START

DOE/RL-94-25
Revision 0

UC-630,721

State Waste Discharge Permit Application

200-E Powerhouse Ash Pit

Date Published
June 1994

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

Approved for Public Release

FOREWORD

As part of the *Hanford Federal Facility Agreement and Consent Order* negotiations (Ecology et al. 1994), the U.S. Department of Energy, Richland Operations Office, the U.S. Environmental Protection Agency, and the Washington State Department of Ecology agreed that liquid effluent discharges to the ground on the Hanford Site which affect groundwater or have the potential to affect groundwater would be subject to permitting under the structure of Chapter 173-216 (or 173-218 where applicable) of the *Washington Administrative Code*, the State Waste Discharge Permit Program. As a result of this decision, the Washington State Department of Ecology and the U.S. Department of Energy, Richland Operations Office entered into *Consent Order No. DE 91NM-177*, (Ecology and DOE-RL 1991).

The *Consent Order No. DE91NM-177* requires a series of permitting activities for liquid effluent discharges. Liquid effluents on the Hanford Site have been classified as Phase I, Phase II, and Miscellaneous Streams. The *Consent Order No. DE91NM-177* establishes milestones for State Waste Discharge Permit application submittals for all Phase I and Phase II streams, as well as the following 11 Miscellaneous Streams as identified in Table 4 of the *Consent Order No. DE91NM-177.*

- 209-E Building Steam Condensate
- 400 Area Sanitary Waste Water
- 200-W Powerhouse Ash Waste Water
- 200-E Powerhouse Ash Waste Water
- 300 Area Powerhouse Ash Waste Water
- 100-N Sanitary Sewer System
- 300 Area Filter Backwash
- 300 Area Sanitary Sewer System
- 234-5Z Steam Condensate/Dry Air Compressor Cooling
- 272-E, 2703-E Buildings Waste Water
- 183-N Filter Backwash Waste Water.

This document constitutes the State Waste Discharge Permit application for the 200-E Powerhouse Ash Pit. The 200-E Powerhouse Ash Waste Water discharges to the 200-E Powerhouse Ash Pit via dedicated pipelines. The 200-E Ash Waste Water is the only discharge to the 200-E Powerhouse Ash Pit.

This page intentionally left blank.

CONTENTS

This page intentionally left blank.

GLOSSARY

BMP	Best Management Practice
BOD	biological oxygen demand
COD	chemical oxygen demand
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
gpd	gallons per day
GWQC	Ground Water Quality Criteria
mg/L	milligrams per liter
NPDES	National Pollutant Discharge Elimination System
PNL	Pacific Northwest Laboratory
PSPL	Puget Sound Power and Light Company
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
SIC	Standard Industrial Classification
SWDP	State Waste Discharge Permit
TKN	total Kjedldahl nitrogen
USGS	United States Geological Survey
ug/L	micrograms per liter
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Company

METRIC CONVERSION CHART

INTO METRIC UNITS			OUT OF METRIC UNITS		
If you know	**Multiply by**	**To get**	**If you know**	**Multiply by**	**To get**
Length			**Length**		
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			**Area**		
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			**Volume**		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit

Source: Lindeburg 1990.

1.0 PERMIT APPLICATION

This section presents the State Waste Discharge Permit application (SWDP) for the 200-E Powerhouse Ash Pit. The 200-E Powerhouse Ash Waste Water discharges to the 200-E Powerhouse Ash pit via dedicated pipelines. The 200-E Ash Waste Water is the only discharge to the 200-E Powerhouse Ash Pit.

1.1 ORGANIZATION

The Washington Administrative Code (WAC) 173-216 SWDP application form for the 200-E Powerhouse Ash Pit is presented in this section. Information required by the SWDP application is provided on the form when adequate space is available. Otherwise, information is provided in the appendices as noted on the completed form. The appendices follow precisely the format of the SWDP application and are designed to supplement the SWDP application form. Appendix A contains site location drawings referenced in Section A of the SWDP application form. Appendices B through H correspond to Sections B through H in the SWDP application form. Within each appendix, those questions that require additional space have been restated and the answer directly follows the question. The questions in the appendices are worded precisely as the questions on the SWDP application form, and are highlighted in bold capitals letters which are underlined.

1.2 STATE WASTE DISCHARGE PERMIT APPLICATION FORM

The following pages contain the SWDP application for the 200-E Powerhouse Ash Pit.

This page intentionally left blank.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

STATE WASTE DISCHARGE PERMIT APPLICATION FOR INDUSTRIAL DISCHARGES TO LAND

FOR STATE USE ONLY

Date Application Received		Date Fee Paid		Application/ Permit No.	
Date Application Accepted				Facility No.	
Temporary Permit Effective Date				Temporary Permit Expiration Date	

This application is for a waste discharge permit as required in accordance with provisions of Chapter 90.48 RCW and Chapter 173-216 WAC. Additional information may be required. Information previously submitted and applicable to this application should be referenced in the appropriate section.

SECTION A. GENERAL INFORMATION

1. Company Name: U.S. Department of Energy, Richland Operations Office

2. Unified Business Idenditfication Number (UBI#): 91-0565159 (DOE tax exempt number)

3. Mailing Address: P.O. Box 550
   Street
   Richland, Washington 99352
   City/State Zip

4. Facility Location: 200-E Area - Hanford Site
   Street or Other Description
   See Maps in Appendix A.
   City/State Zip

5. Person to contact who is familiar with the information contained in this application:
   J. E. Rassmussen — U.S. DOE, Branch Chief, Regulatory Permits — (509) 376-2247
   Name — Title — Telephone

6. Check One: ☐ Permit Renewal ☒ Existing Unpermitted Discharge
   ☐ Proposed Discharge
   Anticipated date of discharge: ____________

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and/or imprisonment for knowing violations.

[signature] — 6/23/94 — Acting Program Manager, Office of Environmental Assurance, Permits and Policy
Signature* — Date — Title

Steven H. Wisness
Printed Name

*Applications must be signed as follows: Corporation, by a principal executive officer of at least the level of vice-president; partnership, by a general partner; sole proprietorship, by the proprietor.

SECTION B. PRODUCT INFORMATION

1. **Briefly describe all manufacturing processes and products, and/or commercial activities. Provide the applicable Standard Industrial Classification (SIC) Code(s) for each activity. (See *Standard Industrial Classification Manual*, 1987 ed.)**

   SIC No(s): 9999

   Description: See Appendix B, Item 1.

2. Include a production schematic flow diagram of the process and service activities described above on a separate sheet. **See Appendix B, Figure B-3**

3. List raw materials and products:

RAW MATERIALS Type	Quantity
Coal	30,000 tons/year
Sanitary Water	2,600,000 gal/month
PRODUCTS Type	**Quantity**
Steam	40,000,000 lbs/month

SECTION C. PLANT OPERATIONAL CHARACTERISTICS

1. Identify the waste stream for each of the production processes or activities described in Section B.1. Assign each waste stream an identification number--use this number in subsequent questions.

Process	Waste Stream Name	Batch or Continuous Process	Waste Stream ID #
200-E Steam Production	200-E Ash Waste Water	Batch	1

2. On a separate sheet, describe in detail the treatment and disposal of all wastewaters as described above. Include a schematic flow diagram for all wastewater treatment and disposal systems. **See Appendix C, Item 2 and Figure C-1.**

3. Indicate treatment provided to each waste stream identified in C.1. above.
No treatment is provided to the waste stream.

Waste Stream(s) ID #	Treatment	Waste Stream(s) ID #	Treatment
	Air flotation		pH correction
	Centrifuge		Ozonation
	Chemical precipitation		Reverse osmosis
	Chlorination		Screen
	Cyclone		Sedimentation
	Filtration		Septic tank
	Flow equalization		Solvent separation
	Grease or oil separation		Biological treatment, type:
	Grease trap		Rainwater diversion or storage
	Grit removal		Other chemical treatment type:
	Ion exchange		Other physical treatment type:

4. Describe any planned wastewater treatment improvements or changes in wastewater disposal methods and when they will occur *(use additional sheets, if necessary)*.

See Appendix C, Item 4.

5. If production processes are subject to seasonal variations, provide the following information. List discharge for each waste stream in gallons per day (GPD). The combined value for each month should equal the estimated total monthly flow.

Waste Stream ID #	MONTHS											
	J	F	M	A	M	J	J	A	S	O	N	D
See Appendix C, Item 5.												
Estimated Total Monthly Flow (GPD)												

6. Shift Information:
   - a. Number of shifts per work day: 3
   - b. Number of work days per week: 7
   - c. Average number of work days per year: 365
   - d. Maximum number of work days per year: 365
   - e. Number of employees per shift:

Shift	Employees	Shift start times
1st	7-18	7:30 am
2nd	7	3:30 pm
3rd	7	11:30 pm

7. List all incidental materials like oil, paint, grease, solvents, soaps, cleaners, that are used or stored on-site. (Use additional sheets, if necessary.)

Material/Quantity Stored See Appendix C, Item 7.

8. Describe any water recycling or material reclaiming processes:

There are no water recycling or material reclaiming processes.

9. Does this facility have:
   a. Spill Prevention, Control, and Countermeasure Plan (per 40 CFR 112)? ☐ Yes ☒ No
   b. Emergency Response Plan (per WAC 173-303-350)? ☒ Yes ☐ No
   c. Runoff, spillage, or leak control plan (per WAC 173-216-110(f))? ☐ Yes ☒ No
   d. Does your current waste discharge permit require a spill plan? ☐ Yes ☐ No
      If yes, submit an update with your application. **Not Applicable.**
   e. Solid Waste Management Plan? ☐ Yes ☒ No

SECTION D. WATER CONSUMPTION AND WATER LOSS

1. Water Source(s):
   ☐ Public System (Specify) ______
   ☐ Private Well ☒ Surface Water
   a. Water Right Permit Number: N/A. The U.S. Government has a reserved water right to utilize water for purposes of Hanford Site activities.
   b. Legal Description:

      SW 1/4S, SE 1/4S, 2 Section, 13NTWN, 25E R

2. a. Indicate total water use: Gallons per day (average) estimated 110,000
   Gallons per day (Maximum) estimated 150,000
   b. Is water metered? ☐ Yes ☒ No

3. Attach a line drawing showing the water flow through the facility. Indicate source of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item C. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (*e.g., for certain mining activities*), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.
   See Appendix D, Item 3 and Figure D-1.

SECTION E. WASTEWATER INFORMATION

1. Provide measurements for treated wastewater prior to land application for the parameters listed below, unless waived by the permitting authority. All analytical methods used to meet these requirements shall, unless approved otherwise in writing by Ecology, conform to the Guidelines Establishing Test Procedures for the Analysis of Pollutants Contained in 40 CFR Part 136.

Parameter	Concentrations Measured	Analytical Method	Detection Limit
pH	See Appendix E, Item 1.		
Conductivity			
Total Dissolved Solids			
Total Suspended Solids			
BOD (5 day)			
COD			
Ammonia-N			
TKN-N			
Nitrate-N			
Ortho-phosphate-P			
Total-phosphate-P			
Total Oil & Grease			
Calcium			
Magnesium			
Sodium			
Potassium			
Chloride			
Sulfate			
Fluoride			
Cadmium (total)			
Chromium (total)			
Lead (total)			
Mercury			
Selenium (total)			
Silver (total)			
Copper (total)			
Iron (total)			
Manganese (total)			
Zinc (total)			
Barium (total)			
Total Coliform			

2. Wastewater characteristics for toxic pollutants.

The intent of this question is to determine which chemicals are or might be present in the process water or wastewater. For each chemical listed below:

a. Use the letter **A** in the Absent column if the chemical is not likely to be present because it is not used in the production process or used on site.

b. Use the letter **S** in the Absent column if the chemical may be present because it is used on site, but the chemical is not used in the production process.

c. Use the letter **P** in the Present column if the chemical is likely to be present because it is used in the production process, but the effluent has not been tested.

d. Use the letter **K** in the Present column if the effluent has been tested and the chemical was found to be present. Attach the analytical results.

Analytical Results
Wastewater Characterization for Toxic Pollutants

Absent	Present	Constituent/CAS No.	Absent	Present	Constituent/CAS No.
A		Acrylamide/79-06-1	A		1,2 Dichloropropane/78-87-5
A		Acrylonitrile/107-13-1	A		1,3 Dichloropropene/542-75-6
A		Aldrin/309-00-2	A		Dichlorvos/62-73-7
A		Aniline/62-53-3	A		Dieldrin/60-57-1
A		Aramite/140-57-8	A		3,3' Dimethoxybenzidine/119-90-4
	K	Arsenic/7440-38-2	A		3,3 Dimethylbenzidine/119-93-7
A		Azobenzene/103-33-3	A		1,2 Dimethylhydrazine/540-73-8
A		Benzene/71-43-2	A		2,4 Dinitrotoluene/121-14-2
A		Benzidine/92-87-5	A		2,6 Dinitrotoluene/606-20-2
A		Benzo(a)pyrene/50-32-8	A		1,4 Dioxane/123-91-1
A		Benzotrichloride/98-07-7	A		1,2 Diphenylhydrazine/122-66-7
A		Benzyl chloride/100-44-7	A		Endrin/72-20-8
A		Bis(chloroethyl)ether/111-44-4	A		Epichlorohydrin/106-89-8
A		Bis(chloromethyl)ether/542-88-1	A		Ethyl acrylate/140-88-5
A		Bis(2-ethylhexyl)phthalate/ 117-81-7	A		Ethylene dibromide/106-93-4
A		Bromodichloromethane/75-27-4	A		Ethylene thioureae/96-45-7
A		Bromoform/75-25-2	A		Folpet/133-07-3
A		Carbazole/86-74-8	A		Furmecyclox/60568-05-0
A		Carbon tetrachloride/56-23-5	A		Heptachlor/76-44-8
A		Chlordane/57-74-9	A		Heptachlor epoxide/1024-57-3
A		Chlorodibromomethane/124-48-1	A		Hexachlorobenzene/118-74-1

Absent	Present	Constituent/CAS No.	Absent	Present	Constituent/CAS No.
A		Chloroform/67-66-3	A		Hexachlorocyclohexane (alpha)/ 319-84-6
A		Chlorthalonil/1897-45-6	A		Hexachlorocyclohexane (tech.)/ 608-73-1
A		2,4-D/94-75-7	A		Hexachlorodibenzo-p-dioxin, mix/ 19408-74-3
A		DDT/50-29-3	A		Hydrazine/hydrazine sulfate/ 302-01-2
A		Diallate/2303-16-4	A		Lindane/58-89-9
A		1,2 Dibromoethane/106-93-4	A		2 Methylaniline/100-61-8
A		1,4 Dichlorobenzene/106-46-7	A		2 Methylaniline hydrochloride/ 636-21-5
A		3,3' Dichlorobenzidine/91-94-1	A		4,4' Methylene bis(N,N-dimethyl)aniline/101-61-1
A		1,1 Dichloroethane/75-34-3		K	Methylene chloride (dichloromethane)/75-09-2
A		1,2 Dichloroethane/107-06-2	A		Mirex/2385-85-5
A		Nitrofurazone/59-87-0	A		O-phenylenediamine/106-50-3
A		N-nitrosodiethanolamine/ 1116-54-7	A		Propylene oxide/75-56-9
A		N-nitrosodiethylamine/55-18-5	A		2,3,7,8-Tetrachlorodibenzo-p-dioxin/ 1746-01-6
A		N-nitrosodimethylamine/62-75-9	A		Tetrachloroethylene/127-18-4
A		N-nitrosodiphenylamine/86-30-6	A		2,4 Toluenediamine/95-80-7
A		N-nitroso-di-n-propylamine/ 621-64-7	A		o-Toluidine/95-53-4
A		N-nitrosopyrrolidine/930-55-2	A		Toxaphene/8001-35-2
A		N-nitroso-di-n-butylamine/ 924-16-3	A		Trichloroethylene/79-01-6
A		N-nitroso-n-methylethylamine/ 10595-95-6	A		2,4,6-Trichlorophenol/88-06-2
A		PAH/NA	A		Trimethyl phosphate/512-56-1
A		PBBs/NA	A		Vinyl chloride/75-01-4
A		PCBs/1336-36-3			

SECTION F. STORMWATER

1. Do you have a Washington State Storm Water Baseline General Permit? **See Appendix F, Item 1.** ☐ Yes ☒ No

   If yes, please list the permit number here ______________

2. Have you applied for a Washington State Storm Water Baseline General Permit. **See Appendix F, Item 2.** ☐ Yes ☒ No

3. Do you have any storm water quality or quantity data? ☐ Yes ☒ No

Note: If you answered "yes" to questions 1 or 2 above, skip questions 4 through 8.

4. Describe the size of the storm water collection area. **See Appendix F, Item 4.**

   a. Unpaved Area ____0____ sq. ft.

   b. Paved Area ____0____ sq. ft.

   c. Other Collection Areas (Roofs) ____0____ sq. ft.

5. Does your facility's storm water discharge to: *(check all that apply)* **See Appendix F, Item 5.**

   ☐ Storm sewer systems; name of storm sewer system *(operator)*:

   ☐ Directly to surface waters or Washington State *(e.g., river, lake, creek, estuary, ocean).*

   ☐ Indirectly to surface waters of Washington State *(i.e., flows over adjacent properties first).*

   ☐ Directly to ground waters of Washington State: ☐ dry well ☐ drainfield ☐ Other

6. Areas with industrial activities at facility: *(check all that apply)* **See Appendix F, Item 6.**

   ☐ Manufacturing Building

   ☒ Material Handling

   ☒ Material Storage

   ☐ Hazardous Waste Treatment, Storage, or Disposal *(Refers to RCRA, Subtitle C Facilities Only)*

   ☒ Waste Treatment, Storage, or Disposal

   ☒ Application or Disposal of Wastewaters

   ☐ Storage and Maintenance of Material Handling Equipment

   ☐ Vehicle Maintenance

   ☒ Areas Where Significant Materials Remain

   ☒ Access Roads and Rail Lines for Shipping and Receiving

   ☐ Other ______________________________

7. Material handling/management practices. **See Appendix F, Item 7.**

   a. Types of materials handled and/or stored outdoors: *(check all that apply)*

- [ ] Solvents
- [ ] Scrap Metal
- [x] Petroleum or Petrochemical Products
- [ ] Plating Products
- [ ] Pesticides
- [x] Hazardous Wastes
- [ ] Acids or Alkalies
- [ ] Paints/Coatings
- [ ] Woodtreating Products
- [x] Other (Please list) Coal, Steel Pipe

   b. Identify existing management practices employed to reduce pollutants in industrial storm water discharges: *(check all that apply)*

- [ ] Oil/Water Separator
- [ ] Containment
- [ ] Spill Prevention
- [ ] Surface Leachate Collection
- [ ] Overhead Coverage
- [ ] Detention Facilities
- [ ] Infiltration Basins
- [ ] Operational BMPs
- [ ] Vegetation Management
- [ ] Other (Please list) ______

8. Attach a map showing storm water drainage/collection areas, disposal areas and discharge points. **See Appendix F, Item 8.**

SECTION G. OTHER INFORMATION

1. Describe liquid wastes or sludges being generated that are not disposed of in the waste stream(s) and how they are disposed of. For each type of waste, provide type of waste, name, address, and phone number of hauler.

   See Appendix G, Item 1

2. Describe storage areas for raw materials, products, and wastes.

   See Appendix G, Item 2

3. Have you designated your wastes according to the procedures of Dangerous Waste Regulations, Chapter 173-303WAC? [x] Yes [ ] No

SECTION H. SITE ASSESSMENT

1. Give the legal description of the land treatment site(s). Give the acreage of each land treatment site(s). Attach a copy of the contract(s) authorizing use of land for treatment.

See Appendix H, Item 1.

2. List all environmental control permits or approvals needed for this project; for example, septic tank permits, sludge application permits, or air emissions permits.

See Appendix H, Item 2.

3. Attach a United States Geological Survey (USGS) a topographic map. Show the following on this map:
See Appendix H, Item 3.
   a. Location and name of internal and adjacent streets
   b. Surface water drainage systems within 1/4 mile of the site
   c. All wells within 1 mile of the site
   d. Chemical and product handling and storage facilities
   e. Infiltration sources, such as drainfields and lagoons within 1/4 mile of the site
   f. Wastewater and cooling water discharge points wit waste stream ID numbers (See Section C.1)
   g. Other activities and land uses within 1/4 mile of the site

4. Attach well logs and well I.D.# when available for all wells within 500 feet and any available water quality data.

See Appendix H, Item 4.

5. Describe soils on the site using information from local soil survey reports.
(Submit on separate sheet.)
See Appendix H, Item 5.

6. Describe the regional geology and hydrogeology within one mile of the site.
(Submit on separate sheet.)
See Appendix H, Item 6.

7. List the names and addresses of contractors or consultants who provided information and cite sources of information by title and author.

See Appendix H, Item 7.

2.0 REFERENCES

Baker, V. R., B. N. Bjornstad, A. J. Busacca, K. R. Fecht, E. P. Kiver, U. L. Moddy, J. G. Rigby, D. F. Stradling, and A. M. Tallman, 1991, "Quaternary Geology of the Columbia Plateau," *Quaternary Nonglacial Geology; Conterminous U. S.*, R. B. Morrison, Editor, Geology of North America, Geological Society of America, vol. K-2, Boulder, Colorado.

DOE, 1988, *Site Characterization Plan, Reference Repository Location, Hanford Site, Washington; Consultation Draft*, DOE/RW-0164, U. S. Department of Energy, Office of Civilian Radioactive Waste Management, Washington, D. C.

DOE-RL, 1993a, *200 East Groundwater Aggregate Area Management Study Report*, DOE/RL-92-19, Rev 0, U. S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1993b, *Phase I and II Feasibility Study Report for the 300-FF-5 Operable Unit*, DOE/RL-93-22, U. S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, EPA, DOE, 1994, *Hanford Federal Facility Agreement and Consent Order*, 2 volumes, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U. S. Department of Energy, Olympia, Washington.

Ecology and DOE-RL, 1991, *Consent Order No. DE 91NM-177*, Washington State Department of Ecology, Olympia, Washington and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 1979, *Methods for the Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, U.S. Environmental Protection Agency, Washington D.C.

EPA, 1980, *Design Manual, Onsite Wastewater Treatment and Disposal System*, EPA-625/1-80-012, U.S. Environmental Protection Agency, Washington D.C.

EPA, 1992, *Test Methods for Evaluating Solid Waste*, Physical/Chemical Methods, SW-846, Latest Edition, U.S. Environmental Protection Agency, Washington D.C.

Fecht, K. R., S. P. Reidel, and A. M. Tallman, 1987, *Paleodrainage of the Columbia River System on the Columbia Plateau of Washington: A Summary*, RHO-BW-SA-318P, Rockwell Hanford Operations, Richland, Washington.

Gephart, R. E., R. C. Arnett, R. G. Baca, L. S. Leonhart, and F. A. Spane Jr., 1979, *Hydrologic Studies Within the Columbia Plateau, Washington: An Integration of Current Knowledge*, RHO-BWI-ST-5, Rockwell Hanford Operations, Richland, Washington.

Hajek, B. F., 1966, *Soil Survey: Hanford Project in Benton County, Washington*, BNWL-243, Pacific Northwest Laboratory, Richland, Washington.

Lindeburg, M. R. PE, *Engineering Unit Conversions, Second Ed*, 1990, Professional Publications Inc., Belmont, California.

Metcalf and Eddy, 1991, *Wastewater Engineering: Treatment, Disposal, and Reuse*, Third Edition. Revised by George Tchobanoglous and Franklin L. Burton, McGraw-Hill Publishing Company, New York, New York.

PNL, 1989, *Hydrogeology of the 200 Areas Low-Level Burial Grounds An Interim Report*, PNL-6820, Pacific Northwest Laboratory, Richland, Washington.

PSPL, 1982, Skagit/Hanford Nuclear Project, *Preliminary Safety Analysis Report*, Vol. 4, App. 20, Amendment 23, Puget Sound Power and Light Company, Bellevue, Washington.

Reidel, S. P. and K. R. Fecht, 1981, "Wanapum and Saddle Mountains Basalt in the Cold Creek Syncline Area," *Subsurface Geology of the Cold Creek Syncline*, RHO-BWI-ST-14, Rockwell Hanford Operations, Richland, Washington.

Smith, G. A., B. N. Bjornstad, and K. R. Fecht, 1989, "Neogene Terrestrial Sedimentation on and Adjacent to the Columbia Plateau; Washington, Oregon, and Idaho," *Volcanism and Tectonism in the Columbia River Flood-Basalt Province*, Special Paper 239, S. P. Reidel and P. R. Hooper, editors, Geological Society of America, Boulder, Colorado.

Tallman, A. M., K. R. Fecht, M. C. Marratt, and G. V. Last, 1979, *Geology of the Separations Areas, Hanford Site, South-Central Washington*, RHO-ST-23, Rockwell Hanford Operations, Richland, Washington.

WHC, 1991a, *Geologic Setting of the 200 West Area: An Update*, WHC-SD-EN-TI-008, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991b, *Geology and Hydrology of the 300 Area and Vicinity, Hanford Site, South-Central Washington*, WHC-EP-0500, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991c, *Geology and Hydrology of the Hanford Site: A Standardized Text for Use in Westinghouse Hanford Company Documents and Reports*, WHC-SD-ER-TI-003, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991d, *Revised Stratigraphy for the Ringold Formation, Hanford Site, South Central Washington*, WHC-SD-EN-EE-004, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992a, *Geologic Setting of the 200 East Area*: An Update, WHC-SD-EN-TI-012, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992b, *Summary of the Geology of the 200-BP-1 Operable Unit*, WHC-SD-EN-TI-037, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993a, *Characterization Report for the Table 4 Miscellaneous Streams in Consent Order No. DE 91NM-177*, WHC-SD-EN-EV-020, Rev.0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993b, *Hanford Site Stormwater Pollution Prevention Plan*, WHC-SD-EN-EV-021, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993c, *Sampling and Analysis Plan for Miscellaneous Streams*, WHC-SD-WM-PLN-069, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1994, *Groundwater Map of the Hanford Site*, WHC-EP-0394-7, Westinghouse Hanford Company, Richland, Washington.

This page intentionally left blank.

APPENDICES

This page intentionally left blank.

APPENDIX A

GENERAL INFORMATION

This page intentionally left blank.

CONTENTS

FIGURES

This page intentionally left blank.

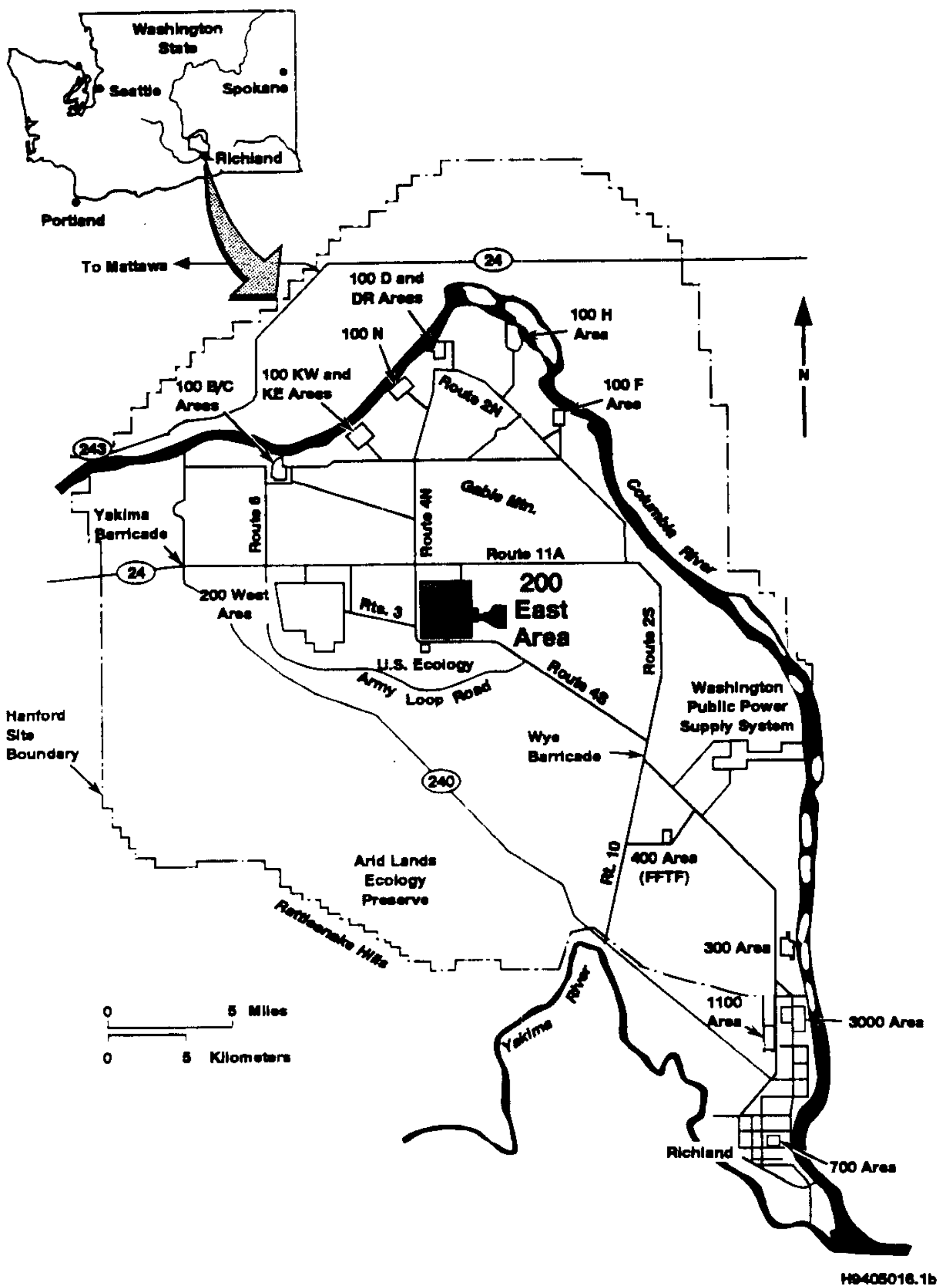


Figure A-1. General Hanford Site Map.

Location of 200-E Powerhouse Ash Pit

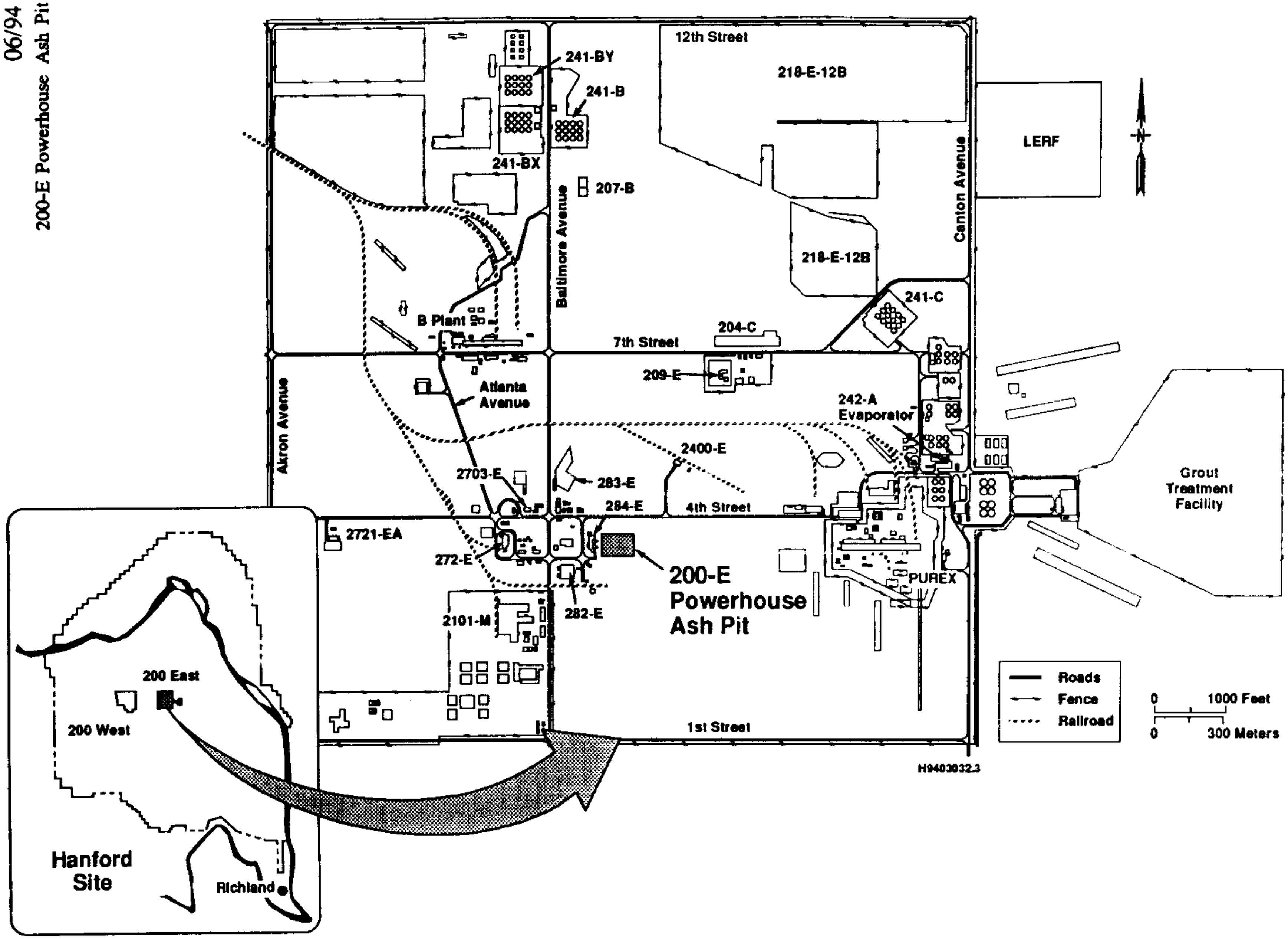


Figure A-2. Location of the 200-E Powerhouse Ash Pit.

APPENDIX B

PRODUCT OR SERVICE INFORMATION

This page intentionally left blank.

CONTENTS

FIGURES

This page intentionally left blank.

SECTION B, ITEM 1.

BRIEFLY DESCRIBE ALL MANUFACTURING PROCESSES AND PRODUCTS, AND/OR COMMERCIAL ACTIVITIES.

INTRODUCTION

The following are facility and process descriptions for the 200-E Powerhouse Ash Waste Water stream. The 200-E Powerhouse is the steam generation facility in the 200-E Area. The 200-E Powerhouse is located in the south central region of the 200-E Area and is designated the 284-E Building (Figure B-1). A description of the facility, the process and the disposal site is provided in the following paragraphs. This information has been summarized and updated from the *Characterization Report for the Table 4 Miscellaneous Streams in Consent Order No. DE 91NM-177* (WHC 1993a).

FACILITY DESCRIPTION

The 200-E Powerhouse consists of a coal-handling and preparation section and boilers. Coal is pulverized in the preparation section and burned in the boilers to generate steam from sanitary water. The 200-E Powerhouse utilizes three Erie City[1] boilers and two Riley Stoker Corporation [2] RX boilers. A backup oil-fired packaged boiler is no longer used. All three Erie City boiler units are water-tube, stoker-fired, three-drum Sterling-type boilers that use the dumping grate method for ash removal. The two RX boilers are stoker-fired with water-tube designs utilizing a traveling grate that discharges ash from the front of the boiler into the ash hopper. Each boiler is rated at a capacity of 29 tons (65,000 pounds) of steam per hour to establish and ensure a safety margin during operations.

The 200-E Powerhouse is a five-story, steel-frame, concrete-block, windowless structure. Included adjacent to the building is a coal storage pit, coal unloading hoppers, conveyer belt inclines, switch and crusher houses, brine pit, ash disposal pit, stacks, and baghouses.

Located on the ground floor (designated the auxiliary floor) are the emergency generator, chemical injection pumps, boiler feed pumps, ash pits, air compressors, and ash handling pumps. The maintenance shop, lockers and shower rooms are located on

---

[1] Eri City boilers were amnufactured by Erie City Iron Works which is currently owned by Zurn Industries.

[2] Riley Stoker RX boilers were manufactured by Riley Stoker Corporation.

the auxiliary floor. The ion exchange resin tanks for the water softener are also located on the auxiliary floor.

The chemical storage room, battery and generator room, flash tank, heat exchanger, steam manifolds, forced draft fans, boiler control panels, and stokers are located on the second floor.

The third floor is at the lower drum level and gives access to the flight conveyer, deaerator, and damper power cylinders. The fourth floor is at the upper drum level. The fifth floor is above the coal bunkers and contains the coal belt and belt tripper car.

PROCESS DESCRIPTION

Sanitary water that has been dechlorinated and sent through a water softener system to remove minerals (calcium and magnesium) is introduced into the coal-fired boilers to produce steam. The steam is superheated before distribution to facilities in the 200 East Area for both heating and process use.

As depicted in Figure B-2, the waste water from the 200-E Powerhouse consists of ash/water slurry resulting from sluicing operations and the removal of flyash from baghouse filters. Sluicing is performed during boiler operations to remove ash that remains after the coal is burned in the boilers. Bottom ash is the solid, or sometimes molten, material that falls to the bottom of the boiler during combustion. The ash from the boiler is dumped periodically to ash hoppers below the furnace grates. Once per day, the ashes are removed from the ash hoppers by sluicing with a stream of high-pressure raw water. The ashes are carried by water into a trench, and the resulting slurry is pumped to the 200-E Powerhouse Ash Pit.

Flyash is the ash and soot collected in the baghouse as a result of filtering flue gas off the boilers. The baghouses collect ash from the boiler off-gas before it exits the stacks. Presently, only one of the two baghouses is used. Once per shift, the baghouse filters are shaken to loosen the ash and soot to a collection hopper. A hydrovac system is then used to remove the ash and soot from collection hoppers and the slurry is sent to the 200-E Powerhouse Ash Pit.

DISPOSAL SITE DESCRIPTION

Ash waste water from the 200-E Powerhouse is discharged to the 200-E Powerhouse Ash Pit via two underground transfer pipes and an open ditch. The 200-E Powerhouse Ash Pit is located approximately 100 feet east of the 284-E Building. The outside dimensions of the pit are 350 feet by 320 feet.

As shown in Figure B-3, the two underground pipes outlet to the open ditch. The pipes extend out horizontally from the west end of the ditch approximately 4 to 6 feet and discharge about 6 to 8 feet above the bottom of the ditch. One pipe is used to transfer ash slurry from the boiler grates, and the other pipe is used for transporting baghouse ash (flyash) slurry.

The 200-E Powerhouse Ash Pit is divided into compartments separated by an earthen dam (Figure B-3). The ash waste water can be directed to either compartment by reconfiguring the ditch that borders the north end of the pit. The two compartments of the pit are used alternately to allow one compartment to dry while the other compartment is being used. The resulting dry ash is removed from the pit and transported to the 200-E Ash Disposal Pile for final disposal.

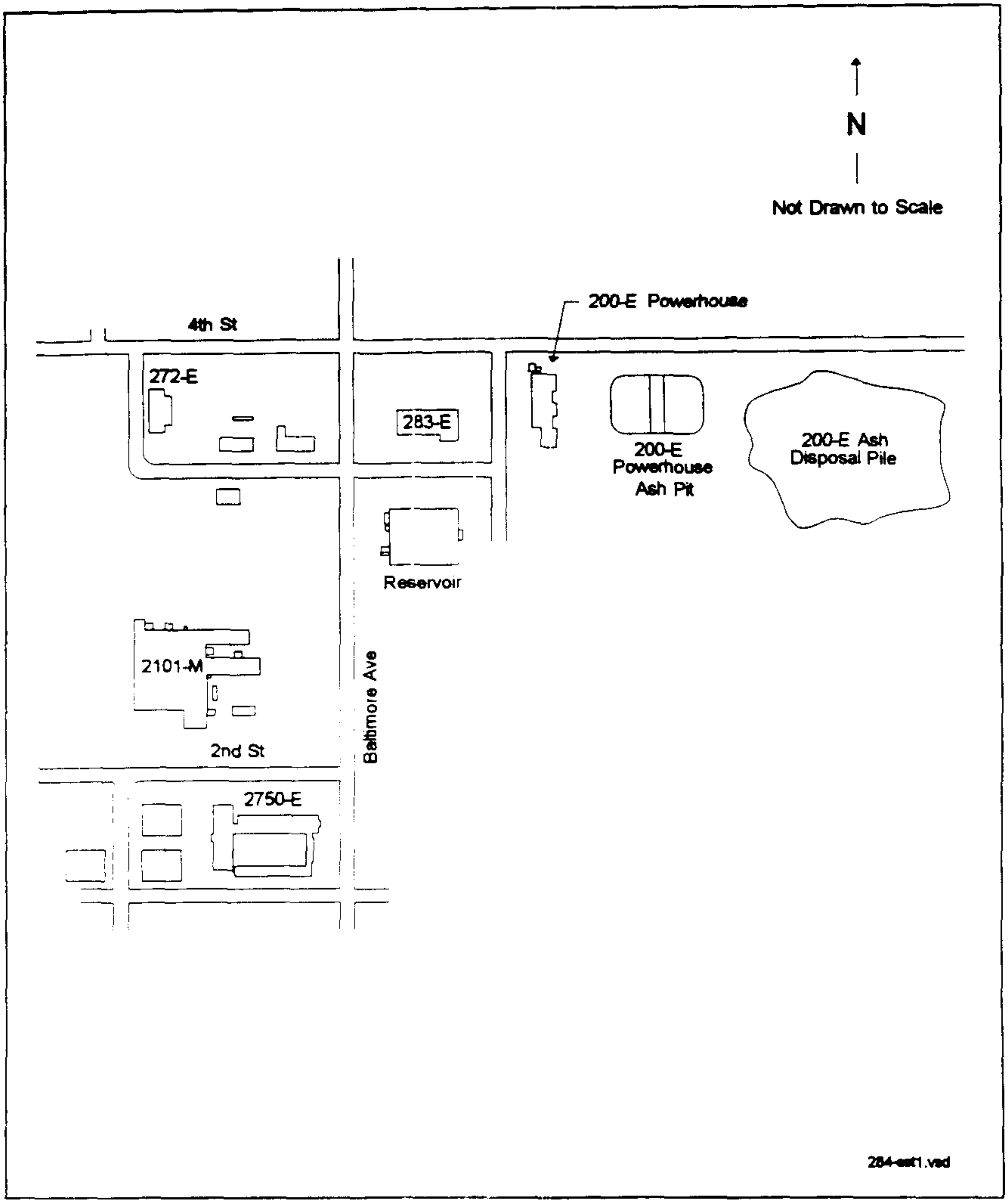


Figure B-1. 200-E Powerhouse and Ash Handling Sites.

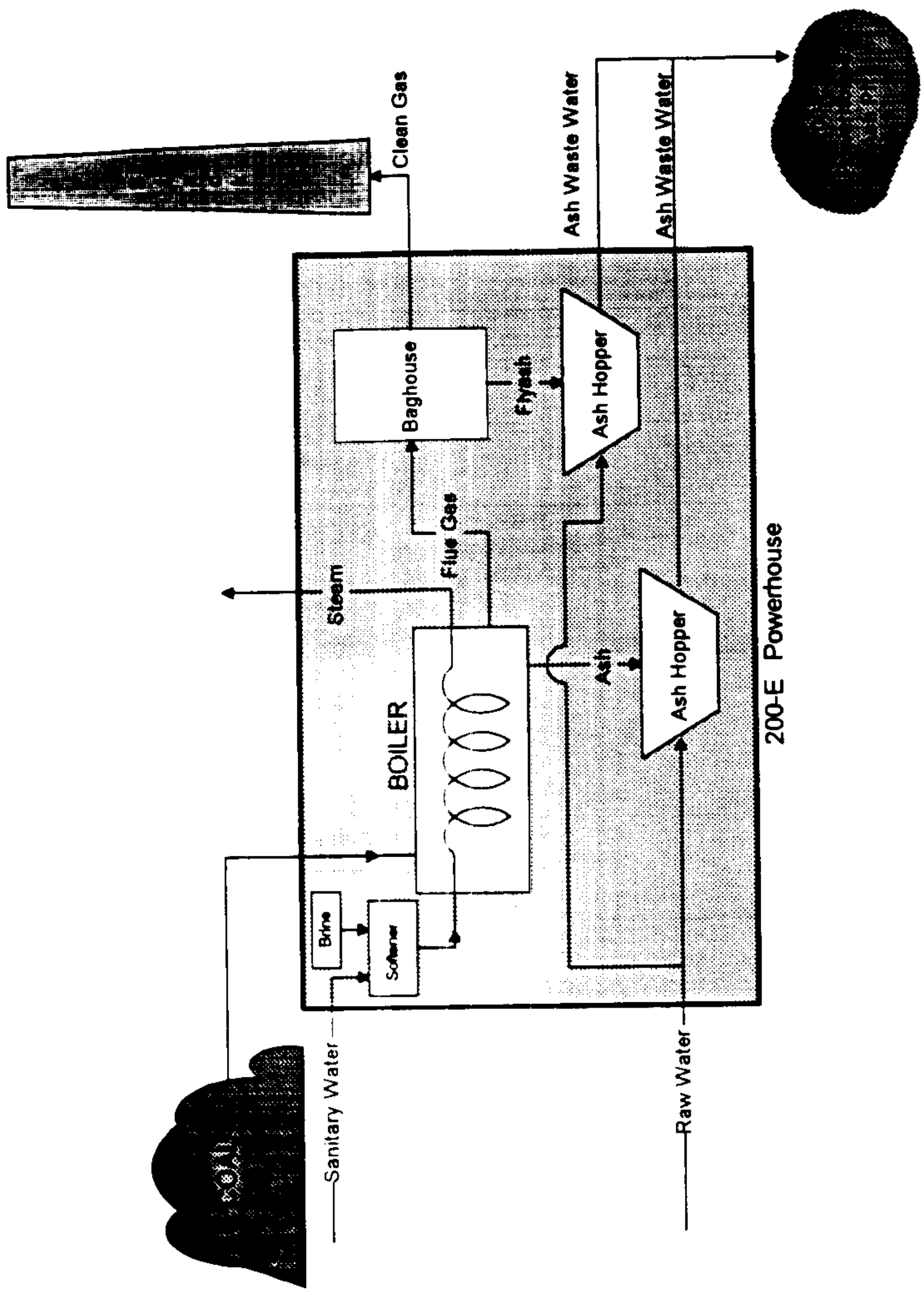


Figure B-2. 200-E Powerhouse Steam Production Flow Diagram.

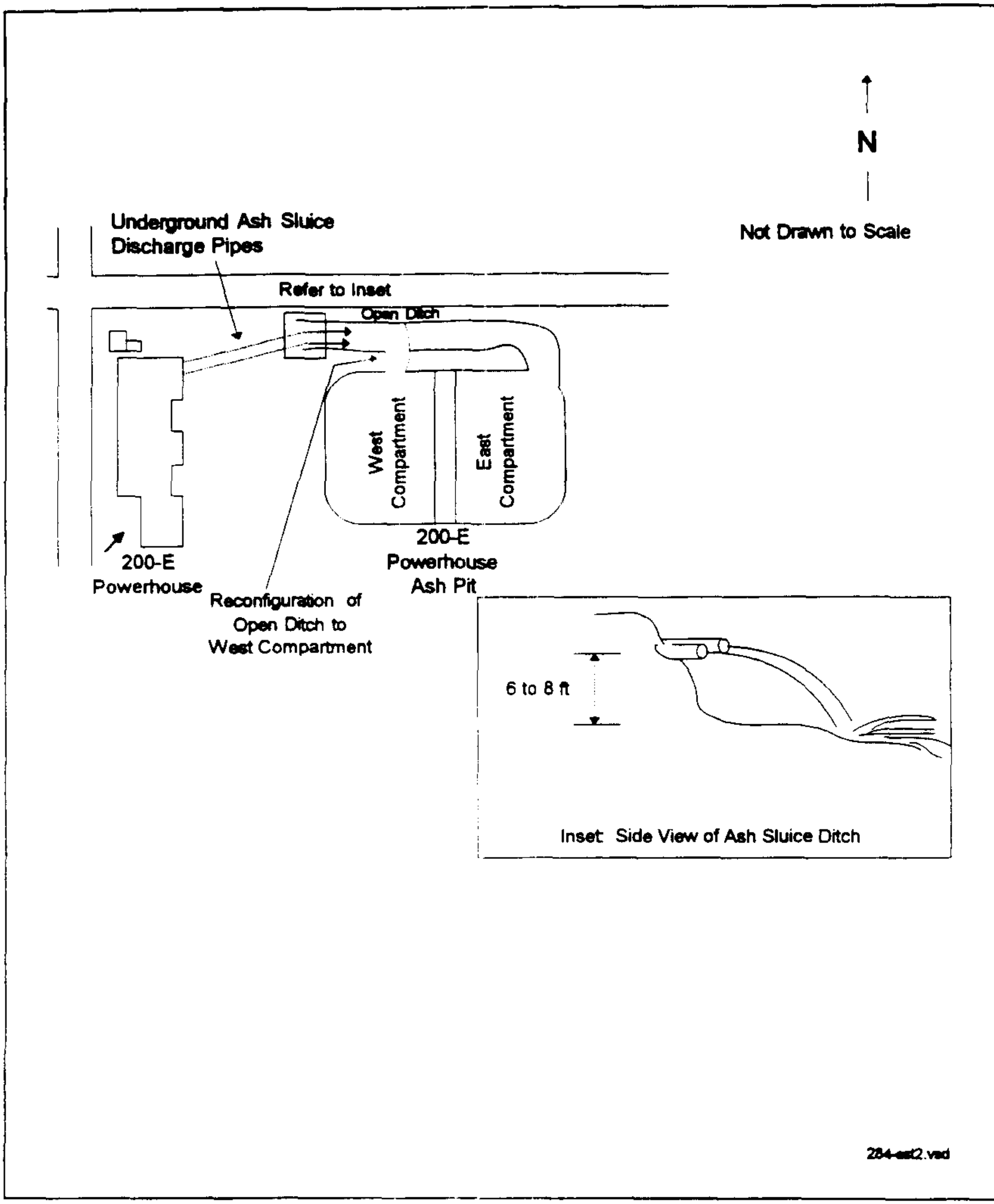


Figure B-3. 200-E Powerhouse Ash Pit and Ash Waste Water Discharge Pipes.

APPENDIX C

PLANT OPERATIONAL CHARACTERISTICS

This page intentionally left blank.

CONTENTS

This page intentionally left blank.

SECTION C, ITEM 2

ON A SEPARATE SHEET, DESCRIBE IN DETAIL THE TREATMENT AND DISPOSAL OF ALL WASTE WATERS AS DESCRIBED ABOVE. INCLUDE A SCHEMATIC DIAGRAM FOR ALL WASTE WATER AND DISPOSAL SYSTEMS.

There is no treatment to the 200-E Powerhouse Ash Waste Water stream. However, the ash slurry is disposed of in the 200-E Powerhouse Ash Pit. The ash settles on the top of the soil and the water evaporates and percolates through the soil. Once dried, the ash is removed and disposed of in the 200-E Ash Disposal Pile. Figure C-1 provides a schematic diagram of the ash waste water disposal.

SECTION C, ITEM 4

DESCRIBE ANY PLANNED WASTE WATER TREATMENT IMPROVEMENTS OR CHANGES IN WASTE WATER DISPOSAL METHODS.

In 1994, a backup boiler system will be installed in the 200 West Area. The 200-W Powerhouse will no longer use coal to produce steam. This backup system will use a package boiler and diesel fuel, thus eliminating the 200-W Powerhouse Ash Waste Water by 1995. These planned changes will require the 200-E Powerhouse to routinely produce more steam to keep up with the current steam usage. This could potentially result in an increased discharge rate of ash waste water to the 200-E Powerhouse Ash Pit. However, there will be no modification to the 200-E Powerhouse Ash Pit.

SECTION C, ITEM 5

IF PRODUCTION PROCESSES ARE SUBJECT TO SEASONAL VARIATIONS, PROVIDE THE FOLLOWING INFORMATION. LIST DISCHARGE FOR EACH WASTE STREAM IN GALLONS PER DAY (GPD). THE COMBINED VALUE FOR EACH MONTH SHOULD EQUAL THE ESTIMATED TOTAL MONTHLY FLOW.

Steam produced at the 200-E Powerhouse is used for building heat and processes. However, steam heat has been replaced with electric heat in many buildings, resulting in a lower demand for steam. The current steam needs are met by operating the 200-E Powerhouse at minimum capacity year-around, which requires only one (possibly two) of the five boilers to operate full time. Because the 200-E Powerhouse operates at minimum capacity year-around, producing steam to accommodate seasonal variations is unnecessary.

SECTION C, ITEM 7

LIST ALL INCIDENTAL MATERIALS LIKE OIL, PAINT, GREASE, SOLVENTS, SOAPS, AND CLEANERS THAT ARE USED OR STORED ON SITE.

Incidental materials are summarized in Table C-1.

Table C-1. 200-E Powerhouse Incidental Material Usage.

Incidental Material	Quantity
Absorbent	5 gallons
Adhesive	<5 gallons
Anti-static spray	<5 gallons
Cutting fluid	<5 gallons
Dearborn 66[1]	650 pounds
Grease	<5 gallons
Indicator solution	2 gallons
Ink	<5 gallons
Lubricant	7 gallons
Oil	18 gallons
Paint	<5 gallons
Polyquest 683[2]	15 gallons
Sealant	<5 gallons
Solvent	5 gallons
Super Filmeen 14[3]	<5 gallons

---

[1] Dearborn 66 is a trademark for Grace Dearborn Company.
[2] Polyquest 683 is a trademark for Grace Dearborn Company.
[3] Super Filmeen 14 is a trademark for Grace Dearborn Company.

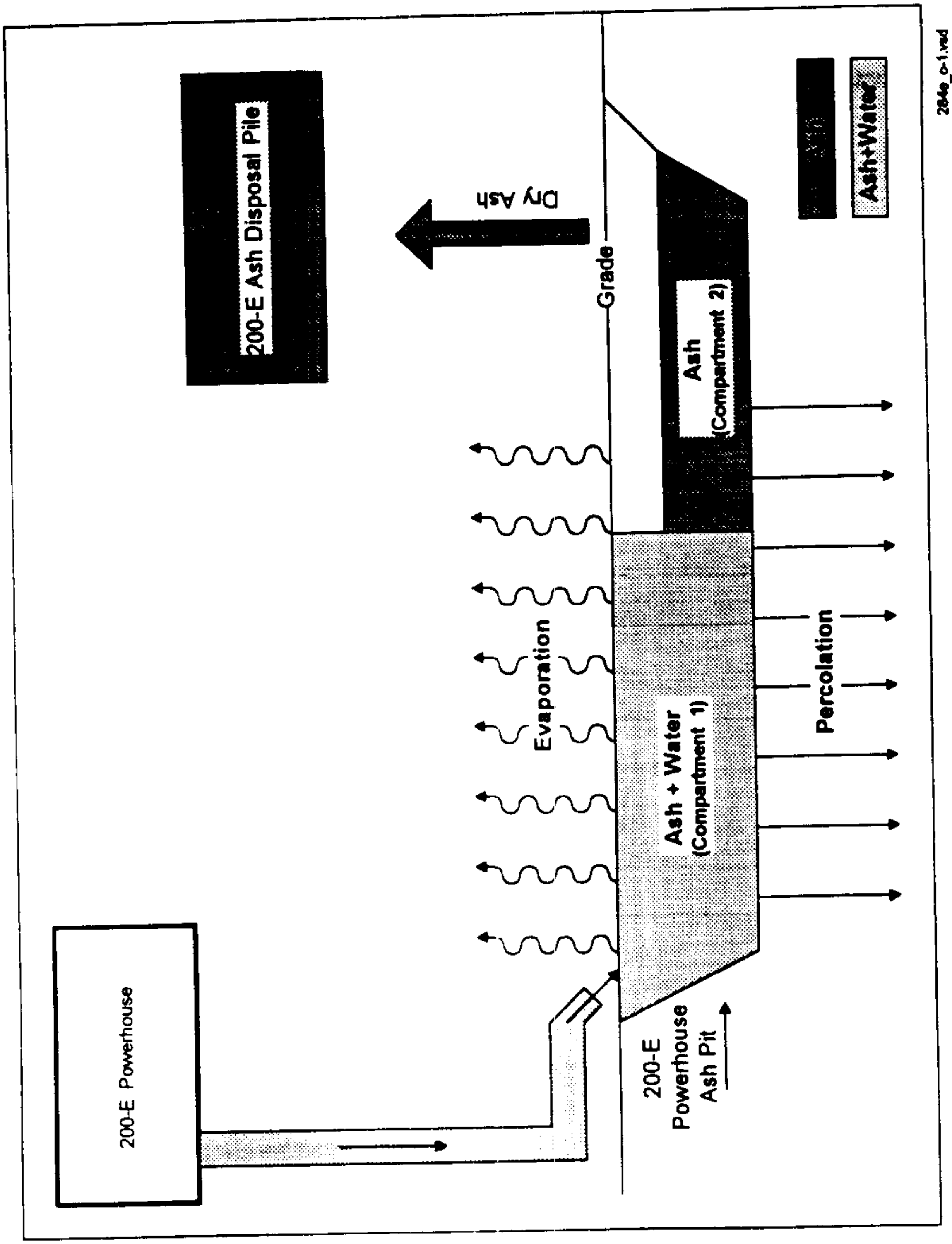


Figure C-1. 200-E Powerhouse Ash Waste Water Disposal.

APPENDIX D

WATER CONSUMPTION AND WATER LOSS

This page intentionally left blank.

CONTENTS

This page intentionally left blank.

SECTION D, ITEM 3

ATTACH A LINE DRAWING THE WATER FLOW THROUGH THE FACILITY. INDICATE SOURCE OF INTAKE WATER, OPERATIONS CONTRIBUTING WASTEWATER TO THE EFFLUENT, AND TREATMENT UNITS LABELED TO CORRESPOND TO THE MORE DETAILED DESCRIPTIONS IN ITEM C. CONSTRUCT A WATER BALANCE ON THE LINE DRAWING BY SHOWING AVERAGE FLOWS BETWEEN INTAKES, OPERATIONS, TREATMENT UNITS, AND OUTFALLS. IF A WATER BALANCE CANNOT BE DETERMINED (E.G., *FOR CERTAIN MINING ACTIVITIES*), PROVIDE A PICTORIAL DESCRIPTION OF THE NATURE AND AMOUNT OF ANY SOURCES OF WATER AND ANY COLLECTION OR TREATMENT MEASURES.

Figure D-1 depicts the water flow through the 200-E Powerhouse.

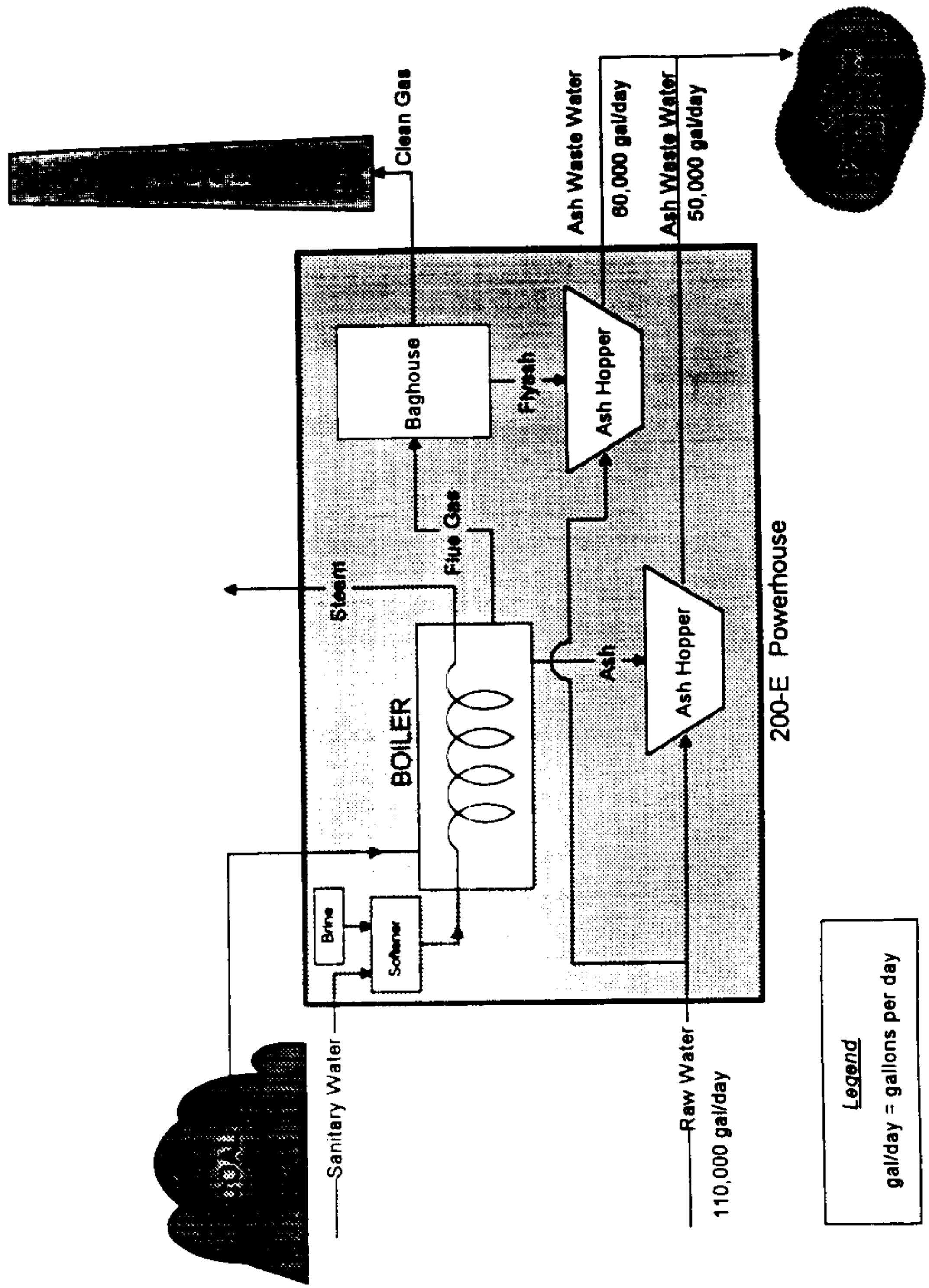


Figure D-1. 200-E Powerhouse Water Balance.

APPENDIX E

WASTE WATER INFORMATION

This page intentionally left blank.

CONTENTS

This page intentionally left blank.

SECTION E, ITEM 1

PROVIDE MEASUREMENTS FOR TREATED WASTE WATER PRIOR TO LAND APPLICATION FOR THE PARAMETERS LISTED BELOW, UNLESS WAIVED BY THE PERMITTING AUTHORITY. ALL ANALYTICAL METHODS USED TO MEET THESE REQUIREMENTS SHALL, UNLESS APPROVED OTHERWISE IN WRITING BY ECOLOGY, CONFORM TO THE *GUIDELINES ESTABLISHING TEST PROCEDURES FOR THE ANALYSIS OF POLLUTANTS CONTAINED IN 40 CFR PART 136*.

The samples and resultant data presented in Table E-1 were obtained in accordance with a sampling and analysis plan (WHC 1993c). Bulk samples of ash slurry were obtained during the ash sluicing cycle. The bulk samples were placed on ice and allowed to settle for 72 hours. At the end of the settling period, individual samples of the supernatant were obtained for subsequent analysis. The data confirm process knowledge information and show that the stream is generally consistent with typical dilute industrial waste water streams as discussed in Metcalf and Eddy (1991) and the EPA design manual (EPA 1980).

Only one constituent, arsenic (As), was found significantly in excess of the WAC-173-200 Ground Water Quality Criteria. Arsenic was measured at a level of 37 ug/L (GWQC = 0.05 ug/L). This level of arsenic is below the EPA's Primary Drinking Water Standard of 50 ug/L. Coal contains arsenic in the ppm range so the arsenic is most likely being leached from the coal ash. Manganese was reported at 60.1 ug/L (GWQC = 50 ug/L). The source of the manganese is not known.

Table E-1. 200-E Powerhouse Ash Waste Water Effluent Data.
Sheet 1 of 3

EFFLUENT [a]						
CONSTITUENT	n	MEAN CONC.	S.D.	UNITS	METHOD [b]	D.L.[c]
Waste Water Parameters [d]						
Conductivity	2	246	1	umho/cm	120.1	6
pH	2	7.1 (J2)	N/A	pH	9040	0.1
TDS	2	130	1	mg/L	160.1	5
TSS	2	5 (U)	N/A	mg/L	160.2	5
BOD	2	17	9	mg/L	5210B	2
TKN	2	0.53	N/A	mg/L	351.3	0.15
Total Phosphorous	2	0.93	.02	mg/L	365.2	0.05
Metals						
Ca	2	29200	2546	ug/L	6010	10 (P)
Mg	2	5160	212	ug/L	6010	30 (P)
Na	2	16500	2546	ug/L	6010	29 (P)
K	2	5000 (U2)	N/A	ug/L	6010	5000
Cd	2	2.1 (B2)	N/A	ug/L	6010	4 (P)
Cr	2	3.0 (U,B)	0.7	ug/L	6010	7 (P)
Pb	2	11.1 (U2)	N/A	ug/L	6010	11.1
Hg	2	0.10 (U2)	N/A	ug/L	7470	0.1
Se	2	32.8 (UJ2)	N/A	ug/L	6010	32.8
Ag	2	2.1 (U2)	N/A	ug/L	6010	2.1
Cu	2	25 (U2)	N/A	ug/L	6010	25
Fe	2	99.1 (B1)	18.2	ug/L	6010	7 (P)

Table E-1. 200-E Powerhouse Ash Waste Water Effluent Data.
Sheet 2 of 3

EFFLUENT [a]						
CONSTITUENT	n	MEAN CONC.	S.D.	UNITS	METHOD [b]	D.L.[c]
Metals (continued)						
Mn	2	60.1	9.4	ug/L	6010	2 (P)
Zn	2	74	22	ug/L	6010	2 (P)
Ba	2	67 (B2)	11	ug/L	6010	2 (P)
As	2	37	2.0	ug/L	6010	16
Anions						
Fl^-	2	0.6	N/A	mg/L	300.0	0.1
Cl^-	2	1.5	0.1	mg/L	300.0	0.2
$SO_4^=$	2	62	1	mg/L	300.0	1-4
NO_2^-, NO_3^-	3	0.25 (U3)	N/A	mg/L	353.2	0.25
Organics						
PAHs	1	ND	N/A	mg/L	8100	5-100
Methylene Chloride (VOC)	1	1 (J)	N/A	mg/L	8240	5
Screening						
TOC	3	1 (U3)	N/A	mg/L	9060	1
TOX	2	13.6 (U1)	9.0	ug/L	9020	5-20
Radionuclides [e]						
Gross Alpha	2	1.5 (UJ,J)	0.8	pCi/L	EP-10	1
Gross Beta	2	1.9 (UJ,J)	0.6	pCi/L	EP-10	2

Table E-1. 200-E Powerhouse Ash Waste Water Effluent Data.
Sheet 3 of 3

BOD	= Biological Oxygen Demand	mg/L	= milligrams per liter
PAH	= Polycyclic Aromatic Hydrocarbons	pCi/L	= picocuries per liter
SVOC	= Semi-Volatile Organic Compound	ug/L	= micrograms per liter
TDS	= Total Dissolved Solids	umho/cm	= micromhos per centimeter
TIC	= Tenatively Identified Compound	N/A	= Not Applicable
TKN	= Total Kjeldahl Nitrogen	ND	= Not Detected
TOC	= Total Organic Carbon		
TOX	= Total Organic Halide		
TSS	= Total Suspended Solids		
VOC	= Volatile Organic Compound		

a n = Number of sample results averaged.
mean conc = mean concentration
S.D. = one standard deviation about the mean

b Three digit numbers with a decimal (i.e., 120.1, 300.0 etc.) are from EPA 1979. Four digit procedure numbers (i.e., 6010, 9131 etc.) are from EPA 1992. Four digit numbers with a letter following (i.e., 5210B) are from "Standard Methods for the Examination of Water and Wastewater", 18th Edition, (APHA, 1992).

c D.L. detection level as reported by the laboratory or procedures (P) if no D.L. was reported with the data.

d Qualifiers which may appear in this table are:
(U) - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit (D.L.) corrected for sample dilution by the laboratory.
(J) - Indicates the compound or analyte was analyzed for and detected, but due to a QC deficiency identified during data validation, the associated quantitation limit is an estimate. This flag is also used when estimating concentrations of TICs or when the presence of a target compound is confirmed at a concentration of less than the D.L. but greater than the instrument detection limit.
(B) - This flag applies to results in which the analyte was detected in both the sample and the associated blank. For the metals, (B) also indicates the analyte concentration is less than the D.L. but greater than the instrument detection level.
Data qualifiers may appear in combinations. An alpha numeric combination (i.e., U2) indicates that two of the sample results used in the mean had a (U) qualifier. Two qualifiers separated by a comma (i.e., B,U) indicates that one of the samples in the mean has a (B) qualifier and one has a (U) qualifier.

e Contractor internal laboratory procedures are used for radiochemical analysis.

APPENDIX F

STORM WATER

This page intentionally left blank.

CONTENTS

This page intentionally left blank.

SECTION F

Due to the overlap between Items 1 and 2, the items were combined and addressed in the following statement.

SECTION F, ITEM 1

DO YOU HAVE A WASHINGTON STATE STORM WATER BASELINE GENERAL PERMIT?

SECTION F, ITEM 2

HAVE YOU EVER APPLIED FOR A WASHINGTON STATE STORM WATER BASELINE GENERAL PERMIT.

Federal facilities are excluded from coverage under the Washington State Storm Water Baseline Permit, as are industrial facilities which have no point source discharge to surface water or a municipal storm sewer. However, a National Pollutant Discharge Elimination System (NPDES) General Permit was developed by EPA on September 9, 1992 for federal facilities located in Washington State, engaged in discharging storm water associated with industrial activities. To obtain site coverage under the NPDES General Permit, DOE-RL filed a Notice Of Intent application before the EPA on October 1, 1992. Subsequently, the Hanford Site has been issued an NPDES General Permit Number WA-R-00-A17F for site-wide coverage of storm water discharge. As required by the NPDES General Permit, the Hanford Site is implementing a storm water pollution prevention program according to the *Hanford Site Stormwater Pollution Prevention Plan* (WHC 1993b). Storm water discharges from the 200 East, 200 West and 400 Areas have no potential discharge to the Columbia or Yakima Rivers and thus were not included in the *Hanford Site Stormwater Pollution Prevention Plan* (WHC 1993b).

SECTION F, ITEM 4

DESCRIBE THE SIZE OF THE STORM WATER COLLECTION AREA.

Storm water from the 200-E Powerhouse and surrounding facilities is not collected for point source discharge to the 200-E Powerhouse Ash Pit. Therefore, there is no storm water collection area for the 200-E Powerhouse Ash Pit.

SECTION F, ITEM 5

DOES YOUR FACILITY'S STORM WATER DISCHARGE TO:

None of the statements apply. Storm water from the 200-E Powerhouse and surrounding facilities is not discharged directly to ground waters of Washington State. The storm water has no point source discharge to surface water or a municipal storm sewer.

SECTION F, ITEM 6

AREAS WITH INDUSTRIAL ACTIVITIES AT FACILITY:

To address this item, a boundary has been drawn around the disposal site and applicable facilities. The facility boundary is shown on Drawing H-13-000089. The notes and legend are on Drawing H-13-000091.

SECTION F, ITEM 7

MATERIAL HANDLING/MANAGEMENT PRACTICES:

A. TYPES OF MATERIALS HANDLED AND/OR STORED OUTDOORS:

The facility boundary on Drawing H-13-000089 was used to address this item. The materials selected were located within the facility boundary. The petroleum and hazardous wastes are stored in the covered 90-day dangerous waste storage pad. The coal is not covered.

B. IDENTIFY EXISTING MANAGEMENT PRACTICES EMPLOYED TO REDUCE POLLUTANTS IN INDUSTRIAL STORM WATER DISCHARGES:

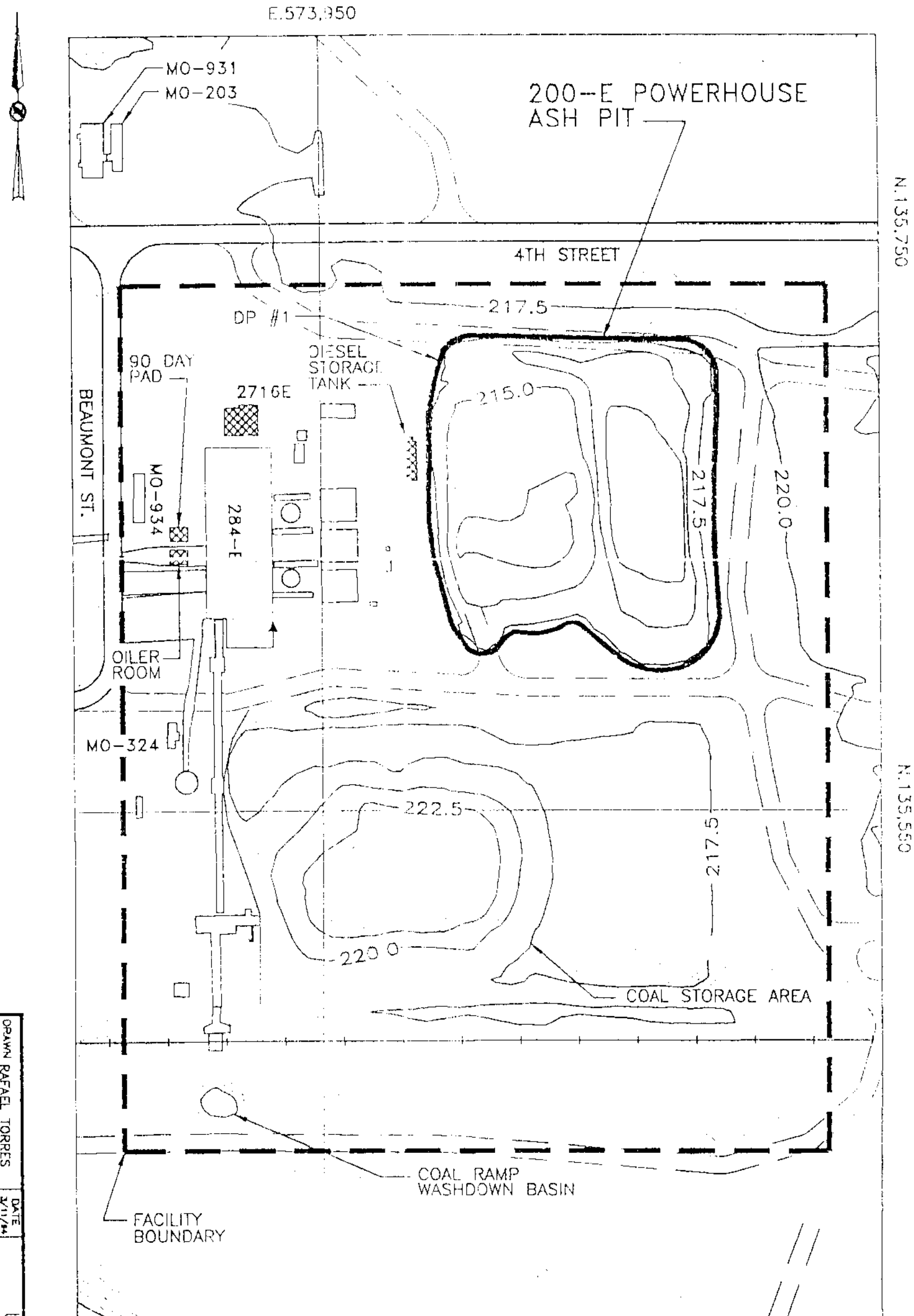
This item is not considered applicable because there is no storm water collection area for the 200-E Powerhouse Ash Pit.

SECTION F, ITEM 8

ATTACH A MAP SHOWING STORM WATER DRAINAGE/COLLECTION AREAS, DISPOSAL AREAS AND DISCHARGE POINTS.

Downspouts collect storm water from the 200-E Powerhouse roof and discharge the storm water to the ground beneath the downspouts. Downspouts are mapped on Drawing H-13-000089.

This page intentionally left blank.



FOR GENERAL NOTES AND LEGEND SEE: H-13-000091

SITE PLAN

SCALE: 1:1500

0 15 30 60 90 120

1 cm = 15 meters

0 100 200 300 400 500 FEET

OFFICIAL RELEASE BY WHC DATE MAY 10 1994

REF NUMBER	TITLE
H-13-000222	200E AREA TOPOGRAPHIC MAP

REFERENCE

NEXT USED ON: H-13-000200

REVISIONS

REV NO	DESCRIPTION	REV BY DATE	CHK BY DATE	DFTG APPVD DATE	COG ENGR	OTHER

CADFILE N0001B9A

CADCODE DOS:6.0:AC02:12.0:SS

		DATE
DRAWN	RAFAEL TORRES	3/11/94
CHECKED		5/5/94
DFTG APVD		5/10/94
COG ENGR		5/10/94
APPVD		
APPVD		
APPVD		

U.S. DEPARTMENT OF ENERGY
DOE Field Office, Richland
Westinghouse Hanford Company

200-E POWERHOUSE ASH PIT FACILITY MAP

SIZE	BLDG NO	INDEX NO	DWG NO	REV
B	284-E	0110	H-13-000089	0

SCALE SHOWN | EDT 604311 | SHEET 1 OF 1

CHK PRINT

COMMENT PRINT

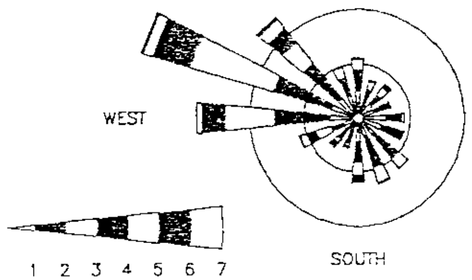
Z0JB0006

DWG NO H-13-000089 SH 1 OF 1 REV 0

THIS PAGE INTENTIONALLY
LEFT BLANK

WIND ROSE FOR: 200E AREA
% CALM WINDS = .7
STATION NO.6

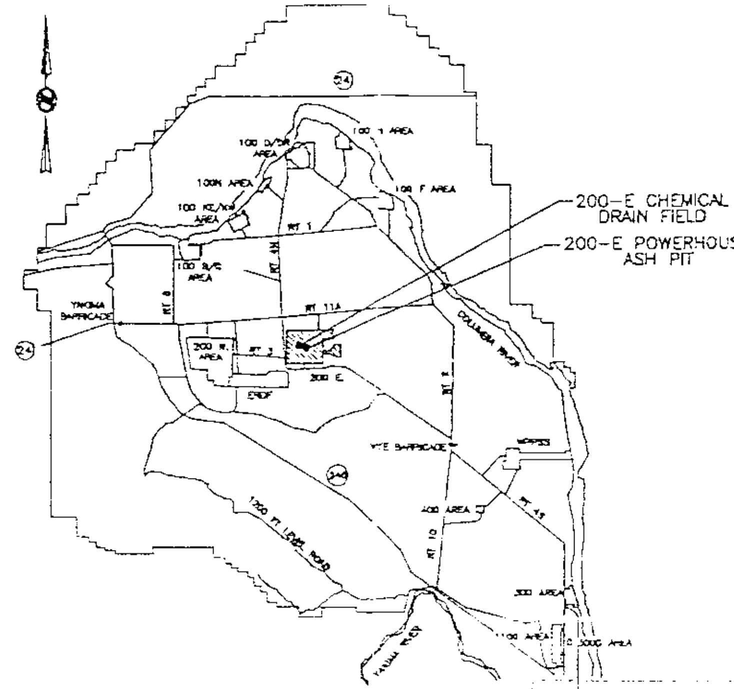
PERIOD COVERED
1/1/93 – 12/31/93



PADDLES INDICATE DIRECTION WIND IS COMING FROM.
RADIAL GRIDS REPRESENT 5.0% AND 10.0% OCCURRENCE.

WIND CLASS	MILES/HOUR
1	>1.0 – 3.0
2	4.0 – 7.0
3	8.0 – 12.0
4	13.0 – 18.0
5	19.0 – 24.0
6	25.0 – 31.0
7	32.0 +

WIND ROSE



KEY PLAN

SCALE: NONE

DATE MAY 10 1994

LEGEND

Y 47,000 / X 43,000	HANFORD PLANT COORDINATES (FEET)
E 575,250 / N 136,200	WASHINGTON STATE COORDINATES (METERS)
	INDEX CONTOUR (METERS)
	INTERMEDIATE CONTOUR
	IMPROVED ROAD
	UNIMPROVED ROAD
	DIRT ROAD
	SIDEWALKS\PARKING LOTS
	RAILROADS
	SECURITY,WARNING,MISC FENCES
	POST & CHAIN (CRIB,BURIAL GROUND FENCES)
	PERIMETER FENCES
	BUILDINGS/STRUCTURES & TOWERS
242-A	BUILDING NUMBER
E27-1	WELL
	TANKS
216-A-42	CRIB
218-E-10	BURIAL GROUND
	CHEMICAL\HANDLING AND STORAGE FACILITIES
DP	DISCHARGE POINT
▲	DOWNSPOUTS

GENERAL NOTES

1. THESE GENERAL NOTES AND LEGEND ARE FOR H-13-000089 AND H-13-000090.
2. THIS MAP IS BASED ON AERIAL PHOTOGRAPHY FLOWN ON 5-24-89. THE ORIGINAL TOPOGRAPHIC MAP WAS PREPARED BY MERRICK & COMPANY AND CERTIFIED TO MEET NATIONAL MAP ACCURACY STANDARDS. OFFICIAL COPIES OF THE MERRICK MAPS THAT SHOW THE CERTIFICATE ARE LOCATED IN THE WESTINGHOUSE ENGINEERING FILES AS DRAWING NUMBERS H-2-79476 SHEET 1 AND H-2-79477 SHEET 1 THRU 37. NAMES OF ADDITIONAL FEATURES AND THE TITLE BLOCK WERE ADDED BY WESTINGHOUSE HANFORD COMPANY.
3. WASHINGTON STATE PLANE COORDINATE SYSTEM: THE OFFICIAL COORDINATE SYSTEM AS DEFINED BY THE REVISED CODE OF WASHINGTON (RCW). THE HANFORD SITE LIES WITHIN THE WASHINGTON COORDINATE SYSTEM, SOUTH ZONE. THIS GRID COVERS THE ENTIRE SITE AND USES X (EASTINGS) AND Y (NORTHINGS) COORDINATES.

   HORIZONTAL DATUM: NAD-83 LAMBERT PROJECTION. WASHINGTON STATE PLANE COORDINATES ARE SHOWN IN METERS.
   CONTOUR INTERVAL: 0.5 METERS.
4. HANFORD PLANT GRID: A LOCAL GRID SYSTEM WITH ITS INITIAL POINT NORTHEAST OF THE 400 AREA. IT COVERS 200 EAST AND 200 WEST AREA AS WELL AS GENERAL SITE WORK SUCH AS WELLS AND BURIAL GROUNDS. HANFORD COORDINATES ARE SHOWN IN FEET.
5. THIS MAP IS TO BE USED FOR REFERENCE PURPOSES ONLY. DO NOT USE THIS MAP FOR CONSTRUCTION PURPOSES.

REF NUMBER	TITLE
H-13-000089	200-E POWERHOUSE ASH PIT FACILITY MAP
H-13-000090	200-E CHEMICAL DRAIN FIELD FACILITY MAP

REFERENCE

NEXT USED ON H-13-000200

MFG REV NO	DESCRIPTION	REV BY DATE	CHK BY DATE	DFTG APRVD DATE	COG ENGR	OTHER	OTHER

REVISIONS — APPROVALS BY/DATE

CADFILE N000091A — CADCODE DCS:6.0:ACD2:12.0:SS

DRAWN	RAFAEL TORRES	5/10/94
CHECKED	[signature]	5/10/94
DFTG APVD	[signature]	5/10/94
COG ENGR	B. P. [signature]	5/10/94
APPVD		
APPVD		
APPVD		

U.S. DEPARTMENT OF ENERGY
DOE Field Office, Richland
Westinghouse Hanford Company

HANFORD SITE FACILITY MAP GENERAL NOTES AND LEGEND

SIZE	BLDG NO	INDEX NO	DWG NO	REV
B	200E	0110	H-13-000091	0

SCALE SHOWN — EDT 604306 — SHEET 1 OF 1

CHK PRINT — COMMENT PRINT

DWG NO H-13-000091 SH 1 OF 1 REV 0

ZDLB0006

THIS PAGE INTENTIONALLY
LEFT BLANK

APPENDIX G

OTHER INFORMATION

This page intentionally left blank.

CONTENTS

This page intentionally left blank.

SECTION G, ITEM 1

DESCRIBE LIQUID WASTES OR SLUDGES BEING GENERATED THAT ARE NOT DISPOSED OF IN THE WASTE STREAM(S) AND HOW THEY ARE DISPOSED OF. FOR EACH TYPE OF WASTE, PROVIDE TYPE OF WASTE, NAME, ADDRESS, AND PHONE NUMBER OF HAULER.

The 200-E Powerhouse Waste Water which includes cooling water, boiler blowdown, floor drains, and water softener regeneration is discharged to the 216-B-3 Pond system. These streams are included under another permit application.

Waste water is also generated when the 200-E coal ramp is washed down with raw water. The waste water is discharged to the coal ramp washdown basin. Refer to Drawing H-13-000089 for the location of the coal ramp washdown basin.

Sanitary sewage is discharged to the 2607E1 septic tank from the 200-E Powerhouse. This tank is pumped out periodically and the sludge is transported to the 100-N Sanitary Sewage Lagoon. Westinghouse Sanitary Systems Maintenance hauls the sewage from the septic systems to the 100-N Sewage Lagoon. Currently, Westinghouse Hanford Company (WHC) also contracts Roto-Rooter Sewer Service Company to haul the sewage. The addresses are as follows:

Sanitary Systems Maintenance
Westinghouse Hanford Company
P.O. Box 1970
MSIN S4-61
Richland, WA 99352
(509) 373-5786

Roto-Rooter Sewer Service Co.
Route 4, Box 4000-D
Kennewick, WA 99336
(509) 783-7311

Dangerous waste is accumulated in satellite accumulation areas. When a container is full, the container is put on the 90-day dangerous waste storage pad. Dangerous waste is hauled from the 90-day dangerous waste storage pad by:

Solid Waste Disposal
Westinghouse Hanford Company
P.O. Box 1970
MSIN N3-11
Richland, WA 99352
(509) 376-4646

SECTION G, ITEM 2

DESCRIBE THE STORAGE AREAS FOR RAW MATERIALS, PRODUCTS, AND WASTES.

Raw Materials - Coal is stored outside in a pile on a gravel surface. Sanitary water is stored in the clearwell.

Products - Steam is distributed through steam lines to other facilities for heating and process systems.

Wastes - The 200-E Powerhouse Waste Water is disposed of in the 216-B Pond. The coal ramp washdown waste water is discharged to a depression in the topography.

Refer to Drawing H-13-000089 for the location of the coal ramp washdown basin. The 90-day dangerous waste storage pad is an open area covered by a roof used to collect dangerous waste from the 284-E Building.

APPENDIX H

SITE ASSESSMENT

This page intentionally left blank.

CONTENTS

FIGURES

SECTION H, ITEM 1

GIVE THE LEGAL DESCRIPTION OF THE LAND TREATMENT SITE(S). GIVE THE ACREAGE OF EACH LAND TREATMENT SITE(S). ATTACH A COPY OF THE CONTRACT(S) AUTHORIZING USE OF THE LAND FOR TREATMENT.

Legal Description:

SW 1/4, SW 1/4, Section 2, Township 12N, Range 26E, Benton County, WA.

The land treatment site has the following acreage:

200-E Powerhouse Ash Pit (total area): 2.07 acres

A specific contract authorizing use of the 200-E Powerhouse Ash Pit for a land treatment site does not exist, but the Hanford Site was created by the U.S. Government to serve as a research and production facility for federal government nuclear projects. The Hanford Site has been in use since the early 1940's and all disposal facilities, such as the 200-E Powerhouse Ash Pit, have been authorized by the U.S. Government.

SECTION H, ITEM 2

LIST ALL ENVIRONMENTAL CONTROL PERMITS OR APPROVALS NEEDED FOR THIS PROJECT; FOR EXAMPLE, SEPTIC TANK PERMITS, SLUDGE APPLICATION PERMITS, OR AIR EMISSIONS PERMITS.

There are no permits specifically for this project. The following permits are general permits for the Hanford Site:

- Hanford Site Radioactive Air Emissions Permit: Number FF-01
- Hanford Site Dangerous Waste Permit: Number WA7890008967
- NPDES General Permit: Number WA-R-00-A17F.

SECTION H, ITEM 3

ATTACH A UNITED STATES GEOLOGICAL SURVEY (USGS) TOPOGRAPHIC MAP. SHOW THE FOLLOWING ON THIS MAP:

a. Location and name of internal and adjacent streets
b. Surface water drainage systems within 1/4 mile of the site
c. All wells within 1 mile of the site

c. All wells within 1 mile of the site
d. Chemical and product handling and storage facilities
e. Infiltration sources, such as drainfields and lagoons within 1/4 mile of the site
f. Waste Water and cooling water discharge points with waste stream ID numbers (See Section C.1)
g. Other activities and land uses within 1/4 mile of the site

Drawing H-13-000085 addresses the above items as applicable. Although this drawing is not a USGS topographic map, it was derived from the Hanford Site topographic map database. The Hanford Site map database provides more detail and allows the items to be addressed at a more appropriate scale than a USGS map. The waste water discharge point shown for the waste stream on Drawing H-13-000085 includes all component substreams prior to discharge. The chemical and product handling and storage areas are difficult to see on a map of this scale and are shown on Drawing H-13-0000089 in Appendix F.

SECTION H, ITEM 4

ATTACH WELL LOGS AND WELL I.D.# WHEN AVAILABLE FOR ALL WELLS WITHIN 500 FEET AND ANY AVAILABLE WATER QUALITY DATA.

Drawing H-13-000085 shows all of the wells within a 1-mile radious of the 200-E Powerhouse Ash Pit. All well numbers are preceded with a 299. No existing wells are present within 500 feet of the 200-E Powerhouse Ash Pit.

SECTION H, ITEM 5

DESCRIBE SOILS ON THE SITE USING INFORMATION FROM LOCAL SOIL SURVEY REPORTS.

The most recent study of the soil on the Hanford Site was done by Hajek (1966). This study presents a soil map and descriptive report of soils in the Benton County portion of the Hanford Site. On the basis of morphologic and genetic characteristics, 13 soil types were identified. An approximate land use capability classification is provided for these soils on the basis of soil limitations for, and damage risks associated with, agricultural use. Approximate engineering classifications for these soils, using the Unified Soil Classification System, are also provided by Hajek (1966). The soil types mapped on the Hanford Site are shown on Figure H-1. There are no soil data for the north slope of the Hanford Site. The soils at the 200 East Area consist of three types: the Burbank loamy sand, the Quincy sand (Rupert sand), and the Ephrata sandy loam.

The following sections describe the soils types in the 200 East Area. A map depicting the soils within one mile of the 200-E Powerhouse Ash Pit is provided as Figure H-2.

The Burbank loamy sand is a dark grayish brown, coarse-textured, excessively-drained soil underlain by gravel. The surface soil is usually about 16 inches thick but can be as much as 30 inches thick. The gravel content of the subsoil may range from 20 to 80 percent (by volume). The surface of the Burbank loamy sand is Group SM (silty sand) and the subsoil is Group GM (silty gravel) to GP (poorly-graded gravel). Group GM (silty gravel) are coarse-grained soils composed predominantly of gravels with more than 12 percent fines. Group GP (poorly-graded gravel) contains coarse-grained soils that are predominantly well-sorted gravels with less than 5 percent fines.

The Quincy sand (Rupert sand) represents one of the most extensive soils at the Hanford Site. The soil is a brown to grayish brown, moderately deep, coarse sand. Quincy soils were developed under grass and sagebrush in coarse alluvial deposits mantled by wind-blown sand. Relief characteristically consists of hummocky terraces and dune-like ridges. The surface and subsoil of the Quincy sand (Rupert sand) were assigned to Group SM (silty sand), which consists of coarse-grained soils composed predominantly of sands with more than 12 percent fines.

The Ephrata sandy loam, occurring to an average depth of 12 inches, is a dark grayish brown, medium-textured soil underlain by deep gravely material. The topography is generally level. The surface of the Ephrata sandy loam belongs to Group SM (silty sand) to ML (silt), and the subsurface belongs to Group ML (silt). Group ML (silt) is fine-grained soils composed of silts and clays with little or no plasticity.

SECTION H, ITEM 6

DESCRIBE THE REGIONAL GEOLOGY AND HYDROGEOLOGY WITHIN ONE MILE OF THE SITE.

REGIONAL GEOLOGY

A summary of the regional geologic characteristics of the Pasco Basin and the Hanford Site is presented below in terms of stratigraphy and structure. WHC (1992a), (1991a), and (1991c) may be consulted for additional detail. See Figure H-3 for a map depicting the surficial geology of the Hanford Site. Figure H-4 is a legend explaining Figure H-3.

REGIONAL STRATIGRAPHY

The Hanford Site lies within the Pasco Basin, a regional structural and topographic, sediment-filled depression. The sediments of the Pasco Basin are underlain by Miocene-age basalt of the Columbia River Basalt Group, a thick sequence of flood basalts that covers a large area in eastern Washington, western Idaho and northeastern Oregon. The sediments overlying the basalts, from oldest to youngest, include: the Miocene-Pliocene Ringold Formation, local alluvial deposits of possible late Pliocene or early Pleistocene age, local "Palouse" soil of mostly eolian origin, glaciofluvial deposits of the Pleistocene Hanford formation, and surficial Holocene eolian and fluvial sediments. The generalized stratigraphy of the Hanford Site is described in the following paragraphs from the oldest to youngest formation. The regional stratigraphy is depicted on Figure H-5.

Columbia River Basalt Group and the Ellensburg Formation

The Columbia River Basalt Group consists of an assemblage of tholeiitic, continental flood basalts of Miocene Age with an accumulated thickness in excess of 10,000 feet within the Pasco Basin. These flows cover an area of more than 63,000 square miles in Washington, Oregon, and Idaho and have an estimated volume of about 40,800 cubic miles. The majority of the flows were erupted 14.5 to 17 million years ago (WHC 1991c).

The Columbia River Basalt Group is formally divided into the following five formations (from oldest to youngest): Imnaha Basalt, Picture Gorge Basalt, Grande Ronde Basalt, Wanapum Basalt, and Saddle Mountains Basalt. Of these, all are present within the Pasco Basin except for the Picture Gorge Basalt. The Saddle Mountains Basalt, divided into the Ice Harbor, Elephant Mountain, Pomona, Esquatzel, Asotin, Wilbur Creek, and Umatilla Members, forms the uppermost basalt unit throughout most of the Pasco Basin. The Elephant Mountain Member is the uppermost unit beneath most of the Hanford Site, except near the 300 Area where the Ice Harbor Member is found and north of the 200 Areas where the Saddle Mountains Basalt has been eroded down to the Umatilla Member in the Gable Gap area (WHC 1991c). The Elephant Mountain Member has also been locally eroded in the vicinity of the northeast corner of the 200 East Area (WHC 1991c). On anticlinal ridges bounding the Pasco Basin, erosion has removed the Saddle Mountains Basalt, exposing the Wanapum and Grande Ronde basalts (WHC 1991c).

The Ellensburg Formation consists of all sedimentary units that occur between the basalt flows of the Columbia River Basalt Group in the central Columbia Basin (Reidel and Fecht 1981). The Ellensburg Formation generally consists of two main lithologies: volcaniclastics and siliciclastics. The volcaniclastics consist mainly of primary pyroclastic air fall deposits and reworked epiclastics derived from volcanic terrains west of the

Columbia Plateau. Siliciclastic strata consist of clastic, plutonic, and metamorphic detritus derived from the Rocky Mountain terrains located to the east.

On the Hanford Site, the three uppermost units of the Ellensburg Formation are the Levy interbed, the Rattlesnake Ridge interbed, and the Selah interbed. The Levy interbed is confined to the vicinity of the 300 Area. The Rattlesnake Ridge and Selah interbeds are found beneath most of the Hanford Site (WHC 1992a).

Suprabasalt Sediments

The suprabasalt sedimentary sequence at the Hanford Site is up to approximately 750 feet thick in the west-central Cold Creek syncline, while it pinches out against the anticlinal ridges that bound or are present within the Pasco Basin (WHC 1991b). The suprabasalt sediments are dominated by laterally extensive deposits of the late Miocene to Pliocene-age Ringold Formation and the Pleistocene-age Hanford formation. Locally occurring strata separating the Ringold and Hanford formations are assigned to the informally defined Plio-Pleistocene unit, early "Palouse" soil, and pre-Missoula gravels, which comprise the remainder of the sequence (DOE-RL 1993b).

Ringold Formation. Overlying the Columbia River Basalt Group is the late Miocene to Pliocene-age Ringold Formation (Fecht et al. 1987, DOE 1988). The Ringold Formation accumulated to a thickness of up to 1,200 feet in the Pasco Basin (Tallman et al. 1979). On the Hanford Site, the Ringold Formation is up to 600 feet thick in the deepest part of the Cold Creek syncline south of the 200 West Area and 560 feet thick in the western Wahluke syncline near the 100-B Area (WHC 1991c). The Ringold Formation pinches out against the anticlinal flanks that bound or are present within the Pasco Basin, and is largely absent in the northern and northeastern parts of the 200 East Area and adjacent areas to the north (WHC 1991c, WHC 1992a). The recent studies of the Ringold Formation (WHC 1991d) indicate it is best described on the basis of sediment facies associations and their distribution. The facies associations have been divided into fluvial gravel, fluvial sand, overbank deposits, lacustrine deposits, and alluvial fans. The lower Ringold contains five separate stratigraphic intervals dominated by fluvial gravels, which have been designated units A, B, C, D, and E, from oldest to youngest. These gravel units are separated by basin-wide overbank and lacustrine deposits (WHC 1992a).

Post-Ringold Pre-Hanford Sediments. Thin alluvial deposits situated stratigraphically between the Ringold Formation and Hanford formation are found within the Pasco Basin. The three informally defined units include: the Plio-Pleistocene unit, the early "Palouse" soil, and the Pre-Missoula gravels. The Plio-Pleistocene unit and early "Palouse" soil are not found in or near the 200 East Area. They are found to the west of the site area near the eastern boundary of the 200 West Area. The pre-Missoula gravels are not found in the site area. The Plio-Pleistocene unit and early

"Palouse" soil are described in detail in PNL (1989) and WHC (1991a). The pre-Missoula gravels are discussed in PSPL (1982) and Fecht et al. (1987).

Hanford formation. The informally designated Hanford formation consists of unconsolidated, glaciofluvial sediments that were deposited during several episodes of cataclysmic flooding during the Pleistocene Epoch. The sediments are composed of pebble-to boulder-size gravel, fine- to coarse-grained sand, and silt. These sediments are divided into three facies: gravel dominated, sand-dominated, and silt-dominated (WHC 1992a). These facies are referred to as coarse-grained deposits, plane-laminated sand facies, and rhythmite facies, respectively (Baker et al. 1991). The silt-dominated deposits are also referred to as "Touchet" Beds, and the gravel-dominated facies generally correspond to the Pasco gravels.

The Hanford formation is thickest in the vicinity of the 200 Areas where it is up to 350 feet thick (WHC 1992a). The formation was deposited by cataclysmic flood waters that originated from glacial lake Missoula (Fecht et al. 1987, DOE 1988, Baker et al. 1991). The deposits are absent from ridges above approximately 1,180 feet above mean sea level, the highest level of cataclysmic flooding in the Pasco Basin (WHC 1991c).

Holocene Surficial Deposits. Holocene surficial deposits consist of silt, sand, and gravel that form a $<$16-feet veneer across much of the Hanford Site. These sediments were deposited by eolian and alluvial processes (WHC 1991c).

REGIONAL GEOLOGIC STRUCTURE

The Hanford Site is located within the Pasco Basin near the eastern edge of the Yakima Fold Belt. The Yakima Fold Belt consists of a series of segmented, narrow, asymmetric, east-west trending anticlines separated by broad synclines or basins that, in many cases, contain thick accumulations of Neogene- to Quaternary-aged sediments (DOE 1988, Smith et al. 1989). The Pasco Basin is one of the larger structural basins of the fold belt.

The northern limbs of the anticlines of the Yakima Fold Belt generally dip steeply to the north or are vertical. The southern limbs generally dip at relatively shallow angles to the south. Thrust or high-angle reverse faults with fault planes that strike parallel or subparallel to the axial trends are principally found on the north sides of the anticlines. The amount of vertical stratigraphic offset associated with these faults varies (WHC 1991c).

Deformation of the Yakima Folds occurred under north-south compression and was contemporaneous with the eruption of the basalt flows. The fold belt was enlarging during the eruption of the Columbia River Basalt Group and continued to enlarge through the Pliocene, into the Pleistocene, and perhaps to the present (WHC 1991c).

The Pasco Basin is a structural depression bounded on the north by the Saddle Mountain anticline; on the west by the Umtanum Ridge, Yakima Ridge, and Rattlesnake Hills anticlines; and on the south by the Rattlesnake Mountain anticline. The Palouse slope, a west-dipping monocline, bounds the Pasco Basin on the east. The Pasco Basin is divided into the Wahluke and Cold Creek synclines by the Gable Mountain anticline, the eastern extension of the Umtanum Ridge anticline.

The Cold Creek syncline lies between the Umtanum Ridge-Gable Mountain uplift and the Yakima Ridge uplift, and is an asymmetric and relatively flat-bottomed structure. The bedrock of the northern limb dips gently to the south, and the southern limb dips steeply to the north. The deepest parts of the Cold Creek syncline, the Wye Barricade depression and the Cold Creek depression, are located approximately 7.5 mile southeast of the 200 Areas and just west-southwest of the 200 West Area, respectively (Tallman et al. 1979).

LOCAL GEOLOGY

The depth to the top to the Elephant Mountain Member basalt in the 200 East Area ranges from approximately 280 feet in the northern part to approximately 520 feet in the southern part. Overlying the basalt are the suprabasalt sediments of the Ringold Formation, Hanford formation, and Holocene surfical deposits. The Plio-Pleistocene unit, early "Palouse" soil, and the Pre-Missoula gravels are absent in the 200 East Area (WHC 1992a). The following discussion of the local geology focuses on the suprabasalt sediments within the 200 East Area. A map depicting the geology within one mile of the 200-E Powerhouse Ash Pit is provided as Figure H-6. A local cross-section has also been included for more detailed information. The line of cross-section is shown on Figure H-7 and the cross section is provided on Figure H-8.

Ringold Formation

The Ringold Formation unconformably overlies the Elephant Mountain Member basalt in the southern two thirds of 200 East, but is absent in the northern part of 200 East. The Ringold Formation thickens and dips to the south, southeast, and southwest towards the axis of the Cold Creek syncline (WHC 1992a). Unit A, the lower mud sequence, and Unit E are the only Ringold Formation units present in the 200 Areas.

The lowest unit of the Ringold Formation is fluvial gravel unit A. Unit A thickens and dips towards the south in the direction of the Cold Creek syncline. The thickness of unit A within 200 East ranges from 0 feet in the northern part to approximately 100 feet near the southern boundary. Unit A is generally described as a clast-supported granule to cobble gravel with a sandy matrix. Clast composition is variable with basalt, quartzite, porphyritic volcanics, and greenstone being the most common. Clasts of silicic plutonic rocks, gneisses, and volcanic breccias can also be found. Associated sands are generally quartzo-feldspathic with basalt content ranging from 5 percent to 25 percent (WHC 1992a).

The lower mud sequence overlies unit A and also dips and thickens towards the south. The thickness of the lower mud sequence ranges from 0 feet in the northern part to approximately 50 feet near the southern boundary of 200 East. The lower mud sequence is composed of overbank and lacustrine deposits. The overbank deposits consist of laminated to massive silt, silty fine-grained sand, and paleosols containing variable amounts of pedogenic calcium carbonate. Plane laminated to massive clay with thin silt and sand interbeds characterize the lacustrine deposits. The lacustrine deposits contain some soft-sediment deformation (WHC 1992a).

Unit E locally overlies the lower mud sequence in the southwest corner of 200 East and in the vicinity of the Grout Treatment Facility. The unit appears to be absent from the northern and central parts of 200 East. The unit thickens toward the separations area between 200 East and 200 West. The thickness of unit E ranges from 0 feet in the northern and central parts of 200 East to approximately 90 feet southwest of 200 East. Unit E is a clast-supported granule to cobble gravel, similar to unit A. Locally, strata typical of the fluvial sand and overbank facies associations may be encountered within unit E (WHC 1992a).

Hanford Formation

In 200 East, the Hanford formation consists predominately of gravel-dominated and sand-dominated facies. Informally, the Hanford formation can be divided into the upper gravel sequence, middle sand sequence, and lower gravel sequence (WHC 1992a). Because of the variability of Hanford formation sediments, contacts between these sediments can be difficult to distinguish, especially where the sandy sequence is missing and the upper gravel directly overlies the lower gravel. In the 200 East Area, the Hanford formation overlies the Ringold Formation in the southern two-thirds of the area and in the northern part, the Hanford formation directly overlies the Elephant Mountain Member basalt where the Ringold Formation is absent.

The lower gravel sequence consists of coarse-grained basaltic sand and granule to boulder gravel. Other clast types include Ringold and Plio-Pleistocene rip-ups, granite, quartzite and gneiss (WHC 1992b). Discontinuous intervals dominated by the sand-dominated facies and localized horizons of silt-dominated deposits are also present within the lower gravel sequence. The lower gravel sequence ranges in thickness from approximately 0 to 134 feet. The lower gravel sequence is absent in the east central part of 200 East (WHC 1992a).

The middle sand sequence overlies the lower gravel sequence and is dominated by deposits of the sand-dominated facies, consisting of fine- to coarse-grained sand and granule gravel displaying plane lamination and bedding. Intercalated horizons typical of both the gravel-dominated and silt-dominated sequences also occur within the middle sand sequence, with the gravel sequence more abundant in the northern part and the silt sequence more abundant in the southern part of 200 East. The middle sand sequence in 200 East ranges in thickness from 0 to 275 feet. The middle sand unit thins and pinches out to the north, east, and west of 200 East (WHC 1992a).

The upper gravel sequence overlies the middle sand sequence in the southern part of 200 East and the lower gravel unit in the northern part of the 200 East. Deposits comprising the upper gravel sequence are typical of the gravel-dominated facies. Lenticular horizons of sand-dominated and silt-dominated facies are encountered locally in the upper gravel sequence. The thickness of the upper gravel sequence ranges from 0 to 60 feet. The upper gravel sequence thickens to the north and is absent in the central part of 200 East.

Holocene Surficial Deposits

Holocene surficial deposits consist of silt, very fine- to medium-grained sand and gravel that form a <36-feet veneer across much of the Hanford Site. These sediments were deposited by a combination of eolian and alluvial processes that have produced sheet sands that blanket the surface. Locally, most of the surfical deposits have been removed by construction activities (WHC 1992a).

REGIONAL HYDROGEOLOGY

The hydrogeology of the Pasco Basin has been broadly characterized as consisting of four primary hydrogeologic units (DOE 1988). These units correspond to the upper three formations of the Columbia River Basalt Group (Grande Ronde Basalt, Wanapum Basalt, and Saddle Mountains Basalt) and the suprabasalt sediments. The basalt aquifers consist of the flood basalts of the Columbia River Basalt Group and relatively minor amounts of intercalated fluvial and volcaniclastic sediments of the Ellensburg Formation. Confined zones in the basalt aquifers are present in the sedimentary interbeds and/or interflow zones that occur between dense basalt flows. The main water-bearing portions of the interflow zones are networks of interconnecting vesicles and fractures of the basalt flow tops and bottoms (DOE 1988).

The uppermost aquifer is part of a flow system that is local to the Pasco Basin, as are the uppermost basalt interbed aquifers (Gephart et al. 1979, DOE 1988). The uppermost aquifer system is regionally unconfined and occurs within the glaciofluvial sands and gravels of the Hanford formation and the fluvial/lacustrine sediments of the Ringold Formation. Confined to semi-confined aquifers of more limited extent also occur in the suprabasalt sediments of the Pasco Basin. These confined zones are generally located within the local flow system, between the unconfined aquifer and the underlying basalt surface. Groundwater in these aquifer systems is most likely recharged and discharged locally. Deeper in the basalt, interbed aquifer systems are part of the regional, or interbasin, flow system, which extends outside the margins of the Pasco Basin (DOE 1988). A water table map of the Hanford Site is provided as Figure H-9.

LOCAL HYDROGEOLOGY

The primary hydrostratigraphic units in the 200 East Area are the confined aquifer system of the Saddle Mountain Basalt Formation and Ellensburg Formation, and the unconfined to confined aquifer system of the Ringold Formation and the Hanford formation. The following discussion focuses on the hydrogeology of the suprabasalt sediments.

In the vicinity of the 200 East Area, the vadose zone is primarily composed of the Ringold gravel unit A through the central and southern portions of the area and the Ringold lower mud sequence to the east near the 216-B-3 Pond. In the northern part of the 200 East Area where the Ringold Formation is discontinuous, the vadose zone is dominantly composed of the Hanford formation (DOE-RL 1993a). The vadose zone ranges from about 317 feet thick near the southwestern part of 200 East to 123 feet thick in the vicinity of the 216-B-3 Pond (DOE-RL 1993a).

The uppermost aquifer system comprises the unconfined aquifer, but also includes localized semiconfined and confined areas The hydrostratigraphy of the unconfined aquifer in the 200 East Area is relatively complex because of depositional and erosional history of the geologic units (DOE-RL 1993a). The unconfined aquifer in the 200 East Area occurs within the Ringold Formation and Hanford formation. The base of the unconfined aquifer is the top of the lower mud sequence along the southern and eastern areas of the 200 East Area. Along the northern parts of 200 East, the base of the unconfined aquifer is the top of the Elephant Mountain Member basalt. The thickness of the unconfined aquifer varies from zero in the northeastern corner where basalt extends above the water table to more than 262 feet to the south (DOE-RL 1993a).

The 200 East Area water table is relatively flat and gradients are difficult to discern. Flow directions from the 200 East Area are the result of hydraulic effects of the B-Pond System groundwater mound situated on the east side of the 200 East Area. The B-Pond mound deflects eastward groundwater flow across the Hanford Site. Other miscellaneous waste stream discharges in the 200 East Area may have minor localized effects on groundwater flow patterns Contaminant plume geometries provide some indication of flow directions where gradients are relatively flat. For the unconfined aquifer, groundwater flow away from the 200-East Area is bifurcated northward through the gap between Gable Mountain and Gable Butte; or to the east southeast across the site and ultimately to the Columbia River.

A semiconfined to confined aquifer is observed in the vicinity of the 216-B-3 Pond where the groundwater occurs in the Ringold unit A gravels and is confined by the lower mud sequence. This aquifer appears to exist only near the 216-B-3 Pond system (DOE-RL 1993a).

SECTION H, ITEM 7

LIST THE NAMES AND ADDRESSES OF CONTRACTORS OR CONSULTANTS WHO PROVIDED INFORMATION AND CITE SOURCES OF INFORMATION BY TITLE AND AUTHOR.

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

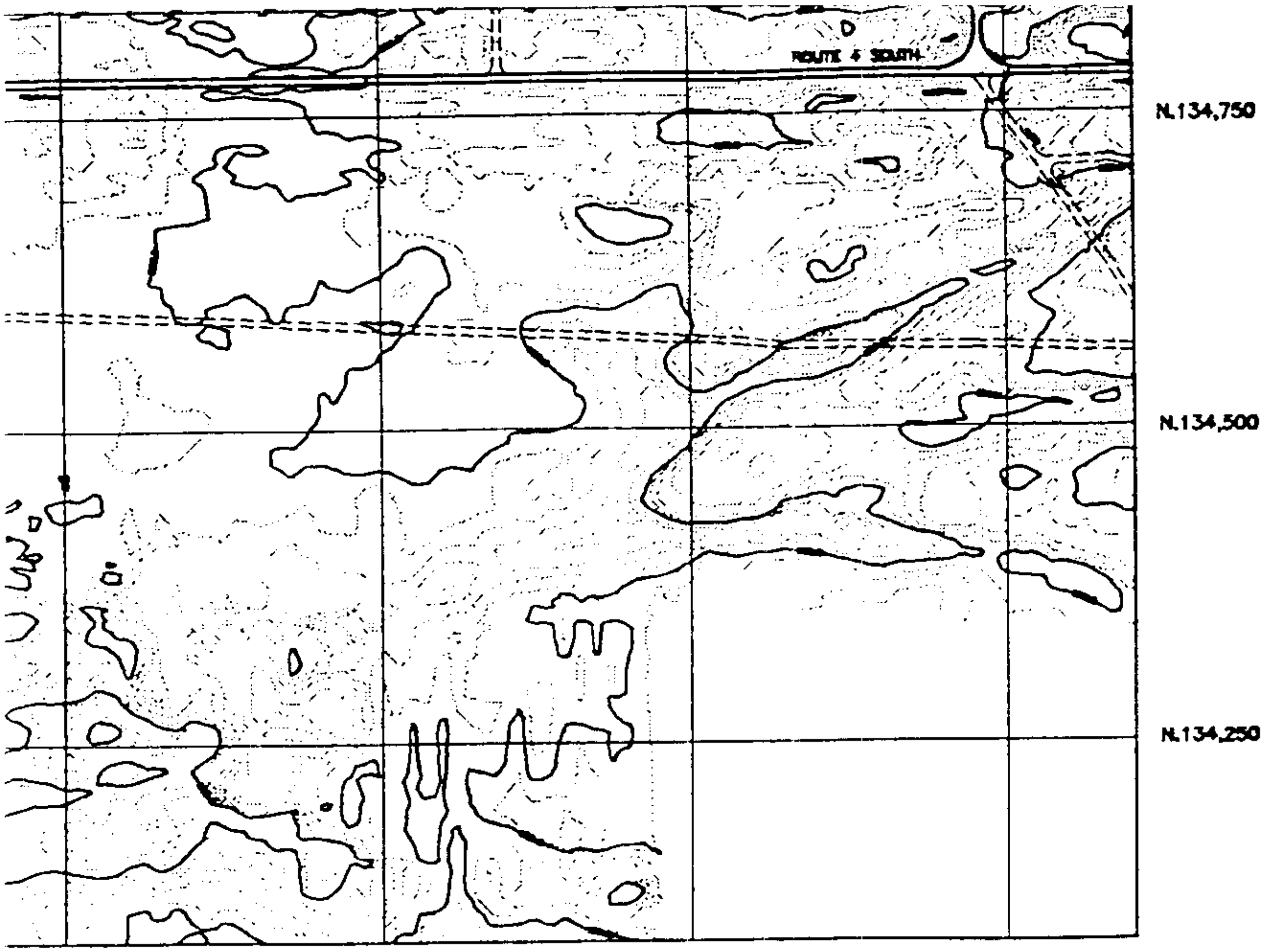
Kaiser Engineers Hanford
P.O. Box 888
Richland, WA 99352

Science Applications International Corp.
1845 Terminal Drive
Richland, WA 99352

Golder Associates Inc.
1933 Jadwin Avenue, Suite 125
Richland, WA 99352

Enserch Environmental Corp.
1201 Jadwin Avenue, Suite 202
Richland, WA 99352

References: Sources of information used for Section H are included in REFERENCES.



DWG NO H-13-000085 SH 1 OF 1 REV 0

E

1994

THIS MAP IS TO BE USED FOR REFERENCE PURPOSES ONLY.
DO NOT USE THIS MAP FOR CONSTRUCTION PURPOSES.

AWN RAFAEL TORRES	DATE 3-12-94	U.S. DEPARTMENT OF ENERGY DOE Field Office, Richland Westinghouse Hanford Company
ECKED (signature)	5-10-94	M
TG APVD (signature)	5-10-94	
G ENGR B.P. Atencio	5-10-94	
VD (signature)	5-10-94	
VD		
VD		
VD		
VD		
VD		

200-E POWERHOUSE ASH PIT

SIZE	BLDG NO	INDEX NO	DWG NO	REV
F	284-E	0110	H-13-000085	0

SCALE SHOWN EDT 604307 SHEET 1 OF 1

A

2 CHK PRINT ☐ DATE COMMENT PRINT ☐ DATE 1

THIS PAGE INTENTIONALLY
LEFT BLANK

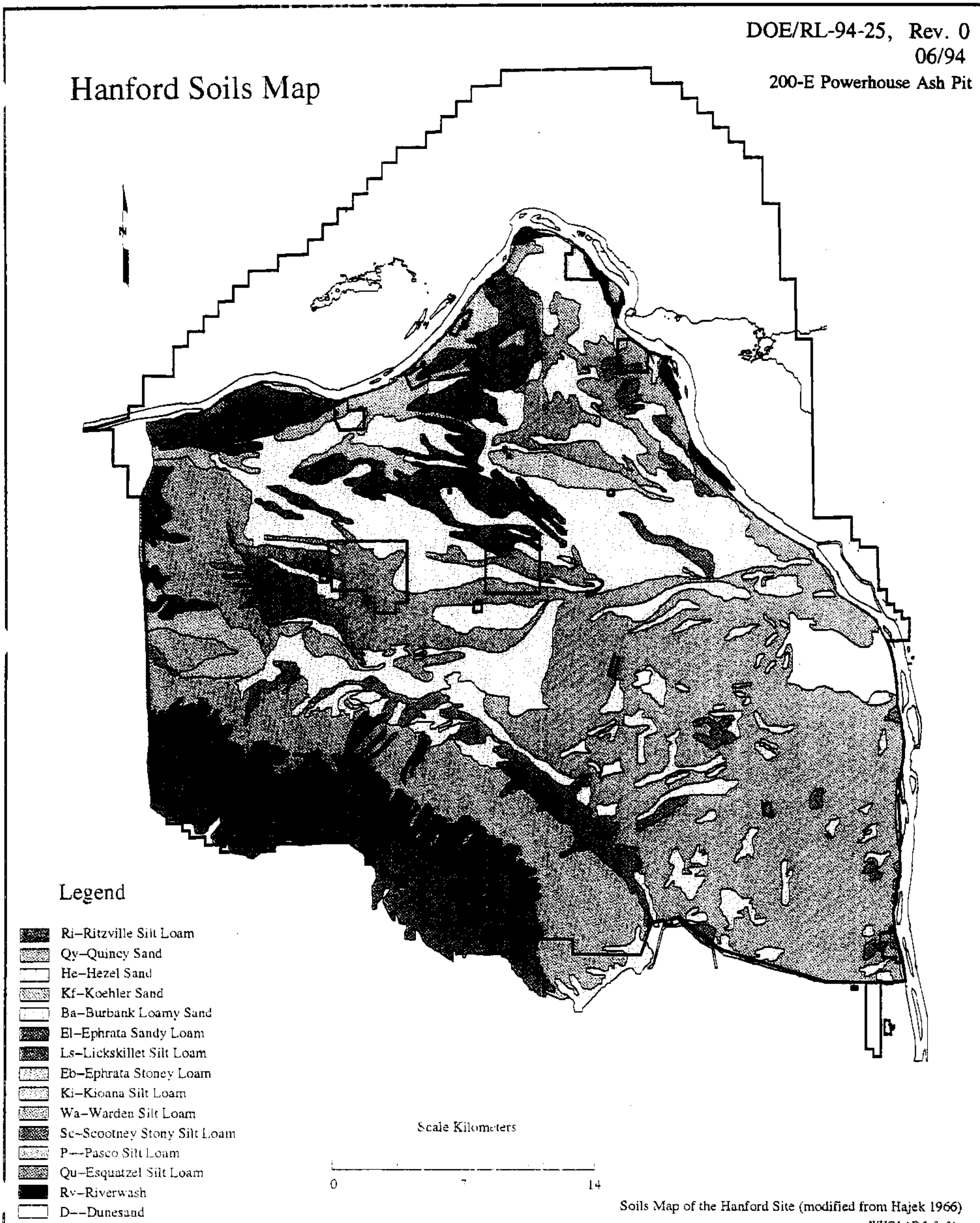


Figure H-1. Hanford Soils Map.

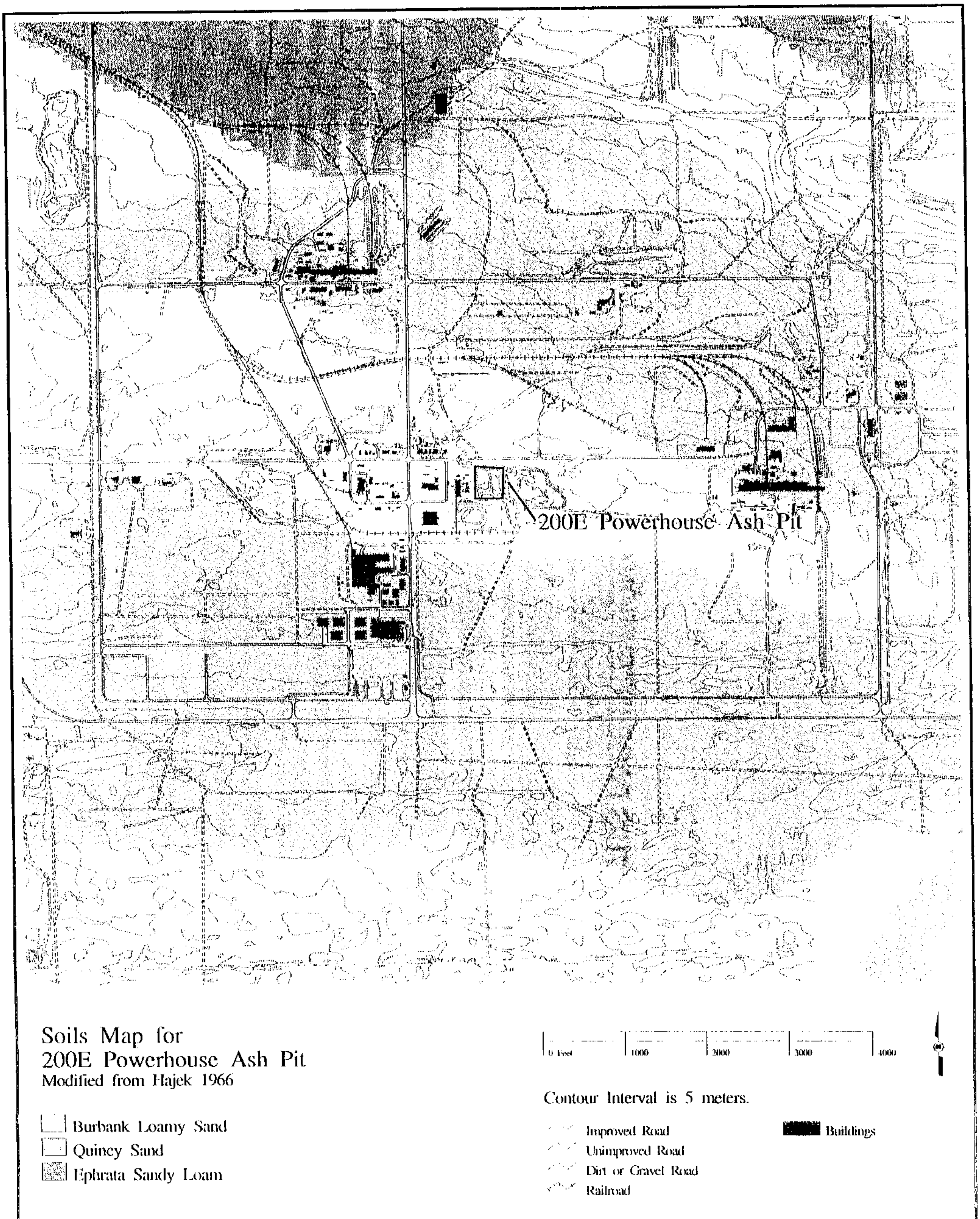


Figure H-2. Soils Map for 200-E Powerhouse Ash Pit.

THIS PAGE INTENTIONALLY
LEFT BLANK

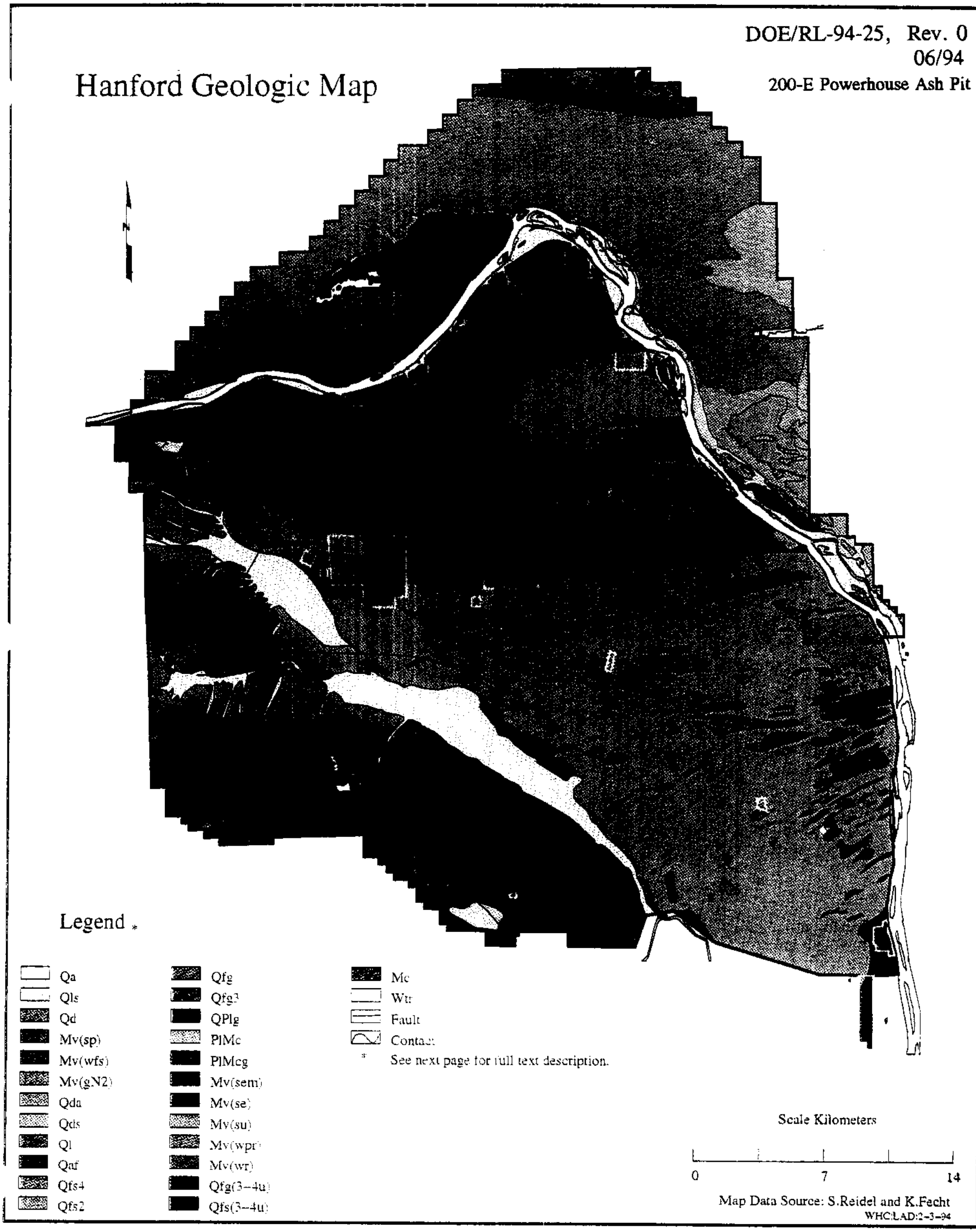


Figure H-3. Hanford Geologic Map.

Legend

- Qa–Alluvium (Holo.–Pleis.)
- Qls–Mass–wasting deposits (Holo.–Pleis.)
- Qd–Dune sand (Holocene)
- Mv(sp)–Saddle Mt Basalt, Pomona Mbr (M. Mio.)
- Mv(wfs)–Wanapum Basalt, Frenchman Spr. Mbr (M. Mio.)
- Mv(gN2)–Grande Ronde Basalt, U. flow–normal pol. (M. Mio.)
- Qda–Dune sand, active (Holocene)
- Qds–Dune sand, stabilized (Holocene)
- Ql–Loess (Holocene to Pleistocene)
- Qaf–Alluvial fans (Holo.–Pleis.)
- Qfs4–Outburst flood dep.(Pleis.), silt & sand, youngest
- Qfs2–Outburst flood dep.(Pleis.), silt & sand, 2nd oldest
- Qfg–Outburst flood dep.(Pleis.), gravels, undiv.
- Qfg3–Outburst flood dep.(Pleis.), gravels, 2nd youngest
- QPlg–Gravel (Pleistocene to Pliocene)
- PlMc–Ringold Fm., Continental sed. (Plio.–Mio.)
- PlMcg–Ringold Fm., Conglomerate (Plio.–Mio.)
- Mv(sem)–Saddle Mt Basalt, Elephant Mt Mbr (U. Mio.)
- Mv(se)–Saddle Mt Basalt, Esquatzel Mbr (M. Mio.)
- Mv(su)–Saddle Mt Basalt, Umatilla Mbr (M. Mio.)
- Mv(wpr)–Wanapum Basalt, Priest Rapids Mbr (M. Mio.)
- Mv(wr)–Wanapum Basalt, Roza Mbr (M. Mio)
- Qfg(3–4u)–Outburst flood dep., gravels, undif.
- Qfs(3–4u)–Outburst flood dep., sands, undif.
- Mc–Cont. sed. dep.–interbeds in Columbia R. Basalt
- WTR–Water
- FAULT–Fault
- CONTACT–Contact between geologic units

Map source data: S.Reidel and K.Fecht
Map source data date: January 1994
Map source data scale: 1:100,000

WHC:LAD:3-22-94

Figure H-4. Legend for Hanford Geologic Map.

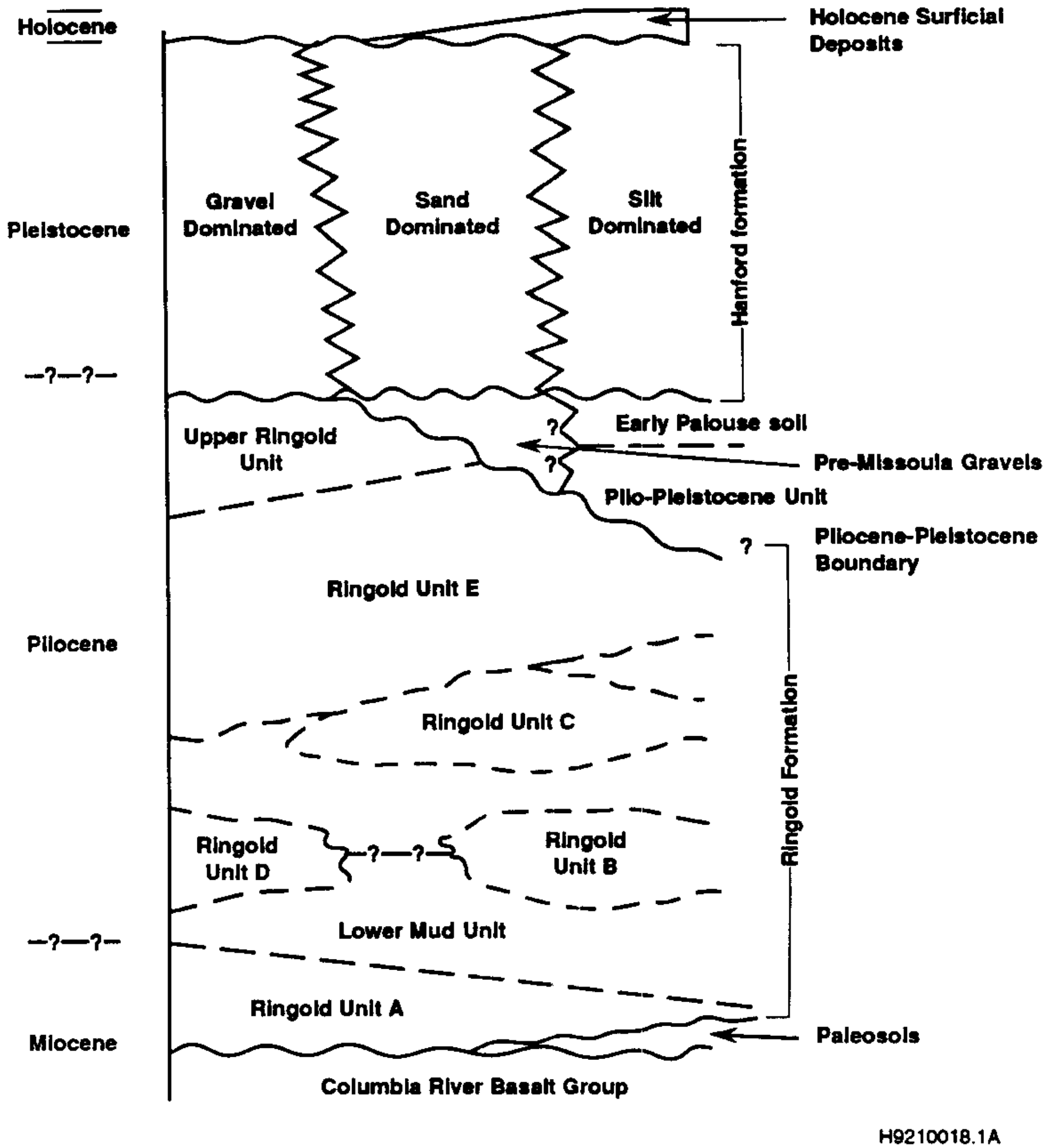


Figure H-5. Regional Stratigraphic Column.

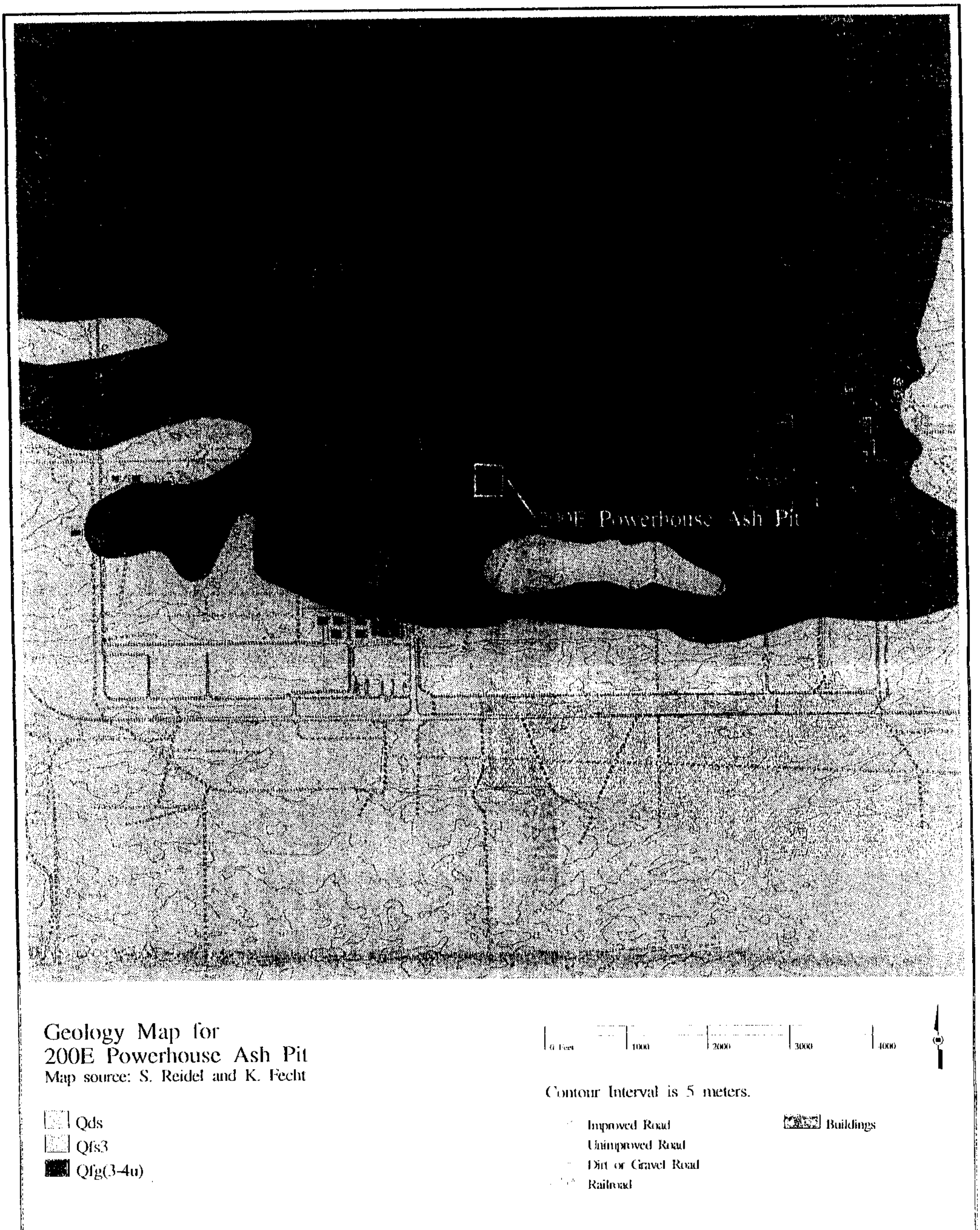


Figure H-6. Geology Map for 200-E Powerhouse Ash Pit.

THIS PAGE INTENTIONALLY
LEFT BLANK

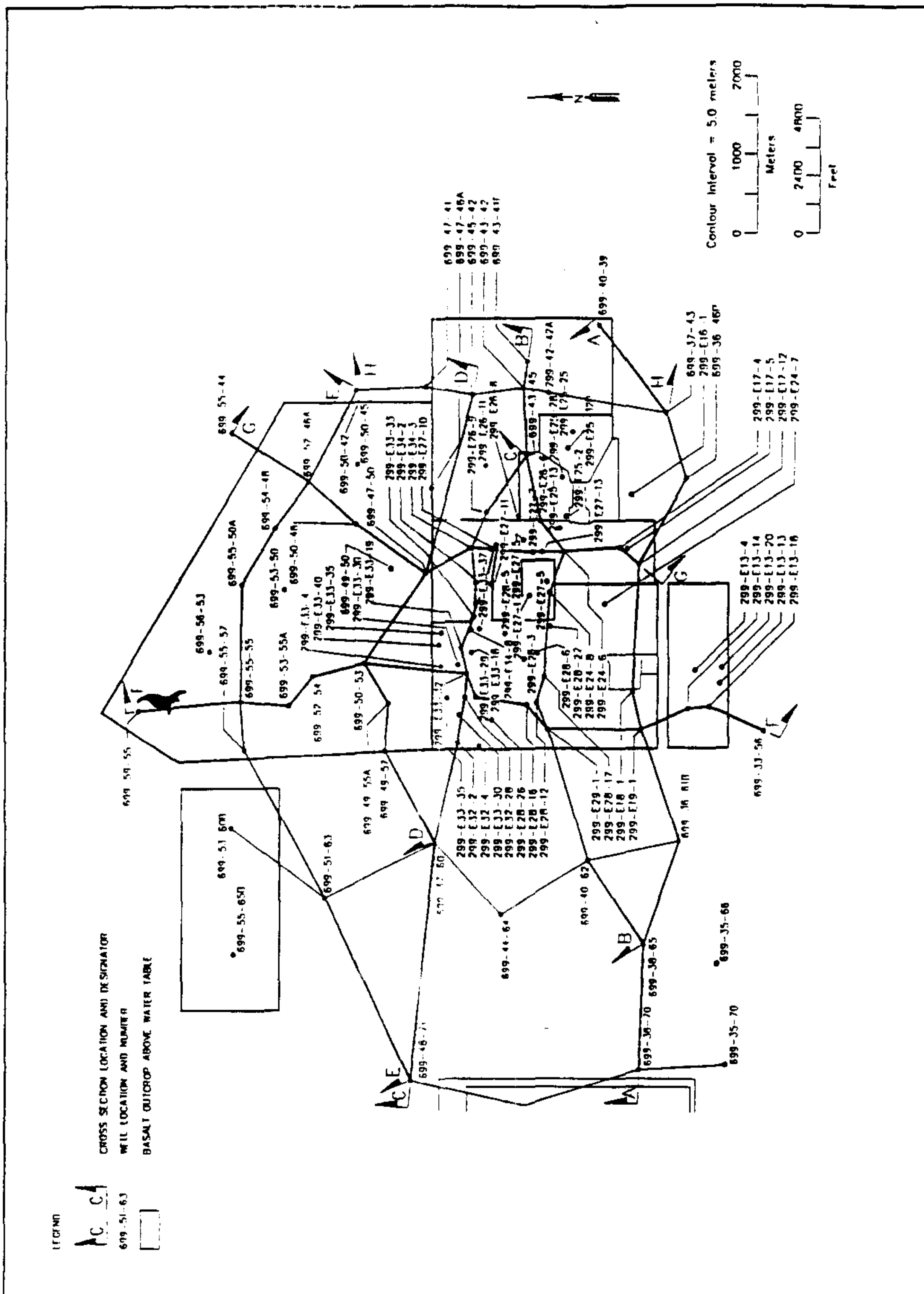


Figure H-7. Line of Cross-Section for the 200-E Area.

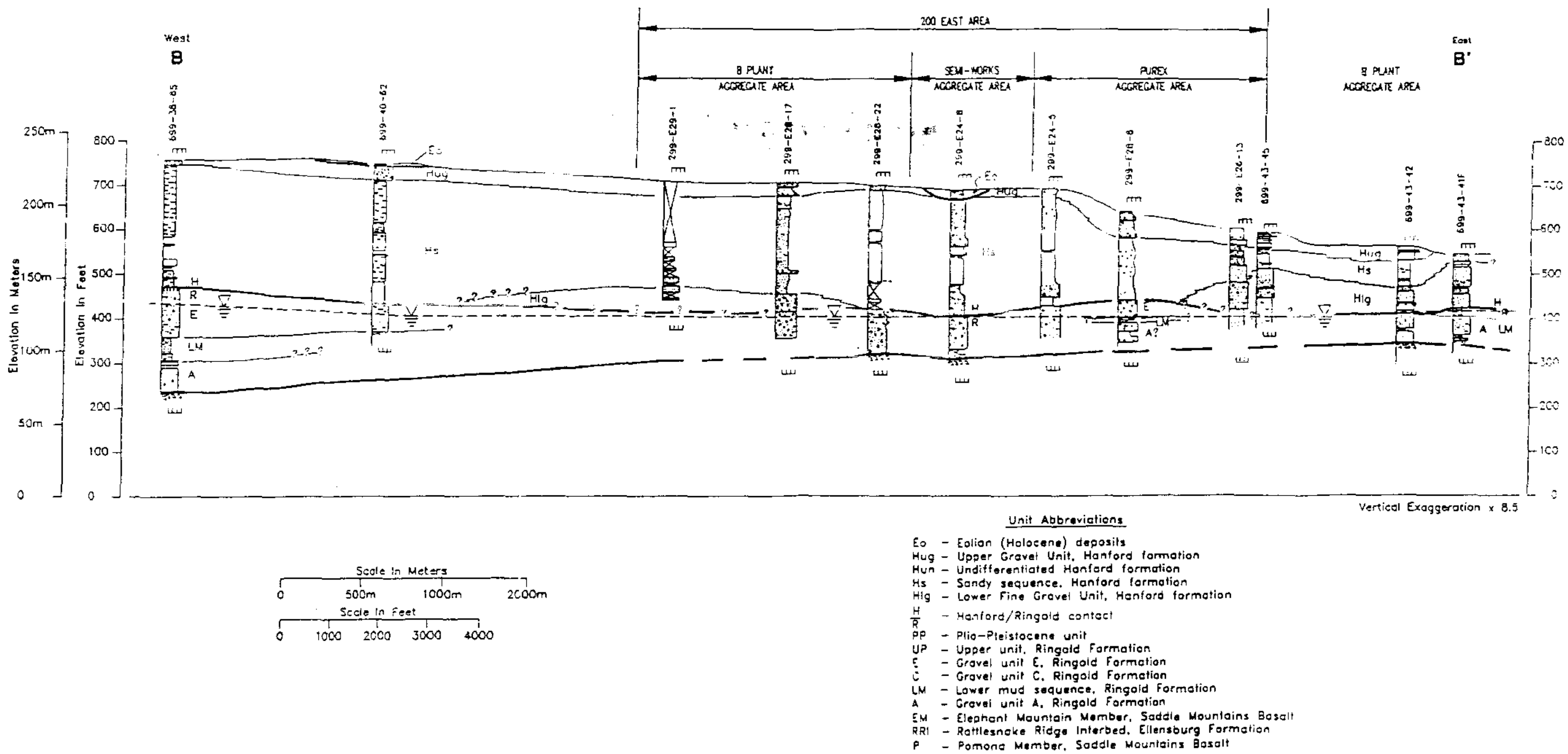


Figure H-8. Cross-Section for the 200-E Area.

THIS PAGE INTENTIONALLY
LEFT BLANK

Hanford Water Table Map

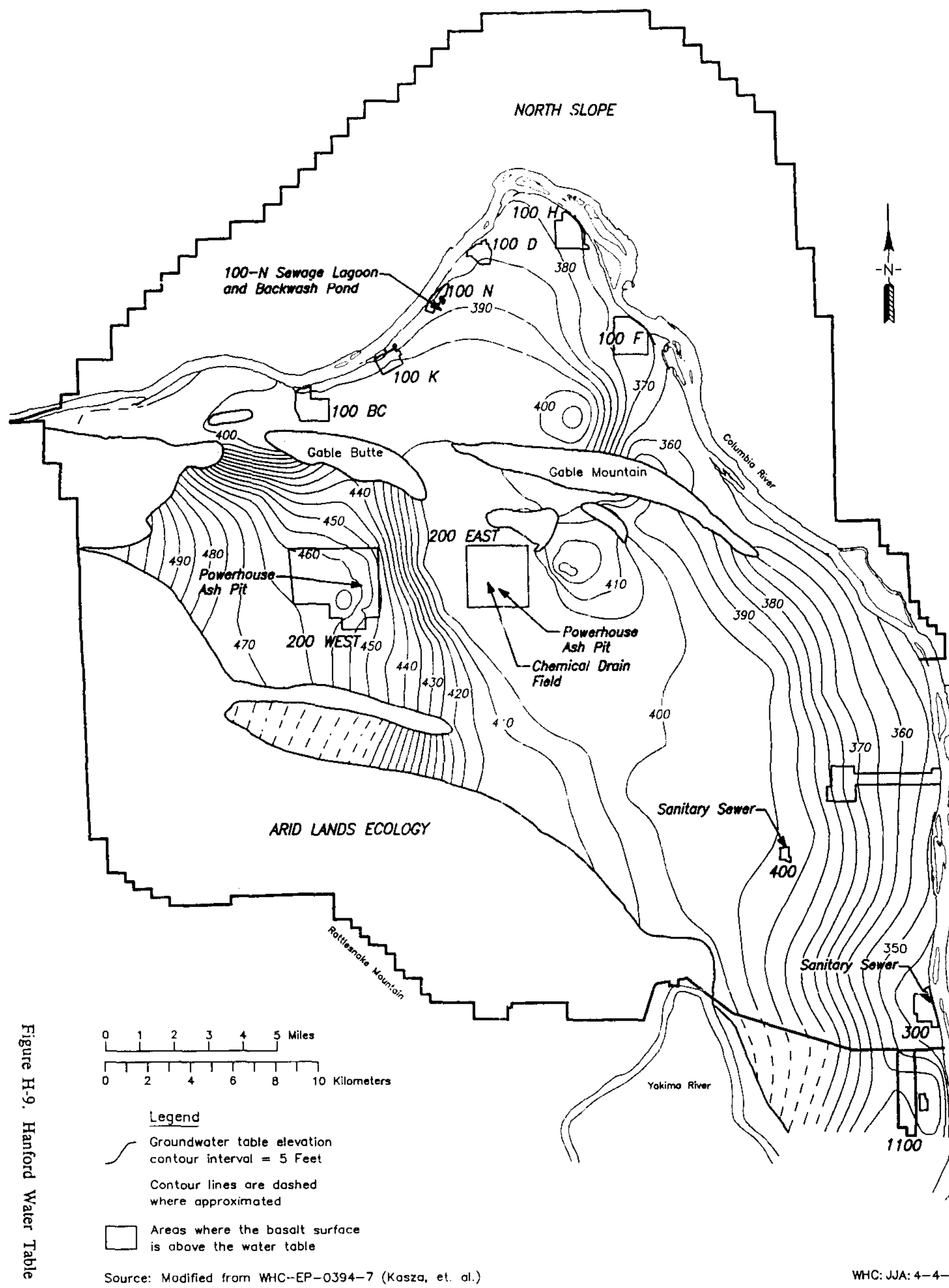


Figure H-9. Hanford Water Table Map.

THIS PAGE INTENTIONALLY
LEFT BLANK