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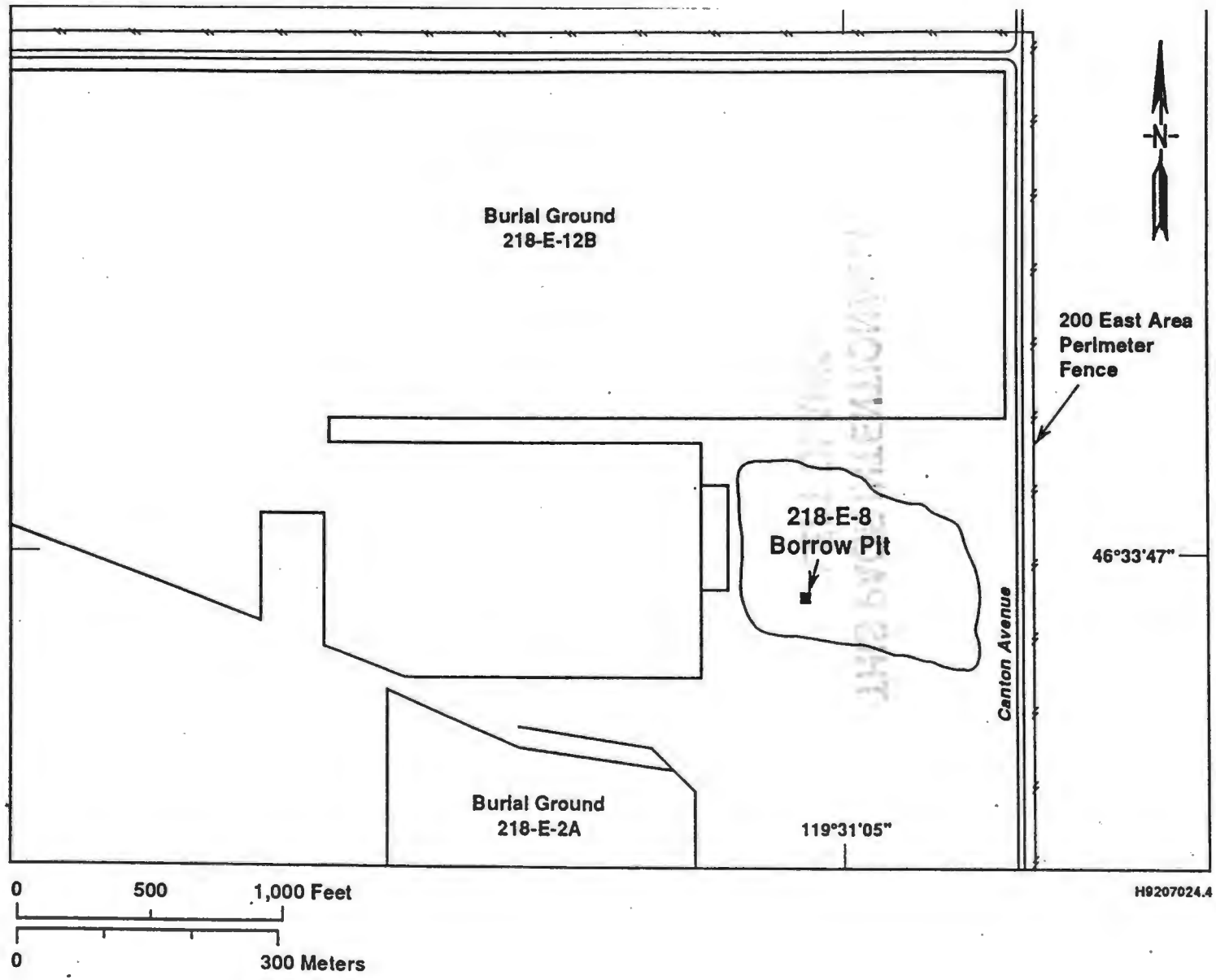

Figure 2-3. 218-E-8 Borrow Pit Demolition Site Layout.

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3.0 PROCESS INFORMATION

The chemicals detonated at the 218-E-8 Demolition Site were discarded explosive chemical products that were determined to be either in excess or beyond designated stock life. The detonation activity was limited to one event in November of 1984. A checklist of the chemical inventory was prepared prior to beginning detonation activities. The explosive chemicals were checked off the list as they were placed into a portable bomb containment vessel, for transportation to the demolition site. The detonation was performed during off-work hours (approximately 10:00 P.M.) under the observation of the Hanford Patrol, the Richland Police Department Bomb Squad, the Hanford Fire Department. The discarded explosive chemical products, in their original containers, were placed in a shallow depression dug specifically for the detonation event. Conventional explosives (nitroglycerin dynamite and detonating cord) were placed around and on top of the chemical containers. The charges were configured in a manner that channeled the explosive force downward. The discarded explosive chemical products were detonated in their original metal and glass containers as a safety precaution. After initiation, there was no evidence of remaining explosives, containers, or parts of containers in the area. The area was inspected the following morning (in daylight) to confirm that no chemicals or containers remained. Hanford Site workers observed that the weather conditions were approximately 45 degrees Fahrenheit, winds less that 15 miles per hour, and overcast (WHC 1993d). The surface soils were dry at the time of the detonation event. The Richland Police Department Bomb Squad provided demolitions expertise and explosives. The Hanford Patrol provided security to prevent inadvertent intrusion by personnel not participating in the demolition activity. The Hanford Fire Department was present to render assistance in case of an accident.

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4.0 WASTE CHARACTERISTICS

This chapter addresses the waste inventory and waste treated at the 218-E-8 Demolition Site.

4.1 ESTIMATE OF MAXIMUM INVENTORY OF WASTE

The 218-E-8 Demolition Site was a one-time use site. The demolition activity was limited to a single detonation event in 1984; hence, waste was never stored at the 218-E-8 Demolition Site. The known inventory of chemicals that was detonated is listed in Table 4-1. The maximum inventory is the sum of those chemical quantities expressed in Table 4-1. The known inventory of product used to initiate detonation activities are listed in Table 4-2. A list of Hanford Sitewide soil background levels and MTCA cleanup values are located in Appendix 4A.

4.2 WASTE TREATED AT THE 218-E-8 DEMOLITION SITE

All waste treated at the 218 E-8 Demolition Site is designated in the Part A Form 3. The chemical waste treated at the 218-E-8 Demolition Site was assumed to be reactive or explosive at the time of treatment. All chemicals detonated were commercial products from onsite laboratories or process areas that were excess to needs or were beyond their designated shelf life.

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Table 4-1. Inventory of Known Discarded Explosive Chemical Products Detonated at the 218-E-8 Borrow Pit Demolition Site.

Demolition Date	Analyte	C.A.S.[a] Number	Quantity (kg)	Vapor pressure 20°C mm Hg	MTCA Method B (mg/kg) unless noted[c]	Sitewide Bkgrd (mg/kg)
Nov-84	2-Butoxyethanol	111-76-2	16.7	0.76	NA	NA
Nov-84	1-4 Dioxane	123-91-1	2.75	27	91[b]	NA
Nov-84	Isopropyl ether	108-20-3	7.92	130	NA	NA
Nov-84	Methyl ethel ketone peroxide	1338-23-4	0.319	NA	NA	NA

*All chemicals listed are liquid under standard conditions.
[a]C.A.S. - Chemical Abstract System Registry Numbers, Chemical Abstract Service is a division of the American Chemical Society.
[b]MTCA Method B cancer cleanup level.
[c]MTCA Method B non-cancer cleanup levels unless noted otherwise.
NA = Not available.

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Table 4-2. Inventory of Known Detonation Materials at Borrow Pit.

Demolition Date	Materials	C.A.S.[a] number	MTCA Method B (mg/kg)[b]	Sitewide Bkgrd (mg/kg)
Nov-84	Nitroglycerin dynamite*	55-63-0	NA	NA
Nov-84	Pentaerythrite tetranitrate*	78-11-5	NA	NA

*denotes materials that are solid under standard conditions.
[a]Chemical Abstract Service.
[b]MTCA Method B non-cancer cleanup levels unless noted otherwise.
NA = Not available.

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CONTENTS

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5.0 GROUNDWATER MONITORING

It is unlikely that the demolition site discarded explosive chemical products interacted with groundwater because (1) rainfall at the Hanford Site is slight [annual average rainfall is 6.26 inches (0.159 meters) per year] (PNL 1993), thus limiting contaminant migration; (2) depth from soil surface to groundwater is 305 feet (93.025 meters) (WHC 1993a); and (3) it is believed that all significant quantities of chemical products were destroyed in the explosion or volatilized to the atmosphere.

The 218-E-8 Borrow Pit is not subject to the groundwater monitoring requirements of WAC 173-303-610(7)(a) if there is no waste left in place, as is consistent with the preferred closure strategy (Chapter 6.0). The 218-E-8 Borrow Pit will not be operated, and has not been operated, as a dangerous waste surface impoundment, waste pile, land treatment unit, or landfill as defined in WAC 173-303-645(1)(a). Therefore, if clean closure can be attained, groundwater monitoring is not required. However, if any groundwater remedial action is required, with respect to contaminants associated with the 218 E-8 Demolition Site, it will be addressed through the CERCLA remedial investigation/feasibility study process.

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6-1. Closure Strategy Flowchart. F6-1

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6.0 CLOSURE STRATEGY AND PERFORMANCE STANDARDS

This chapter describes the closure strategy, closure performance standards, and provides an overview of closure activities.

6.1 CLOSURE STRATEGY

The closure investigation began by performing a radiation survey at the 218-E-8 Demolition Site. The results of the radiation survey confirmed that there is no radioactivity above background levels at the 218-E-8 Demolition Site. Any radiation above background levels at the 218-E-8 Demolition Site would have been from activities other than 218-E-8 Demolition Site activities.

Soil samples have been taken within the 218-E-8 Demolition Site and are currently being analyzed as specified in the Sampling and Analysis Plan (SAP) (Appendix 7C). To meet the criteria for clean closure of the 218-E-8 Demolition Site, soil analytical results must verify that potentially dangerous waste constituents treated at the site are not present above action levels. The analytical results will be evaluated and compared with action levels to verify that the concentration of all detonation activity residues is at or below action levels. The constituents of concern and the analytical methods were agreed upon through the data quality objective (DQO) process by taking into account the waste inventory, reactive byproducts, chemical degradation, and detonation material. The analytical methods are listed in the SAP (Appendix 7C). If at any time an imminent hazard is posed at the 218-E-8 Demolition Site, an emergency response will occur to ensure worker safety.

Action levels are defined as levels above the Hanford Site soil background levels (DOE-RL 1993) and MTCA (WAC 173-340) Method B. If analysis determines that levels are above both guidelines, a phase two investigation will be developed. This is not anticipated, however, because of the detonation efficiency and the ability of the soil system to breakdown and eliminate many organic chemicals through abiotic (e.g., volatilization, hydrolysis, oxidation, reduction, photo-degradation) and biotic (e.g., metabolically active microorganisms, extracellular enzymes or metabolic intermediates) degradation (Dragun 1988).

For noncarcinogens, the principal variable relating human health to action levels is the oral reference dose. The oral reference dose is defined as the level of daily human exposure at or below which no adverse effect is expected to occur during a lifetime. For carcinogens, the cancer slope factor is the basis for determining human health effects; it is a measurement of risk per unit dose. The oral reference dose and cancer slope factor are chemical specific and are obtained from the *Integrated Risk Information System* (EPA 1991) and other health-based EPA-approved databases, which are updated periodically by the EPA (see Appendix 4A for listing of specific health-based information sources). *Model Toxics Control Act* Method B Action levels will be based on values that are current at the time of approval of this closure plan (Appendix 4A).

The closure strategy for the 218-E-8 Demolition Site is depicted in a flow diagram in Figure 6-1.

6.2 CLOSURE PERFORMANCE STANDARDS

The closure performance standards in WAC 173-303-610(2)(a) require the owner or operator to close the TSD unit in a manner that:

"(a)(i) Minimizes the need for further maintenance;

(ii) Controls, minimizes or eliminates to the extent necessary to protect human health and the environment, postclosure escape of dangerous waste, dangerous constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, ground water, or the atmosphere; and

(iii) Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity."

6.2.1 Minimize the Need for Future Maintenance

The closure performance standard in WAC 173-303-610(2)(a)(i) requires the owner or operator of a TSD unit to close the site in a manner that minimizes the need for further maintenance. As discussed in Section 6.1, the strategy proposed for closure (i.e., that the site is clean by demonstration that the contaminants are below action levels or by waste removal) will minimize the need for future maintenance.

6.2.2 Protect Human Health and the Environment

The 218-E-8 Demolition Site is to be clean closed. Consistent with this intent and strategy, the following actions will be/or have been taken (as necessary) in advance of closure certification.

- The closure area was radiologically surveyed (completed 5/92).
- Surface soils were sampled for dangerous waste constituents (completed 6/94).
- Data will be evaluated to determine if constituents of concern are present above action levels and the extent of contamination, if any.
- If contaminated soil is found, options include additional soil sampling or soil removal, to reduce constituent concentrations in site surface soils to acceptable soil cleanup values as determined by methods prescribed in WAC 173-340.

6.2.3 Return Land to the Appearance and Use of Surrounding Land

In accordance with WAC 173-303-610(2)(a)(iii), the owner or operator of a TSD unit is required to close the unit in a manner that returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

When closure of the 218-E-8 Demolition Site is accomplished, the site will be returned to the appearance and continued use of the surrounding 200 East 218-E-8 Borrow Pit.

6.3 OVERVIEW OF CLOSURE ACTIVITIES

The activities presented in this section are divided into planning activities and physical activities.

6.3.1 Planning Activities

The DQO planning process was used to ensure that the performance standards are met to the satisfaction of all parties involved. This DQO process provided the framework for the SAP and defined the data needs and uses. The SAP provides the documentation of agreement and decisions regarding establishing and meeting the action levels for the 218-E-8 Demolition Site Closure (Appendix 7C).

6.3.2 Physical Activities

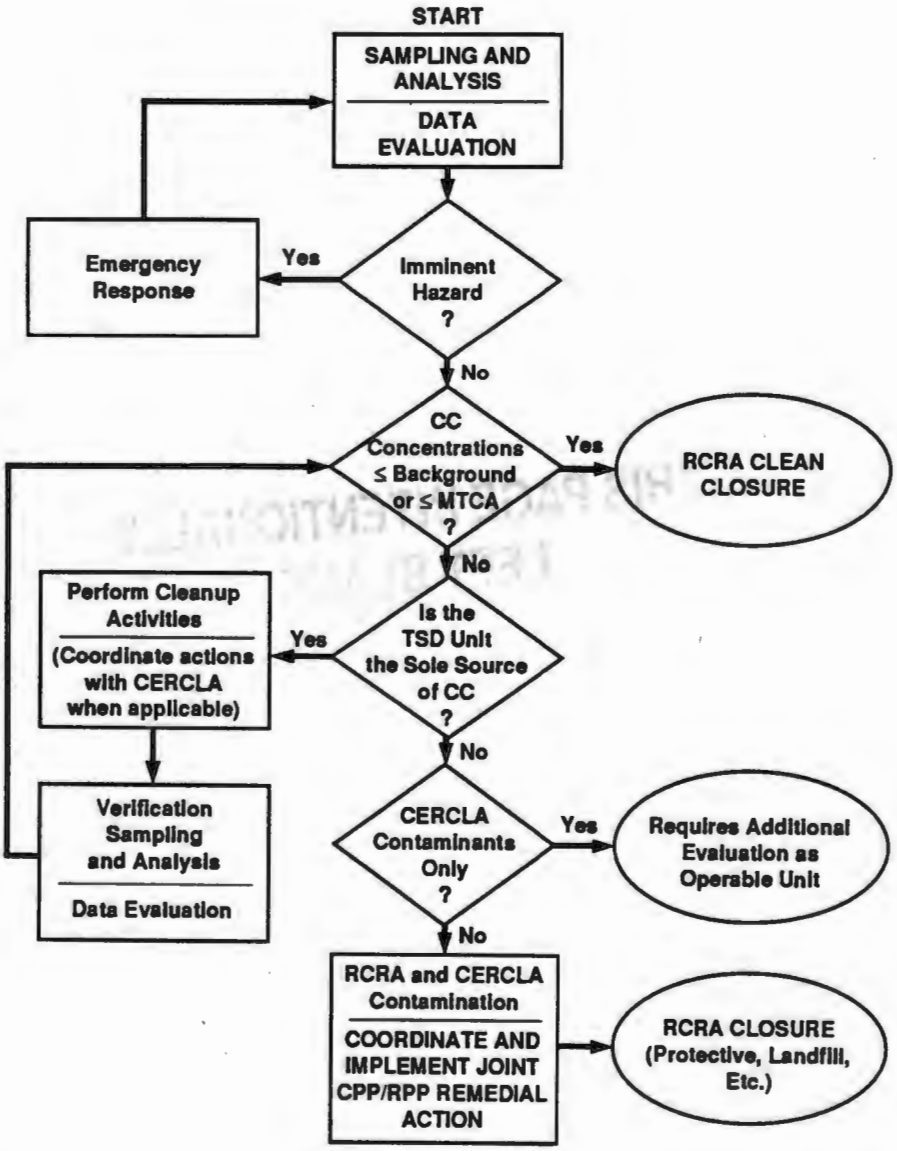
The general closure activities are as follows.

- Perform radiological survey (completed in 5/92).
- Collected soil samples from within the 218-E-8 Demolition Site. Sample locations and collection methods are discussed in Chapter 7.0, Section 7.2.3 and the SAP (Appendix 7C) (completed in 6/94).
- Analyze samples in accordance with EPA-approved procedures and evaluate results. Samples will be analyzed in an offsite laboratory capable of performing to EPA Analytical level III standards.
- Compare analytical results to action levels to determine the extent of contamination and to determine the presence or absence of contaminants.
- If contamination levels for all constituents of concern are below their action levels, the 218-E-8 Demolition Site will be clean closed.
- If contamination at the 218-E-8 Demolition Site is above the action level, a phase two investigation will be developed. The phase two

investigation will be developed in a subsequent DQO negotiation process with all parties involved.

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

Closure activities will be monitored by an independent registered professional engineer who will certify that closure activities were accomplished in accordance with the specifications of the approved closure plan.



Background = Hanford Site-wide background threshold (upper limit of the range of concentrations) for soil (DOE-RL 1992b).
CC = Constituents of concern.
Clean Closure = Closure based on the criterion that dangerous waste is not present in concentrations greater than background or LOQ; no further remedial action to be taken.
CPP/RPP = CERCLA past practice/RCRA past practice.
MTCA = Model Toxics Control Act (WAC 173-340) Method B.
Verification Sampling = Sampling and analysis used to evaluate the success of contamination removal.

Figure 6-1. Closure Strategy Flowchart.

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7.0 CLOSURE ACTIVITIES

This chapter describes the proposed closure activities for the 218-E-8 Demolition Site. In conformance with Chapter 6.0, this chapter provides specific field sampling and laboratory analytical methods that will be applied to identify soil contamination originating at the 218-E-8 Demolition Site. When validated, the analytical results will be used to determine the appropriate closure strategy (as presented in Chapter 6.0 and illustrated in Figure 6-1). The sampling and analysis plan has been developed from the process information (Chapter 3.0), waste inventory (Chapter 4.0), the closure strategy (Chapter 6.0) and the DQO process. Appendix 7A contains the quality assurance project plan for the SAP. Appendix 7C contains the SAP.

7.1 SITE RADIOLOGICAL SURVEY

A radiological survey of the 218-E-8 Demolition Site was performed to confirm that the site is substantially free of radiological contaminants. Radiological activity in surface soils is below levels requiring management of the area as a radiologically contaminated site, control of work at the site by the radiation work permit process, or wearing of prescribed protective clothing and/or respiratory protection. The radiological survey was conducted following the procedures contained in the *Health Physics Procedures Manual*, (WHC 1990c).

7.2 SOIL SAMPLING AND ANALYSIS CRITERIA

Soil samples were collected and are currently being analyzed using level III analytical services procured from an offsite contracted laboratory. If contaminants are present at levels in excess of proposed action levels, the data obtained from soil sampling and analysis will provide information for devising and implementing appropriate remedial action.

7.2.1 Sampling and Data Quality Objectives

To create a suitable soil sampling and analysis scheme, it is necessary to have a general understanding of explosives and detonations. An explosive is a chemical or a mixture of chemicals that is capable of producing an explosion (i.e., detonation) through the liberation of stored energy. All explosive substances produce heat; nearly all of them produce gas (Davis 1943). Explosives are classified into low explosives (or propellants), primary explosives (or initiators), and high explosives. Low explosives are combustible materials, which always include an oxidizer component, such that combustion is supportable whether or not air is present. Low explosives burn but do not explode. Instead, rapid accumulation of the gas products of combustion in a confined space is the actual cause of the explosion. With primary and high explosives, actually undergo an instantaneous chemical transformation when detonation is initiated, which liberates large quantities of heat or heat and gas, thus producing an explosion. Detonation is distinct

from combustion. By themselves, many primary and high explosives will not support combustion. Primary explosives are sensitive to both heat and shock. High explosives generally exhibit sensitivity to shock only, and generally must receive a relatively strong shock, as from a primary explosive, to detonate. Primary and high explosives are characterized by a property termed brisance, referring to the production of a shock wave during detonation, due to the characteristically high propagation velocities involved.

Chemicals that were identified as candidates for demolition at the 218-E-8 Demolition Site included strong oxidizers and reducing agents (i.e., low explosives when combined), chemicals such as ethers and furans that are highly flammable and form shock-sensitive degradation products, and chemical compounds that were recognized as primary or high explosives or chemical cognates of such explosives.

The 218-E-8 Demolition Site demolition event could be characterized as follows.

- Initiation by a primary explosive, resulting in propagation of a shock wave through the mass of chemical containers. The shock wave would have caused any other primary or high explosive chemicals to detonate.

- Nonexplosive chemicals would be dispersed (in the case of solids) or atomized (in the case of liquids), directed upward (the only unconfined direction) by the partial confinement of the shallow pit, and ignited by the heat released by the explosion, causing the fireball. The explosion also could have had the effect of fragmenting some of the chemicals that were present.

- The shock wave from the explosion and the expanding gases from the fireball would have caused unreacted residues (if any) to be dispersed over an unspecified area.

Some chemical residues can remain in the surface soil for many years. However, in the intervening time since the demolition event in 1984, volatile organic residues in the soil have been lost to the atmosphere by vaporization. Unreacted volatiles and semivolatiles may have been broken down and eliminated from the soil column, all or in part, by abiotic (e.g., volatilization, photodegration) and biotic (e.g., microbial activity) degradation (Dragun 1988).

The primary objective of soil sampling will be to determine whether dangerous waste contaminants are present in surface soils at the 218-E-8 Demolition Site at levels exceeding the proposed action levels. Potential contaminants (i.e., constituents of concern) can be selected based on the waste inventory constituent list for the 218-E-8 Demolition Site. Analytical methods are required that provide the capabilities to identify and quantify these constituents if the constituents are present in the soil.

If dangerous waste constituents are present above proposed action levels, a second objective of sampling will be to determine the extent and areal distribution of contamination. The efficiency of thermal destruction during

the demolition events is not directly assessable at this late date. Any chemical constituents that were not effectively destroyed in the explosion might simply have been dispersed across the detonation site. Recognizing this possibility, the sampling scheme has been designed to obtain data that will, support an assessment regarding the adequacy of existing 218-E-8 Demolition Site closure area dimensions.

It is generally acknowledged that detonation and thermal destruction are very efficient processes, and that any dangerous waste constituents that might remain in the soil at the closure area probably would exist at very low concentrations, such that detection might be difficult. Therefore, a sufficiently conservative EPA analytical support level (level III) will be invoked during analysis to minimize concerns that dangerous waste concentrations above the proposed action levels could go undetected.

Data quality objectives are developed to describe the overall level of uncertainty in environmental data that decision-makers are willing to accept. Typically, data quality requirements are specified in terms of objectives for precision, accuracy, representativeness, comparability, and completeness. Project-specific DQOs for 218-E-8 Demolition Site soil sampling and analysis activities are identified in Appendix 7A and the SAP (Appendix 7C).

7.2.2 Analytical Parameters

As indicated in Chapter 4.0, Table 4-1, the detonation events at the 218-E-8 Demolition Site included a variety of organic and inorganic constituents that are (or are suspected to be) characteristic ignitable, corrosive, and/or reactive waste as defined in WAC 173-303-090. The majority of the chemical compounds were of two general types: (1) organic chemicals that form unstable degradation products (e.g., ethers and furans that produce shock-sensitive peroxides); and (2) reactive powdered metals and metal salts. The analytical methods chosen through the DQO process were based on these constituents of concern and the initiating products, which are listed in Section 6.0 of the SAP (Appendix 7C).

7.2.3 Sampling Methodology

The following sections discuss sample locations, background samples, and analytical instrumentation and procedures.

7.2.3.1 Sample Locations. The blasting pit was reconstructed by removing wind-blown sand to create a 6-inch- (0.15-meter-) deep, 3-foot- (0.915-meter-) diameter hole at the center of the site. Eight soil samples were taken from

the seven locations indicated in the SAP (Appendix 7C). The Numbers and types of samples to be collected and submitted for analysis consisted of the following.

- Two authoritative soil samples were collected at the site center. One sample will be collected at a depth of 0 to 6 inches (0 to 0.15 meter) and one sample at a depth of 12 to 18 inches (0.305 to 0.476 meter).

- Three soil samples were collected from predetermined random locations within a 1.5-foot (0.458-meter) radius of the site center.

- Three soil samples were collected along the prevailing wind path, one sample upwind, and two downwind with a radius of 3.5 and 5.5 feet (1.068 and 1.678 meters) from the site center.

- One sample was split in the field, placed in separate containers, and submitted for quality assurance and quality control purposes.

- Two blanks, consisting of an equipment blank, and a trip blank, were collected and submitted for analysis with the soil samples and splits. Blanks consisted of silica sand.

Soil samples were removed from the specified locations for qualitative and quantitative analyses by an offsite contracted laboratory. Sampling were performed in conformance with Environmental Investigations Instruction (EII) 5.2, Appendix E (WHC 1988a). Samples will be collected manually, using decontaminated, stainless steel hand tools. Soil sample locations and depths are located in the SAP (Appendix 7C).

All soil samples (including blanks and duplicates) had preassigned sample numbers in conformance with EII 5.10, "Obtaining Sample Identification Numbers and Accessing Hanford Environmental Information System (HEIS) Data" (WHC 1988a). The sample volume required for each soil sample was determined by the analytical laboratory. The samples were chilled with ice in the field. Samples were temporarily refrigerated and then transported to the analytical laboratory in an ice chest.

7.2.3.2 Background Samples. A Hanford Sitewide assessment of natural constituent background levels has been performed for the Hanford Site (WHC 1991a; WHC 1991b). The majority of dangerous waste constituents detonated at the site were organic chemicals, for which background values are unavailable. For these constituents, concentration data will be compared to MTCA Method B levels. A few compounds on the waste inventory list contained inorganic metal and halide elements. Residues from these compounds could include oxides, cations, and/or various anions with non-zero background values. Results from the Hanford Sitewide assessment will be available for use in data interpretation. The adequacy of available Hanford Sitewide background data for site-specific contaminants will be evaluated in conjunction with the interpretation of analytical results.

7.2.4 Field Documentation

The field team leader maintained a logbook during soil sampling surveying activities in accordance with EII 1.5, "Field Logbooks" (WHC 1988a). Information pertinent to ongoing activities at the closure areas were recorded in a legible manner with indelible ink in the logbook.

7.2.5 Evaluation of Data

Data reliability will be evaluated through a review of field documentation, sample handling procedures, analytical procedures, offsite contracted laboratory documentation, and calibration records. The purpose of the review will be to establish the reliability of the data by verifying that samples were labeled, handled, and controlled in a manner designed to minimize the possibility of physical misidentification. Procedures for quality control documentation will follow SW-846, Chapter 1, "Quality Assurance" (EPA 1990). Analytical Data returned from the contract laboratory will be validated according to requirements described in *Data Validation Procedures for Chemical Analyses* (WHC 1993b).

7.2.6 Statistical Evaluation

Analytical results will be reviewed and summarized. Procedures for calculating detection and quantitation limits of constituents and for reporting of data will follow the guidance in EPA SW-846, Chapter 1, "Quality Assurance" (EPA 1990) and *Characterization and Use of Soil and Groundwater Background for the Hanford Site* (WHC 1991a). Constituents will be eliminated from further consideration in cases where all results are below detection limits (provided the detection limit is below background). For the remaining constituents, data will be tabulated for statistical evaluation. Summary statistics will be computed. The following information for individual constituents will be summarized for presentation:

- Total number of values
- Number of values less than detection limits
- Minimum value
- Maximum value
- Median
- Mean
- Standard deviation
- Coefficient of variation.

Data analysis and evaluation procedures will be used that: (1) balance the false positive and false negative error rates; (2) are appropriate for the distribution of sample data for each analyte; and (3) are consistent with the nature of the data (e.g., the proportion of 'non-detects' in the data sets) and the applicable regulatory limits (background values or health-based standards). Appropriate statistical methods might include (but would not be limited to) tests on means, percentiles, and/or proportions.

7.2.7 Determination of Proposed Action Levels

Soil cleanup action levels were developed from Hanford Site background threshold values (DOE-RL 1993) and MTCA Method B (WAC 173-340). Action levels were determined for all constituents of concern during the DQO process (Appendix 7C). Constituent levels will be compared against proposed action levels to assess the need for remedial action. If a determination is made that some remedial action will be necessary as a condition of closure, a remedial action plan will be prepared.

7.3 REMOVAL OF CONTAMINATED SOIL

If soil analytical results and assessments of remedial options should indicate that soil removal is necessary to close the 218-E-8 Demolition Site, this section of the closure plan will be implemented as indicated in Chapter 6.0, Figure 6-1. This section describes the following activities relating to soil removal:

- Estimating the volume of contaminated soil to be removed
- Soil removal survey control
- Soil removal operations
- Verification sampling.

7.3.1 Estimating the Volume of Contaminated Soil to be Removed

The volume of contaminated soil will be determined based on soil sampling results (i.e., the indicated constituents and their respective concentrations and distributions) and the constituent-specific proposed action levels (i.e., soil cleanup values). The volume of contaminated soil will be calculated in the following manner.

- Soil sample information will be plotted on a closure area plan drawing.

- For each contaminated area, the volume of soil to be removed will be estimated by the results obtained in the initial characterization.

- A phase two investigation sampling scheme will propose to define the location of the constituents of concern. The location of the site contamination must be known with some degree of certainty to begin any soil excavation. Supplemental sampling with portable field screening instrumentation might be carried out to better define the areal extent of contamination.

7.3.2 Soil Removal Survey Control

The surveyed corner monuments installed at the site will serve as control points for any soil removal excavation work. The monuments also provided location control for the surface radiological survey and soil sampling

activities. If removal of contaminated soil is necessary for clean closure of the site, additional control points may be installed as needed to effectively manage and document the excavation work. As preliminary actions, a survey grid will be projected over the area to be excavated, and a controlled drawing of the existing site topography will be prepared identifying all control point positions and soil sample locations. Depending upon the size and shape of the excavation area, elevation surveys and grade stakes will be used (as appropriate) to control the work. The controlled drawing will be modified to show the extent of soil removed and the final site surface configuration. Afterward, the survey grid and the drawing(s) will assist in location control and documentation for verification sampling.

7.3.3 Soil Removal Operations

If soil removal is necessary and if the contaminated soil volume is sufficient, the soil removal operation will be performed using standard types of earth moving equipment (e.g., grader, front-end loader, backhoe, and rear dump trucks). Excavation will be performed with either a backhoe or a front-end loader. Dust suppression would be employed if needed, to minimize dust generation and potential releases of contaminants, e.g., a water truck could apply water periodically to the excavation area and adjacent affected areas. Dust control activities will be repeated as necessary to maintain the soil in a condition sufficient to minimize or eliminate dust production.

If the contaminated soil volume is small, 55-gallon (208-liter) containers will be used. Alternatively, soil could be bulk loaded into rear dump trucks. Contaminated soil (containerized or bulk loaded) will be transported to a permitted disposal facility. Contaminated soil will be prepared for shipment (i.e., labeled, marked, and placarded) as required in WAC 173-303-190 which incorporates by reference the applicable federal regulations on hazardous waste shipments (49 CFR 172, 173, 178, and 179). An EPA hazardous waste manifest would be prepared to document each offsite shipment of contaminated soil as required in WAC 173-303-180 and 40 CFR 262.

If soil removal is necessary, the affected area will be recontoured with surrounding soils. After excavation and before recontouring of the removal areas, the affected area will undergo verification sampling (Chapter 6.0, Figure 6-1).

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

As appropriate, the destination of any removed soil will be identified in the Administrative Record for the 218-E-8 Demolition Site. This identification will be undertaken concurrently with the closure certification (Section 7.7).

7.3.4 Verification Sampling

Verification sampling will be performed following soil removal to establish that residual concentrations of the constituents of concern are below action levels (i.e., the objective of soil removal has been attained). Verification samples will be taken from the newly exposed surface area resulting from soil removal. Verification samples will be analyzed in an offsite contracted laboratory. The scope of sample analysis will be limited to quantifying the residual concentrations of constituents of concern to compare these concentration values to the cleanup standards. Before verification sampling, the number and location of the samples and the analytical methods will be submitted for regulatory concurrence. It is envisioned that verification samples will be analyzed by the same procedures identified in Section 7.2.2.

7.4 PERSONNEL TRAINING

Appendix 7B contains a brief description of the training courses required for the onsite personnel. Training for soil sampling personnel is covered within the EIIs. All personnel entering the TSD unit during closure must have 40 hour of hazardous waste training as defined in 29 CFR 1910.120. Before performing actual closure activities, specific work plans will be submitted to the lead regulatory agency for review. These documents will detail the specific work activities and will not be written until the latest technology and specific materials and equipment are known.

7.5 SCHEDULE FOR CLOSURE

Closure of the 218-E-8 Demolition Site will begin on notification by Ecology of plan approval. Closure will proceed according to the schedule presented in Figure 7-1.

7.6 CLOSURE CONTACTS

The following office (or its successor) is the official contact for the 218 E-8 Demolition Site Closure Plan:

Office of Environmental Assurance,
Permits, and Policy
U.S. Department of Energy,
Richland Operations Office
P.O. Box 550
Richland, Washington 99352
(509) 376-5441.

7.7 AMENDMENT OF CLOSURE PLAN

The closure plan for the 218-E-8 Demolition Site 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. This plan may be amended any time before certification of final closure of the 218-E-8 Demolition Site.

If an amendment to the approved closure plan is required, the DOE-RL will submit a written request to the lead regulatory agency to authorize a change to the approved plan. The written request will include a copy of the closure plan amendment for approval. Documentation supporting the independent registered professional engineer's certification will be supplied upon request of the regulatory authority.

7.8 CERTIFICATION OF CLOSURE AND SURVEY PLAT

Within 60 days of closure of the 218-E-8 Demolition Site, the DOE-RL will submit to the Benton County Auditor and the lead regulatory agency a certification of closure and a duly certified survey plat. The certification of closure will be signed by both the DOE-RL and a registered independent professional engineer, stating that the unit has been closed in accordance with the approved closure plan. The certification will be submitted by registered mail or an equivalent delivery service.

The DOE-RL and the independent professional engineer will certify with a document similar to Figure 7-2.

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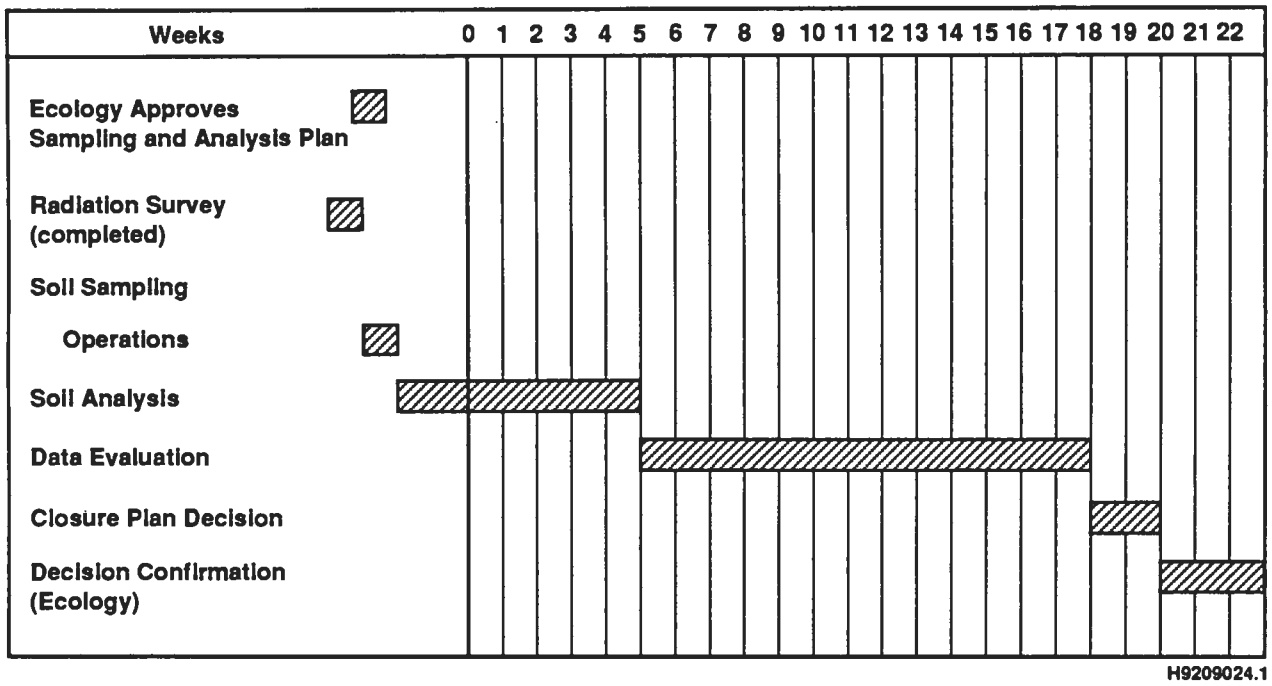

Figure 7-1. 218-E-8 Borrow Pit Demolition Site Closure Schedule.

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CLOSURE CERTIFICATION
FOR

_____

Hanford Site
U.S. Department of Energy, Richland Operations Office

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.# _____ State ___ _____
Signature Independent Registered Professional Engineer Date
(Typed Name, Professional Engineer license number, state of issuance, and date of signature)

Figure 7-2. Typical Closure Certification Document.

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8.1 NOTICE IN DEED BOOK 8-1

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8.0 POSTCLOSURE PLAN

In the event that the 218-E-8 Demolition Site cannot be clean closed and that residual soil contamination remains after soil removal activities, a 218-E-8 Demolition Site postclosure permit application will be submitted in accordance with WAC 173-303 regulations.

8.1 NOTICE IN DEED BOOK

This closure plan proposes that the 218-E-8 Demolition Site be closed with no residual soil contamination that would pose a threat to human health or the environment. However, if clean closure cannot be secured, the following action will be taken in accordance with WAC 173-303-610(1)(b). Within 60 days of the certification of closure, the 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 General Index.

TO WHOM IT MAY CONCERN

The United States Department of Energy, Richland Operations Office, 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 the 218-E-8 Demolition Site)

(b) The United States Department of Energy, Richland Operations Office, by operation of the 218-E-8 Demolition Site, has disposed hazardous and/or dangerous waste under other terms of regulations promulgated by the United States Environmental Protection Agency and the Washington State 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 property

(e) The United States Department of Energy, Richland Operations Office, has filed a survey plat with the Benton County Planning Department and with the United States Environmental Protection Agency, Region 10, and the Washington State Department of Ecology (whichever are

applicable) showing the location and dimensions of the 218-E-8 Demolition Site and a record of the type, location, and quantity of waste treated.

8.2 POSTCLOSURE CARE

Postclosure care is required when a TSD unit has residual contamination that poses a problem to human health or the environment. At the 218-E-8 Demolition Site, underlying soils and possibly groundwater might have been contaminated by waste treated during 218-E-8 Demolition Site operations. Under the Tri-Party Agreement, source contamination and groundwater operable units will be investigated and remediated through the CERCLA process.

As described in Chapter 6.0, soil remediation may be coordinated with the CERCLA remedial investigation/feasibility study process. If the soil is contaminated from 218-E-8 Demolition Site detonation activities, the TSD unit will not be considered closed until the remediation is complete. Closure remediation activities may be completed when the larger-scale cleanup is implemented. The 218-E-8 Demolition Site will be inspected until CERCLA remediation activities begin at the site. This inspection would be combined with TSD unit inspections presently conducted. The inspections would determine the need for maintenance of any temporary covers or other physical barriers and to check the security of the site. Any required maintenance would be performed by Hanford Site personnel.

Any data obtained from sampling and analyses during RCRA closure activities will be part of the official record and included with the closure plan. These data will be available for the CERCLA evaluation of the 200-PO-6 operable unit.

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9.2 CODE OF FEDERAL REGULATIONS AND FEDERAL REGISTER

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

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40 CFR 265, "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.

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49 CFR 173, "Shippers-General Requirements for Shipments and Packaging," Title 49, *Code of Federal Regulations*, Part 173, as amended, U.S. Department of Transportation, Washington, D.C.

49 CFR 178, "Shipping Container Specification," Title 49, *Code of Federal Regulations*, Part 178, as amended, U.S. Department of Transportation, Washington, D.C.

49 CFR 179, "Specifications for Tank Cars," Title 49, *Code of Federal Regulations*, Part 179, U.S. Department of Transportation, Washington, D.C.

9.3 FEDERAL AND STATE ACTS

Atomic Energy Act of 1954, 42 USC 2011 et seq.

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

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

State of Washington Hazardous Waste Management Act of 1976, Revised Code of Washington, Chapter 70.105 et seq., Olympia, Washington.

9.4 WASHINGTON ADMINISTRATIVE CODE AND REVISED CODE OF WASHINGTON

WAC 173-303, *Dangerous Waste Regulations*, Washington State Department of Ecology, Olympia, Washington.

WAC 173-340, *Model Toxics Control Act Cleanup Regulations*, as amended, Washington State Department of Ecology, Olympia, Washington.

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7C SAMPLING AND ANALYSIS PLAN

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APPENDIX 2A

PHOTOGRAPHS

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(Photograph taken 1994)

218-E-8 Borrow Pit Demolition Site, Facing South.

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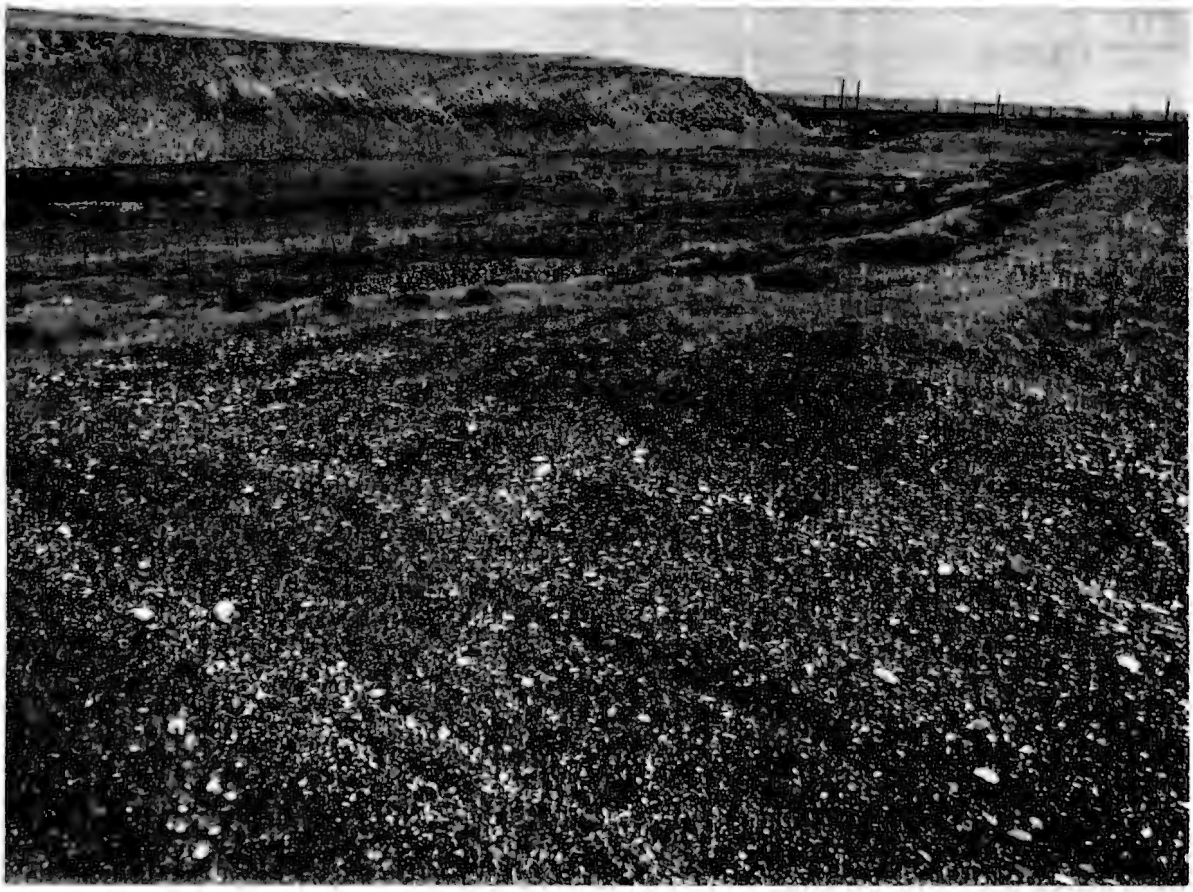

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(Photograph taken 1992)

218-E-8 Borrow Pit Site, Facing Northeast.

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APPENDIX 4A

TOXICITY DATA

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Table 4A-1.

Waste Identification		Toxicity Values		RfD Updated/ Source	Cancer Slope Factor, Updated Source	Model Toxics Control Act Cleanup Levels (mg/kg unless noted)			Sitewide Bkgrd (mg/kg)
						Method A	Method B Soil		
Chemical Name	C.A.S. (b) Number	Oral Chronic RfD mg/(kg*d)	Cancer Slope Factor (kg*d)/mg			Soil Residential	Non-Cancer	Cancer	
2-Butoxyethanol	111-76-2	NA	NA						NA
1-4 Dioxane	123-91-1	NA	1.10E-02		(a)			91	NA
Isopropyl ether	108-20-3	NA	NA						NA
Methyl ethel ketone peroxide	1338-23-4	NA	NA						NA
Nitrate, expressed as N	14797-55-8	1.6E+00	NA	(a)			130,000		906
Nitrate, expresses as NO3-	14797-55-8	7.1E+00	NA	RfD calculated from Nitrate			570,000		906

MODEL TOXICS CONTROL ACT EQUATIONS

Non-cancer Cleanup Level = RfD* (ABW * UCF * HQ)/(SIR * ABI * FOC)

Cancer Cleanup Level = [(RISK * ABW * LIFE * UCF)/(SIR * ABI * DUR * FOC)]/Slope Factor

EQUATION PARAMETERS**

Parameters	Units	Method B	
		Non-cancer	Cancer
Unit Conversion Factor (UCF)	mg/kg	1.00E+06	1.00E+06
Average body weight over period of exposure (ABW)	kg	16	16
Soil Ingestion Rate (SIR)	mg/day	200	200
Gastrointestinal absorbtion rate (ABI)		1	
Frequency of contact (FOC)		1	1
Hazard Quotient (HQ)		1	1
Lifetime (LIFE)	yrs		75
Duration of exposure (DUR)	yrs		6
(RISK) cancer risk level			1.00E-06

Notes

(a) EPA, Integrated Risk Information System (IRIS database), U.S. Environmental Protection Agency, Washington D.C., Oral RfDs, cancer slope factors, and cancer class are updated first quarter of 1994 unless otherwise noted.

(b) C.A.S. - Chemical Abstract System Registry Numbers, Chemical Abstract Service is a division of the American Chemical Society.

**Ecology 1991b.

NA = Not available.

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APPENDIX 7A

QUALITY ASSURANCE PROJECT PLAN FOR SOIL SAMPLING AND ANALYSIS FOR THE 218-E-8 BORROW PIT DEMOLITION SITE

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7A.0 QUALITY ASSURANCE PROJECT PLAN FOR SOIL SAMPLING AND ANALYSIS FOR THE 218-E-8 BORROW PIT DEMOLITION SITE

This appendix provides the quality assurance and quality control information for assuring that the 218-E-8 Demolition Site closure activities (Chapter 7.0) will provide suitable closure data.

7A.1 PROJECT DESCRIPTION

On one occasion in November 1984, discarded explosive chemical products, including a number of organic and inorganic compounds, were detonated at the 218-E-8 Demolition Site. This TSD unit will undergo clean closure consistent with the WAC 173-303. The present status of soil contamination at the site is unknown. A round of soil sampling and analysis are proposed in the closure plan to verify that constituents of concern are not present in the surface soils at the site above action levels. This quality assurance project plan (QAPjP) has been prepared for regulatory review with the closure plan in support of proposed sampling and analysis activities.

7A.1.1 Project Objectives

The principal objective of phase one investigative sampling is to facilitate a RCRA clean closure of the site by verifying that the concentrations of all detonation activity contaminants are at or below action levels. Action levels are defined as levels above the Hanford Site soil background levels (DOE-RL 1993) and MTCA (WAC 173-340) Method B levels. If analysis determines that levels are above both these guidelines, a phase two investigation will be developed. Eight soil samples will be taken from specific locations within a 5.5-foot radius centered at the blasting pit. Collected samples are being analyzed by an offsite contracted laboratory.

If any soil is removed from the 218-E-8 Demolition Site to facilitate closure, a second round of sampling and analysis (verification sampling) would be performed to demonstrate that soil removal objectives had been achieved (i.e., that residual contamination levels were below the proposed cleanup values).

7A.1.2 Applicability and Relationship to the Onsite Contractor's Quality Assurance Program

This QAPjP applies specifically to field activities and laboratory analyses to be performed in support of closure of the 218-E-8 Demolition Site. This QAPjP has been prepared in compliance with the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a) and the *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (EPA 1980). This QAPjP describes the means selected to implement quality assurance program requirements, defined in the *Quality Assurance Manual* (WHC 1988b), as the requirements apply to

environmental investigations, while accommodating the specific requirements for project plan format and content agreed upon in the Tri-Party Agreement. The project plan contains a matrix of procedural resources from *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a) and *Environmental Investigations and Site Characterization Manual* (WHC 1988a). This QAPjP is subject to mandatory review and revision in advance of initiation of field sampling activities. Distribution and revision control of this plan will be carried out in compliance with QR 6.0, "Document Control," and QI 6.1, "Quality Assurance Document Control" (WHC 1988b). All plans and procedures referenced in this QAPjP are available for regulatory review.

7A.2 DATA QUALITY OBJECTIVES FOR MEASUREMENTS

Data quality objectives for a given data collection activity describe the overall level of uncertainty that decision makers are prepared to accept in the analytical results deriving from the activity. Sampling and Analysis agreements resulted from Data Quality Objective meetings and are summarized in the SAP (Appendix 7C). Data quality requirements generally are defined in terms of specific objectives for precision, accuracy, representativeness, comparability, and completeness. Objectives for soil sampling at the 218-E-8 Demolition Site are described in this section.

Precision typically is calculated either as a range (R) (for duplicate measurements) or a standard deviation (σ). Precision also can be expressed as a relative range (RR) (for duplicates) or a relative standard deviation (RSD). When the precision for a method is not constant over the concentration range of interest, the reported range or standard deviation will describe the concentration dependence. The dependence alternatively could be described in terms of a slope and intercept for a linear relationship, an indicated function for a nonlinear relationship, or a tabulated set of precision values for specific indicated concentrations.

Accuracy usually is expressed as percent recovery (P) or as percent bias (P-100). When accuracy is observed to be significantly concentration dependent, it could be reported in terms of a linear relationship, an alternative functional relationship, or as a table of measured values.

The method detection limit is the minimum concentration of a chemical constituent that can be measured reliably (i.e., it can be reported with 99 percent confidence that the analyte concentration is greater than zero). The method detection limit is determined from a minimum of three analyses of samples of a given matrix type (water, soil, etc.) spiked with the analyte of interest at a concentration three to five times the estimated method detection limits. The method detection limit is the standard deviation of the replicate measurements (reported in concentration units) multiplied by the appropriate Student's t value for the number of replicates taken for a one-tailed test at the 99 percent level of confidence. Practical quantitation limit is defined in SW-846 (EPA 1990) as the lowest concentration level that can be determined reliably within specified limits of precision and accuracy during routine laboratory operating conditions. Practical quantitation limit values are

tabulated in SW-846 for various EPA approved analytical methods for evaluating solid waste. The practical quantitation limit values are matrix-dependent and method-dependent. Typically, practical quantitation limits are listed as multiples of the method detection limits for specified methods and matrix types.

The performance of the analytical laboratory will be subject to method- and analyte-specific quantitation limits and minimum requirements for precision, accuracy, and completeness as follows:

- Precision: The agreement among a set of replicate measurements without assumption of knowledge of the true value. Precision is estimated by means of duplicate/replicate analyses. These samples should contain concentrations of analyte above the MDL, and may involve the use of matrix spikes. The most commonly used estimates of precision are the relative standard deviation (RSD) or the coefficient of variation (CV),

$$RSD = 100CV = 100\ lc/\bar{x},$$

where:

$\bar{x}$ = the arithmetic mean of the x_i measurements, and lc = standard deviation. The relative percent difference (RPD) when only two samples are available is (EPA 1990)

$$RPD = 100\ [(x_1 - x_2)/\{(x_1 + x_2)/2\}].$$

- Accuracy: The closeness of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will be a combination of a random component and of a common systematic error (or bias) component (EPA 1990).

- Completeness: Requirements for precision and accuracy will be met for at least 95 percent of the total number of determinations on quality assurance and quality control samples.

More stringent requirements for precision and accuracy could be specified in procedures for individual laboratory methods. In that event, the more stringent requirements will apply as DQOs for this project.

Goals for data representativeness for soil sampling are addressed qualitatively by the specification of sample locations and intervals in the soil sampling and analysis plan. Sample data should be comparable with other measurement data for similar samples and sample conditions. Comparability will be achieved qualitatively by using standard techniques to collect and analyze representative samples and by reporting analytical results in appropriate units.

Approved analytical procedures will require adherence to reporting techniques and units that are consistent with EPA reference methods to

facilitate the comparability of data sets in terms of precision and accuracy. Actual achieved and/or used detection limits, and values for precision, accuracy, and completeness will be provided in all summary reports of analyses.

Failure to conform to these criteria will be documented in data summary reports as described in Section 7A.7.1, and will be evaluated in the validation process discussed in Section 7A.7.2. Corrective actions will be initiated by the Technical Lead as appropriate, as noted in Section 7A.12, in the event that the criteria initially are not achieved.

For any soil sampling activities that are to occur at the 218-E-8 Demolition Site subsequent to investigative sampling, the SAP (Appendix 7C) will be updated to reflect current constituents of concern and DQOs as project requirements.

7A.3 PROCEDURES

The following sections discuss sampling procedures to be used and the approvals and control of these procedures.

7A.3.1 Procedure Approvals and Controls

The following sections describe the procedures referenced to support soil sampling and analysis activities.

7A.3.1.1 Hanford Site Procedures. The Hanford Site procedures that have been referenced to support soil sampling and analysis activities for the 218-E-8 Demolition Site are listed in the quality assurance program index in the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). Referenced procedures include EIIs (WHC 1988a), and quality requirements (QR) and quality instructions (QI) (WHC 1988b). Requirements relating to approval, revision, and distribution control of EIIs are addressed in EII 1.2, "Preparation and Revision of Environmental Investigation Instructions"; 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". Other controlling documents that apply to preparation, review, and revision of Hanford Site analytical laboratory procedures and sample management procedures are identified under Criteria 5.00 and 6.00 in the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). All of the aforementioned procedures will be available on request for regulatory review.

7A.3.1.2 Participating Contractor and/or Subcontractor Procedures. Participating contractor and/or subcontractor services may be procured for sampling or technical assistance. All such procurements will 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, "Preprocurement Planning

and Proposal Evaluation"; and/or QI 7.2, "Supplier Evaluation" (WHC 1988b). Whenever such services require procedural controls, conformance to onsite procedures, or submittal of contractor procedures for onsite review and approval before implementation, the requirement(s) will be identified in the procurement document or work order, as applicable. Analytical laboratories will be required to submit their analytical procedures as well as the current version of their internal quality assurance program plans for review and approval. The subject plans and procedures will be reviewed and approved by operations contractor's quality assurance, sample management, and analytical laboratories organization personnel, and/or other qualified personnel as determined by the Technical Lead. As necessary, all reviewers will be qualified per the requirements of EII 1.7, "Indoctrination, Training, and Qualification" (WHC 1988a). All approved participating contractor or subcontractor procedures, plans, and/or manuals will be retained as project quality records in compliance with the *Document Control and Record Management Manual*, Section 9 (WHC 1989); QR 17.0, "Quality Assurance Records"; and QI 17.1, "Quality Assurance Records Control" (WHC 1988b). All such documents will be available on request for regulatory review.

7A.3.2 Sampling Procedures

Soil samples for analysis by an offsite contractor laboratory will be collected in compliance with EII 5.2, "Soil and Sediment Sampling" (WHC 1988a). Sample numbers will be assigned as indicated in EII 5.10, "Obtaining Sample Identification Numbers and Accessing HEIS Data" (WHC 1988a). Sampling activities will be carried out in conformance with the sample identification, container type, preparation, and preservation requirements of EII 5.11, "Sample Packaging and Shipping" (WHC 1988a).

7A.3.3 Procedure Additions and Changes

Additional EIIs or modifications to existing EIIs that might be required as a consequence of sampling plan requirements will be developed in compliance with EII 1.2, "Preparation and Revision of Environmental Investigations Instructions" (WHC 1988a). Should deviations from established EIIs be required to accommodate unforeseen field situations, the Field Team Leader can authorize such deviations consistent with provisions and requirements in EII 1.4, "Deviation from Environmental Investigations Instructions" (WHC 1988a). Deviations are documented, reviewed, and dispositioned by means of instruction change authorization forms, as required by EII 1.4. Other types of document change requests will be completed as required by the procedures governing their preparation and revision.

7A.4 SAMPLE CUSTODY

All samples obtained during the course of this investigation will be controlled from the point of origin to the analytical laboratory as stipulated in EII 5.1, "Chain of Custody" (WHC 1988a). Chain-of-custody documentation also will be maintained for the return of residual sample materials from the

laboratory. Requirements and procedures will be defined in procurement documentation to subcontractor or participant contractor laboratories for the return of residual sample materials after completion of analysis. Laboratory chain-of-custody procedures will ensure that sample integrity and identification are maintained throughout the analytical process and will be reviewed and approved in advance as required by onsite procurement control procedures, as noted in Section 7A.3.1.2.

Results of analyses will be traceable to the original samples through a unique code or identifier, as specified in Section 7A.3. All analytical results will be controlled as permanent project quality records as required by QR 17.0, "Quality Assurance Records" (WHC 1988b) and EII 1.6, "Records Management" (WHC 1988a).

Sample and/or data flow will be coordinated by the Commercial Analytical Services (CAS) organization. The CAS organization will be responsible for tracking, controlling, and verification of in-process samples and data per Section 1.0, "Sample Tracking"; Section 1.3, "Data Package Control"; and Section 1.1, "Data Package Verification" (WHC 1990b).

All soil samples will be screened in the field for beta/gamma and gross alpha radioactivity in compliance with approved Hanford Site health physics procedures (WHC 1988c). Samples must be released for offsite shipment by health physics technicians before the samples can be transported to offsite laboratories for analysis of dangerous constituents.

7A.5 CALIBRATION PROCEDURES

Calibration of the contracting laboratory analytical equipment will be performed per applicable standard methods, subject to review and approval.

7A.6 ANALYTICAL PROCEDURES

Specific analytical methods or procedures will be reviewed and approved before use in compliance with the procedures and procurement control requirements noted in Section 7A.4.1.

7A.7 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction, validation of completed laboratory data packages, reporting requirements, and review and records management are discussed in the following sections.

7A.7.1 Data Reduction and Data Package Preparation

On completion of each group of analyses, the analytical laboratory will be responsible for preparing a report summarizing the analytical results. The analytical laboratory also will prepare a detailed data package that will

include all information necessary to perform data validation to the extent indicated by the minimum applicable requirements of Section 7A.7.2. Data summary report format and data package content will be defined in procurement documentation subject to review and approval as noted in Section 7A.3.1. As a minimum, laboratory data packages will 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 analyses were 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 might have affected the laboratory's measurement system during the time in which the analyses were performed

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

Other supporting information, such as initial calibration data, reconstructed ion chromatographs, spectrograms, traffic reports, and raw data, are included in submittal of individual data packages. All sample data, will be retained by the analytical laboratory and made available for systems or program audit purposes upon the request of the operations contractor, DOE-RL, or regulatory agency representatives (Section 7A.9.0). Such data will be retained by the analytical laboratory through the duration of the contractual statement of work, at which time the data will be transmitted for archiving.

A completed data package will be reviewed and approved by the analytical laboratory quality assurance manager before the package is submitted to the sample management organization for validation.

The requirements of this section will be included in procurement documents and/or work orders, as appropriate, in compliance with the procurement control procedures identified in Section 7A.3.1.

7A.7.2 Validation

Validation of completed laboratory data packages will be performed by the sample management organization. Data validation and reporting will be performed in conformance with requirements and procedures identified in *Sample Management and Administration* (WHC 1990b) and the *Data Validation Procedures for Chemical Analyses* (WHC 1993b).

Data validators will perform a number of tasks on each sample delivery group in response to general and specific requirements identified in the data validation procedures (WHC 1993b). A sample delivery group is defined as a group of samples (usually 20 or fewer) reported within a single laboratory data package. These tasks are summarized as follows:

- Take delivery of the data package, stamp the receipt date on the package, and make duplicate copies of the sample concentration reports or report forms

- Organize and review the data package for completeness as described in the data validation procedures (WHC 1993b) and document the completeness review on the applicable data validation checklist

- Validate the data package and qualify sample results according to the procedures and criteria described in the data validation procedures (WHC 1993b). Data that are rejected at any point during validation will be eliminated from further review or consideration

- Check for calculation and transcription errors, applying the frequency guidelines identified below

- Resolve any discrepancies identified during the review of the data package, including any missing data, with the laboratory

- After the data have been validated, prepare a narrative summary of the acceptability of the data, and prepare a summary of the validated results in tabular and electronic formats

- Submit the data validation report, with the narrative summary, an electronic media copy of the data, checklists, summary forms, and the qualified laboratory concentration reports to the Technical Lead within 21 days after receipt of the data package from the laboratory.

For this sampling and analysis project, the following frequencies will be used to check for calculation and transcription errors.

- **Investigative samples and verification samples taken following soil removal**--All reported laboratory results for at least 20 percent of the samples contained in the sample delivery group and 100 percent of the reported quality control samples (duplicates, matrix spikes, field blanks and any performance audit samples) will be recalculated and verified against the instrument printouts and bench sheet records (raw data). If possible, at least one-half of the samples selected for recalculation should contain positive results for the compounds analyzed.

- **Confirmatory samples**--All reported laboratory results for 100 percent of the samples contained in the sample delivery group and 100 percent of the reported quality control samples (duplicates, matrix spikes, field blanks and any performance audit samples) will be calculated and verified against the raw data.

Reporting requirements for validation of data produced by routine and special analytical methods other than EPA reference methods (EPA 1990) will be established within applicable procedures for the individual methods, subject to review and approval as discussed in Section 7A.3.1. The reporting requirements will be in general compliance with the guidelines provided previously in this section.

7A.7.3 Final Review and Records Management Considerations

All validation reports and supporting analytical data packages will be subjected to a final technical review by a qualified reviewer at the direction of the Technical Lead before submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments will be retained as permanent project quality records in compliance with *Document Control and Records Management Manual*, Section 9 (WHC 1989) and QR 17.0, "Quality Assurance Records" (WHC 1988b).

7A.8 INTERNAL QUALITY CONTROL

All analytical samples will be subject to in-process quality control measures both in the field and in the laboratory. The following types of control samples are specified in the sampling and analysis plan for the purpose of maintaining internal quality control.

- Duplicate Samples--Field duplicate samples are samples retrieved from a single sampling location using the same equipment and sampling technique, but analyzed independently. Duplicate samples generally are used to verify the repeatability or reproducibility of the analytical data.

- Trip Blanks--A trip blank for soil sampling consists of a sample container of silica sand that is prepared in the laboratory, transported to the sampling site, and returned unopened for analysis with the actual soil samples. Analysis of the trip blank will eliminate false positive results for the actual samples arising from contamination during shipment.

- Equipment Blanks--An equipment blank for soil sampling consists of pure silica sand that is drawn through decontaminated sampling equipment and placed in a container identical to those used for the actual field samples. Equipment blanks are used to verify the adequacy decontamination procedures for sampling equipment.

Additional quality control checks will be performed by the analytical laboratories as follows.

- Duplicates or Matrix-Spiked Duplicates--Check for analytical precision.

- Matrix-Spiked Samples--A known quantity of a representative analyte of interest is added to an aliquot (or a replicate) of an actual sample as a measure of recovery percentage. Spike compound selection, quantities, and concentrations will be described in the laboratory's analytical procedures.

- Laboratory Quality Control Samples--A quality control sample is prepared from an independent standard at a concentration within the calibration range. Reference samples provide an independent check on analytical instrument calibration.

The numbers and/or frequencies of quality control samples to be submitted and analyzed with each group of soil samples are specified in the soil sampling and analysis plan of the closure plan. The numbers of quality control samples proposed in the sampling plan have been determined based on guidance presented in SW-846 (EPA 1990).

Detailed descriptions of internal quality control requirements for participating contractor or subcontractor laboratories will be provided in procurement documents or work orders in compliance with standard procedures noted in Section 7A.3.1.

7A.9 PERFORMANCE AND SYSTEM AUDITS

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

Regarding offsite contractor laboratory analyses of confirmatory soil samples, performance audits of analytical accuracy will be implemented through the use of quality assurance and quality control samples.

System audit requirements will be implemented in accordance with QI 10.4, "Surveillance" (WHC 1988b). Surveillances will be performed regularly throughout the course of sampling activities. Additional performance and system 'surveillances' might be scheduled as a consequence of corrective action requirements or might be performed on request. All quality affecting activities will be subject to surveillance.

Sampling plan activities could be evaluated as part of environmental restoration program-wide quality assurance audits under procedural requirements (WHC 1988b). Program audits will 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". Program audits will be performed by qualified auditors in compliance with QI 2.5, "Qualification of Quality Assurance Program Audit Personnel" (WHC 1988b).

7A.10 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and the laboratory that directly affect the quality of analytical data will be subject to preventive maintenance measures that ensure minimization of measurement system downtime. Preventive maintenance instructions for field equipment will be as stipulated in approved operating procedures for the equipment. Laboratories will be responsible for performing or managing the maintenance of assigned analytical equipment. Maintenance requirements, spare parts lists, and preventive maintenance instructions will be included in individual laboratory procedures or in laboratory quality assurance plans, subject to review and approval. When samples are to be analyzed by a contractor or subcontractor laboratory, preventive maintenance requirements for laboratory analytical equipment will be as defined in the contractor laboratory's quality assurance plan(s).

7A.11 DATA ASSESSMENT

Analytical data will be compiled and summarized by the laboratory and forwarded to the sample management organization for validation as described in Section 7A.7.2 before the data can be used in any assessment activities. Assessments could include various statistical and probabilistic techniques to compare and/or analyze data. The statistical methodologies and assumptions that are to be used to evaluate data will be identified in written instructions that are to be signed, dated, and retained as project quality records in compliance with EII 1.6, "Records Management" (WHC 1988a) and QR 17.0, "Quality Assurance Records" (WHC 1988b). These instructions will be documented in the final report for each sampling and analysis project.

7A.12 CORRECTIVE ACTION

Corrective actions required as a result of surveillance reports, nonconformance reports, or audit activities will 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 1988b). Primary responsibilities for corrective action resolution will be assigned to the Technical Lead and the quality assurance coordinator. Other needs for corrections to measurement systems, procedures, or plans that are identified as a result of routine review processes will be resolved as stipulated in applicable procedures or referred to the Technical Lead for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation will be retained as project quality assurance records.

7A.13 QUALITY ASSURANCE REPORTS

As indicated in Sections 7A.9 and 7A.12, project activities will be assessed regularly by audit and surveillance processes. At the conclusion of a given sampling and analysis project, all related field and laboratory data, raw data, reports, surveillance reports, nonconformance reports, audit

reports, and corrective action documentation will be transferred for archival to the Hanford Site Records Holding Area (if documentation has not been transmitted previously). In the event that original quality-affecting documents are to be retained and/or controlled by others, legible copies will be transmitted to the Records Holding Area for inclusion in the project record file.

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APPENDIX 7B

TRAINING COURSE DESCRIPTIONS

APPENDIX 7B

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Environmental and Hazardous Material Safety Training Matrix.

Employee category	Course title (length/frequency)														
	Hazardous Communication and Waste Orientation (1 hour)	Generator Hazards Safety Training (4 hours)	Hazardous Materials Waste Job-Specific Training (length varies with each TSD unit)	Radiation Worker Training (8 hours)	Waste Site Basic (16 hours)	Scott SKA-PAK* Training (2 hours)	Cardiopulmonary Resuscitation (4 hours)	Fire Extinguisher Safety (1 hour)	Waste Site Advanced (24 hours)	Waste Site Field Experience (24 hours)	Hazardous Waste Shipment Certification (24 hours)	Certification of Hazardous Material Shipments (8 hours)	Hazardous Waste Site Supervisor/Manager (8 hours)	Compliance Category**	Total hours
1. All employees	X														1
2. General worker		X	X											1	5 + unit-specific training
3. General supervisor/manager		X	X											1	5 + unit-specific training
4. General nonradiological shipper		X	X								X			1,2	29 + unit-specific training
5. General hazardous material shipper		X	X									X		1,2	13 + unit-specific training
6a. Hazardous waste worker (known hazards)		X	X	X	X									1,3	28 + unit-specific training + field experience
6b. Hazardous waste worker (unknown hazards)		X	X	X		X	X	X	X	X				1,4	44 + unit-specific training + field experience
7. Hazardous waste supervisor/manager		X	X	X		X	X	X	X	X			X	1,5	52 + unit-specific training + field experience
8. Hazardous waste shipper		X	X	X		X	X	X	X	X	X	X		1,2,4	76 + unit-specific training + field experience

* Scott SKA-PAK is a trademark of Figgie International, Incorporated.
** Compliance categories:
1 WAC 173-303, 29 CFR 1910.1200
2 49 CFR 173
3 29 CFR 1910.120 (24-hour requirement)
4 29 CFR 1910.120 (40-hour requirement)
5 29 CFR 1910.120 (40-hour plus 8-hour requirement).

ENVIRONMENTAL AND HAZARDOUS MATERIAL SAFETY TRAINING		
	Course name	Description
1.	Hazard Communication and Waste Orientation	Course provides an overview of the federal and applicable hazard communication programs and hazardous and/or dangerous waste disposal programs.
2.	Generator Hazards Safety Training	Course provides the hazardous and/or dangerous material/waste worker with the fundamentals for use and disposal of hazardous and/or dangerous materials.
3.	Hazardous Materials/Waste Job-Specific Training	Course provides specific information on hazardous and/or dangerous chemicals and waste management at the employees' TSD unit.
4.	Initial Radiation Worker Training	Course provides radiation workers with the fundamentals of radiation protection and the proper procedures for maintaining exposures ALARA.
5.	Waste Site Basics	Course provides required information for the safe operation of hazardous and/or dangerous waste TSD units regulated under 40 CFR 264 and 265 pursuant to RCRA and WAC 173-303.
6.	Scott 'SKA-PAK'[1] Training-SKA	Course instructs employees in the proper use of the Scott 'SKA-PAK' for entry, exit, or work in conditions 'immediately dangerous to life and health' and instructs employees to recognize and handle emergencies.
7.	Cardiopulmonary Resuscitation	Course of the American Heart Association that provides certification in cardiopulmonary resuscitation for the single rescuer (Heartsaver Course).

[1]Scott SKA-PAK is a trademark of Figgie International, Incorporated.

	Course name	Description
8.	Fire Extinguisher Safety	Course provides videocassette presentation that covers types of portable fire extinguishers and the proper usage for each.
9.	Waste Site-Advanced	Course provides environmental safety information for RCRA and/or CERCLA operations and sites. Topics include regulations and acronyms, occupational health and safety, chemical hazard information, toxicology, personal protective equipment and respirators, site safety, decontamination, and chemical monitoring instrumentation.
10.	Waste Site Field Experience	Course is a 3-day field experience under the direct supervision of a trained, experienced supervisor.
11.	Hazardous Waste Shipment Certification	Course provides an indepth look at federal, state, and Hanford Site requirements for nonradioactive hazardous and/or dangerous waste management and transportation.
12.	Certification of Hazardous Material Shipments	Course provides training in dangerous material regulation of the U.S. Department of Transportation, as required by law, to those who certify the compliance of Hanford Site hazardous and/or dangerous material shipments. The main focus is on the proper preparation and release of radioactive material shipments.
13.	Hazardous Waste Site Supervisor/Manager	Course provides specialized training to operations and site management in the following programs: safety and health, employee training, personal protective equipment, spill containment, and health hazard monitoring procedures and techniques.

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APPENDIX 7C

SAMPLING AND ANALYSIS PLAN

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FIGURES:

1 218-E-8 Borrow Pit Demolition Site 2
2 Soil Sampling Locations/Depth 3

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1.0 PURPOSE

This document provides guidance for sampling and analysis activities associated with the proposed *Resource Conservation and Recovery Act of 1976* (RCRA) clean closure of the 218-E-8 Borrow Pit Demolition Site (Figure 1). This document is a supplement to *218-E-8 Borrow Pit Demolition Site Closure Plan* (DOE-RL 1992), and should be used in conjunction with the *Environmental Investigations and Site Characterization Manual* (WHC 1988) for specific procedures.

A metric conversion chart (Attachment 1) is provided to the reader as a tool to aid in conversion.

2.0 OBJECTIVE

Eight soil samples will be taken from specific locations (Figure 2) within a 5.5-ft-radius centered around the blasting pit. The objective of the work is to facilitate a RCRA clean closure of the site by verifying that the concentrations of all detonation activity contaminants are below action levels. Action levels are defined as levels above the Hanford Site soil background levels identified in *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes* (DOE-RL 1993) and Model Toxic Control Act (MTCA) (WAC 173-340) residential levels. If analysis determines that levels are above both these guidelines, a phase two investigation will be developed. This is not anticipated because of the nature of detonation efficiency and weathering action.

3.0 SITE DESCRIPTION/BACKGROUND

The 218-E-8 Demolition Site is located in the northeast corner of the 200 East Area, with approximate dimensions of 600 ft x 900 ft. The borrow pit was used for demolition activities, asbestos disposal, tumbleweed incineration, and storage of hazardous waste. The demolition site was located apart from these other activities within the borrow pit. None of these other activities are believed to have contaminated the demolition site.

In November 1984, a single demolition occurred at the 218-E-8 Demolition Site. Discarded explosive chemicals were placed in a 6- to 12-in. depression dug expressly for demolition purposes. The depression no longer exists, but a 20 ft x 20 ft surface area over the depression location is roped off and marked as a dangerous waste site. The site also is marked by surveyed monuments.

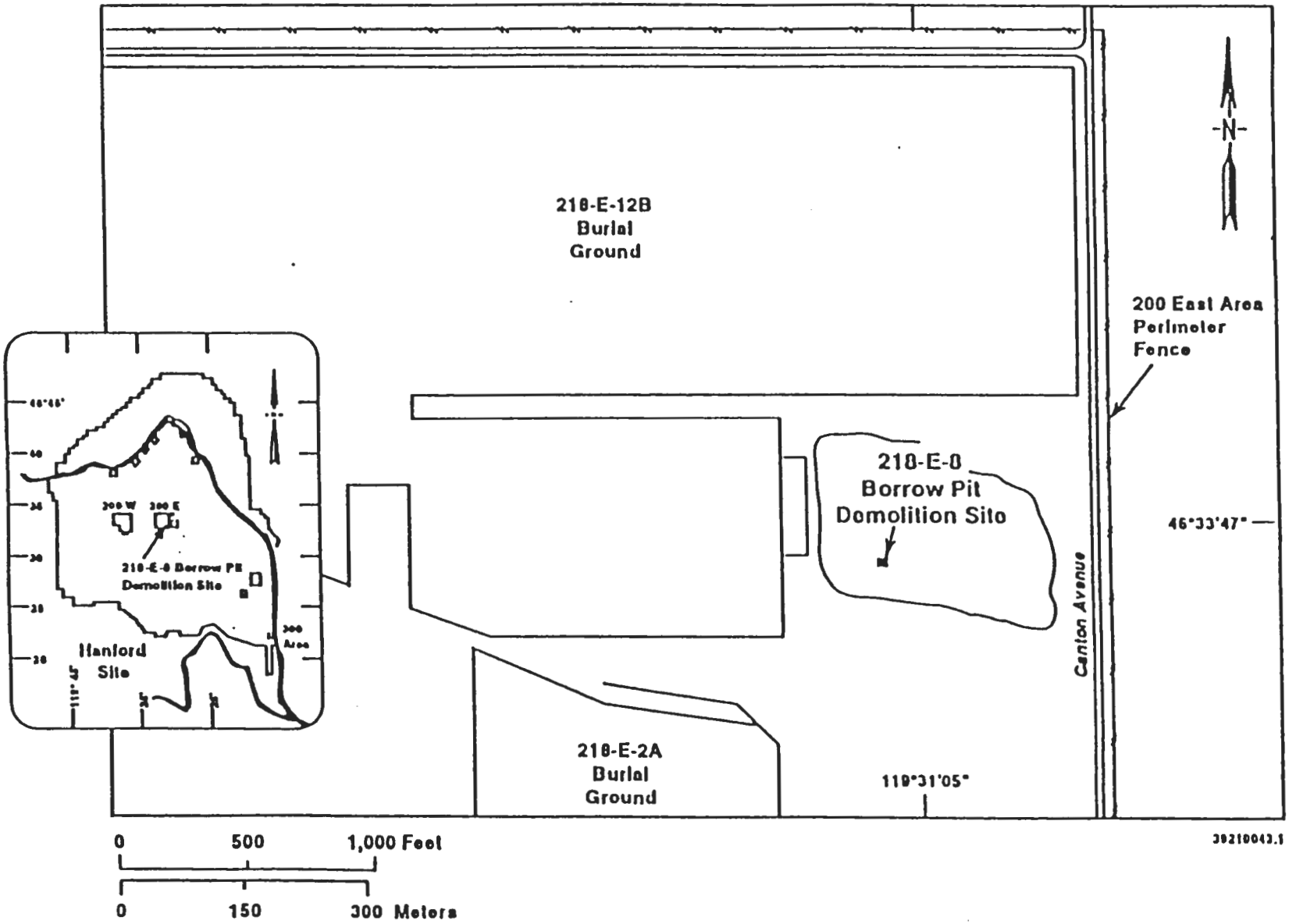
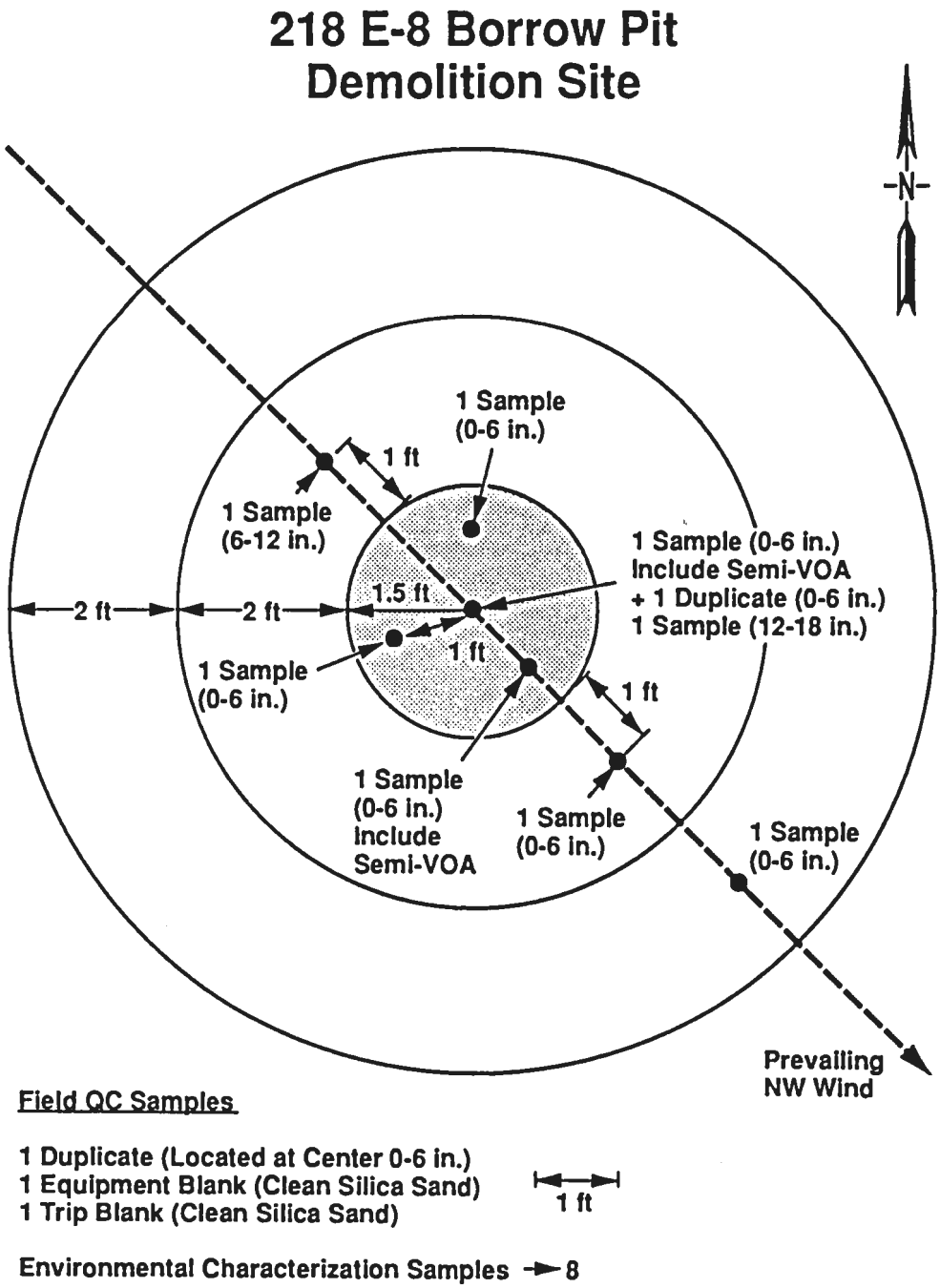


Figure 1. 218-E-8 Borrow Pit Demolition Site.



Field QC Samples

1 Duplicate (Located at Center 0-6 in.)
1 Equipment Blank (Clean Silica Sand)
1 Trip Blank (Clean Silica Sand)

1 ft

Environmental Characterization Samples → 8

H9405002.2

Figure 2. Soil Sampling Locations/Depth.

4.0 SCOPE OF WORK

Eight soil characterization samples will be taken by hand from locations at the 218-E-8 Demolition Site (Figure 2).

All sampling activities will be conducted in accordance with the following environmental investigations instructions (EII) procedures (WHC 1988):

- EII 1.1, Hazardous Waste Site Entry Requirements
- EII 1.5, Field Logbooks
- EII 1.13, Environmental Readiness Review
- EII 5.1, Chain of Custody
- EII 5.2, Soil and Sediment Sampling
- EII 5.5, 1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment
- EII 5.10, Obtaining Sample Identification Numbers and Accessing HEIS Data
- EII 5.11, Sample Packaging and Shipping
- EII 14.1, Analytical Laboratory Data Management.

5.0 SAMPLING AND FIELD ACTIVITIES

This section discusses Task 1, Sampling of the 218-E-8 Demolition Site.

5.1 SUBTASK 1A - SAMPLE LOCATION DETERMINATIONS

The blasting pit will be reconstructed by removing wind-blown sand to create a 6-in-deep, 3-ft diameter hole (original diameter 1.5 ft). The pit will be located at the center of the posted dangerous waste site. The eight sampling locations will be appropriately marked (Figure 2) and if necessary, the pit diameter will be enlarged to facilitate sampling. Sample depths within reconstructed crater (Figure 2, shielded area) are based upon reconstructed crater.

5.2 SUBTASK 1B - SAMPLING

Engineering support personnel will use hand tools to obtain soil samples in accordance with information provided in Figure 2. All samples will be packaged, handled, and shipped in accordance with WHC (1988).

6.0 LABORATORY ANALYSIS

Samples collected for chemical analysis will be analyzed utilizing SW-846 methods (EPA 1986) and approved EPA 300 series methods (EPA 1983). The contaminants of concern and the methods used for testing are:

- Volatile organic analysis, method 8240
- Semivolatile organic analysis, method 8270
- Detonation residue, method 8330
- Anions, EPA 300.0
- Total nitrogen, EPA 353.1-2.

7.0 REGULATORY AND HANFORD SITE COMPLIANCE

Field quality control (QC) samples will be collected by the sampling scientist and documented in the sampling logbook in accordance with EII 1.5, "Field Logbooks" (WHC 1988). The following is a list of the field QC samples to be collected:

- One duplicate sample at center of pit (0 to 6 in. depth) for full analysis
- One equipment blank (clean silica sand) for full analysis
- One trip blank (clean silica sand) for VOA analysis only.

9.0 REFERENCES

DOE-RL, 1992, *218-E-8 Borrow Pit Demolition Site Closure Plan*, DOE/RL-92-53, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1993, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 1, U. S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 1983, *Methods for Chemical Analysis of Water and Waste*, 600/4-79-020, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1986, as amended, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, 3rd Edition, U.S. Environmental Protection Agency, Washington, D.C.

WHC, 1988, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

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ATTACHMENT 1

METRIC CONVERSION CHART

The following conversion chart is provided to the reader as a tool to aid in conversion.

Into Metric Units

If You Know	*Multiply By*	*To Get*
Length		
inches	25.4	millimeters
inches	2.54	centimeters
feet	0.305	meters
yards	0.914	meters
miles	1.609	kilometers
Area		
sq. inches	6.452	sq. centimeters
sq. feet	0.093	sq. meters
sq. yards	0.836	sq. meters
sq. miles	2.6	sq. kilometers
acres	0.405	hectares
Mass (weight)		
ounces	28.35	grams
pounds	0.454	kilograms
short ton	0.907	metric ton
Volume		
teaspoons	5	milliliters
tablespoons	15	milliliters
fluid ounces	30	milliliters
cups	0.24	liters
pints	0.47	liters
quarts	0.95	liters
gallons	3.8	liters
cubic feet	0.028	cubic meters
cubic yards	0.765	cubic meters
Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius

Out of Metric Units

If You Know	*Multiply By*	*To Get*
Length		
millimeters	0.039	inches
centimeters	0.394	inches
meters	3.281	feet
meters	1.094	yards
kilometers	0.621	miles
Area		
sq. centimeters	0.155	sq. inches
sq. meters	10.76	sq. feet
sq. meters	1.196	sq. yards
sq. kilometers	0.4	sq. miles
hectares	2.47	acres
Mass (weight)		
grams	0.035	ounces
kilograms	2.205	pounds
metric ton	1.102	short ton
Volume		
milliliters	0.033	fluid ounces
liters	2.1	pints
liters	1.057	quarts
liters	0.264	gallons
cubic meters	35.315	cubic feet
cubic meters	1.308	cubic yards
Temperature		
Celsius	multiply by 9/5ths, then add 32	Fahrenheit

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