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Department of Energy

Richland Operations Office
P.O. Box 550
Richland, Washington 99352
JUN 23 1994

94-RPS-236

Mr. David C. Nylander
Nuclear Waste Program
State of Washington
Department of Ecology
P.O. Box 1386, MSIN 91-05
Richland, Washington 99352-0539

Dear Mr. Nylander:

STATE WASTE DISCHARGE PERMIT APPLICATIONS FOR THE TABLE 4 MISCELLANEOUS STREAMS

Transmitted herein are the State Waste Discharge Permit (SWDP) Applications for the "Miscellaneous Streams." The Miscellaneous Streams are identified on Table 4 of Ecology Consent Order DE 91NM-177 (216 Consent Order). The permit applications include the following:

- State Waste Discharge Permit Application - 100-N Sewage Lagoon (DOE/RL-94-22)
- State Waste Discharge Permit Application - 183-N Backwash Discharge Pond (DOE/RL-94-23)
- State Waste Discharge Permit Application - 200-E Chemical Drain Field (DOE/RL-94-24)
- State Waste Discharge Permit Application - 200-E Powerhouse Ash Pit (DOE/RL-94-25)
- State Waste Discharge Permit Application - 200-W Powerhouse Ash Pit (DOE/RL-94-26)
- State Waste Discharge Permit Application - 400 Area Septic System (DOE/RL-94-28).

Section 6, Table 4 of the 216 Consent Order identifies eleven miscellaneous streams which require the submittal of Washington Administrative Code (WAC) 173-216 SWDP Applications by June 30, 1994. Of the eleven streams identified, the five following streams do not require permitting under WAC 173-216:

- 300 Area Powerhouse Ash Waste Water (will be permitted under a National Pollutant Discharge Elimination System [NPDES] permit)
- 300 Area Filter Backwash streams (will be permitted under a NPDES permit)

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JUN 23 1994

Mr. D. C. Nylander
94-RPS-236

- 2 -

- 234-5Z Ventilation Steam Condensate/Dry Air Compressor Cooling Water (will be rerouted to and permitted under the 200 Areas Treated Effluent Disposal Facility)
- 209-E Building Steam Condensate (has been eliminated)
- 300 Area Sanitary Sewer (will be rerouted to the City of Richland Publicly Owned Treatment Works before June 1995).

The enclosed WAC 173-216 permit applications were prepared for the remaining six streams, and thus fulfill the requirements of the 216 Consent Order.

State Environmental Policy Act (SEPA) environmental checklists were not prepared for the "Miscellaneous Streams" listed on Table 4 of the 216 Consent Order. The SEPA regulations [WAC 197-11-855(1)] exempt the existing streams from the SEPA process.

Should you have any questions or require any additional information regarding these permit applications, please contact Mr. J. E. Rasmussen on (509) 376-2247.

Sincerely,

Steven H. Wisness, Acting Program Manager
Office of Environmental Assurance,
Permits, and Policy

EAP:JET

Enclosures

cc w/o encl:
Administrative Records
B. P. Atencio, WHC
J. J. Luke, WHC
M. A. Selby, Ecology
J. E. Turnbaugh, WHC

State Waste Discharge Permit Application

200-W Powerhouse Ash Pit

Date Published
June 1994

**United States
Department of Energy**

P.O. Box 550
Richland, Washington 99352

Approved for Public Release

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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 agree 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-W Powerhouse Ash Pit. The 200-W Powerhouse Ash Waste Water discharges to the 200-W Powerhouse Ash Pit via dedicated pipelines. The 200-W Powerhouse Ash Waste Water is the only discharge to the 200-W Powerhouse Ash Pit.

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GLOSSARY

BMP	Best Management Practice
BOD	biological oxygen demand
CFR	Code of Federal Regulations
COD	chemical oxygen demand
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 Kjeldahl nitrogen
ug/L	micrograms per liter
USGS	United State Geological Survey
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 (SWDP) application for the 200-W Powerhouse Ash Pit. The 200-W Powerhouse Ash Waste Water discharges to the 200-W Powerhouse Ash Pit via dedicated pipelines. The 200-W Powerhouse Ash Waste Water is the only discharge to the 200-W Powerhouse Ash Pit.

1.1 ORGANIZATION

The Washington Administrative Code (WAC) 173-216 SWDP application form for the 200-W Powerhouse Ash Pit is presented in this section. Information required by the SWDP application form 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 permit application form. Appendix A contains site location maps referenced in Section A of the permit application form. Appendices B through H correspond to Sections B through H in the permit application form. Within each appendix, those questions which require additional space have been restated and the answer directly follows the question. The questions in the appendices are worded precisely as they are in the application form and are highlighted in bold capital letters which are underlined.

1.2 STATE WASTE DISCHARGE PERMIT APPLICATION FORM

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

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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 Identification 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-W 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] 12/23/94
Signature Date

Acting Program Manager, Office of Environmental Assurance, Permits and Policy

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): 9999Description: 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:

Type	RAW MATERIALS	Quantity
Coal		23,000 tons/year
Sanitary Water		2,000,000 gal/month
Type	PRODUCTS	Quantity
Steam		33,000,000 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-W Steam Production	200-W 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
Estimated Total Monthly Flow (GPD)												

See Appendix C, Item 5.

6. Shift Information:

a. Number of shifts per work day:	<u>3</u>
b. Number of work days per week:	<u>7</u>
c. Average number of work days per year:	<u>365</u>
d. Maximum number of work days per year:	<u>365</u>
e. Number of employees per shift:	Shift start times
1st <u>7-18</u>	1st <u>7:30 am</u>
2nd <u>7</u>	2nd <u>3:30 pm</u>
3rd <u>7</u>	3rd <u>11:30 pm</u>

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:

- 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.
- 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.
- 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.
- 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 thiourea/96-45-7
A	Bromoform/75-25-2	A	Folpet/133-07-3
A	Carbazole/86-74-8	A	Furmecycloxy/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☒ Hazardous Wastes☐ Scrap Metal☐ Acids or Alkalies☒ Petroleum or Petrochemical Products☐ Paints/Coatings☐ Plating Products☐ Woodtreating Products☐ Pesticides☒ Other (Please list) Coalb. Identify existing management practices employed to reduce pollutants in industrial storm water discharges: *(check all that apply)*☐ Oil/Water Separator☐ Detention Facilities☐ Containment☐ Infiltration Basins☐ Spill Prevention☐ Operational BMPs☐ Surface Leachate Collection☐ Vegetation Management☐ Overhead Coverage☐ 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?

☒ 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

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APPENDIX A

GENERAL INFORMATION

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Figure A-1. General Hanford Site Map.

Location of the 200-W Powerhouse Ash Pit

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

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APPENDIX B

PRODUCT INFORMATION

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CONTENTS

SECTION B, ITEM 1.

BRIEFLY DESCRIBE ALL MANUFACTURING PROCESSES
AND PRODUCTS, AND/OR COMMERCIAL ACTIVITIES. B-1

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B-2 200-W Powerhouse Steam Production Flow Diagram B-5
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1 **SECTION B, ITEM 1.**

2
3 **BRIEFLY DESCRIBE ALL MANUFACTURING PROCESSES AND PRODUCTS,**
4 **AND/OR COMMERCIAL ACTIVITIES.**

5
6
7 **INTRODUCTION**

8
9 The following are facility and process descriptions for the 200-W Powerhouse Ash
10 Waste Water stream. The 200-W Powerhouse is the steam generation facility in the 200-
11 W Area. The 200-W Powerhouse is located in the central region of the 200-W Area and
12 is designated the 284-W Building (Figure B-1). A description of the facility, process and
13 disposal site is provided in the following paragraphs. This information has been
14 summarized and updated from the *Characterization Report for the Table 4 Miscellaneous*
15 *Streams in Consent Order No. DE 91NM-177* (WHC 1993a).

16
17
18 **FACILITY DESCRIPTION**

19
20 The 200-W Powerhouse consists of a coal handling and preparation section and
21 boilers. Coal is pulverized in the preparation section and burned in the boilers to
22 generate steam from sanitary water. The 200-W Powerhouse contains four Erie City¹
23 boilers; three operable boilers and one inoperable boiler. All four boiler units are
24 water-tube, stoker-fired, three-drum, Sterling-type boilers using the dumping grate
25 method for ash removal. Each boiler is rated at a capacity of 29 tons (65,000 pounds) of
26 steam per hour to establish and ensure a safety margin during operation.

27
28 The 200-W Powerhouse is a five-story, steel-frame, concrete-block, windowless
29 structure. Included adjacent to the building is a coal storage pit, coal unloading hoppers,
30 conveyer belt inclines, switch and crusher houses, a brine pit, an ash disposal pit, stacks,
31 and baghouses.

32
33 Located on the ground floor (designated the auxiliary floor) are the emergency
34 generator, chemical injection pumps, boiler feed pumps, ash pits, air compressors, and
35 ash handling pumps. The maintenance shop, lockers and shower rooms are located on
36 the auxiliary floor. The ion exchange resin tanks for the water softener are also located
37 on the auxiliary floor.

38
39

¹ Erie City boilers were manufactured by Erie City Iron Works which is now owned by
40 Zurn Industries Incorporated.

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

4
5 The third floor is at the lower drum level and gives access to the flight conveyer,
6 deaerator, and damper power cylinders. The fourth floor is at the upper drum level.
7 The fifth floor is above the coal bunkers and contains the coal belt and belt tripper car.

8 9 **PROCESS DESCRIPTION**

10
11 Sanitary water that has been dechlorinated and sent through a water softener
12 system to remove minerals (calcium and magnesium) is introduced into the coal-fired
13 boilers to produce steam. This steam is superheated before distribution to facilities in
14 the 200 West Area for both heating and process use.

15
16 As depicted in Figure B-2, the waste water from the 200-W Powerhouse consists of
17 ash/water slurry resulting from sluicing operations and the removal of flyash from
18 baghouse filters. Sluicing is performed during boiler operations to remove ash that
19 remains after the coal is burned in the boilers. Bottom ash is the solid, or sometimes
20 molten, material that falls to the bottom of the boiler during combustion. The ash from
21 the boiler is dumped periodically to ash hoppers below the furnace grates. Once per
22 day, the ash is removed by sluicing with a stream of high-pressure raw water. The ash is
23 carried by water into a trench, and the resulting slurry is pumped to the 200-W
24 Powerhouse Ash Pit.

25
26 Flyash is the ash and soot collected in the baghouse as a result of filtering flue gas
27 off the boilers. The baghouses collect ash from the boiler offgas before the offgas exits
28 the stacks. Presently, only one of the two baghouses is used. Once per shift, the
29 baghouse filters are shaken to loosen the ash and soot to a collection hopper. A
30 hydrovac system is used to remove the ash and soot from collection hoppers and the
31 resulting slurry is sent to the 200-W Powerhouse Ash Pit.

32 33 34 **DISPOSAL SITE DESCRIPTION**

35
36 Ash waste water from the 200-W Powerhouse is discharged to the 200-W
37 Powerhouse Ash Pit via two underground transfer pipes (see Figure B-3). The 200-W
38 Powerhouse Ash Retention Pit is located approximately 175 feet southeast of the 200-W
39 Building. The outside dimensions of the 200-W Powerhouse Ash Pit are approximately
40 170 feet by 420 feet.

41
42 The two underground pipes outlet at the northeast corner of the 200-W
43 Powerhouse Ash Pit. The pipes extend out horizontally from the side of the pit

1 approximately 4 to 6 feet and discharge approximately 6 to 8 feet above the bottom of
2 the pit (Figure B-3). One pipe is used to transfer ash slurry from the boiler grates and
3 the other pipe is used for transporting the flyash slurry.
4

5 The 200-W Powerhouse Ash Pit is divided into compartments that are separated by
6 an earthen dam. The dam can be manually reconfigured to direct the discharge to one
7 compartment or the other. The ash in the unused side is dried as the water evaporates
8 and percolates into the ground. The dried ash is then removed from the 200-W
9 Powerhouse Ash Pit for disposal in the 200-W Ash Disposal Pile.

Figure B-1. 200-W Area Powerhouse and Ash Handling Sites.

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

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

APPENDIX C

PLANT OPERATIONAL CHARACTERISTICS

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CONTENTS

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. C-1

SECTION C, ITEM 4
DESCRIBE ANY PLANNED WASTE WATER TREATMENT
IMPROVEMENTS OR CHANGES IN WASTE WATER DISPOSAL
METHODS. C-1

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. THE COMBINED VALUE FOR
EACH MONTH SHOULD EQUAL THE ESTIMATED TOTAL
MONTHLY FLOW. C-1

SECTION C, ITEM 7
LIST ALL INCIDENTAL MATERIALS LIKE OIL, PAINT,
GREASE, SOLVENTS, SOAPS, CLEANERS, THAT ARE
USED OR STORED ON SITE. C-2

TABLE

C-1 200-W Powerhouse Incidental Materials C-3

FIGURE

C-1 200-W Powerhouse Ash Waste Water Disposal C-4

1
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4
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1 **SECTION C, ITEM 2**

2
3 **ON A SEPARATE SHEET, DESCRIBE IN DETAIL THE TREATMENT AND**
4 **DISPOSAL OF ALL WASTE WATERS AS DESCRIBED ABOVE. INCLUDE A**
5 **SCHEMATIC DIAGRAM FOR ALL WASTE WATER AND DISPOSAL SYSTEMS.**
6

7 There is no treatment to the 200-W Powerhouse Ash Waste Water stream.
8 However, the ash slurry is disposed of in the 200-W Powerhouse Ash Pit. The ash settles
9 on the top of the soil and the water evaporates and percolates through the soil. Once
10 dried, the ash is removed and disposed of in the 200-W Ash Disposal Pile. Figure C-1
11 provides a schematic diagram of the ash waste water disposal.
12
13

14 **SECTION C, ITEM 4**

15
16 **DESCRIBE ANY PLANNED WASTE WATER TREATMENT IMPROVEMENTS OR**
17 **CHANGES IN WASTE WATER DISPOSAL METHODS.**
18

19 In 1994, a backup boiler system will be installed in the 200 West Area. The 200-W
20 Powerhouse will no longer use coal to produce steam. This backup system will use a
21 package boiler and diesel fuel, thus eliminating the 200-W Powerhouse Ash Waste Water
22 by 1995.
23
24

25 **SECTION C, ITEM 5**

26
27 **IF PRODUCTION PROCESSES ARE SUBJECT TO SEASONAL VARIATIONS,**
28 **PROVIDE THE FOLLOWING INFORMATION. LIST DISCHARGE FOR EACH**
29 **WASTE STREAM IN GALLONS PER DAY. THE COMBINED VALUE FOR EACH**
30 **MONTH SHOULD EQUAL THE ESTIMATED TOTAL MONTHLY FLOW.**
31

32 Steam produced at the 200-W Powerhouse is used for building heat and processes.
33 However, steam heat has been replaced with electric heat in many buildings resulting in
34 a lower demand for steam. The current steam needs are met by operating the 200-W
35 Powerhouse at minimum capacity year around, which requires only one (possibly two) of
36 the four boilers to operate full time. Because the 200-W Powerhouse operates at
37 minimum capacity year around producing steam to accommodate seasonal variations is
38 unnecessary.
39

1 **SECTION C, ITEM 7**

2

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

5

6 Incidental Materials are summarized in Table C-1.

Table C-1. 200-W Powerhouse Incidental Materials.
(Sheet 1 of 1)

INCIDENTAL MATERIAL	QUANTITY
Acid	< 5 gallons
Adhesive	< 5 gallons
Alcohol	< 5 gallons
Alkatrol 2025 ¹	55 gallons
Cleaner/degreaser	< 5 gallons
Cutting fluid	< 5 gallons
Dearborn 66 ²	776 pounds
Flux remover	< 5 gallons
Furniture polish	< 5 gallons
Grease	12 gallons
Ink	< 5 gallons
Kerosine	< 5 gallons
Lubricant	23 gallons
Mercury	25 pounds
Oil	63 gallons
Paint	< 5 gallons
Petroleum jelly	10 pounds
Polyquest 683 ³	250 gallons
Primer	< 5 gallons
Sealant	< 5 gallons
Sodium Carbonate	< 5 gallons
Solvent	< 5 gallons
Super Filmeen 14 ⁴	400 kilograms

¹ Alkatrol 2025 is a trademark for Grace Dearborn Company.

² Dearborn 66 is a trademark for Grace Dearborn Company.

³ Polyquest 683 is a trademark for Grace Dearborn Company.

⁴ Super Filmeen 14 is a trademark for grace Dearborn Company.

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

APPENDIX D

WATER CONSUMPTION AND WATER LOSS

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CONTENTS

SECTION D, ITEM 3.
ATTACH A LINE DRAWING SHOWING THE WATER FLOW
THROUGH THE FACILITY. INDICATE SOURCE OF
INTAKE WATER, OPERATIONS CONTRIBUTING WASTE
WATER 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. D-1

FIGURE

D-1 200-W Powerhouse Water Balance Diagram D-2

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1 SECTION D, ITEM 3.

2
3 ATTACH A LINE DRAWING SHOWING THE WATER FLOW THROUGH THE
4 FACILITY. INDICATE SOURCE OF INTAKE WATER, OPERATIONS
5 CONTRIBUTING WASTE WATER TO THE EFFLUENT, AND TREATMENT UNITS
6 LABELED TO CORRESPOND TO THE MORE DETAILED DESCRIPTIONS IN ITEM
7 C. CONSTRUCT A WATER BALANCE ON THE LINE DRAWING BY SHOWING
8 AVERAGE FLOWS BETWEEN INTAKES, OPERATIONS, TREATMENT UNITS, AND
9 OUTFALLS. IF A WATER BALANCE CANNOT BE DETERMINED (E.G., FOR
10 CERTAIN MINING ACTIVITIES), PROVIDE A PICTORIAL DESCRIPTION OF THE
11 NATURE AND AMOUNT OF ANY SOURCES OF WATER AND ANY COLLECTION
12 OR TREATMENT MEASURES.

13
14 Figure D-1 depicts the water flow through the 200-W Powerhouse.

DOE/RL-94-26, Rev. 0
06/94
200-W Powerhouse Ash Pit

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Figure D-1. 200-W Powerhouse Water Balance Diagram.

APPENDIX E

WASTE WATER INFORMATION

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CONTENTS

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 <u>GUIDELINES ESTABLISHING TEST PROCEDURES</u> <u>FOR THE ANALYSIS OF POLLUTANTS CONTAINED</u> <u>IN 40 CFR PART 136.</u>	E-1
---	-----

TABLE

E-1 200-W Powerhouse Ash Waste Water Effluent Data	E-2
--	-----

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1 **SECTION E, ITEM 1**
2

3 **PROVIDE MEASUREMENTS FOR TREATED WASTE WATER PRIOR TO LAND**
4 **APPLICATION FOR THE PARAMETERS LISTED BELOW. UNLESS WAIVED BY**
5 **THE PERMITTING AUTHORITY. ALL ANALYTICAL METHODS USED TO MEET**
6 **THESE REQUIREMENTS SHALL, UNLESS APPROVED OTHERWISE IN WRITING**
7 **BY ECOLOGY, CONFORM TO THE GUIDELINES ESTABLISHING TEST**
8 **PROCEDURES FOR THE ANALYSIS OF POLLUTANTS CONTAINED IN 40 CFR**
9 **PART 136.**
10

11 The samples and resultant data presented were obtained in accordance with a
12 sampling and analysis plan (WHC 1993b). Bulk samples of ash slurry were obtained
13 during the ash sluicing cycle. The bulk samples were placed on ice and allowed to settle
14 for 72 hours. At the end of the settling period, individual samples of the supernatant
15 were obtained for subsequent analysis. The data confirm process knowledge information
16 and show that the stream is innocuous. The constituent concentrations are generally
17 consistent with typical dilute industrial waste water streams as discussed in Metcalf and
18 Eddy (1991) and the EPA design manual (EPA 1980).
19

20 Only one constituent, arsenic (As), was found significantly in excess of the WAC-
21 173-200 Ground Water Quality Criteria. Arsenic was measured at a level of 56 ug/L
22 (GWQC=0.05 ug/L). This level of arsenic is near the EPA's Primary Drinking Water
23 Standard of 50 ug/L. Coal contains arsenic in the ppm range so the arsenic is most
24 likely being leached from the coal ash.
25
26

Table E-1. 200-W 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	422	1	umho/cm	120.1	6
pH	2	7.0 (J2)	N/A	pH	9040	0.1
TDS	2	263	6	mg/L	160.1	5
TSS	2	30	13	mg/L	160.2	5
BOD	2	11.5	2.1	mg/L	5210B	2
TKN	2	0.66	0.15	mg/L	351.3	0.15
Total Phosphorous	2	0.10	0.03	mg/L	365.2	0.05
Metals						
Ca	2	49850	6290	ug/L	6010	10 (P)
Mg	2	6790	481	ug/L	6010	30 (P)
Na	2	31650	4880	ug/L	6010	29 (P)
K	2	1415 (B2)	163	ug/L	6010	5000
Cd	2	2.3 (B2)	0.5	ug/L	6010	4 (P)
Cr	2	2.5 (U2)	N/A	ug/L	6010	2.5
Pb	2	11.1 (U2)	N/A	ug/L	6010	11.1
Hg	2	0.10 (U2)	N/A	ug/L	7470	0.10
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)	0.1	ug/L	6010	25
Fe	2	107 (B1)	38	ug/L	6010	7 (P)
Mn	2	25.1	3.4	ug/L	6010	2 (P)
Zn	2	121	16	ug/L	6010	2 (P)
Ba	2	145 (B2)	18	ug/L	6010	2 (P)

Table E-1. 200-W 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)						
As	2	56.1	4.4	ug/L	6010	16
Anions						
Fl ⁻	2	0.5	N/A	mg/L	300.0	0.1
Cl ⁻	2	1.1	N/A	mg/L	300.0	0.2
SO ₄ ²⁻	2	107	N/A	mg/L	300.0	10-20
NO ₂ ⁻ , NO ₃ ⁻	2	0.30 (U2)	N/A	mg/L	353.2	0.30
Organics						
PAHs	N/A	ND	N/A	ug/L	8100	N/A
Methylene Chloride (VOC)	1	1 (J)	N/A	ug/L	8240	10
Screening						
TOC	3	1 (U)	N/A	mg/L	9060	1
TOX	2	18 (UJ,J)	19	ug/L	9020	5-20
Radionuclides ^c						
Gross Alpha	2	0.07 (UJ2)	0.18	pCi/L	EP-10	1-2
Gross Beta	2	0.9 (UJ2)	0.4	pCi/L	EP-10	2

**Table E-1. 200-W 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	= Tentatively Identified Compound	N/A	= Not Applicable
TKN	= Total Kjeldahl Nitrogen	ND	= Not Detected
TOC	= 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

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4
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6

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SECTION F, ITEM 1	
DO YOU HAVE A WASHINGTON STATE STORM WATER	
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1 **SECTION F**

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

5
6 **SECTION F, ITEM 1**

7
8 **DO YOU HAVE A WASHINGTON STATE STORM WATER BASELINE GENERAL**
9 **PERMIT?**

10
11
12 **SECTION F, ITEM 2**

13
14 **HAVE YOU EVER APPLIED FOR A WASHINGTON STATE STORM WATER**
15 **BASELINE GENERAL PERMIT.**

16
17 Federal facilities are excluded from coverage under the Washington State Storm
18 Water Baseline Permit, as are industrial facilities which have no point source discharge
19 to surface water or a municipal storm sewer. However, a National Pollutant Discharge
20 Elimination System (NPDES) General Permit was developed by EPA on September 9,
21 1992 for federal facilities located in Washington State, engaged in discharging storm
22 water associated with industrial activities. To obtain site coverage under the NPDES
23 General Permit, DOE-RL filed a Notice Of Intent application before the EPA on
24 October 1, 1992. Subsequently, the Hanford Site has been issued an NPDES General
25 Permit Number WA-R-00-A17F for site-wide coverage of storm water discharge. As
26 required by the NPDES General Permit, the Hanford Site is implementing a storm water
27 pollution prevention program according to the *Hanford Site Stormwater Pollution*
28 *Prevention Plan* (WHC 1993b). Storm water discharges from the 200 East, 200 West and
29 400 Areas have no potential discharge to the Columbia or Yakima Rivers and thus were
30 not included in the *Hanford Site Stormwater Pollution Prevention Plan* (WHC 1993b).

31
32
33 **SECTION F, ITEM 4**

34
35 **DESCRIBE THE SIZE OF THE STORM WATER COLLECTION AREA.**

36
37 Storm water from the 200-W Powerhouse and surrounding facilities is not collected
38 for point source discharge to the 200-W Powerhouse Ash Pit. Therefore, there is no
39 storm water collection area for the 200-W Powerhouse Ash Pit.

1 **SECTION F, ITEM 5**

2
3 **DOES YOUR FACILITY'S STORM WATER DISCHARGE TO:**

4
5 None of the statements apply. Storm water from the 200-W Powerhouse and
6 surrounding facilities is not discharged directly to ground waters of Washington State.
7 The storm water has no point source discharge to surface water or a municipal storm
8 sewer.
9

10
11 **SECTION F, ITEM 6**

12
13 **AREAS WITH INDUSTRIAL ACTIVITIES AT FACILITY:**

14
15 To address this item, a boundary has been drawn around the disposal site and
16 applicable facilities. The facility boundary is shown on Drawing H-13-000092. The notes
17 and legend are on Drawing H-13-000093.
18
19

20 **SECTION F, ITEM 7**

21
22 **MATERIAL HANDLING/MANAGEMENT PRACTICES:**

23
24 **A. TYPES OF MATERIALS HANDLED AND/OR STORED OUTDOORS:**

25
26 The facility boundary on Drawing H-13-000092 was used to address this item. The
27 materials selected were located within the facility boundary. The petroleum and
28 hazardous waste are stored on the covered 90-day dangerous waste storage pad. The
29 coal is not covered.
30
31

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

34
35 This item is not considered applicable because there is no storm water collection
36 area for the 200-W Powerhouse Ash Pit.
37
38

1 **SECTION F, ITEM 8**

2
3 **ATTACH A MAP SHOWING STORM WATER DRAINAGE/COLLECTION AREAS.**
4 **DISPOSAL AREAS AND DISCHARGE POINTS.**

5
6 Downspouts collect storm water from the 200-W Powerhouse roof and discharge
7 storm water to the ground beneath the downspouts. Downspouts are mapped on
8 Drawing H-13-000092.

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E.567,500

SITE PLAN

SCALE: 1:1500

1 cm = 15 meters

H-13-000211	200E AREA TOPOGRAPHIC MAP	MFG	REV NO	DESCRIPTION	REV BY DATE
H-13-000219	200E AREA TOPOGRAPHIC MAP				
REF NUMBER	TITLE	REV NO	REVISIONS		
REFERENCE					
NEXT USED ON	H-13-000200	CADFILE N000C92A			CADCODE DX

E.567,700

N.136,000

FOR GENERAL NOTES AND LEGEND SEE: H-13-000093

N.136,800

OFFICIAL RELEASE
BY WHO
DATE MAY 10 1994

500 FEET

CHK BY DATE	DFTG APRVD DATE	COC ENGR	OTHER	OTHER
APPROVALS BY/DATE				

DRAWN RAFAEL TORRES	DATE 3/11/94
CHECKED <i>[Signature]</i>	5/10/94
DFTG APRVD <i>[Signature]</i>	5/10/94
COC ENGR <i>[Signature]</i>	5/10/94
APPVD	
APPVD	
APPVD	

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

200-W POWERHOUSE ASH PIT FACILITY MAP

SIZE	BLDG NO	INDEX NO	DWG NO	REV
B	284-W	0110	H-13-000092	0

DS:6.0:ACD2:12.0:SS

SCALE SHOWN EDT 604321

SHEET 1 OF 1

CHK
PRINT ☐

COMMENT
PRINT ☐

DWG NO H-13-000092 SH 1 OF 1 REV 0

WIND ROSE FOR: HANFORD MET STATION
 % CALM WINDS = .5
 STATION NO. 21

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

LEGEND

	HANFORD PLANT COORDINATES (FEET)		BUILDINGS/STRUCTURES & TOWERS
	WASHINGTON STATE COORDINATES (METERS)		BUILDING NUMBER
	INDEX CONTOUR (METERS)		WELL
	INTERMEDIATE CONTOUR		TANKS
	IMPROVED ROAD		CRIB
	UNIMPROVED ROAD		BURIAL GROUND
	DIRT ROAD		CHEMICAL HANDLING AND STORAGE FACILITIES
	SIDEWALKS/PARKING LOTS		DISCHARGE POINT
	RAILROADS		DOWNSPOUTS
	SECURITY, WARNING, MISC FENCES		
	POST & CHAIN (CRIB, BURIAL GROUND FENCES)		
	PERIMETER FENCES		

H-13-000092	200-W POWERHOUSE ASH PIT FACILITY MAP	MFG	REV NO	DESCRIPTION	REV BY DATE	C
REF NUMBER	TITLE	REV				C
REFERENCE		REVISIONS				
NEXT USED ON	H-13-000200	CADFILE N000093A			CADCODE D05	

APPENDIX G

OTHER INFORMATION

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CONTENTS

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. G-1

SECTION G, ITEM 2

DESCRIBE THE STORAGE AREAS FOR RAW MATERIALS,
PRODUCTS, AND WASTES. G-1

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1 **SECTION G, ITEM 1**

2
3 **DESCRIBE LIQUID WASTES OR SLUDGES BEING GENERATED THAT ARE NOT**
4 **DISPOSED OF IN THE WASTESTREAM(S) AND HOW THEY ARE DISPOSED OF.**
5 **FOR EACH TYPE OF WASTE, PROVIDE TYPE OF WASTE, NAME, ADDRESS, AND**
6 **PHONE NUMBER OF HAULER.**

7
8 The 200-W coal ramp is washed down with raw water and the waste water is
9 discharged to a coal ramp washdown basin. Drawing H-13-000092 indicates the location
10 of the coal ramp washdown basin.

11
12 Sanitary sewage is discharged to the 2607-W1 septic tank. This tank is periodically
13 pumped out and the sludge is transported to the 100-N Sanitary Sewage Lagoon.
14 Westinghouse Sanitary Systems Maintenance hauls the sewage from the septic systems to
15 the 100-N Sewage Lagoon. Currently, Westinghouse Hanford Company also contracts
16 Roto-Rooter Sewer Service Co. to help haul the sewage. The addresses are as follows:

17
18 Sanitary Systems Maintenance
19 Westinghouse Hanford Company
20 P.O. Box 1970
21 MSIN S4-61
22 Richland, WA 99352
23 (509) 373-5786

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

24
25 Dangerous waste is accumulated in satellite accumulation areas inside the building.
26 When a container is full, it is put out on the 90-day dangerous waste storage pad.
27 Dangerous waste is hauled from the 90-day dangerous waste storage pad by the
28 following:

29
30 Solid Waste Disposal
31 Westinghouse Hanford Company
32 P.O. Box 1970
33 MSIN N3-11
34 Richland, WA 99352
35 (509) 376-4646

36
37
38 **SECTION G, ITEM 2**

39
40 **DESCRIBE THE STORAGE AREAS FOR RAW MATERIALS, PRODUCTS, AND**
41 **WASTES.**
42

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

3
4 Products - Steam is distributed through steam lines to other facilities for heating
5 and process systems.

6
7 Wastes - The 200-W coal ramp washdown waste water is discharged to a
8 depression in the topography.

9
10 Refer to Drawing H-13-000092 for the location of the coal ramp washdown basin.
11 The 90-day dangerous waste storage pad is an open area covered by a roof used to
12 collect dangerous waste from the 284-W Building.

APPENDIX H

SITE ASSESSMENT

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CONTENTS

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 LAND FOR TREATMENT.	H-1
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.	H-1
SECTION H, ITEM 3 ATTACH A UNITED STATES GEOLOGICAL SURVEY (USGS) TOPOGRAPHIC MAP. SHOW THE FOLLOWING ON THIS MAP:	H-1
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.	H-2
SECTION H, ITEM 5 DESCRIBE SOILS ON THE SITE USING INFORMATION FROM LOCAL SOIL SURVEY REPORTS. (SUBMIT ON SEPARATE SHEET.)	H-2
SECTION H, ITEM 6 DESCRIBE THE REGIONAL GEOLOGY AND HYDROGEOLOGY WITHIN ONE MILE OF THE SITE.	H-3
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.	H-12

FIGURES

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H-2	Soils Map for the 200-W Powerhouse Ash Pit	H-14
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H-4	Legend for Hanford Geologic Map	H-16
H-5	Regional Stratigraphic Column	H-17
H-6	Geology Map for the 200-W Powerhouse Ash Pit	H-18
H-7	Line of Cross-Section for the 200-W Area.	H-19
H-8	Cross-Section for the 200-W Area	H-20
H-9	Hanford Water Table Map.	H-21

1 **SECTION H, ITEM 1**

2
3 **GIVE THE LEGAL DESCRIPTION OF THE LAND TREATMENT SITE(S). GIVE THE**
4 **ACREAGE OF EACH LAND TREATMENT SITE(S). ATTACH A COPY OF THE**
5 **CONTRACT(S) AUTHORIZING USE OF LAND FOR TREATMENT.**
6

7
8 **Legal Description:**
9

10 SW 1/4, SE 1/4, Section 1, Township 12N, Range 25E, Benton County, WA.
11

12 **The land treatment site has the following acreage:**
13

14 200-W Powerhouse Ash Pit (total area): 1.71 acres
15

16 A specific contract authorizing use of the 200-W Powerhouse Ash Pit for a land
17 treatment site does not exist, but the Hanford Site was created by the U.S. Government
18 to serve as a research and production facility for federal government nuclear projects.
19 The Hanford Site has been in use since the early 1940's and all disposal facilities, such
20 as the 200-W Powerhouse Ash Pit, have been authorized by the U.S. Government.
21

22
23 **SECTION H, ITEM 2**
24

25 **LIST ALL ENVIRONMENTAL CONTROL PERMITS OR APPROVALS NEEDED FOR**
26 **THIS PROJECT; FOR EXAMPLE, SEPTIC TANK PERMITS, SLUDGE**
27 **APPLICATION PERMITS, OR AIR EMISSIONS PERMITS.**
28

29 There are no permits specifically for this project. The following permits are
30 general permits for the Hanford Site:
31

- 32 • Hanford Site Radioactive Air Emissions Permit: Number FF-01
 - 33 • Hanford Site Dangerous Waste Permit: Number WA7890008967
 - 34 • NPDES General Permit: Number WA-R-00-A17F.
- 35
36

37 **SECTION H, ITEM 3**
38

39 **ATTACH A UNITED STATES GEOLOGICAL SURVEY (USGS) TOPOGRAPHIC MAP.**
40 **SHOW THE FOLLOWING ON THIS MAP:**
41

- 42 a. Location and name of internal and adjacent streets
- 43 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. 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-13-000087 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-13-000087 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-13-000092 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-13-000087 shows all of the wells within a one-mile radius of the 200-W Powerhouse Ash Pit. All well numbers are preceded with a 299. There are no wells within 500 feet of the 200-W Powerhouse Ash Pit.

SECTION H, ITEM 5

DESCRIBE SOILS ON THE SITE USING INFORMATION FROM LOCAL SOIL SURVEY REPORTS. (SUBMIT ON SEPARATE SHEET.)

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 in Hajek (1966). The soil types mapped on the Hanford Site are shown on Figure H-1. There is no soil data for the north slope of the Hanford Site. The soils in the 200 West Area predominately consist of two soil types: the Quincy sand (Rupert sand) and the Burbank loamy sand. The

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

3
4 The Quincy sand (Rupert sand) represents one of the most extensive soils at the
5 Hanford Site. The soil is a brown to grayish brown, moderately-deep, coarse sand.
6 Quincy soils developed under grass and sagebrush in coarse alluvial deposits mantled by
7 wind-blown sand. Relief characteristically consists of hummocky terraces and dune-like
8 ridges. The surface and subsoil of the Quincy sand (Rupert sand) were assigned to
9 Group SM (silty sand) which consists of coarse-grained soils composed predominantly of
10 sands with more than 12 percent fines.

11
12 The Burbank loamy sand is a dark grayish brown, coarse-textured, excessively
13 drained soil underlain by gravel. The surface soil is usually about 16 inches thick but can
14 be as much as 30 inches. The gravel content of the subsoil may range from 20 to 80
15 percent (by volume). The surface of the Burbank loamy sand is Group SM (silty sand)
16 and the subsoil is Group GM (silty gravel) to GP (poorly graded gravel). Group GM
17 (silty gravel) are coarse-grained soils composed predominantly of gravels with more than
18 12 percent fines. Group GP (poorly graded gravel) contains coarse-grained soils that are
19 predominantly well-sorted gravels with less than 5 percent fines.

20 21 22 SECTION H, ITEM 6

23 24 DESCRIBE THE REGIONAL GEOLOGY AND HYDROGEOLOGY WITHIN ONE 25 MILE OF THE SITE.

26 27 28 REGIONAL GEOLOGY

29
30 A summary of the regional geologic characteristics of the Pasco Basin and the
31 Hanford Site is presented below in terms of stratigraphy and structure. WHC (1992a),
32 (1991a), and WHC (1991c) may be consulted for additional detail. Figure H-3 shows a
33 map depicting the surficial geology of the Hanford Site. Figure H-4 is a legend
34 explaining Figure H-3.

35 36 37 REGIONAL STRATIGRAPHY

38
39 The Hanford Site lies within the Pasco Basin, a regional structural and
40 topographic, sediment-filled depression. The sediments of the Pasco Basin are underlain
41 by Miocene-age basalt of the Columbia River Basalt Group, a thick sequence of flood
42 basalts that covers a large area in eastern Washington, western Idaho and northeastern
43 Oregon. The sediments overlying the basalts, from oldest to youngest, include: the

1 Miocene-Pliocene Ringold Formation, local alluvial deposits of possible late Pliocene or
2 early Pleistocene age, local "Palouse" soil of mostly eolian origin, glaciofluvial deposits of
3 the Pleistocene Hanford formation, and surficial Holocene eolian and fluvial sediments.
4 The generalized stratigraphy of the Hanford Site is described in the following paragraphs
5 from the oldest to youngest formation. The regional stratigraphy is depicted on Figure
6 H-7.

8 **Columbia River Basalt Group and the Ellensburg Formation**

10 The Columbia River Basalt Group consists of an assemblage of tholeiitic,
11 continental flood basalts of Miocene Age with an accumulated thickness in excess of
12 10,000 feet within the Pasco Basin. These flows cover an area of more than 63,000
13 square miles in Washington, Oregon, and Idaho and have an estimated volume of about
14 40,800 cubic miles. The majority of the flows were erupted 14.5 to 17 million years ago
15 (WHC 1991c).

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

32 The Ellensburg Formation consists of all sedimentary units that occur between the
33 basalt flows of the Columbia River Basalt Group in the central Columbia Basin (Reidel
34 and Fecht 1981). The Ellensburg Formation generally consists of two main lithologies:
35 volcanics and siliciclastics. The volcanics consist mainly of primary pyroclastic
36 air fall deposits and reworked epiclastics derived from volcanic terrains west of the
37 Columbia Plateau. Siliciclastic strata consist of clastic, plutonic, and metamorphic
38 detritus derived from the Rocky Mountain terrains located to the east.

40 At the Hanford Site, the three uppermost units of the Ellensburg Formation are
41 the Levy interbed, the Rattlesnake Ridge interbed, and the Selah interbed. The Levy
42 interbed is confined to the vicinity of the 300 Area. The Rattlesnake Ridge and Selah
43 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 thicknesses 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). A more detailed discussion of the Ringold Formation stratigraphy can be found in WHC (1991d).

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

AIM

Association for Information and Image Management

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910
301/587-8202

Centimeter

Inches

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BY APPLIED IMAGE, INC.

2 of 2

1 are divided into three facies: gravel dominated, sand-dominated, and silt-dominated
2 (WHC 1992a). These facies are referred to as coarse-grained deposits, plane-laminated
3 sand facies, and rhythmite facies, respectively (Baker et al. 1991). The silt-dominated
4 deposits are also referred to as "Touchet" Beds, and the gravel-dominated facies
5 generally correspond to the Pasco gravels.
6

7 The Hanford formation is thickest in the vicinity of the 200 Areas where it is up to
8 350 feet thick (WHC 1992a). The formation was deposited by cataclysmic flood waters
9 that originated from glacial lake Missoula (Fecht et al. 1987, DOE 1988, Baker et al.
10 1991). The deposits are absent from ridges above approximately 1,180 feet above mean
11 sea level, the highest level of cataclysmic flooding in the Pasco Basin (WHC 1991c).
12

13 **Holocene Surficial Deposits.** Holocene surficial deposits consist of silt, sand, and
14 gravel that form a <16-feet veneer across much of the Hanford Site. These sediments
15 were deposited by eolian and alluvial processes (WHC 1991c).
16
17

18 REGIONAL GEOLOGIC STRUCTURE

19

20 The Hanford Site is located within the Pasco Basin near the eastern edge of the
21 Yakima Fold Belt. The Yakima Fold Belt consists of a series of segmented, narrow,
22 asymmetric, east-west trending anticlines separated by broad synclines or basins that, in
23 many cases, contain thick accumulations of Neogene- to Quaternary-aged sediments
24 (DOE 1988, Smith et al. 1989). The Pasco Basin is one of the larger structural basins of
25 the fold belt.
26

27 The northern limbs of the anticlines of the Yakima Fold Belt generally dip steeply
28 to the north or are vertical. The southern limbs generally dip at relatively shallow angles
29 to the south. Thrust or high-angle reverse faults with fault planes that strike parallel or
30 subparallel to the axial trends are principally found on the north sides of the anticlines.
31 The amount of vertical stratigraphic offset associated with these faults varies (WHC
32 1991c).
33

34 Deformation of the Yakima Folds occurred under north-south compression and
35 was contemporaneous with the eruption of the basalt flows. The fold belt was enlarging
36 during the eruption of the Columbia River Basalt Group and continued to enlarge
37 through the Pliocene, into the Pleistocene, and perhaps to the present (WHC 1991c).
38

39 The Pasco Basin is a structural depression bounded on the north by the Saddle
40 Mountain anticline; on the west by the Umtanum Ridge, Yakima Ridge, and Rattlesnake
41 Hills anticlines; and on the south by the Rattlesnake Mountain anticline. The Palouse

1 slope, a west-dipping monocline, bounds the Pasco Basin on the east. The Pasco Basin is
2 divided into the Wahluke and Cold Creek synclines by the Gable Mountain anticline, the
3 eastern extension of the Umtanum Ridge anticline.

4
5 The Cold Creek syncline lies between the Umtanum Ridge-Gable Mountain uplift
6 and the Yakima Ridge uplift, and is an asymmetric and relatively flat-bottomed structure.
7 The bedrock of the northern limb dips gently to the south, and the southern limb dips
8 steeply to the north. The deepest parts of the Cold Creek syncline, the Wye Barricade
9 depression and the Cold Creek depression, are located approximately 7.5 miles southeast
10 of the 200 Areas and just west-southwest of the 200 West Area, respectively (Tallman et
11 al. 1979).

12 13 14 **LOCAL GEOLOGY**

15
16 The depth to the top to the Elephant Mountain Member basalt in the 200 West
17 Area ranges from approximately 500 feet in the northern part to approximately 580 feet
18 in the southern part. Overlying the basalt are the suprabasalt sediments of the Ringold
19 Formation, Plio-Pleistocene unit, early "Palouse" soil, Hanford formation, and Holocene
20 surficial deposits. The Pre-Missoula gravels are absent in the 200 West Area (WHC
21 1991a). The following discussion of the local geology emphasizes the suprabasalt
22 sediments in the vicinity of the 200 West Area. A map depicting the geology within one
23 mile of the 200-W Powerhouse Ash Pit is provided as Figure H-6. A local cross-section
24 has also been included for more detailed information. The line of cross-section is shown
25 on Figure H-7 and the cross section is provided on Figure H-8.

26 27 **Ringold Formation**

28
29 The Ringold Formation overlies the Elephant Mountain Member basalt throughout
30 the 200 West Area. The Ringold units present in the 200 West Area, from the bottom
31 to the top of the section, are the fluvial gravel unit A, the lower mud sequence, the
32 fluvial gravels of unit E, and the upper Ringold unit D.

33
34 Unit A overlies the Elephant Mountain Member basalt throughout the 200 West
35 Area. Unit A thickens and dips to the south and southwest in the direction of the Cold
36 Creek syncline. The top of the unit is flat. The thickness of unit A within 200 West
37 ranges from 20 feet in the northern part of the 200 West Area to approximately 90 feet
38 in the southwestern part of the 200 West Area. Unit A pinches out north of the
39 northern boundary of 200 West. Unit A is generally described as a clast-supported
40 granule to cobble gravel with a sandy matrix. Clast composition is variable with basalt,
41 quartzite, porphyritic volcanics, and greenstone being the most common. Clasts of silicic
42 plutonic rocks, gneiss, and volcanic breccias can also be found. Associated sands are
43 generally quartzofeldspathic with basalt content ranging from 5 to 25 percent.

1 Interbedded lenticular sand and silt layers are common in the western and southern part
2 of the area (WHC 1991a).

3
4 The lower mud sequence overlies unit A and also dips and thickens towards the
5 south. The lower mud sequence ranges from 15 feet thick in the north part of the 200
6 West Area to approximately 85 feet thick near the southwestern boundary of the 200
7 West Area. The lower mud sequence pinches out to the northeast of the 200 West Area.
8 The top of the unit has an irregular surface. The lower mud sequence is composed of
9 overbank deposits, lacustrine deposits and paleosols. The overbank deposits consist of
10 laminated to massive silt, silty fine-grained sand, and paleosols containing variable
11 amounts of pedogenic calcium carbonate. Plane laminated to massive clay with thin silt
12 and sand interbeds characterize the lacustrine deposits. The lacustrine deposits contain
13 some soft-sediment deformation (WHC 1991a).

14
15 Unit E overlies the lower mud sequence and thickens from the east-southeast
16 towards the northwest corner of the 200 West Area. The thickness of unit E ranges from
17 140 feet in the southeast corner of the 200 West Area to approximately 330 feet
18 northwest corner of the 200 West Area. The composition of unit E is a clast-supported
19 granule to cobble gravel, similar to unit A. Locally, strata typical of the fluvial sand and
20 overbank facies associations may be encountered within unit E. The top of unit E is an
21 irregular surface with highs in the northern and southern parts of the 200 West Area and
22 lows in the central part of the area (WHC 1991a).

23
24 The upper Ringold unit D overlies unit E, but is very discontinuous across the 200
25 West Area due to post-Ringold erosion. The upper Ringold unit D is only found in the
26 northern, western, and central parts of the 200 West Area and ranges in thickness from 0
27 to 60 feet in the northwest corner. The upper Ringold unit D consists of overbank
28 deposits and fluvial sands. The overbank deposits are composed of laminated to massive
29 silty fine-grained sand. The fluvial sands are quartzo-feldspathic, displaying cross-
30 bedding and cross-lamination (WHC 1991a).

31 32 **Plio-Pleistocene Unit**

33
34 The Plio-Pleistocene unit unconformably overlies the Ringold Formation and is
35 discontinuous throughout the 200 West Area. The unit pinches out along the eastern
36 and southern boundaries of the 200 West Area. The unit ranges in thickness from 0 to
37 46 feet. High areas in the southern, southwestern and southeastern corners of the 200
38 West Area surround a low area, which forms a trough-like feature running from the
39 northeast corner to the center of the 200 West Area and continuing toward the southeast
40 corner. A calcic paleosol characterizes the Plio-Pleistocene unit in the 200 East Area.
41 The calcic paleosol consists of massive calcium carbonate cemented silt, sand, and gravel
42 (caliche) to interbedded caliche-rich and caliche-poor silts and sands. In general, the
43 calcium carbonate content decreases to the south (WHC 1991a).

1 **Early "Palouse" Soil**

2
3 The early "Palouse" soil overlies the Plio-Pleistocene unit. The thickness varies
4 irregularly throughout the 200 West Area. The thickness ranges from 0 feet, where the
5 unit pinches out near the southern, eastern, and northern boundaries of the 200 West
6 Area, to 50 feet. The early "Palouse" soil is composed of massive, compact, uncemented,
7 loess-like silt and minor fine-grained sand. Calcium carbonate is common, but the
8 calcium carbonate content is less than the underlying Plio-Pleistocene unit (WHC
9 1991a).

10
11 **Hanford formation**

12
13 In the 200 West Area, the Hanford formation consists of the gravel-dominated,
14 sand-dominated, and silt-dominated facies. The Hanford formation can be informally
15 divided into the fine-grained sequence and coarse-grained sequence (WHC 1991a).

16
17 The fine-grained sequence overlies the early "Palouse" soil. The fine-grained
18 sequence is thick, but locally discontinuous, ranging from 0 to 160 feet thick. The fine-
19 grained sequence is absent along the northern boundary, in a circular depression in the
20 southwestern corner, and in a north-south elongated area in the center of the 200 West
21 Area (WHC 1991a). The sequence generally thickens towards the south-southeast in the
22 direction of the axis of the Cold Creek syncline. The fine-grained sequence consists of
23 thinly bedded, plane-laminated silt and fine-grained sand characteristic of the silt-
24 dominated facies interbedded with bedded and plane-laminated fine- to coarse-grained
25 sand and granule gravel typical of the sand-dominated facies. Thin gravel-dominated
26 facies are found locally. The distribution of the facies varies, but the sequence generally
27 fines to the south where the silt-dominated facies becomes more common (WHC 1991a).

28
29
30 The coarse-grained sequence is composed of interbedded gravel, sand, and lesser
31 silt characteristic of the gravel-dominated sequence. At some localities, deposits typical
32 of the sand-dominated facies dominates the coarse-grained facies. Minor, laterally
33 discontinuous silty deposits similar to the silt-dominated facies are found locally. The
34 gravel-dominated sequence consists of coarse-grained basaltic sand and granule- to
35 boulder-size gravel. Other clast types include Ringold and Plio-Pleistocene rip-ups,
36 granite, quartzite, and gneiss. The thickness of the coarse-grained sequence ranges from
37 0 feet near the southern boundary to 220 feet in the northwest corner of the 200 West
38 Area. The coarse-grained sequence fills the areas where the early "Palouse" soil was
39 absent.

Holocene Surficial Deposits

Eolian sheet sands dominated the Holocene surficial deposits in the 200 West Area. The sands consist of very fine- to medium-grained sand with little silt. The thickness of the eolian sand sheets are generally less than 10 feet. Much of the eolian material within the 200 West Area has been removed by construction activities (WHC 1991a).

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 volcanoclastic 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 West 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.

1 The vadose zone in the 200 West Area is composed of the fluvial gravel of Ringold
2 unit E, the upper unit of the Ringold formation, the Plio-Pleistocene unit, early
3 "Palouse" soil, and the Hanford formation. The thickness of the vadose zone ranges
4 from less than 165 feet near the southeast corner to more than 328 feet in the northwest
5 corner.

6
7 Within the vadose zone there are perched water zones. The Plio-Pleistocene unit
8 and early "Palouse" soil provide amenable conditions for the formation of perched water
9 zones. The Plio-Pleistocene unit is present at elevations ranging from 490 to 610 feet
10 above sea level, and the early "Palouse" soil is present at elevations ranging from about
11 500 to 630 feet above sea level. Perched water zones have been documented or
12 suspected in the U Plant, Z Plant, and S Plant Aggregate Areas (DOE-RL 1993a).

13
14 The uppermost aquifer system is composed of the unconfined aquifer, but also
15 includes localized semiconfined and confined areas. The uppermost aquifer system in
16 the 200 West Area is contained within the fluvial and lacustrine sediments of the
17 Ringold Formation. Depth to the uppermost unconfined aquifer ranges from
18 approximately 165 feet to more than 328 feet. The thickness of the saturated portion of
19 the unconfined aquifer ranges from 130 to 260 feet and consists of generally unconfined
20 groundwater within the fluvial gravel Ringold unit E (DOE-RL 1993a). Drilling in the
21 northeastern part of the Z Plant Aggregate Area has indicated that the water table may
22 locally be confined at several locations beneath carbonate-rich sediments in unit E
23 (DOE-RL 1993a).

24
25 The lower part of the uppermost aquifer consists of confined to semiconfined
26 groundwater within the gravelly sediments of Ringold unit A. Unit A is confined on the
27 top by the Ringold lower mud sequence and on the bottom by the Elephant Mountain
28 Member basalt. The thickness of this confined zone ranges from greater than 125 feet in
29 the southeastern portion of the 200 West Area to zero just north of the northern
30 boundary of the 200 West Area where unit A pinches out (DOE-RL 1993a).

31
32 A groundwater mound in the 200 West Area is attributed to massive discharges of
33 waste water to the ground since Hanford operations began. The 200 West Area mound
34 that resulted from historic discharges has "backed up" eastward flowing groundwater
35 along the Cold Creek drainage, which is derived from natural recharge and possibly
36 influenced by offsite agricultural irrigation. The 200 West Area groundwater flow is
37 currently predominantly influenced by liquid effluent discharges to the 284-WB
38 Powerplant Pond, U-14 Ditch, Z-20 Crib, Z-21 Seepage Basin, and various septic tank
39 tilefields. Groundwater flow from the 200 West Area bifurcates and flows through the
40 Gable Gap or southeastward across the Site.

SECTION H, ITEM 7

**LIST THE NAMES AND ADDRESS'S 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 Ave, Suite 202
Richland, WA 99352

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

WIND ROSE FOR: HANFORD ME
% CALM WINDS = .5
STATION NO. 21

F

WEST

1 2 3 4 5 6 7

PADDLES INDICATE DIR
RADIAL GRIDS REPRESENT

WIND CLASS

1-----
2-----
3-----
4-----
5-----
6-----
7-----

WIN

E

100 D/DR
AREA

100N AREA

FORD MET STATION

PERIOD COVERED
1/1/93 - 12/31/93

WIND DIRECTION WIND IS COMING FROM.
 REPRESENT 5.0% AND 10.0% OCCURRENCE.

<u>WIND CLASS</u>	<u>MILES/HOUR</u>
-----	>1.0 - 3.0
-----	4.0 - 7.0
-----	8.0 - 12.0
-----	13.0 - 18.0
-----	19.0 - 24.0
-----	25.0 - 31.0
-----	32.0 +

WIND ROSE

E.548,000

E.548,250

E.548,500

E.548,750

E.549,000

E.568,250

E.568,500

E.568,750

E.568,000

N.137,250

N.137,000

N.136,750

N.136,500

N.136,250

F

E

KEY PL.
SCALE: NON

LEGEND

- N. 47,000
N. 43,000** HANFORD PLANT COORDINATES (FEET)
- E. 576,250
N. 136,000** WASHINGTON STATE COORDINATES (METERS)
- INDEX CONTOUR (METERS)
- INTERMEDIATE CONTOUR
- IMPROVED ROAD
- UNIMPROVED ROAD
- DIRT ROAD
- SIDEWALKS\ PARKING LOTS
- RAILROADS

D

C

B

PLAN
NONE

END

BUILDINGS/STRUCTURES
& TOWERS

242-A

BUILDING NUMBER

MOBILE OFFICES

-82
-70
4-62
W15-13
W14-3
W14-3P
4-1
W14-2
14-12
(67-75)
(103-149,153-156)
(158-183,187-197)

W14-63
2713-W
W14-59
W14-80
-61
2

W14-7
W15-5(50-S)
W18-222
W18-(221,223-230) ABANDONED
(17,18,200)
(19,189) ABANDONED
(192-194) ABANDONED
(233-241) ABANDONED
(201,202,205-214) ABANDONED

W19-(53,54,74-76)
W18-(51-55,90-92)
W18-(100-105,109,110)
W18-(113-148)
W18-178 ABANDONED

W19-31
W19-12
207-U
W19-9
W19-72
W19-73
W19-32
W19-15
W19-11
W19-27
W19-21
W19-10
W19-14
W19-7
W19-13
W19-60
W19-59
W19-61
W19-58
W19-57

COAL STORAGE AREA

DP #1

200W ASH DISPOSAL BASIN

200-W POWER
ASH PIT

ASH DISPOSAL BASIN

W14-58
W14-56
W14-57

W19-77
W14-BA
W14-8B

W19-8
W19-52
W19-51
W19-16
W19-17
W19-18
W19-72
W19-73
W19-32
W19-15
W19-11
W19-13
W19-60
W19-59
W19-61
W19-58
W19-57

W19-24
W19-19
W19-89
W19-25
W19-20
W19-26
W19-88
W19-23

W19-28
W19-30
W19-90
W19-83

N.136,250

N.136,000

N.135,750

N.135,500

N.135,250

N.135,000

LEGEN

N. 47,000 N. 49,000	HANFORD PLANT COORDINATES (FEET)
E. 576,250 N. 138,000	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

GENERAL NOTES

1. THIS MAP IS BASED ON AERIAL PHOTOGRAPHY FLOWN ON 6-24-89. THE ORIGINAL TOPOG 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 ENGINEERING FILES AS DRAWING NUMBERS H-2-79476 SHEET 1 AND H-2-79477 SHEET 2. NAMES OF ADDITIONAL FEATURES AND THE TITLE BLOCK WERE ADDED BY WESTINGHOUSE H
 2. WASHINGTON STATE PLANE COORDINATE SYSTEM: THE OFFICIAL COORDINATE SYSTEM AS DE REISED CODE OF WASHINGTON (RCW). THE HANFORD SITE LIES WITHIN THE WASHINGTON SOUTH ZONE. THIS GRID COVERS THE ENTIRE SITE AND USES X (EASTINGS) AND Y (NORT
- HORIZONTAL DATUM: NAD-83 LAMBERT PROJECTION. WASHINGTON STATE PLANE COORDINAT
CONTOUR INTERVAL: 0.5 METERS.
3. HANFORD PLANT GRID: A LOCAL GRID SYSTEM WITH ITS INITIAL POINT NORTHEAST OF TH COVERS 200 EAST AND 200 WEST AREA AS WELL AS GENERAL SITE WORK SUCH AS WELL GROUNDS. HANFORD COORDINATES ARE SHOWN IN FEET.

SCALE: NONE

LEGEND

NT COORDINATES				BUILDINGS/STRUCTURES & TOWERS
STATE COORDINATES				
JR (METERS)				
CONTOUR				
ROAD				
PARKING LOTS				
MINING, MISC FENCES				
JN				
GROUND FENCES)				
FENCES				
		242-A		BUILDING NUMBER
		MOBILE OFFICES
		W27-1
		WELL
		ABANDONED WELL
		TANKS
		216-A-42		CRIB
		218-E-10		BURIAL GROUND
		DP		DISCHARGE POINT

SITE PL

SCALE: 1:6000

1 cm = 60 meters

NOTES

4-89. THE ORIGINAL TOPOGRAPHIC MAP WAS PREPARED
AP ACCURACY STANDARDS.
LOCATIONS ARE LOCATED IN THE WESTINGHOUSE
1 AND H-2-79477 SHEET 1 THRU 37.
ADDED BY WESTINGHOUSE HANFORD COMPANY.

COORDINATE SYSTEM AS DEFINED BY THE
ES WITHIN THE WASHINGTON COORDINATE SYSTEM,
X (EASTINGS) AND Y (NORTHINGS) COORDINATES.

STATE PLANE COORDINATES ARE SHOWN IN METERS.

POINT NORTHEAST OF THE 400 AREA. IT
L SITE WORK SUCH AS WELLS AND BURIAL

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REVISIONS								APVD	
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					OTHER	OTHER			
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							APVD		
							APVD		
							COG ENGR		
							DFTG APVD		
							CHECKED		
							DRAWN		
							DATE		

THIS MAP IS TO BE
DO NOT USE THIS

0001 01 APR 1968

QUARTER
REVENUE TO DATE

RELEASE
3Y 10 1994

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

DRAWN RAFAEL TORRES		DATE 3-12-94		U.S. DEPARTMENT OF ENERGY DOE Field Office, Richland Westinghouse Hanford Company <h2 style="text-align: center;">200-W POWERHOUSE ASH PIT</h2>			
CHECKED <i>Larry Johnson</i>		5-10-94					
DATE APVD <i>Wren</i>		5-10-94					
CDS ENGR B.P. Atencio		5-10-94					
APVD <i>J. J. Lugo</i>		5-10-94					
APVD							
OTHER APVD							
DATE	APVD	SIZE F	BLDG NO 284-W	INDEX NO 0110	DWG NO H-13-000087	REV 0	
	APVD						
	APVD						

2

CHK PRINT ☐	DATE	COMMENT PRINT ☐	DATE
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1

DWG NO H-13-000087 SH 1 REV 0

Hanford Soils Map

Legend

- Ri—Ritzville Silt Loam
- Qy—Quincy Sand
- He—Hezel Sand
- Kf—Koehler Sand
- Ba—Burbank Loamy Sand
- El—Ephrata Sandy Loam
- Ls—Licksillet Silt Loam
- Eb—Ephrata Stony Loam
- Ki—Kioana Silt Loam
- Wa—Warden Silt Loam
- Sc—Scootney Stony Silt Loam
- P—Pasco Silt Loam
- Qu—Esquatzel Silt Loam
- Rv—Riverwash
- L—Dunesand

Scale Kilometers

Soils Map of the Hanford Site (modified from Hajek 1966)

WHC-LAD:3-3-94

Figure H-1. Hanford Soils Map.

Soils Map for 200W Powerhouse Ash Pit Modified from Hajek 1966

- ☐ Burbank Loamy Sand
- ☐ Quincy Sand

Contour Interval is 5 meters.

- Improved Road
- Unimproved Road
- Dirt or Gravel Road
- Railroad
- Buildings

WHC:pp 03/22/94 saic_5.aml

DOE/RL-94-26, Rev. 0
06/94
200-W Powerhouse Ash Pit

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

Hanford Geologic Map

Legend *

Qa	Qfg
Qls	Qfg3
Qd	QPlg
Mv(sp)	PlMc
Mv(wfs)	PlMcg
Mv(gN2)	Mv(sem)
Qda	Mv(se)
Qds	Mv(su)
Ql	Mv(wpr)
Qaf	Mv(wr)
Qfs4	Qfg(3-4u)
Qfs2	Qfs(3-4u)

Mc
Wtr
Fault
Contact

* See next page for full text description.

Scale Kilometers

Map Data Source: S.Reidel and K.Fecht

WHCLAD:2-3-94

Figure H-3. Hanford Geologic Map.

Legend

DOE/RL-94-26, Rev. 0

06/94

200-W Powerhouse Ash Pit

- 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

WHCLAD:3-22-94

Figure H-4. Legend for Hanford Geologic Map.

H9210018.1A

Figure H-5. Regional Stratigraphic Column.

Geology Map for 200W Powerhouse Ash Pit Map source: S. Reidel and K. Fecht

- Qda
- Qds
- Qfg(3-4u)

Contour Interval is 5 meters.

- Improved Road
- Unimproved Road
- Dirt or Gravel Road
- Railroad
- Buildings

W:\C:\pp 03\24\94 saic_5g.mxd

DOE/RL-94-26, Rev. 0
06/94
200-W Powerhouse Ash Pit

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

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

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

Hanford Water Table Map

Figure H-9. Hanford Water Table Map.

Source: Modified from WHC-EP-0394-7 (Kasza, et. al.)

WHC:JJA:4-4-93

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